Larimer County Multi-Jurisdictional

Hazard Mitigation Plan

May 2016

Participants

The following Larimer County Jurisdictions, Special Districts, and Organizations have collaboratively participated in this Hazard Mitigation Planning Process.

Larimer County

Town of Berthoud
Berthoud Fire Protection District
Crystal Lakes Fire Protection District
Colorado State University (CSU)
Town of Estes Park
Estes Park Medical Center
Estes Valley Fire Protecion District
Estes Valley Recreation and Park District
City of Fort Collins
Glacier View Fire Protection District
City of Johnstown
Livermore Fire Protection District
Town of Wellington

City of Loveland
Loveland Fire Rescue Authority
Northern Colorado Water Conservancy District
Pinewood Springs Fire Protection District
Platte River Power Authority
Poudre Canyon Fire Protection District
Poudre Fire Authority
Thompson Valley EMS
Town of Timnath
Town of Windsor
Upper Thompson Sanitation District
Wellington Fire Protection District
Windsor Severance Fire Rescue

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1 Certification of Annual Plan Review Meetings

The Larimer County Hazard Mitigation Small Planning Team (HM SPT) has agreed to review the contents of this Hazard Mitigation Plan annually. The following table hereby certifies this review.

YEAR	DATE	SIGNATURE
2016		
2017		
2018		
2019		
2020		

2 Executive Summary

On behalf of all municipalities, county agencies, and Title 32 Special Districts throughout Larimer County, the Larimer Office of Emergency Management is submitting this Larimer County 2016 Multi-Jurisdictional Hazard Mitigation Plan (HMP) for review by the State of Colorado, Division of Homeland Security and Emergency Management, and the Federal Emergency Management Agency. This Plan is the result of the continued effort from stakeholders, partners and districts to complete a document that updates the 2010 Northern Colorado Regional Hazard Mitigation Plan. The updated Plan addresses natural and human-caused hazards throughout Larimer County with the expressed purpose of saving lives and reducing future losses in anticipation of future events.

Larimer's HMP has been completed with a high degree of public participation. A broad range of public and private stakeholders, including agencies, local businesses, nonprofits, and other interested parties were invited to participate in the development of the 2016 Plan. Twenty-seven different jurisdictions participated in the planning process, including Larimer County, all municipalities within the county, Colorado State University, and multiple Fire, EMS, Sanitation, Park, and Water Districts. Stakeholder involvement was encouraged through staff and planning team invitations to agencies and individuals to actively participate in local planning meetings and to interact with the planning materials and surveys posted on the project website. Public input was sought throughout the planning process by advertising open public meetings through local newspapers, email distribution lists, community bulletins, social media networks, and jurisdictional websites.

The Hazard Identification and Risk Assessment (HIRA) builds on available historical data from past hazard occurrences, establishes detailed profiles for each hazard, and culminates in a hazard risk ranking based on conclusions about the frequency of occurrence, spatial extent, and potential impact of each hazard. FEMA's HAZUS loss estimation methodology was also used in evaluating known hazard risks by their relative long-term cost in expected damages. In essence, the information generated through the risk assessment serves a critical function as communities seek to determine the most appropriate mitigation actions to pursue and implement — enabling communities to prioritize and focus their efforts on those hazards of greatest concern and those structures or planning areas facing the greatest risk(s). The hazards analyzed in detail in this plan include:

- Biological Hazards / Contagion
- Civil Disturbance
- Earthquake
- Erosion / Deposition
- Fire – Wildland
- Flood – Flash and Riverine
- Hazmat – Fixed and Transport
- Landslide / Rockslide
- Spring / Summer Storms
- Tornado
- Utility Disruption
- Winter Storm (Blizzard, Heavy Snow)

The final, and arguably the most important step in updating the Mitigation Strategy was the creation of new Mitigation Actions. In preparing their Mitigation Actions, the County and each participating jurisdiction considered the 2016 planning goals and their individual hazard risks,

priorities, and capabilities to mitigate identified hazards. The mitigation actions represent the key outcome of the mitigation planning process.

While this plan is being reviewed by the State of Colorado and the Federal Emergency Management Agency, Larimer County jurisdictions will prepare for full adoption of the plan. This will be accomplished with the following actions:

- Larimer County jurisdictions will review and respond to comments provided by the State of Colorado and the Federal Emergency Management Agency.
- Larimer County will make appropriate changes and will recommend the adoption of the Plan.
- All participating jurisdictions, upon receipt of the HMP with incorporated comments and recommendations, will adopt the plan.
- The Board of Commissioners, upon receipt of the Plan with addressed comments and recommendations, and by Resolution, will adopt the plan for Larimer County.

The Larimer Office of Emergency Management, and all participating jurisdictions, hereby submit this Hazard Mitigation Plan for consideration by the State of Colorado and Federal Emergency Management Agency.

3 The Planning Process

This section of the Plan describes the mitigation planning process undertaken by Larimer County and participating municipalities in the preparation of this Multi-Hazard Mitigation Plan. This chapter consists of the following subsections:

- Background
- Hazard Mitigation Planning
- Local Methodology and Update Process
- The Planning Team
- Planning Meetings and Documentation
- Public and Stakeholder Participation
- Multi-Jurisdictional Planning and Participation
- Existing Planning Mechanisms

3.1 Background

Emergency Management is the practice of identifying, managing, and reducing risks. It is a discipline that involves preparing for a disaster before it occurs, supporting those affected by the disaster, as well as rebuilding after the natural or human-caused disaster event. Emergency Management is an ever-changing process by which all individuals, groups, and communities attempt to manage hazards in an effort to avoid or reduce the impact of disasters. One method for proactively managing hazard risks is Hazard Mitigation Planning. Hazard Mitigation Planning includes the identification of policies, capabilities, activities, and tools necessary to implement successful and sustainable risk reduction actions.

Why is Larimer County creating a hazard mitigation plan? Mitigation planning offers many benefits, including:

- Saving lives and property
- Saving money
- Ensuring quick and effective recovery following disasters
- Reducing future vulnerability through wise development and post-disaster recovery and reconstruction
- Enhancing coordination within and across participating jurisdictions,
- Expediting the receipt of pre-disaster and post-disaster grant funding, and
- Demonstrating a firm commitment to improving community health and safety

Mitigation planning has great potential to produce long-term and recurring benefits by breaking the repetitive cycle of disaster loss. A core assumption of hazard mitigation is that pre-disaster investments will significantly reduce the demand for post-disaster assistance by lessening the need for emergency response, repair, recovery, and reconstruction. Furthermore, mitigation practices enable local residents, businesses, and industries to re-establish themselves in the wake of a disaster, getting the community economy back on track sooner and with less interruption.

The benefits of mitigation planning go beyond reducing hazard vulnerability. Measures such as the acquisition or regulation of land in known hazard areas can help achieve multiple community goals, such as preserving open space, improving water quality, maintaining environmental health, and enhancing

recreational opportunities. Thus, it is vitally important that any local mitigation planning process be integrated with existing local planning efforts, and any proposed mitigation strategies must take into account broader community goals. Larimer County and its municipalities have embraced this approach, identifying multiple opportunities to link the Plan with pre-existing programs, policies, plans, and resilience-building initiatives.

During the last two decades, the emergency management cycle has evolved considerably. A renewed emphasis has been placed on planning for disasters before they occur as a complement to effective response and recovery. As a result, hazard mitigation has gained increasing prominence as a critical part of emergency management. By mitigating hazards through sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards, risks can be proactively combated in a systematic manner, rather than being reacted to once they occur.

This 2016 Plan is the result of continuing work by the citizens of the county to update a regional pre-disaster multi-hazard mitigation plan that will not only continue to guide the county towards greater disaster resistance, but will also respect the character and needs of the community.

PURPOSE

Larimer County adopted the 2010 Northern Colorado Regional Hazard Mitigation Plan (NCRHMP) in July of 2010. The 2010 Plan provided momentum for making homes, businesses, and communities as safe as possible against the impacts of floods, tornadoes, winter weather, and other natural hazards.

Larimer County has remained dedicated in continuing the work started in the 2010 Northern Colorado Regional Hazard Mitigation Plan and has elected to develop a county-scale hazard mitigation plan. The purposes of the 2016 Larimer County Multi-Jurisdictional Hazard Mitigation Plan are:

- To protect life and property by reducing the potential for future damages and economic losses that result from natural hazards;
- To qualify for additional grant funding, in both the pre-disaster and post-disaster environment;
- To provide quick recovery and redevelopment following future disasters;
- To integrate other existing and associated local planning documents;
- To demonstrate a firm local commitment to hazard mitigation principles; and
- To comply with state and federal legislative requirements tied to local hazard mitigation planning.

SCOPE

This Plan has been prepared to meet requirements set forth by the Federal Emergency Management Agency (FEMA) and the Colorado Division of Homeland Security and Emergency Management (DHSEM) in order for Larimer County to be eligible for funding and technical assistance from state and federal hazard mitigation programs. It will continue to be updated and maintained to continually address those natural hazards determined to be of high and moderate risk as defined by the updated results of the local hazard, risk, and vulnerability summary. Other natural hazards will continue to be evaluated during future updates of the Plan in order to determine if they warrant additional attention, including the development of specific mitigation measures intended to reduce their impact. This Plan will be updated and FEMA-approved within its five-year expiration date.

AUTHORITY

This Hazard Mitigation Plan has been adopted by Larimer County and its participating jurisdictions in accordance with the authority granted to counties by the State of Colorado.

This Plan was developed in accordance with current state and federal rules and regulations governing local hazard mitigation plans. The Plan shall be monitored and updated on a routine basis to maintain compliance with the following legislation and guidance:

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

The following Federal Emergency Management Agency (FEMA) guides and reference documents were used to prepare this document:

- FEMA. 386-1: Getting Started. September 2002.
- FEMA. 386-2: Understanding Your Risks: Identifying Hazards and Estimating Losses. August 2001.
- FEMA. 386-3: Developing the Mitigation Plan. April 2003.
- FEMA. 386-4: Bringing the Plan to Life. August 2003.
- FEMA. 386-5: Using Benefit-Cost Review in Mitigation Planning. May 2007.
- FEMA. 386-6: Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning. May 2005.
- FEMA. 386-7: Integrating Manmade Hazards into Mitigation Planning. September 2003.
- FEMA. 386-8: Multi-Municipality Mitigation Planning. August 2006.
- FEMA. Coordinators Manual, National Flood Insurance Program Community Rating System. 2007.
- FEMA. 386-9: Using the Hazard Mitigation Plan to Prepare Successful Mitigation Projects. August 2008.
- FEMA. Local Mitigation Plan Review Guide. October 1, 2011
- FEMA. Local Multi-Hazard Mitigation Planning Handbook. March, 2013.

3.2 Hazard Mitigation Planning

Local hazard mitigation planning is the process of organizing community resources, identifying and assessing hazard risks, and determining how to best minimize or manage those risks. This process results in a hazard mitigation plan that identifies specific mitigation actions, each designed to achieve both short term planning objectives and a long-term community vision. To ensure the functionality of each mitigation action, responsibility is assigned to a specific individual, department, or agency along with a schedule for its implementation. Plan maintenance procedures are established to help implement, evaluate, and enhance the Plan as necessary. Developing clear plan maintenance procedures ensures that Larimer County's Multi-Jurisdictional Hazard Mitigation Plan remains a current, dynamic, and effective planning document over time.

3.3 Local Methodology and Update Process

This Plan contains a narrative description of the process followed to prepare it. All incorporated towns and Title 32 Special Districts were notified of the requirement relating to the update process and the

formation of the Hazard Mitigation Planning Team, consisting of a Hazard Mitigation Large Planning Team (HM LPT) and Hazard Mitigation Small Planning Team (HM SPT). Subsequent meetings were held to ensure the accuracy of the information included in the plan, and that input provided by participating agencies, organizations, and the public was included as presented. Throughout the planning process, the Larimer County HM LPT & HM SMP reviewed and analyzed each section of the plan. In preparing the updated Plan, documentation indicates that the planning teams utilized a multi-jurisdictional planning process consistent with the one recommended by FEMA (Publication Series 386).

The first Northern Colorado Regional Hazard Mitigation Plan (NCRHMP) was adopted by Larimer County, the City of Fort Collins, and the City of Loveland in 2005. The updated NCRHMP was adopted by those jurisdictions, in addition to the cities of Berthoud, Estes Park, and Wellington in 2010.

The following documents were reviewed and incorporated into the 2016 planning process:

- 2010 Northern Colorado Regional Hazard Mitigation Plan
- 2013 Colorado Natural Hazards Mitigation Plan
- Larimer County and Local Jurisdiction Master Plans and Specific Area Plans
- Community Wildfire Protection Plans (CWPPs)
- 2015 Larimer County Open Lands Master Plan
- 2014 Larimer County Office on Aging, Community Assessment Survey for Older Adults (CASOA)
- 2007 Larimer County Parks Master Plan
- 2014 Colorado Action Plan for Disaster Recovery
- City of Fort Collins Drainage Basin Master Plans
- City of Fort Collins Floodplain Management Public Information Committee: A Program for Public Information

In addition to the plans listed above, data and goals from various plans and initiatives currently in place in participating jurisdictions were utilized during the revision of the Plan. A key focus of the 2016 Plan was the integration of hazard mitigation with ongoing land use and community development activities.

The 2010 Northern Colorado Regional Hazard Mitigation Plan addressed twenty (20) hazards including man-made hazards terrorism and hazardous material spills. The risk of each hazard was assessed by its historical frequency, potential magnitude, speed of onset, and geographic extent.

The planning process used for the 2016 Plan update was based on Section 322 of the Disaster Mitigation Act of 2000 and supporting guidance developed by FEMA. The planning process followed these steps:

- Conduct kickoff meeting with the Larimer County Small Planning Team
- Conduct a 5-year Plan review
- Conduct a Hazard Risk Factor exercise
- Establish a Large Planning Team made up of local stakeholders and subject matter experts
- Review and update the local hazard, risk, and vulnerability summary
- Determine capability for the county and each municipality
- Present risk assessment to local communities

- Conduct a Mitigation Action workshop with the large planning team
- Update the Mitigation Strategy
- Update the Plan maintenance procedures
- Complete a draft plan for review by the Small Planning Team
- Advertise opportunity/hold public meeting for comment on final draft
- Provide final draft to DHSEM for review
- Provide final draft to FEMA for review
- Present Plan to municipalities for adoption
- Present Plan to Larimer County for adoption

Each of the planning steps described above resulted in key products and outcomes that collectively make up the Multi-Jurisdiction Hazard Mitigation Plan. These work elements are discussed below in further detail.

The County and Community Profiles, located in Chapters 4 and Appendix B respectively, describe the general makeup of Larimer County and its municipalities, including prevalent geographic, demographic, and economic characteristics. This baseline information provides a snapshot of the countywide planning area and assists participating officials in recognizing the social, environmental, and economic factors that ultimately play a role in determining community vulnerability to natural hazards.

The Risk Assessment (RA), found in Chapter 5, focuses on three elements for each identified hazard: *Hazard Identification/Profile*, *Hazard Analysis* and a *Vulnerability/Loss Assessment*. Together, these elements identify, assess, and profile Larimer County's overall risk to natural and human-caused hazards. The RA builds on available historical data from previous occurrences, establishes hazard-by-hazard profiles, and culminates in a hazard risk priority or ranking based on conclusions about the frequency of occurrence, potential impact, spatial extent, warning time, and duration of each hazard. FEMA's Hazus loss estimation software was also used in evaluating known flood and earthquake risks according to their relative long-term cost, measured in expected damages. The RA is designed to assist communities in seeking the most appropriate mitigation actions to pursue and implement by focusing their efforts on those hazards of greatest concern and those structures or planning areas facing the greatest risk(s).

The Community Profiles and RA collectively serve as a basis for establishing goals for this Plan, each contributing to the development, adoption, and implementation of a meaningful Mitigation Strategy update that is based on accurate background information and community goals.

The Mitigation Strategy, located in Chapter 6, consists of broad goal statements as well as specific mitigation actions for each jurisdiction participating in the planning process. This updated strategy provides the foundation for detailed *Mitigation Action Guides* (MAGs) that link jurisdictionally-specific mitigation actions to locally assigned implementation mechanisms. Together, these sections are designed to make the 2016 Plan more strategic and functional through the identification of both long-term goals and near-term actions that will guide day-to-day decision-making and project implementation.

In addition to the identification and prioritization of possible mitigation projects, emphasis has been placed on the use of program and policy alternatives to help make Larimer County and participating municipalities less vulnerable to the damaging forces of nature while improving the economic, social, and

environmental health of the community. The concept of multi-objective planning is emphasized throughout this Plan, identifying ways to link hazard mitigation policies and programs with complimentary community goals that may be related to housing, economic development, community revitalization, recreational opportunities, transportation improvements, environmental quality, land development, and public health and safety. This Multi-Jurisdiction Hazard Mitigation Plan should be seen as a proactive document that represents a concerted effort to make Larimer County and its participating jurisdictions more livable, resilient communities.

The *Plan Implementation and Maintenance* procedures, found in Chapter 7, includes the measures Larimer County and participating jurisdictions will take to ensure the Plan's continuous long-term implementation. The procedures also include the manner in which the Plan will be regularly monitored, reported upon, evaluated, and updated to remain a current and meaningful planning document. Local capabilities are outlined in this section to highlight strengths and areas of improvement related to personnel, planning capacity, and ongoing risk-reduction efforts.

3.4 The Planning Team

A participatory, community-based planning approach contributed heavily to the development of this Plan. Larimer County formed both a Hazard Mitigation Small & Hazard Mitigation Large Planning Team (HM SPT & LPT). Additionally, local government officials, public stakeholders, and Larimer County residents were invited and included in local meetings and planning workshops to discuss and complete tasks associated with preparing the Plan. The HM SPT was created prior to the initial kick-off meeting and consisted of members of those jurisdictions that participated in the 2010 NCRHMP. The HM LPT was identified during the HM SPT kick-off meeting and included all jurisdictions and special districts within Larimer County, well as non-governmental organizations (NGO's) and public stakeholders. Members of the HM LPT participated in the risk assessment, mitigation strategy development, plan review, public outreach, and plan maintenance strategy.

The participants listed in the following Table represent the members of the HM SPT & LPT who were responsible for participating in the updating of this Plan.

Table 1. 2016 Larimer County Hazard Mitigation Small Planning Team (HM SPT)

Name	Jurisdiction	Small Planning Team	Large Planning Team
Lori Hodges, Director of Emergency Management	Larimer County	X	X
Mike Gavin, Emergency Manager	City of Fort Collins, Poudre Fire Authority	X	X
Eric Rose, Emergency Manager	Town of Estes Park	X	X
Gary Green, Fire Chief	Wellington Fire Protection District	X	X
Pat Mialy, Emergency Manager	City of Loveland, Loveland Fire Rescue Authority	X	X
Marsha Hilmes-Robinson, Floodplain Administrator	City of Fort Collins	X	X

All members of the HM SPT were also included as members of the HM LPT. After the initial HM SPT kick-off meeting the HM LPT was assembled for meetings and plan development throughout all phases of the planning process. The HM SPT reviewed the 2010 Plan, identified new information that needed to be included in the 2016 Plan update and incorporated it as required by state and federal guidelines. The HM SPT was also tasked with collecting all accurate data from plan participants and provided outreach to the HM LPT, local agencies and special interest groups, and public stakeholders to ensure that everyone's information was included in this Plan.

Table 2. 2016 Larimer County Hazard Mitigation Large Planning Team (HM LPT)

Name	Jurisdiction	Small Planning Team	Large Planning Team
Lori Hodges	Larimer County	X	X
Mike Gavin	City of Fort Collins	X	X
Eric Rose	Town of Estes Park	X	X
Gary Green	Wellington Fire Protection District	X	X
Pat Mialy	City of Loveland	X	X
Marsha Hilmes-Robinson	City of Fort Collins	X	X
Jan Dowker	Town of Berthoud		X
Steve Charles	Berthoud Fire Protection District		X
Shayna Jones	Big Thompson River Watershed Coalition		X
Marian Kelly	Crystal Lakes Fire Protection District		X
Ken Quintana	Colorado State University		X
Mike Bielmaier	Estes Park Medical Center		X
Jim Duell	Estes Park Sanitation District		X
Jon Landkamer	Estes Valley Fire Protection District		X
Matt Hines	Estes Valley Recreation and Park District		X
Robert Issacson	Glacier View Fire Protection District		X
Tom Hellen	Town of Johnstown		X
Donn Maynard	Livermore Fire Protection District		X
Bill Lundquist	Loveland Fire Rescue Authority		X
Jim Struble	Northern CO Water Conservation District		X
Dick Wilcox	Pinewood Springs Fire Protection District		X
Jim Boizot	Platte River Power Authority		X
Hugh Collins	Poudre Canyon Fire Protection District		X
Jim Montague	Poudre Fire Authority		X
Braden Applegate	Poudre Valley EMS		X

Name	Jurisdiction	Small Planning Team	Large Planning Team
Mike Larson	Thompson Valley EMS		X
April Getchius	Town of Timnath		X
Matt Allen	Upper Thompson Sanitation District		X
Larry Lorentzen	Town of Wellington		X
Gary Green	Wellington Fire Protection District		X
John Vazquez	Town of Windsor		X
Mike Blackwill	Windsor Severance Fire Rescue		X

3.5 Planning Meetings and Documentation

The preparation of the Plan update required a series of meetings and workshops intended to facilitate discussion and initiate data collection efforts with local community officials. More importantly, the meetings and workshops prompted continuous input and feedback from local officials, public stakeholders, staff, and subject matter experts throughout the update process.

Below is a summary of the key meetings and workshops conducted throughout the development of the 2016 Larimer County Multi-Jurisdiction Hazard Mitigation Plan. Sign-in sheets and meeting minutes for both the HM SPT and HM LPT meetings and conference calls are provided in Appendix A.

HM SPT KICK-OFF MEETING

The Small Team kickoff meeting for the Larimer County 2016 Multi-Jurisdictional Hazard Mitigation Plan was held via conference call on June 4th, 2015. All official representatives of the HM SPT attended the call. Largely a logistics-focused meeting, the SPT come together to organize the following action items:

Large Team Invites: The first meeting topic was to identify who to invite to participate on the project's large planning team. The project's small planning team agreed that they wanted this hazard mitigation planning process to include as many potential stakeholders as possible, to ensure the resulting mitigation strategy includes input from a diverse cross section of the county, its jurisdictions, and other organizations. The small team agreed to send each of their recommended contacts to Michael Baker International (Baker), its selected contractor for this project, to compile.

Large Team Proposed Meetings: The next topic involved the large planning team's proposed meetings that would be held during the planning process. The small team decided on three separate meetings to be held throughout the planning process. The first would be a project overview and informational meeting. The second would focus on the results of the hazard risk assessment and would begin to define the mitigation strategy. The third would focus on specific mitigation actions and also plan maintenance and incorporation into other planning processes.

Jurisdictional Participation Requirements: The small team then discussed the need to define (and communicate) requirements for plan participants and adoptees. It was agreed that those wanting to formally adopt the countywide hazard mitigation plan would agree to the following: *submit a participation letter; help to identify hazards unique to that jurisdiction; identify how vulnerabilities and risks may differ from the county as a whole; formulate mitigation actions specific that that jurisdiction; offer community*

stakeholders an opportunity to be involved in the planning process; document a process for plan integration and maintenance; and formally adopt the plan by the jurisdiction's governing body.

Hazards to Profile: The next topic involved identifying the hazards to be profiled in the plan. The team agreed that all hazards previously identified in the current plan would be discussed in the plan, but that only those hazards which present the most risk would receive a full hazard profile and risk assessment. The team agreed to each offer up their own 'top 10' list of those hazards and then work together via email and phone to come to consensus. It was also stressed that team members should remember to focus on those hazards that can truly be mitigated through actions or projects.

Public Project Communications and Outreach: The team then discussed preferred public outreach and communication preferences for the planning process. It was agreed that a centralized public project website would be created where all project-related information will be posted. The county agreed to utilize OEM's existing Facebook and Twitter social media accounts to keep followers informed and engaged throughout the planning process. This would also help to drive the public to the project website. The team agreed to utilize online surveys as a method to collect information and comments from both participating jurisdictions as well as the general public. The team also agreed to utilize existing email contact lists to share plan updates and information as necessary. Lastly the team agreed to discuss later on in the project the potential for public meetings or events where the hazard mitigation plan could be presented and disseminated.

Project Surveys: As mentioned above, online project surveys were agreed upon as a key tool to engage the public and also to collect necessary information from participating jurisdictions throughout the planning process. These surveys would be disseminated to the public on a regular schedule and will be posted to the website and shared via social media. Other large planning team specific surveys would be sent out to the team as needed to collect required information for inclusion into the plan.

At the conclusion of the meeting, the small team agreed that it would hold both project meetings and calls as needed throughout the planning process. The team would also utilize group emails as necessary. Finally, the following project schedule (and date for the 1st large planning team meeting) was established.

- 6/29/2015: Large Team Kick-Off Meeting
- August 2015: Risk Assessment / Mitigation Strategy Meeting
- September 2015: Mitigation Actions / Plan Maintenance Meetings
- Late Summer / Fall 2015: Public Outreach
- November/December 2015: Final Draft Posted for Comment
- November 2015: Submit to State/FEMA
- TBD: FEMA Approval Pending Adoption
- TBD: Presentation to County Commissioners

The following post-meeting action items were established by the members for the Small Team:

- Small team to provide their own large planning team invite lists to Baker.
- Small team to provide 'top 10' hazard list to Baker for further facilitation of that discussion.
- Small team to fill out survey to set the date for the other two large planning team meetings.

Throughout the duration of the planning process, the HM SPT held a total of four logistics and project management meetings/conference calls. The meeting minutes for these calls are documented in Appendix A.

HM LPT KICKOFF MEETING #1

The Large Team (HM LPT) kickoff meeting for the Larimer County 2016 Multi-Jurisdictional Hazard Mitigation Plan was held on June 29th at the Larimer County Courthouse. After a welcome and brief introductions, members of the HM SPT reviewed the importance of hazard mitigation and went over the basic processes involved with hazard mitigation planning. During this time, the members of the Large Team were informed of the participation requirements for any jurisdictions planning to formally adopt the 2016 Plan. Additionally, the project schedule was explained to the members of the Large Team, including the process of formal plan adoption.

During the kickoff meeting, members of the HM LPT participated in a review of the previously adopted Hazard Mitigation Plan. This was referred to as the *5-Year Plan Review*. The project team gave an overview of the Northern Colorado Regional Hazard Mitigation Plan and introduced the HM LPT to the first planning team survey (located on the project website). The intent of the survey was to solicit comments about the existing plan: *what are the strengths and weaknesses*; *has the Plan been implemented in your community and what were implementation challenges; have hazard risks changed, etc*.

During this discussion, the project team asked the audience to raise their hands if they were involved in the development of the Northern Colorado Regional Hazard Mitigation Plan. Less than 10 people raised their hands (about 15% of the meeting attendees). This indicated that the 2016 Multi-Jurisdictional Hazard Mitigation Planning Process was new to the majority of planning team members and that additional effort would be well-spent educating them about how hazard mitigation could improve quality of life in their communities. The Project Team made sure to devote meeting time to talk to the Large Team about mitigation actions including a conversation about the four main categories of actions, which include: Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, and Education and Awareness Programs.

The Large Planning Team also reviewed and provided comments on the list of hazards that the Small Team agreed to profile fully. The 'Top 10' list of hazards ended up including the following 12:

- Biological Hazards / Contagion

- Civil Disturbance
- Earthquake
- Erosion / Deposition
- Fire – Wildland
- Flood – Flash and Riverine
- Hazmat – Fixed and Transport
- Landslide / Rockslide
- Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)
- Tornado
- Utility Disruption
- Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)

After the list of hazards was established, the Planning Team reviewed the goals and objectives outlined in the 2010 Hazard Mitigation Plan. The goals and objectives were updated at HM LPT Meeting #2 based on comments received after the Kickoff Meeting.

The last 20 minutes of the Kickoff Meeting was spent conducting a group Planning Exercise. Attendees were divided into small groups (3-6 people) and each group was provided with a specific hazard scenario. Four different scenarios were proposed with hazard situations specific to flooding, wildfire, tornado, or winter storm. Each group was then asked to spend some time brainstorming potential mitigation actions to help reduce or eliminate the hazard, preferably one from each of the four mitigation action categories. Throughout the meeting, the project team circulated copies of FEMA's Mitigation Ideas booklet, which contains ideas for specific mitigation ideas focused on individual hazards. When the exercise was complete, the groups were asked to present their mitigation ideas and explain their reasoning. This lead to beneficial dialog and was a great learning opportunity for the members of the Planning Team.

At the end of the meeting, participants were given three action items to complete:

1. Large team members were asked to begin compiling and sending existing data and plans that may be applicable to this hazard mitigation plan.
2. Large team members were asked to begin sharing news of this project with their communities.
3. Large team members were asked to begin thinking about mitigation actions that they want to document in this plan.

HM LPT MEETING #2

The second HM LPT meeting was held on August 24th, 2015, at the Ranch Complex in Loveland. Official representatives from all jurisdictions and districts participating in the Hazard Mitigation Plan and representatives from other organizations and stakeholder groups were invited to participate. The intent of the meeting was to review the results of the first planning team surveys, to increase participant familiarity with the Risk Assessment results and how to use the interactive webmap, to define the goals and objectives of the County Mitigation Strategy, and to collect status updates on any mitigation actions included in the 2010 plan from previously participating communities. The following agenda items were discussed at the second planning meeting:

- Welcome and Introductions
- Project Overview Update: Schedule, Status, HM SPT Role

- Jurisdictional Participation Requirements / Expectations
- Review of 5-Year Plan Review & Risk Factor survey results
- Overview of Risk Assessment Results
- 2016 Mitigation Strategy Goals and Objectives
- Review status updates for 2010 Mitigation Actions
- Review of 2016 Mitigation Action Guides
- Jurisdictional/Special District Break-Out Session
- Q&A Session

The second planning meeting provided the project team with an opportunity to reiterate the planning participation requirements and to present the results of the Risk Assessment to members of the HM LPT. Participants were encouraged to leverage the interactive risk assessment maps on the project website as they worked to identify priorities and mitigation actions for the 2016 Mitigation Strategy.

During this meeting, the project team presented some of the high-level results of the 5-Year Plan Review and Risk Factor Survey. This survey was conducted through the large planning team and will be used for the jurisdictional and district appendixes to the plan document. The planning team also presented preliminary results from the first public survey, which will be shared with the large planning team for their use in compiling mitigation actions.

The updated mitigation strategy goals and objectives, revised and reviewed by the HM SPT were then presented to the large team. The project team explained how the goals and objectives define the high-level mitigation strategy for the plan update and how the proposed mitigation actions will align with defined goals. Members of the HM LPT were given an opportunity to comment on the goals and add content as needed. At this time, the Project Team introduced the jurisdiction-specific Mitigation Action Guides (MAGs) that were developed as a planning tool for the multi-jurisdictional project. Each jurisdiction was assigned a number of MAGs, which were designed to help keep track of how mitigation projects are progressing over time.

Near the end of the meeting HM LPT participants were broken out into jurisdictional groups for an opportunity to discuss strategies, brainstorm, ask questions, and plot out next steps forward. The jurisdictional groups then reported back to the larger group on what they discussed. Some jurisdictions agreed that they would be holding internal planning meetings in preparation for the 3rd and final large planning team meeting.

At the end of the meeting, participants were given three action items to complete:

1. Participating jurisdictions to submit Participation Letter (if not already done).
2. Adopting jurisdictions to complete pending surveys.
3. Adopting jurisdictions (and other interested Large Team organizations) to begin brainstorming / compiling mitigation actions/projects for review during the final large planning team meeting.

HM LPT MEETING #3

The third and final large planning team meeting was held on October 20th at the Larimer County Sheriff's Office. Official representatives from all jurisdictions and districts participating in the Hazard Mitigation Plan and representatives from other organizations and stakeholder groups were invited to participate.

Organized as a working session, the intent of the meeting was to discuss and finalize plan maintenance and implementation strategies for both the County and its participating jurisdictions, to finalize local Mitigation Action Guides (MAGs), and to prioritize mitigation actions at the community level. The following agenda items were discussed at the second planning meeting:

- Welcome and Introductions
- Project Overview Update: Schedule, Status
- Jurisdictional Participation Requirements / Expectations
- Mitigation Action Guide (MAG) Working Session
- Mitigation Action Prioritization Exercise
- Q&A

The third round of planning meetings gave participating communities and districts the opportunity to work directly with the project team and local subject matter experts to refine their identified mitigation projects. The workshop setting proved incredibly helpful for vetting ideas, sharing resources, and establishing best practices for project implementation and maintenance. Members of the HM LPT revisited the interactive risk assessment maps on the project website as they worked to refine their MAGs and identify additional mitigation actions for the 2016 Mitigation Strategy.

During the third planning meeting members of the HM LPT also worked with staff from Larimer County OEM and Michael Baker International to prioritize each of their identified mitigation actions. Using the STAPLEE method recommended by FEMA in the State and Local Mitigation Planning How-To Guide, each community weighed the pros and cons of their different mitigation actions based on social, technical, administrative, political, legal, economic, and environmental considerations. The objective was for each jurisdiction to systematically prioritize their mitigation projects in a way that led to an overall Mitigation Strategy that was realistic, cost effective, and attainable.

At the end of the meeting, participants were given two action items to complete:

1. Participating jurisdictions to complete any remaining project surveys
2. Adopting jurisdictions to submit digital versions of final MAG's to small team for review

3.6 Public and Stakeholder Participation

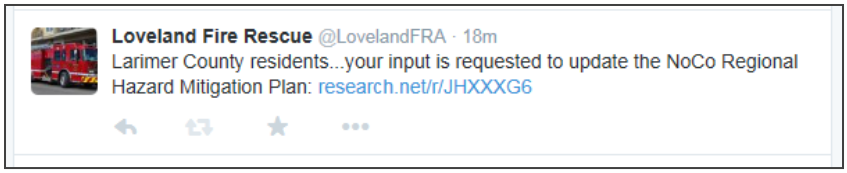
An important component of the success of Larimer County's mitigation planning process involved ongoing public, stakeholder, and jurisdiction participation. Individual citizen involvement provided both the HM SPT and HM LPT with a greater understanding of local concerns and ensured a higher degree of mitigation success by developing community "buy-in" from those directly affected by the planning decisions of public officials.

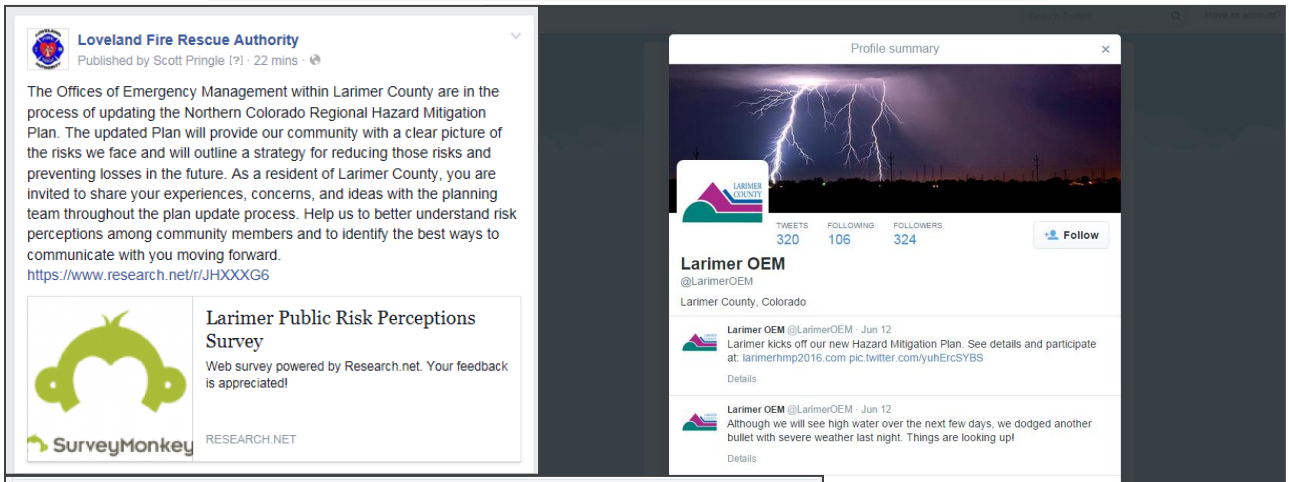
A broad range of public and private stakeholders, including agencies, local businesses, nonprofits, and other interested parties were invited to participate in the development of the 2016 Plan. Stakeholder involvement was encouraged through staff and planning team invitations to agencies and individuals to actively participate in local planning meetings and to interact with the planning materials and surveys posted on the project website.

Public input was sought throughout the planning process by advertising open public meetings through the following outlets:

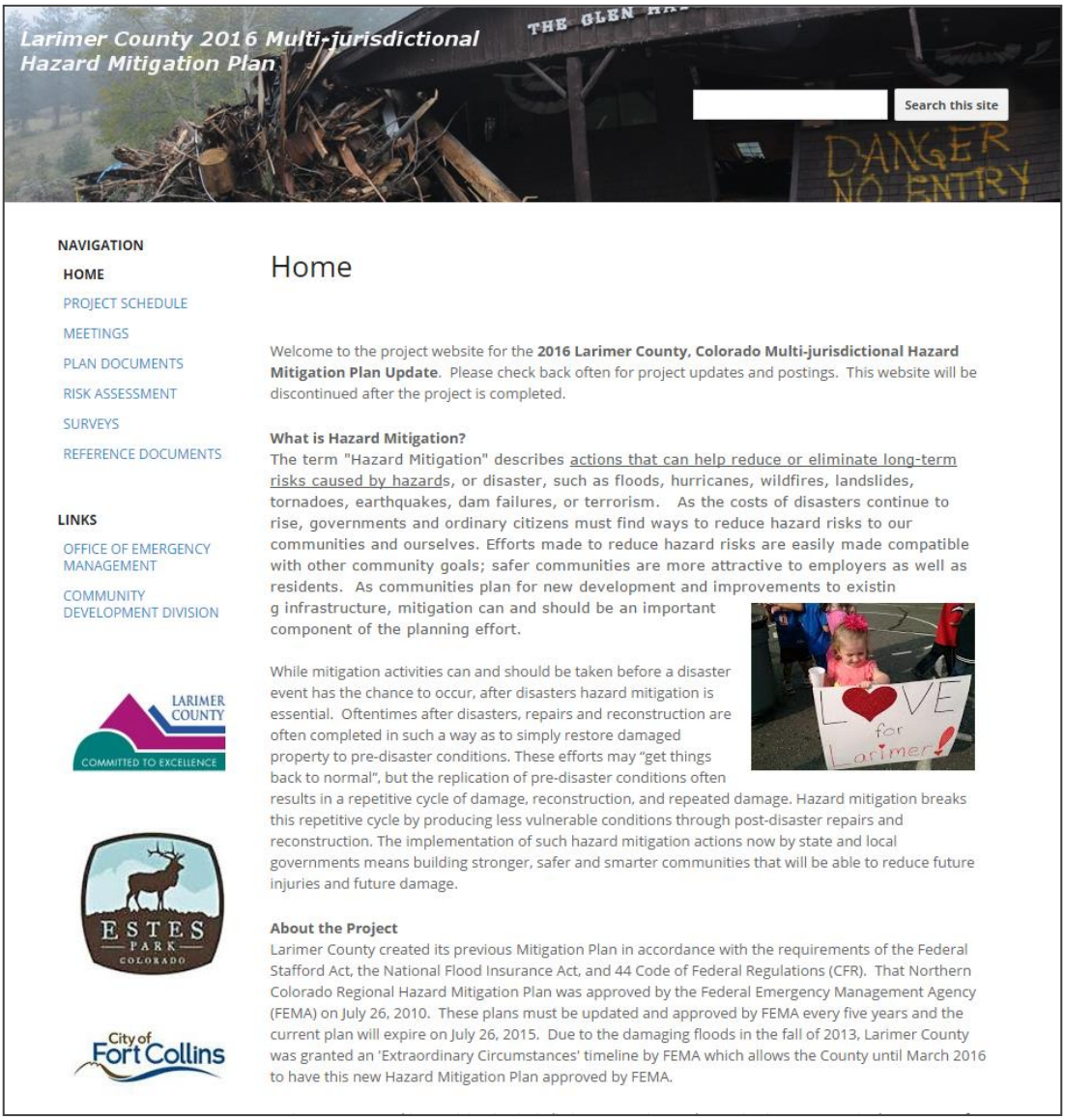
- Local newspapers and bulletins in communities across the county
- Social media networks (including agency and municipal Twitter and Facebook accounts)
- Online agency websites (including the Larimer County website)

Below are examples of a few of the planning announcements and public meeting invitations created and distributed by members of the HM LPT.



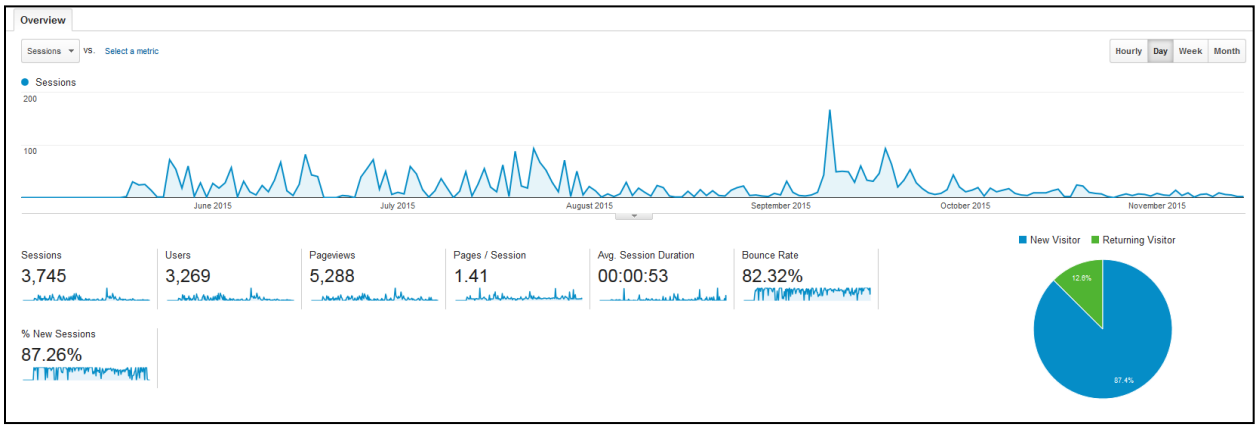


Multiple media platforms were used in order to reach and engage the maximum number of local and regional stakeholders. Additionally, a website was created to provide information to public stakeholders and to obtain feedback on the 2016 Larimer County Multi-Jurisdictional Hazard Mitigation Plan Update.[1] In addition to providing hazard mitigation resources and announcements about community events, the draft plan was posted on the website for public review. Community members were encouraged to share their input, photos and experiences for use during the hazard mitigation planning process. The screen shot below provides a visual of the project website.

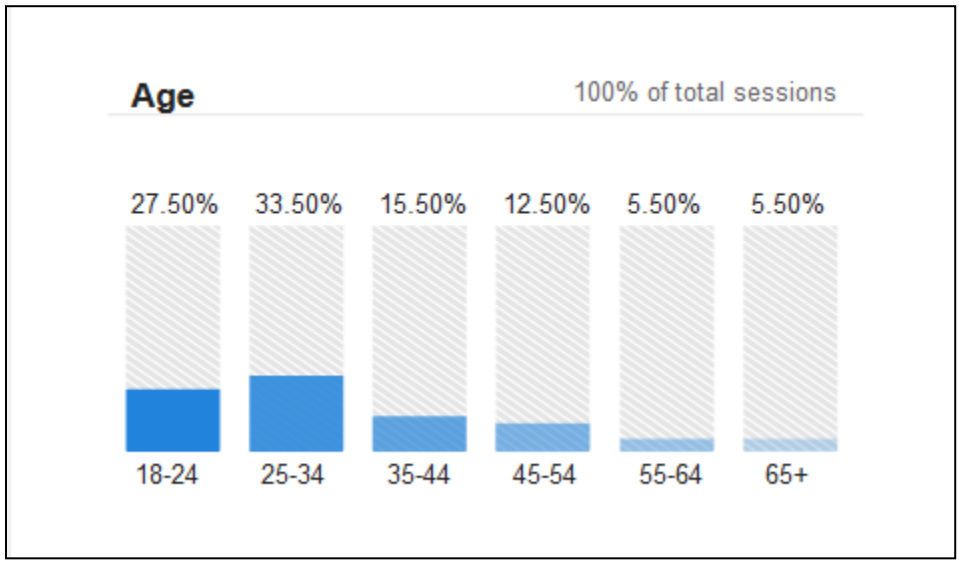


[1] The project website was discontinued upon completion of the Plan update.

Based on website traffic diagnostics, the project website reached over 3,000 users throughout the course of the hazard mitigation planning process. The image below summarizes website use between June 2015 and November 2015.



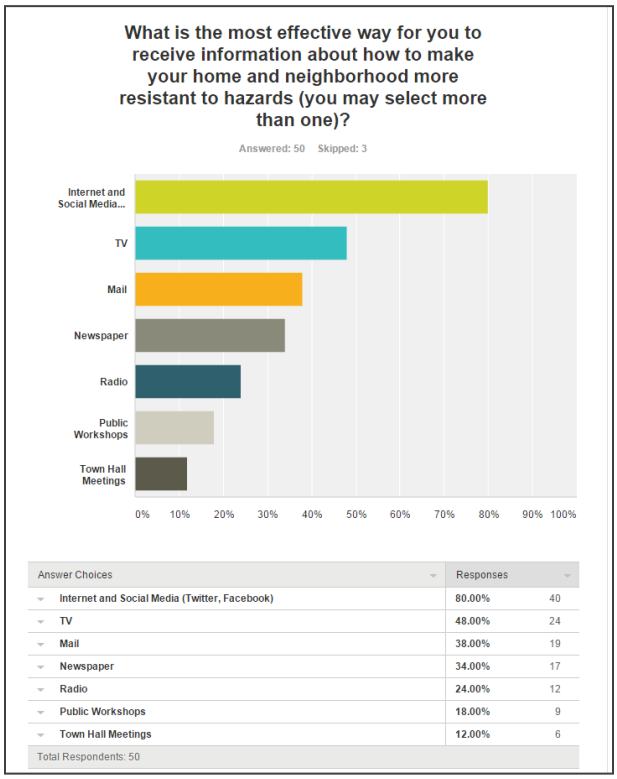
The majority of visitors to the project website were between the ages for 18 and 34. In the future, web-based outreach efforts in the county should keep in mind that use of these tools skews to a relatively younger age group.



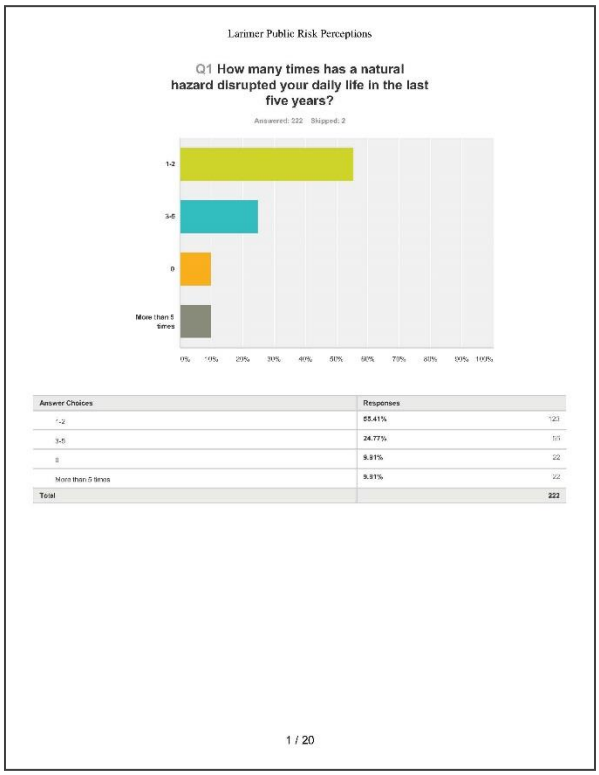
The website included two public surveys designed to gather information about public hazard risk perceptions and visions for community resilience:

1. Survey #1 – *Public Hazard Risk Perceptions*: The purpose of this survey was to engage citizens in order to better understand risk perceptions among members of the Larimer County community and to identify the best ways to communicate with public stakeholders moving forward.
2. Survey #2 – *Visions for a Resilient Larimer County*: The purpose of this survey was to gather preliminary information from community members and stakeholders about the current capacities and resiliency conditions of their community as well as a long-range vision for a resilient Larimer County.

The surveys were utilized throughout the planning process to engage with and educate local residents. Information and comments from the surveys were shared with members of the planning team and were used to guide the planning process. Links to the surveys were posted on the website and updates were communicated through multiple county and local jurisdiction media outlets. Participating jurisdictions posted links to the public surveys on their local websites and social media links to gather input from interested stakeholders. At the time of the third and final HM LPT meeting a total of 402 Larimer County residents had submitted responses for the "Visions for a Resilient Larimer County" survey. 324 residents submitted responses for the "Public Risk Perceptions" survey. Both the HM SPT and HM LPT were thrilled about the response rate for both surveys, which greatly exceeded previous survey participation for similar planning efforts. The results of the Visions for a Resilient Larimer County survey will be used for ongoing planning projects related to hazard risk reduction and community planning.



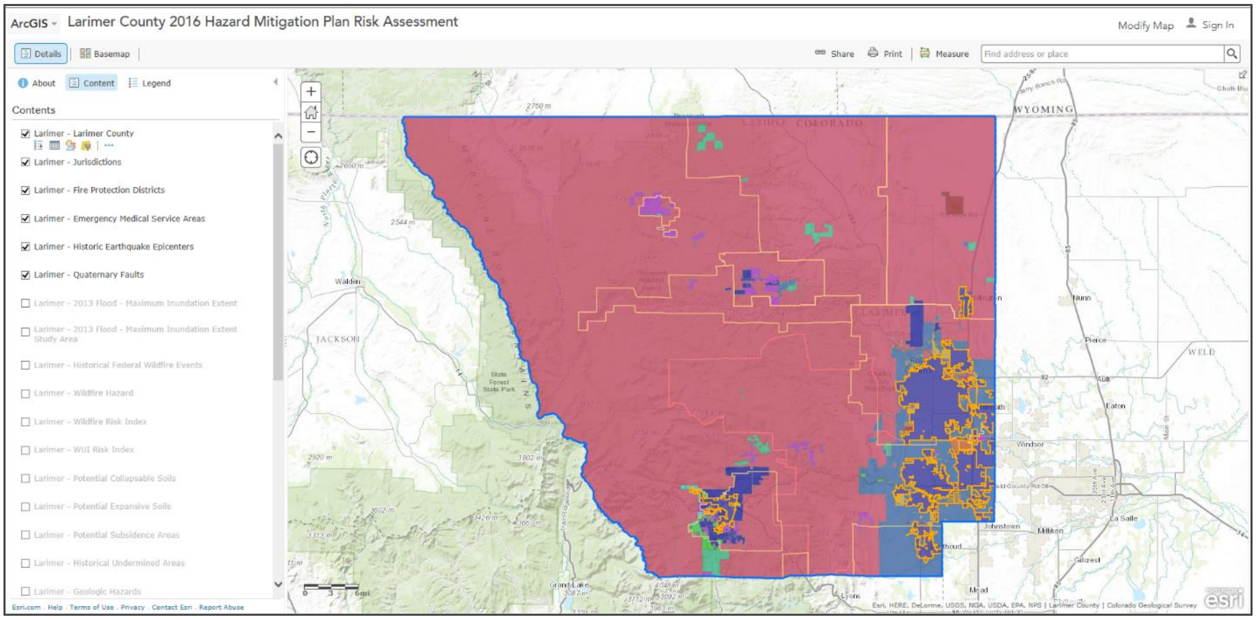
Answer Choices	Responses	
Internet and Social Media (Twitter, Facebook)	80.00%	40
TV	48.00%	24
Mail	38.00%	19
Newspaper	34.00%	17
Radio	24.00%	12
Public Workshops	18.00%	9
Town Hall Meetings	12.00%	6
Total Respondents: 50		



Answer Choices	Responses	
1-2	55.41%	123
3-5	24.77%	55
0	9.91%	22
More than 5 times	9.91%	22
Total		222

In addition to the project website, the Michael Baker International Team used the data from the results of the risk assessment to create a series of interactive online maps. Available to the public on the internet, the maps served as a tool for analyzing hazards and patterns of risk at various scales within the county. In addition to helping members of the HM LPT visualize and assess their risks to various hazards, the online maps were also designed as an outreach tool and were used to communicate risk to the public and to ground-truth quantitative risk assessment results at local public meetings throughout the planning process.

The following image provides a screen shot of the online mapping tool:



Finally, participating members of the Larimer County HM SPT were encouraged to initiate and sustain their own public outreach program throughout the planning process. These local representatives serve as a vital link between the county and its businesses and residents. The conversations that were held outside of the formal hazard mitigation planning meetings helped to ensure a successful, open, and collaborative planning process.

Throughout the planning process, members of the HM SPT and HM LPT leveraged any opportunities that they had to inform the public about the hazard mitigation planning project. Not only did their efforts help to inform citizens about the planning process, it also contributed to the ultimate goal of creating a more disaster resilient Larimer County. A few participating communities documented their public interactions in order to keep track of strategies that worked and to facilitate improved outreach efforts during the next plan update. This information is included in Appendix C.

Two public meetings were held in Fort Collins during the planning process to educate residents about multi-hazard risks, to gather feedback and local perspectives about risk and vulnerability to hazards, and to inform community members about the hazard mitigation planning process (including the benefits of hazard mitigation and a review of proposed mitigation actions). The following figures show flyers for the two events, the first of which was held in July 2015 and the second held in December 2015.

A Resilient Fort Collins: Mitigating Hazards in our Backyard

Larimer County and its jurisdictions have recently kicked-off a planning process to update the local hazard mitigation plan and would like input from the community.

Attend a Meeting

To learn more, the Larimer County Office of Emergency Management and City of Fort Collins invite you to a casual evening of discussions about local natural hazards and what impacts can be expected. Your input regarding what you think can be done to mitigate these impacts is important.

Questions to think about:

- What natural hazards impact you?
- What can we do to reduce these impacts?
- How could natural hazards impact those you care about and services you rely on daily?

Other details include:

- open house setting
- casual discussions facilitated by the City of Fort Collins
- high-quality, up-to-date natural hazard maps
- opportunities to learn and share ideas

Information regarding additional meeting locations and dates, as well as background on the project and hazard mitigation, are available at *www.larimerhmp2016.com*.

Take a Survey

Public participation is a vital component of this planning process. In addition to attending upcoming meetings, we welcome you to take a brief, anonymous survey related to this project at *www.larimerhmp2016.com/home/surveys*.

Thank you for your time and participation.

OPEN HOUSE

Monday, July 27

Fort Collins Police Services Building
2221 S. Timberline Rd.

6:30–8:30 p.m.

Short presentations will be given at 6:45 p.m. and 7:45 p.m.

Contact:

Lori Hodges, Larimer County
Director of Emergency Management
303-656-3214

Mike Gavin, City of Fort Collins
Emergency Manager
970-416-2878

www.larimerhmp2016.com

LARIMER COUNTY
COMMITTED TO EXCELLENCE

City of Fort Collins

6/15

A Resilient Larimer County: Mitigating Hazards in our Backyard

Larimer County and its jurisdictions are finalizing a planning process to update the local hazard mitigation plan and would like input from the community.

Attend a Meeting

To learn more, the Larimer County Office of Emergency Management and its major cities and towns invite you to a casual evening of discussions about local natural hazards and what impacts can be expected. Your input regarding what you think can be done to mitigate these impacts is important.

Questions to think about:

- What natural hazards impact you?
- What can we do to reduce these impacts?
- How could natural hazards impact those you care about and services you rely on daily?

Other details include:

- open house setting
- casual discussions facilitated by city representatives
- high-quality, up-to-date natural hazard maps
- opportunities to learn and share ideas

Information regarding additional meeting locations and dates, as well as background on the project and hazard mitigation, are available at *www.larimerhmp2016.com*.

OPEN HOUSE

Wednesday, Dec. 2, 6-8 p.m.
Larimer County Building
200 West Oak St.
Boyd Lake Conference Room, 1st Floor
Short presentations will be given
at 6:15 p.m. and 7:15 p.m.

Contact:
Lori Hodges, Larimer County
Director of Emergency Management
303-656-3214

Mike Gavin, City of Fort Collins
Emergency Manager
970-416-2878

Pat Mialy, Loveland Fire Rescue Authority
Emergency Manager
970-962-2534

www.larimerhmp2016.com

LARIMER COUNTY COMMITTED TO EXCELLENCE

City of Fort Collins

City of Loveland

11/15

BOARD OF COUNTY COMMISSIONERS

200 W. Oak Street
Post Office Box 1190
Fort Collins, Colorado 80522-1190
(970) 498-7010
Fax (970) 498-7006
E-mail: bocc@larimer.org

NEWS RELEASE

CONTACT: Lori R. Hodges, Director of Emergency Management, (970) 498-7147, hodgeslr@co.larimer.co.us
Mike Gavin, City of Fort Collins Emergency Management, 970-416-2878, migavin@poudre-fire.org
FROM: Deni La Rue, Community Information Manager, 970.498.7150

DATE: December 11, 2015

SUBJECT: **Larimer Hazard Mitigation Plan – Public Comment**

FOR IMMEDIATE RELEASE:

Larimer Jurisdictions are looking for public input on the new Hazard Mitigation Plan

FORT COLLINS, Colo. – Larimer cities, towns, and special districts have been working collaboratively with Larimer County over the last year to update our Multi-Jurisdictional Hazard Mitigation Plan. Twenty-seven different jurisdictions throughout Larimer County participated in this planning process, with additional input from non-profit and non-governmental organizations. The plan outlines the hazards that we face here in Larimer County, as well as the various ways in which each jurisdiction can mitigate those hazards in the future. Additionally, the participating jurisdictions added a social vulnerability analysis to the plan in recognition of the various social and economic factors that play a role in how each community may respond to emergencies and disasters.

Please take the time to review the plan and provide comments to ensure that the plan information accurately portrays the needs of the larger community. The public comment period will be open until January 10, 2016. Following the public comment period, the plan will be sent to the State Office of Emergency Management and to FEMA for approval, which will assist Larimer County in getting necessary support for hazard mitigation in the future.

For information regarding the plan or the process, please visit the project website at www.larimerhmp2016.com. Comments are welcome online at the project website or, if internet is not available, by contacting Lori Hodges, Director of Emergency Management at (970) 498-7147.

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3.7 Multi-Jurisdictional Planning and Participation

The 2016 Larimer County Multi-Jurisdictional Hazard Mitigation Plan is a multi-jurisdictional plan. To satisfy multi-jurisdictional participation requirements, each of the local jurisdictions listed in the participation table below committed to the planning process. Each jurisdiction wishing to join the planning partnership acknowledged their understanding of the following expectations:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Meeting attendance was tracked at all planning activities and attendance records are included in Appendix A of this plan. All participating communities attended and actively participated in all meetings. Participating jurisdictions acknowledged that their failure to meet these criteria may result in being dropped from the partnership by the County, and thus losing eligibility under the scope of this plan.

Table 3. 2010 and 2016 Multi-Jurisdictional Hazard Mitigation Plan Participation

JURISDICTION	PARTICIPATED IN 2010 NORTHERN CO REGIONAL HMP	PARTICIPATED IN 2016 LARIMER COUNTY HMP	SIGNED PARTICIPATION LETTER	2016 ADOPTION DATE
Larimer County	•	•	N/A	May 31, 2016
Town of Berthoud	•	•	•	August 1, 2016
Berthoud Fire Protection District	•	•	•	September 20, 2016
Crystal Lakes Fire Protection District	•	•	•	June 16, 2016
Colorado State University	•	•	•	N/A
Town of Estes Park	•	•	•	June 28, 2016
Estes Park Medical Center	•	•	•	October 25, 2016
Estes Valley Fire Protection District	•	•	•	June 22, 2016

JURISDICTION	PARTICIPATED IN 2010 NORTHERN CO REGIONAL HMP	PARTICIPATED IN 2016 LARIMER COUNTY HMP	SIGNED PARTICIPATION LETTER	2016 ADOPTION DATE
Estes Valley Recreation and Park District	•	•	•	July 19, 2016
City of Fort Collins	•	•	•	June 21, 2016
Glacier View Fire Protection District	•	•	•	September 19, 2016
Town of Johnstown	•	•	•	June 28, 2016
Livermore Fire Protection District	•	•	•	October 20, 2016
City of Loveland	•	•	•	July 5, 2016
Loveland Fire Rescue Authority	•	•	•	June 29, 2016
Northern CO Water Conservation District	•	•	•	October 13, 2016
Pinewood Springs Fire Protection District	•	•	•	October 12, 2016
Platte River Power Authority	•	•	•	July 28, 2016
Poudre Canyon Fire Protection District	•	•	•	July 13, 2016
Poudre Fire Authority	•	•	•	May 24, 2016
Thompson Valley EMS	•	•	•	September 29, 2016
Town of Timnath	•	•	•	October 7, 2016
Upper Thompson Sanitation District	•	•	•	June 21, 2016
Town of Wellington	•	•	•	August 1, 2016
Wellington Fire Protection District	•	•	•	June 1, 2016
Town of Windsor	•	•	•	May 27, 2016
Windsor Severance Fire Rescue	•	•	•	July 14, 2016

3.8 Existing Planning Mechanisms

There are numerous existing regulatory and planning mechanisms in place at the state and county levels of government which support hazard mitigation planning efforts. These tools include the State of Colorado Hazard Mitigation Plan, county subdivision regulations and road and bridge standards, the Larimer County Master Plan, and local zoning regulations. These planning mechanisms were discussed at mitigation planning meetings and the members of the Larimer County HM LPT were encouraged to review all available technical information available for their jurisdictions as they worked to develop the risk

assessment and their mitigation actions. Moving forward, the local jurisdictions included in the 2016 Larimer County Multi-Jurisdictional Hazard Mitigation Plan will continue to integrate the goals and actions of the Plan into their evolving local planning mechanisms, including comprehensive plans, capital improvement plans, and resource and land use regulations.

The State of Colorado mitigates natural hazards through a number of statutes and programs. Funded by the state and federal government, several agencies and programs within the state implement mitigation actions through assistance to local governments. State statues that are applicable to hazard mitigation are listed below:

- County Fire Planning Authority, Colorado Statute, Title 30, Article 11, Part 1:30-11-124
- Colorado Land Use Commission Authority, Colorado Revised Statute, 24-65-101 & 102
- Colorado Land Use Commission Directives & Duties, Colorado Revised Statutes, 25-65-105 & 24-65-104
- County Building Codes – Master Plan, Colorado Statute, Title 30, Article 28, Part 1:30-28-106
- Local Government Land Use Control Enabling Act, Colorado Revised Statute, 29-20-101, *et seq*
- Local Land Use Control and Regulation, Colorado Revised Statute, 29-20-104
- Colorado Wildfire Preparedness Plan and Fund, Colorado Revised Statute 24-30-310(2)(3)
- Fire Suppression Program Rules, Colorado Revised Statute, 24-33.5-1205(1) (a)
- State Fire Ban Authority, Colorado Revised Statute, 24-30-308
- Colorado Geological Survey (CGS), Colorado Statute, 34-1-1-1 & 103
- CGS Land Use Review Program (Subdivision Law), Colorado Revised Statute, 30-28-101, *et seq*
- Soils & Hazard Analyses of Residential Construction Act, Colorado Revised Statute, 6-6.5-101
- Drought Mitigation Planning, Colorado Revised Statute, 37-60-126.5
- Building Codes – Zoning – Planning, Colorado Revised Statute, 22-32-124(1)
- Colorado Floodplain Management Authority, Colorado Revised Statute, 24-65.1-403(1)
- Emergency Dam Repair Cash Fund, Colorado Revised Statute, 37-60-122.5
- Flood Response Fund, Colorado Revised Statute, 37-60-123.2
- Office of Smart Growth, Colorado Revised Statute, 24-32-3201 *et seq*
- State Engineer – High Hazard Dams Reports, Colorado Revised Statute, 37-87-123
- State Planning and Interest, Colorado Revised Statute, 24-65.1-203

Colorado Statute includes a number of measures that dictate the state's ability to influence land use decisions and subsequently impact local vulnerability to hazards. In most cases, these statutes allow county level and local governments to establish their own rules and regulations.

Larimer County's risk and vulnerability reduction efforts are supported by additional planning efforts, including the following:

- The 2015 Larimer County Code of Ordinances
- Larimer County Comprehensive Emergency Management Plan (2015)
- Colorado Emergency Resource Mobilization Plan (2012)
- State of Colorado Emergency Operations Plan (2013)

- State of Colorado EOP Emergency Support Function Annexes (2013):
- State of Colorado EOP Supporting Annexes (2013):
    - Evacuation
    - Geographic Information Systems (GIS)
    - International Coordination
    - Public Affairs
    - Tribal Relations
    - Volunteer and Donations Management
- State of Colorado EOP Incident Annexes (2013):
    - Drought Incident
    - Tornado Incident
    - Mass Casualty Incident
    - Earthquake Incident
    - Landslide and Debris Flow Incident
    - Flood Incident
    - Winter Incident
    - Terrorism, Law Enforcement, and Investigation Incident
    - Cyber Incident
    - Biological Incident
    - Chemical Stockpile Emergency Preparedness Program Incident

Larimer County is a participant in the National Flood Insurance Program (NFIP). Since it entered the program, the county has adopted the minimum NFIP requirements and imposed additional requirements into its Charter and County Code and Ordinances.

In the future, this plan will serve as a source document for risk reduction, policy making, and land use planning. It will be incorporated into existing planning mechanisms as they are updated or developed. These planning mechanisms will enhance the county's ability to implement the actions outlined in the mitigation plan. During the hazard mitigation planning process, the county worked together with local jurisdictions to identify ways in which identified mitigation actions/projects will be incorporated into their existing planning and regulatory mechanisms over time. The results of these conversations and planning activities are described in each Community Profile.

4 County Profile

Larimer County describes itself as a "thriving, friendly place where people of all ages, cultures, and economic backgrounds live, work, play and most of all, call home." Larimer County's 2013 Visions and Goals framework outlines a number of key strengths, priorities, and guiding principles that serve as key focus areas for the county:

- Our strength lies in the diversity, talents, and character of our people. We encourage and foster an environment of respect, supporting both physical and mental health.
- Our county is beautiful and clean. We protect our air and water, open spaces, and natural resources. We are prepared for wildfires, floods, and water supply. There are plenty of things to do both in nature and within our local communities.
- We have safe and clean neighborhoods, schools, businesses, roads, structures, and parks throughout our county.
- A prosperous economy is powered by innovation, education, a business-friendly atmosphere, well-paying jobs, affordable housing, and convenient transportation networks that keep pace with growth.
- We place a priority on our youth and their healthy development so that quality of life extends to future generations.
- We "tell our story" so our residents understand, engage, and are fully vested in our shared Community Vision.
- We promote collaboration with citizens, local governments, businesses, non-profits and community organizations by working together to create the County's future.

These visions reflect the character of the county and are evident in the outcomes of the 2016 Larimer County Multi-Jurisdictional Multi-Hazard Mitigation Plan.

4.1 Demographics

The current population of Larimer County is 324,122. Population forecasts are created annually by the Colorado State Demography Office. The population forecast below illustrates the population of Larimer County in future years, based on "plausible courses of future population change."

Table 4. Population Forecasts for Larimer County, 2000-2040

Area	2000	2010	2020	2030	2040
Colorado	4,338,801	5,049,717	5,924,692	6,519,379	7,752,887
Larimer County	253,087	300,532	360,434	424,882	483,322

Source: State Demography Office, Colorado (2015)

In 2010, Larimer County became the sixth most populated county in the state of Colorado. Net migration (which is calculated as the difference between residents moving into and out of the county) has accounted for two thirds (over 66%) of the population increase in Larimer County between 1980 and 2009. This growth factor is estimated to account over 78% of total growth between 2010 and 2039. The Colorado State Demography Office estimates that net migration will continue to provide the large majority of population growth in Colorado through 2040.

Based on data from the U.S. Census Bureau's County Business Patterns (CBP), the following private businesses employ the lion's share of Larimer County residents:

- Poudre Valley Health Systems
- Hewlett Packard
- Center Partners
- Woodward, Inc.
- Banner Health

In addition to the private employers listed above, several public employers (Colorado State University, Poudre and Thompson School Districts, Larimer County and the Cities of Fort Collins and Loveland) employ more than 1,500 workers each.

Larimer County is adjacent to Jackson, Grand, Boulder and Weld Counties and the State of Wyoming to the north. Major transportation corridors cross the county from east to west (State Highway 34) and north to south (I-25 and US Route 287). Many Larimer County residents commute across county boundaries for work. This creates important emergency management considerations both pre- and post-disaster. The top five commuting destinations by workers living in Larimer County are as follows (DOLA, 2010; Census *LEHD*):

1. Boulder County
2. Weld County
3. Denver County
4. Arapahoe County
5. Jefferson County

Larimer County has a rich agricultural history and the county's agricultural lands are rapidly vanishing as the county continues to develop. Although the number of farms in Larimer County rose steadily between 1982 and 2007, the number of acres covered by farms declined. Over the 24 year period, Larimer County saw an overall drop of 16.1% in the total acreage in farmland, compared with an increase of 56% in number of farms. The trend in Larimer County is more pronounced than it is nationally or in the state of Colorado. In Larimer County, this increase in number of farms, followed by a decrease in acreage, is due to larger farms going out of business and being resold as smaller 'ranchettes'.

4.2 Social Vulnerability

Local vulnerability to disasters depends on more than the relationship between a place and its exposure to hazards. Social and economic factors – including race, age, income, renter status, or institutionalized living – directly affect a community's ability to prepare for, respond to, and recover from hazards and disasters. The concept of social vulnerability helps explain why communities often experience a hazard event differently, even when they experience the same amount of physical impacts or property loss.

Social vulnerability to disasters refers to *"the characteristics and situation of a person or group that influence their capacity to anticipate, cope with, resist, or recover from the impact of a hazard"*[2]. It is determined by a number of pre-existing social and economic characteristics. Very often, the impacts of

[2] Wisner, B., Blaikie, P., Cannon, T., Davis, I. (2004). At Risk: Natural Hazards, People's Vulnerability and Disasters. London: Routledge.

hazards fall disproportionately on the most disadvantaged or marginalized people in a community – the poor, children, the elderly, the disabled, and minorities. During emergencies, for example, self-evacuation can be nearly impossible for disabled or institutionalized individuals. Additionally, the willingness of an individual/family to invest in residential mitigation actions is often limited if their home is a rental and they are adverse to investing money in long-term mitigation activity. Not only do conditions like these limit the ability of some communities to get out of harm's way, they also decrease the ability of communities to recover from and thrive in the aftermath of a disaster event.

The 2016 Plan integrates social vulnerability into the hazard risk analysis in order to more effectively identify hazard risk experienced by the most vulnerable residents and communities within the county. The social vulnerability assessment is designed to improve local decision making, hazard prioritization, and emergency management activities. By incorporating social vulnerability into the risk assessments of individual hazards, local communities are able to identify more vulnerable areas and tailor their mitigation actions to accommodate all members of their community, including the most sensitive groups.

The pre-existing social conditions that contribute to disaster losses can be identified using social vulnerability indicators. Using methods identified in the Social Vulnerability Index (SoVI) developed by Cutter et. al. (2003)[3], a county-wide social vulnerability analysis was carried out at the census tract level. Local socioeconomic and demographic data were used to identify spatial patterns in social vulnerability across the county and have been applied to the hazards in the 2016 Larimer County Multi-Jurisdictional Hazard Mitigation Plan.

The table below outlines the social vulnerability indicators that were used in the Larimer County social vulnerability analysis. Indicators with plus signs (+) are positively related to social vulnerability levels. For example, communities with higher percentages of people 65 years or older have higher levels of social vulnerability to disasters. Indicators with minus signs (-) are negatively related to social vulnerability levels. For the purpose of the Larimer County Multi-Jurisdictional Hazard Mitigation Plan, each social vulnerability factor was weighted equally in the Social Vulnerability Index.

Table 5. Social Vulnerability Indicators – Larimer County, CO

Social Vulnerability Factors	Indicators
Age/Elderly	• Children (Age 18 and under) (+) • Elderly (Age 65 and over) (+) • Social Security Recipients, % Population (+) • Renter Occupied, % HH (+) • Median Age

[3] Cutter, S.L., Boruff, B.J., and Shirley, W.L. (2003). Social Vulnerability to Environmental Hazards. *Social Science Quarterly*, 84:242-261.

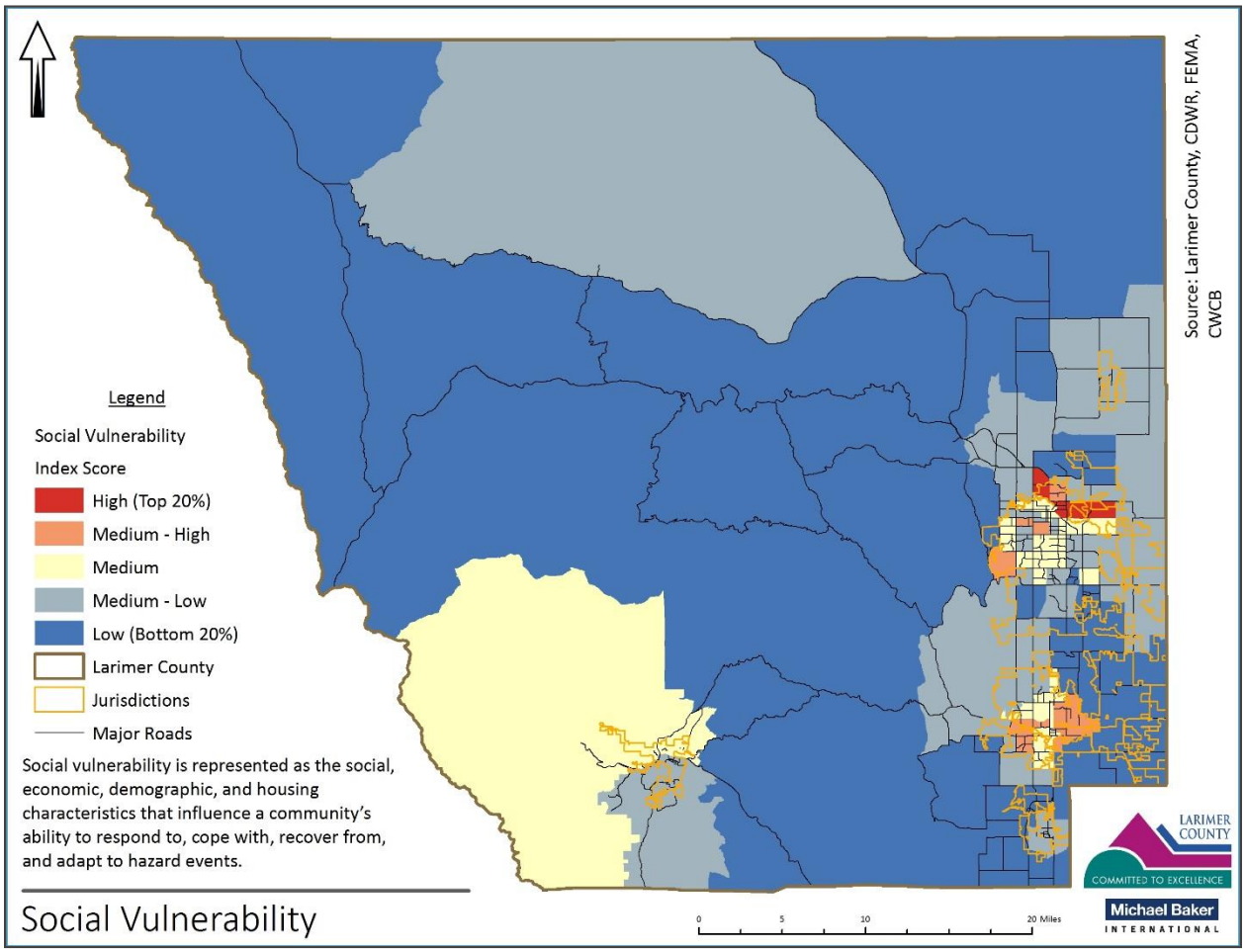
Social Vulnerability Factors	Indicators
Special Needs	• Group Quarters, % Population (+) • Mobile Homes, % OCHH (+) • 5 years old, % Population (+) • Age 18 and under (+)
Ethnicity	• Hispanic, % Population (+) • Native American, % Population (+) • Other Races, % Population (+) • Pacific Islander, % Population (+) • Linguistically Isolated, % Population (+)
Race, Class, Poverty	• African American Population, % Population(+) • Female Headed Households, % HH (+) • No Vehicles, % HH (+) • No High School Diploma, % Over 25 years old (+) • Poverty, % Population • Unemployment Rate (+)
Wealth	• Asian, % Population (-) • Household earnings greater than $200K, % HH (-) • Housing Density (+) • Per-Capita Income (-) • Population Density (+) • White, % Population

The results of the social vulnerability assessment are displayed on the map below. On the map, social vulnerability is represented at the census tract level by 5 classes of vulnerability: Low (bottom 20% of the county), Medium-Low, Medium, Medium-High, and High (top 20% of the county). The social vulnerability map shows relative levels of social vulnerability across the county. It is important to note that although many areas within the county have medium-low to low levels of social vulnerability, it does not mean that there are no socially vulnerable people living in those areas.

On its own, the social vulnerability map can inform communities about disparate social conditions across the county. When combined with physical hazard analyses, the map illustrates where human hardships may occur in a disaster situation. These hardships may result in citizens that are less likely to prepare, respond, withstand, or recover from a hazard event due to their elevated levels of social vulnerability. This information is valuable for both mitigation and disaster response activity.

During the risk assessment and mitigation strategy development phases of the 2016 planning process, participating jurisdictions reviewed the results of the social vulnerability analysis in conjunction with the multi-hazard risk assessment results. The social vulnerability information helped communities uncover unseen risks and better prioritize their local mitigation actions.

Figure 1. Larimer County Social Vulnerability Map[4]



Social vulnerability is represented as the social, economic, demographic, and housing characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to hazard events. The pre-existing social conditions that contribute to disaster losses can be identified using social vulnerability indicators. Using methods identified in the Social Vulnerability Index (SoVI) developed by Cutter et. al. (2003), this layer shows the social vulnerability index scores for the State of Colorado at the census tract level. Social vulnerability is represented at the Census tract level by five classes of vulnerability: Low, Medium-Low, Medium, Medium-High, and High.

Social vulnerability analysis is particularly useful in the context of hazard mitigation planning because it can reveal disparities within a community that make a difference when it comes to the ability of residents to prepare, evacuate, mobilize resources, and recover from disasters. The Larimer County social vulnerability assessment is designed to improve local decision making, hazard prioritization and emergency management activities. By incorporating social vulnerability into the risk assessments of

[4] Citation: Colorado Division of Water Resources, Dam Safety Branch. Dam Inundation Consequence and Social Vulnerability Analysis. Laura Ferre and Bill McCormick. Project funding: FEMA NDSP Grant and CWCB Grant. 2013-2014.

individual hazards, local communities are able to identify highly vulnerable areas and tailor their mitigation actions to accommodate all members of their community, including the most sensitive groups.

4.3 Housing Stock

Below, the County and Regional Housing Snapshot highlights the variations and similarities between Larimer County and the State. The county's low vacancy rate means that as population growth continues to surge, rents are likely to increase, putting more pressure on the labor force and potentially leading to more commuters into the county from neighboring jurisdictions.

Table 6. County and State Housing Snapshot

	Larimer County	Colorado
Total Housing Units	138,463	2,273,441
Average Household Size	2.42	2.49
Group Quarter Population	8,927	117,735
Vacancy Rate	6.13%	7.64%

Source: Colorado Department of Local Affairs (DOLA), 2014 Estimates

COMMUNITY VALUES, HISTORIC AND SPECIAL CONSIDERATIONS

Historic resources include landmarks buildings, historic structures and sites, commercial and residential districts, historic rural resources, archaeological and cultural sites, and the historic environment in which they exist. Historic resources serve as visual reminders of a community's past, providing a link to its development. Preservation of these important resources makes it possible for them to continue to play an integral, vital role in the community. Currently, Larimer County has 98 properties and Historic Districts listed on the National Register of Historic Places, including two National Historic Landmarks.

Depending on the number of historic resources within a community, it can be unrealistic to assume that all of the necessary mitigation activities can be taken to protect these resources. Historic preservation and protection work must be done in a manner that retains the character-defining features of a historic property. Because this work can be costly, it is important to set priorities in terms of which resources and mitigation projects should become the point of focus. Larimer County and its jurisdictions recognizes that the preservation and maintenance historic sites and structures contributes to the cultural heritage of the county and is in the long-term best interest of the community.

4.4 Critical Facilities

Critical facilities are essential to a community's long-term disaster resilience as they are important delivery pathways for diverse crisis management services and resources. Members of the Larimer County Small Hazard Mitigation Planning Team worked collaboratively to define a critical facility inventory for the 2016 Multi-Hazard Mitigation Plan. For safety and security reasons, neither a map nor a detailed description of critical facilities have been included in this plan.

The following table provides a count of how many critical facilities, structures, and parcels are located in Larimer County. The table also outlines estimated replacement costs based on aggregate appraised values, when available.

Table 7. Larimer County Critical Facilities

	Count	Total Assessor Value
Structures/Parcels	159,154	$80,263,478,166
Critical Facilities	937	$3,956,652,337

Critical facilities deserve additional mitigation attention because of the higher potential for the loss of life, property, and/or environmental quality in the event that they suffer significant damage. The protection of critical facilities is essential because these specific facilities can have a significant impact on the scope of damage caused by a natural disaster. Additionally, the disruption of critical facilities during a natural disaster is likely to affect response and recovery activity.

4.5 Future Development

A key strategy for reducing future losses in a community is to avoid development in known hazard areas while enforcing the development of safe structures in other areas. The purpose of this strategy is to keep people, businesses, and buildings out of harm's way before a hazard event occurs. The 2016 Larimer County Multi-Jurisdictional Multi-Hazard Mitigation Plan highlights areas where future development can be expected and areas where mitigation options can be considered in future land use decisions to ensure safe, smart growth in the county.

The State Demography Office, a division of the Colorado Department of Local Affairs (DOLA), monitors population growth trends across the state and between counties. The two tables below provide a picture of future population growth rates and numbers within the state, within the Denver primary metro statistical area (PMSA), and within Larimer County.

Table 8. Population Forecasts by Region and County (2000 – 2040)

	Average Annual Percent Change (5 year increments)							
	00-05	05-10	10-15	15-20	20-25	25-30	30-35	35-40
Colorado	1.4%	1.6%	1.7%	1.9%	1.7%	1.4%	1.3%	1.1%
Denver PMSA	1.4%	1.7%	1.8%	1.7%	1.4%	1.2%	1.0%	0.8%
Larimer County	1.7%	1.7%	1.9%	1.8%	1.8%	1.5%	1.4%	1.2%

Source: Colorado Department of Local Affairs (DOLA)

Table 9. State Demographers Office Population Projections by Region and County (2010 – 2040)

	Population Projections (5 year increments)						
	July, 2010	July, 2015	July, 2020	July, 2025	July, 2030	July, 2034	July, 2040
Colorado	5,049,717	5,439,290	5,924,692	6,429,532	6,915,379	7,352,327	7,752887
Denver PMSA	2,502,291	2,736,460	2,971,101	3,183,692	3,383,952	3,554,764	3,704,391
Larimer County	3000,532	329,559	360,434	393,517	424,882	454,593	483,322

Source: Colorado Department of Local Affairs (DOLA)

The population of the county is expected to reach over 390,000 by 2025 and over 480,000 by 2040. This growth is slightly faster than the projected growth of the state of Colorado and is much faster than the projected growth rate of the Denver PMSA. The first of the following two maps shows average annual percent population change forecasts by county for the state of Colorado. Larimer County is expected to grow at a moderate rate compared to the majority of Colorado counties between now and 2040. The second map shows projected population growth across the state between 2010 and 2040. Again, Larimer County is expected to sustain large amounts of growth in the next 25 years.

Figure 2. Average Annual Percent Change in Population, Statewide

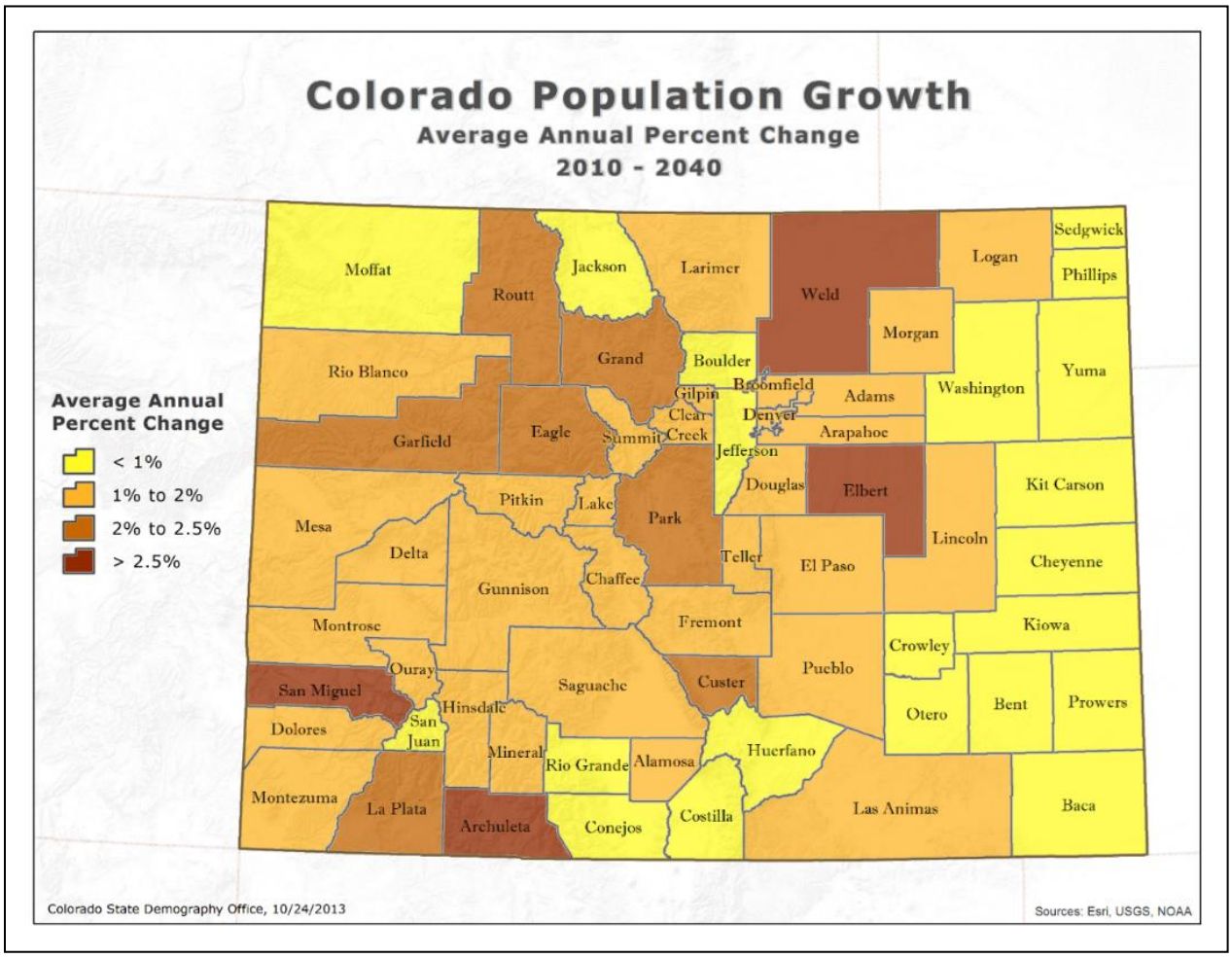
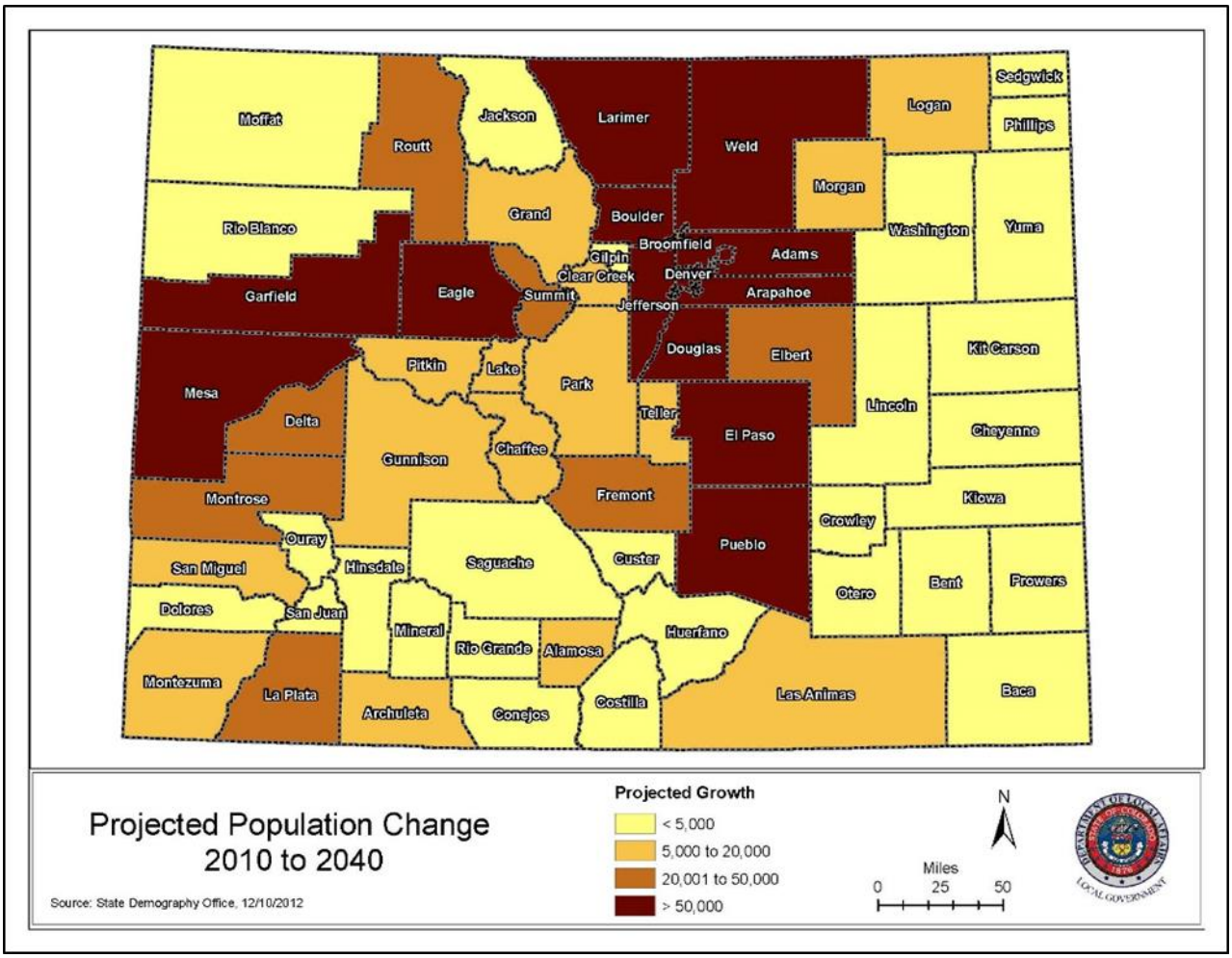


Figure 3. Projected Statewide Population Growth



Larimer County has grown significantly in the past decade and is one of the fastest growing counties in the State. The amount of growth that Larimer County has seen over the past decade has been dictated by the availability of undeveloped land. Based on observed population growth trends, housing demand within Larimer County is expected to remain steady over the next decade.

5 Risk Assessment

This section of the Larimer County Multi-Jurisdictional Hazard Mitigation Plan describes the local Hazard Identification and Risk Assessment summary undertaken by the county and participating jurisdictions and special districts. This section consists of the following subsections:

- Introduction and Update Summary
- Climate Change and Hazards
- Hazard Profiles
  - Biological Hazards / Contagion
  - Civil Disturbance
  - Earthquake
  - Erosion / Deposition
  - Fire – Wildland
  - Flood – Flash and Riverine
  - Hazmat – Fixed and Transport
  - Landslide / Rockslide
  - Spring / Summer Storm
  - Tornado
  - Utility Disruption
  - Winter Storm

5.1 Introduction and Update Summary

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

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

Source: Federal Emergency Management Agency, 2001

A Risk Assessment (RA) is a method for evaluating risk as defined by probability and frequency of occurrence of a hazard event, exposure of people and property to the hazard, and consequences of that exposure. Different methodologies exist for assessing the risk of hazard events, ranging from qualitative to quantitative approaches.

Larimer County and its communities are vulnerable to a wide range of natural and human-caused hazards that threaten life and property. The hazards identified by the Small Planning Team for inclusion in the Plan

are those determined to be of potential threat to the county and its municipalities and are consistent with the hazards identified by the State of Colorado and the Federal Emergency Management Agency for this part of the State and this region of the country. The hazards profiled for the 2016 Plan include:

- Biological Hazards / Contagion
- Civil Disturbance
- Earthquake
- Erosion / Deposition
- Fire – Wildland
- Flood – Flash and Riverine
- Hazmat – Fixed and Transport
- Landslide / Rockslide
- Spring / Summer Storm
- Tornado
- Utility Disruption
- Winter Storm

Some of these hazards are interconnected (for example, severe storms can cause flooding and prolonged drought can lead to wildfire). Therefore, discussion of these hazards overlaps throughout the Risk Assessment. Of the sixteen (16) hazards profiled in the State of Colorado's 2013 Hazard Mitigation Plan, twelve (12) are addressed in the 2016 Larimer County Multi-Jurisdictional Multi-Hazard Mitigation Plan. Hazards that were excluded were done so because no significant vulnerability was identified within Larimer County. The following Table summarizes this information.

Table 10. State/Region/County Plan Hazards Matrix

INCLUDED IN 2013 COLORADO NATURAL HAZARD MITIGATION PLAN	INCLUDED IN 2010 NORTHERN COLORADO REGIONAL HMP	INCLUDED IN 2016 LARIMER COUNTY MITIGATION PLAN
Avalanche	Aircraft Accidents	Biological Hazards / Contagion
Drought	Avalanche	Civil Disturbance
Earthquake	Biological Hazards / Influenza	Earthquake
Erosion and Deposition	Civil Disturbance	Erosion / Deposition
Expansive Soil	Dam Failure	Fire – Wildland
Extreme Temperatures	Drought / Extreme Heat	Flood – Flash and Riverine
Flood	Earthquake	Hazmat – Fixed and Transport
Hail	Fire – Urban	Landslide / Rockslide
Landslide, Mud/Debris Flow, Rockfall	Fire – Wildland	Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)
Lightning	Flood – Flash and Riverine	Tornado
Pest Infestation	Hail Storm	Utility Disruption
Severe Wind	Hazmat – Fixed Facility	Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)
Subsidence	Hazmat – Transportation	
Tornado	Landslide / Rockslide	

INCLUDED IN 2013 COLORADO NATURAL HAZARD MITIGATION PLAN	INCLUDED IN 2010 NORTHERN COLORADO REGIONAL HMP	INCLUDED IN 2016 LARIMER COUNTY MITIGATION PLAN
Wildfire	Lightning	
Winter Storm	Terrorism / WMD	
	Tornado	
	Utility Interruption	
	Wind Storm – Severe	
	Winter Storm - Severe	

To further focus on the list of identified hazards for the Plan, the following table presents a list of all federal disaster and emergency declarations that have occurred in Larimer County since 1953, according to the Federal Emergency Management Agency. This list presents the foundation for identifying what hazards pose the greatest risk to the County and to its local jurisdictions.

Table 11. Presidential Disaster and Emergency Declarations in Larimer County

DECLARATION #	DATE	EVENT DETAILS
FEMA-4145-DR	09/14/2013	Severe Storms, Flooding, Landslides, and Mudslides
FEMA-3365-EM	09/12/2013	Severe Storms, Flooding, Landslides, and Mudslides
FEMA-4067-DR	06/28/2012	High Park and Waldo Canyon Wildfires
FEMA-2980-FM	06/09/2012	High Park Fire
FEMA-2877-FM	04/03/2011	Crystal Fire
FEMA-2857-FM	09/12/2010	Reservoir Road Fire
FEMA-1762-DR	05/26/2008	Severe Storms and Tornadoes
FEMA-3270-EM	01/07/2007	Snow
FEMA-3224-EM	09/05/2005	Hurricane Katrina Evacuation
FEMA-2514-FM	4/1/2004	CO - PICNIC ROCK FIRE - 03/30/2004
FEMA-2511-FM	11/12/2003	CO - BUCKHORN CREEK FIRE - 11/11/2003
FEMA-2486-FM	7/25/2003	CO-CLOUDY PASS FIRE-07/25/2003
FEMA-EM-3185	04/09/2003	Snowstorm

DECLARATION #	DATE	EVENT DETAILS
FEMA-2447-FS	07/18/2002	Big Elk Fire
FEMA-1421-DR	6/19/2002	Wildfires
FEMA- 2383-FS	11/1/2001	CO – Armageddon Fire
FEMA-2308-FS	6/12/2000	Bobcat Gulch Fire
FEMA-1276-DR	05/17/1999	CO Flooding 4/30/1999
FEMA-1186-DR	08/01/1997	Severe Storms, Heavy Rain, and Flash Floods, Flooding, Mudslides
FEMA-665-DR	7/22/1982	Flash Flood Due to Dam Failure
FEMA-517-DR	08/02/1976	Severe Storms and Flash Flooding
FEMA-385-DR	05/23/1973	Heavy Rain, Snowmelt, Flooding
FEMA-261-DR	05/19/1969	Severe Storms, Flooding
FEMA-200-DR	06/19/1965	Tornadoes, Severe Storms, Flooding

Source: FEMA Disaster Declarations Summary – Open Government Dataset

Figure 4. Summary of Disaster Declaration Events, Colorado

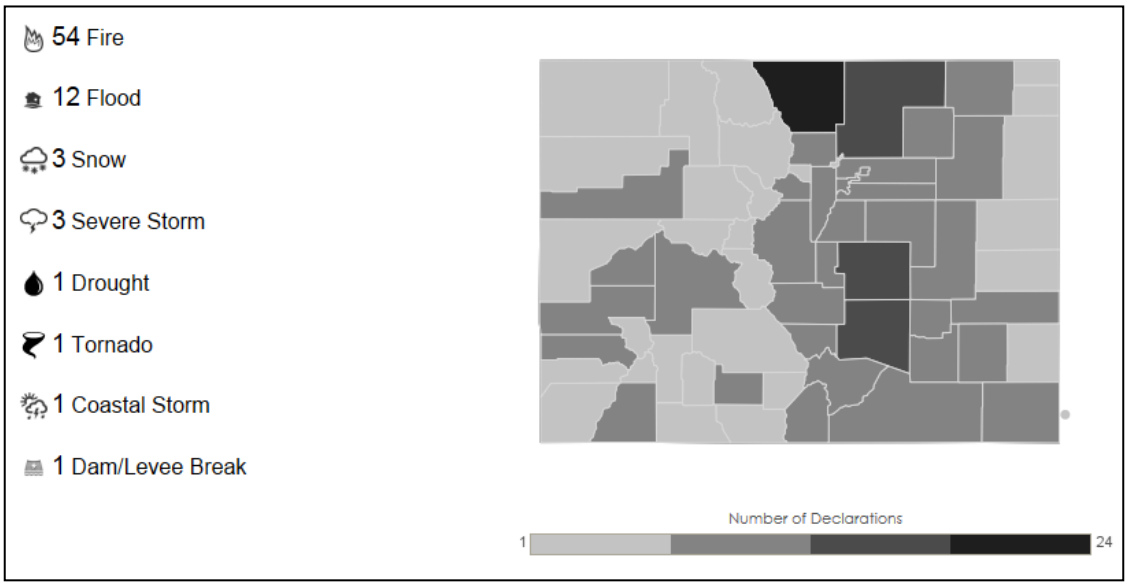
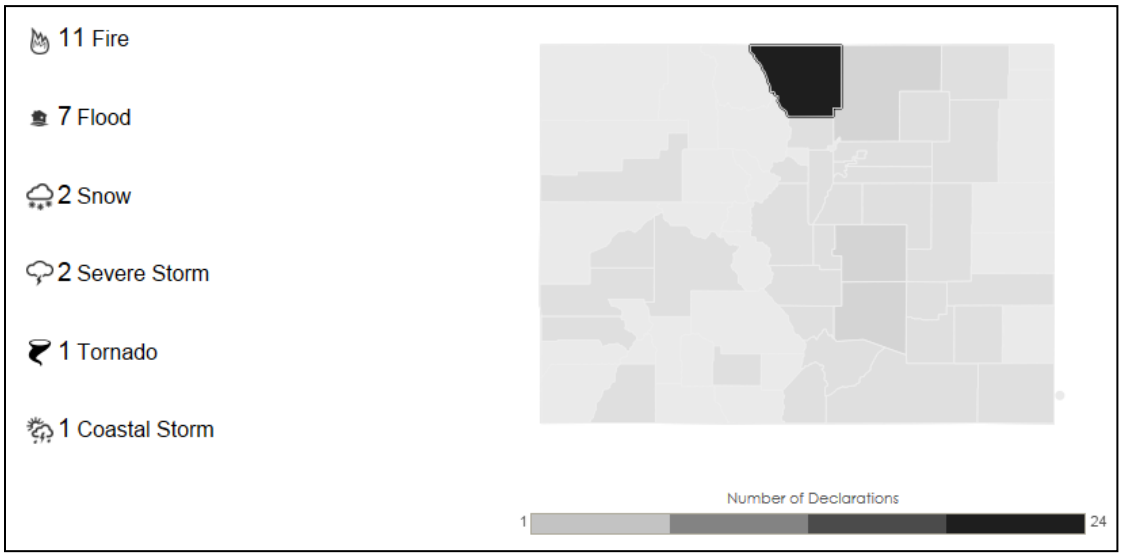


Figure 5. Summary of Disaster Declaration Events, Larimer County



Hazards were ranked in order to provide structure and prioritize the mitigation goals and actions discussed in the Plan. Ranking was both quantitative and qualitative. First, the quantitative analysis considered all the historical and geospatial hazard-specific data available. Then, a qualitative method, the Risk Factor (RF) approach, was used to provide additional insights on the specific risks associated with each hazard. This process also served as a valuable cross-check and validation of the quantitative analysis performed.

The RF approach combines historical experiences, local knowledge, and consensus opinions to produce numerical values that allow identified hazards to be ranked against one another. During the planning process, the Larimer County HM SPT compared the results of the hazard profile against their local knowledge to generate a set of ranking criteria. These criteria were used to evaluate hazards and identify those posing the highest risk.

RF values are obtained by assigning varying degrees of risk to five categories for each hazard: *probability, impact, spatial extent, warning time*, and *duration*. Each degree of risk is assigned a value ranging from 1 to 4 and a weighing factor for each category was agreed upon by the MH SPT (documented in the following Table). To calculate the RF value for a given hazard, the assigned risk value for each category is multiplied by the weighting factor. The sum of all five categories equals the final RF value, as demonstrated in the following example equation:

RF Value = [(Probability x .30) + (Impact x .30) +
(Spatial Extent x .20) + (Warning Time x .10) + (Duration x .10)]

Table 12. Risk Factor Criteria

RISK ASSESSMENT CATEGORY	LEVEL	DEGREE OF RISK LEVEL	INDEX	WEIGHT
PROBABILITY What is the likelihood of a hazard event occurring in a given year?	**UNLIKELY**	LESS THAN 1% ANNUAL PROBABILITY	**1**	**30%**
	POSSIBLE	BETWEEN 1 & 10% ANNUAL PROBABILITY	**2**	
	LIKELY	BETWEEN 10 &100% ANNUAL PROBABILITY	**3**	
	HIGHLY LIKELY	100% ANNUAL PROBABILTY	**4**	
IMPACT *In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?*	**MINOR**	VERY FEW INJURIES, IF ANY. ONLY MINOR PROPERTY DAMAGE & MINIMAL DISRUPTION OF QUALITY OF LIFE. TEMPORARY SHUTDOWN OF CRITICAL FACILITIES.	**1**	**30%**
	LIMITED	MINOR INJURIES ONLY. MORE THAN 10% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN ONE DAY.	**2**	

RISK ASSESSMENT CATEGORY	LEVEL	DEGREE OF RISK LEVEL	INDEX	WEIGHT
	CRITICAL	MULTIPLE DEATHS/INJURIES POSSIBLE. MORE THAN 25% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN ONE WEEK.	**3**	
	CATASTROPHIC	HIGH NUMBER OF DEATHS/INJURIES POSSIBLE. MORE THAN 50% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR 30 DAYS OR MORE.	**4**	
SPATIAL EXTENT *How large of an area could be impacted by a hazard event? Are impacts localized or regional?*	**NEGLIGIBLE**	LESS THAN 1% OF AREA AFFECTED	**1**	**20%**
	SMALL	BETWEEN 1 & 10% OF AREA AFFECTED	**2**	
	MODERATE	BETWEEN 10 & 50% OF AREA AFFECTED	**3**	
	LARGE	BETWEEN 50 & 100% OF AREA AFFECTED	**4**	
WARNING TIME *Is there usually some lead time associated with the hazard event? Have warning measures been implemented?*	**MORE THAN 24 HRS**	SELF DEFINED	**1**	**10%**
	12 TO 24 HRS	SELF DEFINED	**2**	
	6 TO 12 HRS	SELF DEFINED	**3**	
	LESS THAN 6 HRS	SELF DEFINED	**4**	
DURATION *How long does the hazard event usually last?*	**LESS THAN 6 HRS**	SELF DEFINED	**1**	**10%**
	LESS THAN 24 HRS	SELF DEFINED	**2**	
	LESS THAN 1 WEEK	SELF DEFINED	**3**	

RISK ASSESSMENT CATEGORY	LEVEL	DEGREE OF RISK LEVEL	INDEX	WEIGHT
	MORE THAN 1 WEEK	SELF DEFINED	**4**	

According to the default weighting scheme applied, the highest possible RF value is 4.0. The methodology illustrated above lists categories that are used to calculate the variables for the RF value.

HAZARD RANKING RESULTS

The following table summarizes the results of the Risk Factor ranking exercise performed by Larimer County. The results represent the relative rank of different hazards within the county from the perspective of local stakeholders and subject matter experts.

Table 13. Risk Factor Results for Larimer County

NATURAL HAZARD	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Biological Hazards / Contagion	1.2	0.6	0.4	0.1	0.4	2.70
Civil Disturbance	0.6	0.6	0.4	0.4	0.2	2.20
Earthquake	0.6	0.9	0.6	0.4	0.3	2.80
Erosion / Deposition	0.9	0.6	0.2	0.4	0.2	2.30
Fire - Wildland	1.2	0.9	0.4	0.4	0.4	3.30
Flood – Flash and Riverine	0.9	1.2	0.6	0.3	0.4	3.40
HAZMAT	0.6	0.9	0.4	0.4	0.2	2.50
Landslide/ Rockslide	0.9	0.6	0.4	0.4	0.2	2.50
Spring / Summer Storm	1.2	0.6	0.6	0.2	0.3	2.90
Tornado	0.6	0.9	0.4	0.4	0.4	2.70
Utility Disruption	0.6	0.6	0.4	0.4	0.3	2.30
Winter Storm	0.9	0.6	0.6	0.2	0.3	2.60

Based on the Larimer County RF analysis, the natural hazards with the highest Risk Factor scores are Flood and Fire. Both hazards have a RF value over 3.0. This is primarily due to the high probability of the hazards occurring and the wide spatial extent of their potential damages and impacts. Biological Hazards/Contagion, Earthquake, HAZMAT, Landslide/Rockslide, Spring/Summer Storm, Tornado, and Winter Storm also ranked within the "High Risk" RF category. Civil Disturbance, Erosion/Deposition, and Utility Disruption round out the list of moderate to high ratings, with scores between 2.2 and 2.3.

The conclusions drawn from the qualitative assessment carried out by Larimer County were organized into three categories (shown in the following table) and provided a summary of hazard risk for Larimer County based on High, Moderate or Low risk designations. This process helped frame ongoing planning discussions around local and regional hazard risks and assisted with the prioritization of mitigation actions.

Table 14. Hazard Risk Conclusions for Larimer County

HIGH RISK (2.5 or higher)	**Biological Hazards/Contagion; Earthquake; Fire – Wildland; Flood – Flash and Riverine; HAZMAT; Landslide/Rockslide; Spring/Summer Storm; Tornado; Winter Storm**
MODERATE RISK (2.0 – 2.4)	**Civil Disturbance; Erosion/Deposition; Utility Disruption**
LOW RISK (1.9 or lower)	**None**

Although the following hazards from the 2010 Northern Colorado Regional Hazards Mitigation Plan were not included in the risk assessment for the 2016 Larimer County Plan, they can impact residents of Larimer County (as evidenced by their inclusion in the 2010 plan). For this reason, descriptions of these hazards have been included below to facilitate decision making and the hazard prioritization process during the next plan update:

Aircraft Accidents: Aircraft accidents can occur at any location, with significant differences in magnitude due to the size of aircraft, altitude of the incident, and population density at the crash site and/or debris field. The cities of Fort Collins and Loveland, and Larimer County, are subject to potential aircraft accidents. The cities of Loveland and Fort Collins share a municipal airport that offers limited commercial service. The Fort Collins-Loveland Municipal Airport primarily handles small aircraft and helicopters, along with various larger private and commercial aircraft. The airspace above this region is utilized and controlled by Denver Center, which also services the Denver International Airport (DIA). The City of Fort Collins operated the Fort Collins Downtown Airport until 2005, when it was permanently closed. Larimer County experienced several aircraft accidents while controlling wildland fires during 2001.

Avalanche: An avalanche is a mass of snow, ice, and other debris that flows and/or slides rapidly down a steep slope. If conditions are right, an avalanche can reach speeds in excess of 150 mph. Avalanches can be triggered by either natural causes such as earthquake, thermal changes, or blizzards, or by human activities such as snowmobiling, skiing, or hiking. The greatest threat of avalanche is in the mountainous area of Larimer County. While avalanches are quite common in the mountains, the risk of personal injury or property damage from avalanche is minimal due to the remote location. There is minimal development in mountainous areas where avalanches occur. Furthermore, there is usually a small number of people in the area when avalanches occur.

Dam Failure: Dam failures are rare; however, they can cause immense damage and loss of life when they occur. The hazard risk associated with dam failure is determined by the potential loss of life and downstream property damage it may cause. There are many reasons and/or potential causes for dam failure, including terrorism, earthquakes, rapid erosion, etc. However, the most common reasons for dam failure are spillway design error, geologic instability, poor maintenance, extreme rainfall, and dam design error.

Drought / Extreme Heat: According to the 2010 Northern Colorado Regional HMP, drought is defined as "a shortage of water associated with a deficiency of precipitation." The 2010 plan highlights, however, that water shortages can also be induced by humans through water mismanagement practices: *drought occurs when a normal amount of moisture is not available to satisfy an area's usual water-consuming activities.* For the purpose of the 2010 Northern Colorado Regional Hazard Mitigation Plan, drought was defined as a condition of climatic dryness that is severe enough to reduce soil moisture and water below the minimum necessary for sustaining plant, animal, and human life systems.

Although Extreme Heat was not profiled in the 2016 HMP, it is a hazard that has increasing potential to impact residents of Larimer County. The City of Fort Collins recently commissioned an Extreme Heat Report (The Rocky Mountain Climate Organization, 2014) and the information included in the report has great potential to be useful for future planning efforts and hazard mitigation plan updates.[5]

Fire – Urban: Structure fires are among the most costly of fires in the nation. The National Fire Protection Association (NFPA) reports that residential structure fires currently account for 25 percent of fires nationwide, 83 percent of fire deaths, 77 percent of fire injuries, and 64 percent of direct dollar loss from fire (2010 Northern Colorado Regional Hazard Mitigation Plan). Most structure fires in the region occur in residential occupancies. The two primary reasons for the lack of significant commercial structure fires are constantly improving business safety practices and frequent fire department inspections

Terrorism / WMD: Terrorism is defined in the U.S. Patriot Act as *"activities that (A) involve acts dangerous to human life that are a violation of the criminal laws of the U.S. or of any state; that (B) appear to be intended (i) to intimidate or coerce a civilian population, (ii) to influence the policy of a government by intimidation or coercion, or (iii) to affect the conduct of a government by mass destruction, assassination, or kidnapping; and (C) occur primarily within the territorial jurisdiction of the U.S."* Terrorism can be domestic or international depending on its origin, base, and the objectives of the terrorist. Incidents usually involve a criminal act, often symbolic in nature and intended to influence an audience beyond the immediate victims. Although political violence has existed in the country since the American Revolution, new forms of politically motivated terrorism are rapidly emerging.

5.2 Climate Change and Hazards

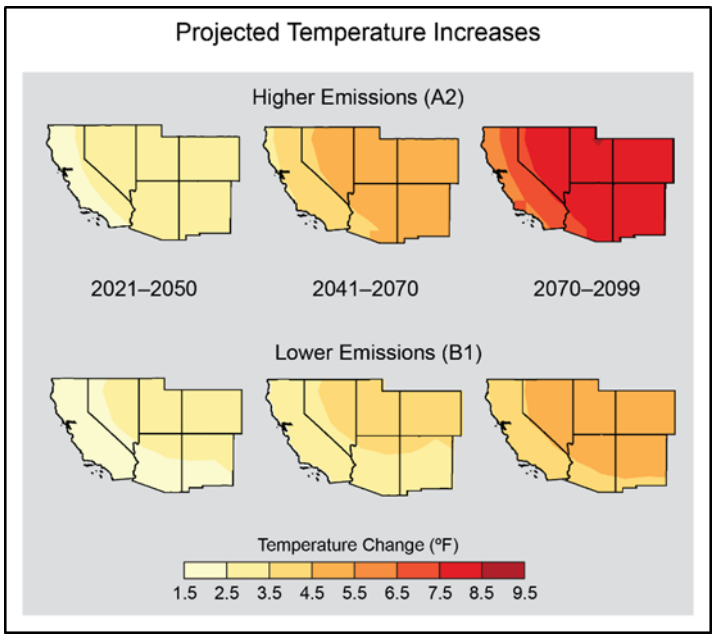
In May of 2014, the U.S. Global Change Research Program released the Third U.S. National Climate Assessment, the authoritative and comprehensive report on climate change and its impacts in the United States. Not only did the report confirm that climate change is affecting Americans in every region of the U.S., the report identifies increased heat, drought, insect outbreaks, wildfire, and flooding as key climate-related concerns for the Southwest region of the U.S. (which includes Colorado).[6]

[5] *Extreme Heat in Fort Collins*, 2014. The Rocky Mountain Climate Organization.
[6] *Third U.S. National Climate Assessment*, 2014. U.S. Global Change Research Program.

The myriad impacts of climate change are already being felt by communities and ecosystems in the southwestern United States. The Southwest is the hottest and driest region in the U.S. and climate change poses significant challenges for an already parched region that is expected to get hotter and significantly drier.

Recent warming in the region is among the most rapid in the nation and is significantly greater than the global average, and the period since 1950 has been hotter than any comparable long period in at least 600 years. Current climate models predict that average temperatures in Colorado will warm by 2.5°F to 5.5°F by 2041-2070 and by 5.5°F to 9.5°F by 2070-2099.[7] Summer temperatures across the state are expected to warm more than winter temperatures and projections suggest that typical summer months will be as warm as (or warmer than) the hottest 10% of summers that occurred between 1950 and 1999.[8]

Figure 6. Climate Change: Projected Temperature Increases in the Southwestern U.S.



The maps in the preceding Figure show projected changes in average temperatures in the Southwest region, as compared to 1971-1999. The top row of the figure (A2) shows projections assuming heat-trapping gas emissions continue to rise (also known as "business-as-usual"). The bottom row (B1) shows projections assuming substantial reductions in emissions. These temperature changes have great potential to directly affect urban public health through increased risk of heat stress, and urban infrastructure through increased risk of disruptions of electric power generation. Rising temperatures also have direct impacts on crop yields and productivity of key regional crops and livestock.

The impacts of climate change already pose a threat to people and property in the southwest region of the United States, including Larimer County. Together, these impacts represent a slow-onset disaster that is likely to manifest and change over time. Recently, climate change impacts have altered the intensity and rate of weather and climate extremes in the region. Current projections predict even more

[7] *Third U.S. National Climate Assessment*, 2014. U.S. Global Change Research Program.
[8] *Colorado Climate Change: A Synthesis to Support Water Resource Management and Adaptation*. Colorado Water Conservation Board (2008).

rapid changes in the near future, which are likely to affect hazards such as heat waves, wildfire, and drought.[9]

In the future, many of the natural hazards that Larimer County has historically dealt with are likely to evolve due to the effects of climate change. This is particularly true for drought, flooding, wildfire and extreme temperature hazards. The nature of erosion/land subsidence and public health hazards are also likely to evolve in intensity and character due to a changing regional climate. For these reasons, the hazard identification and risk assessment for the 2016 Larimer County Multi-Jurisdictional Multi-Hazard Mitigation plan includes a discussion of how climate change may impact the frequency, intensity, and distribution of specific hazards within the county. Because many impacts of climate-related hazards cross county boundaries, some of the discussion looks at impacts on a regional scale. As climate science evolves, future mitigation plan updates may consider including climate change projections in the risk rankings and vulnerability assessments of the hazards included in the Plan.

5.3 Hazard Profiles

Over time, accepted risk assessment methodologies evolve, develop, and grow. Data availability also tends to change as funding shifts and technological improvements emerge. For this reason, it is important to incorporate best available data and analysis strategies when formulating a comprehensive mitigation plan. The following summarizes the vulnerability and loss estimation methodologies used in the 2010 Northern Colorado Regional Hazard Mitigation Plan and presents the updated methodologies used for the 2016 Larimer County Multi-Jurisdictional Hazard Mitigation Plan. This table highlights the progress of Larimer County's hazard mitigation planning efforts over time and provides a record of data use to inform future mitigation planning projects in the County.

The following table summarizes the methodologies used in the 2010 Northern Colorado Regional Hazard Mitigation Plan to analyze vulnerability and estimate losses associated with each identified hazard, and the updated methodologies used as part of the 2016 Larimer County Multi-Jurisdictional Hazard Mitigation Plan.

[9] *Summary for Policy Makers: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation.* IPCC (2012).

Table 15. Summary of Vulnerability Analysis and Loss Estimation and Methodologies

	2010 Northern Colorado Regional Hazard Mitigation Plan	2016 Larimer County Multi-Jurisdictional Hazard Mitigation Plan
Atmospheric Hazards		
Flood – Flash and Riverine	*Vulnerability Analysis:* Input from city / county departments, public input, review of past disaster declarations, identification of NFIP losses of properties in the region *Loss Estimation:* None	*Vulnerability Analysis:* Enhanced Hazus Level 2 analysis of a 1% annual chance flood event scenario using: FEMA defined 100-yr floodplains supplemented by additional floodplains provided by the City of Fort Collins, best available LiDAR and DEMs terrain coverages; Critical facilities also assessed separately; UDF/parcel centroids; inundation extents and flood depth and boundaries from the 2013 flood event (for select areas); Narrative of historical flood events from NCDC and the current State Hazard Mitigation Plan *Loss Estimation:* Enhanced Hazus Level 2 analysis of a 1% annual chance flood event scenario using: FEMA defined 100-yr floodplains supplemented by Hazus 100-yr floodplains, best available LiDAR and DEMs terrain coverages; UDF/parcel centroids; Critical facilities also assessed separately.
Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)	<u>Hail</u> *Vulnerability Analysis (Hail):* Public input, review of past declarations *Loss Estimation (Hail):* None <u>Lightning</u> *Vulnerability Analysis (Lightning):* NWS, review of past incidents *Loss Estimation (Lightning):* None <u>Wind Storm</u> *Vulnerability Analysis:* NWS reports, review of past incidents, input from OEM *Loss Estimation:* None <u>Thunderstorm</u>	<u>Hail</u> *Vulnerability Analysis:* GIS mapping using Storm Prediction Center historical hail events; Narrative of historical events from NCDC. *Loss Estimation:* Narrative; Loss estimates based on historical events reported by NCDC; Loss estimates representing 10 percent, 30 percent and 50 percent of the assessed value of exposed building stock/critical facilities for those jurisdictions and districts ranking this hazard as high. <u>Lightning</u> *Vulnerability Analysis:* GIS mapping using National Weather Service Historical lightning flash density maps; National Climatic Data Center - Historical lightning events by county and jurisdiction. *Loss Estimation:* Narrative; Loss estimates based on historical events reported by NCDC; National Weather Service - Historical lightning casualties by county. <u>Wind Storm</u>

	2010 Northern Colorado Regional Hazard Mitigation Plan	2016 Larimer County Multi-Jurisdictional Hazard Mitigation Plan
	Not profiled in previous plan	*Vulnerability Analysis:* Assessment of historical high wind events based on data supplied by the NCDC. *Loss Estimation:* Narrative; Loss estimates based on historical events reported by NCDC <u>Thunderstorm</u> *Vulnerability Analysis:* Assessment of historical thunderstorm events based on data supplied by the NCDC. *Loss Estimation: Narrative*
Tornado	*Vulnerability Analysis:* NWS reports, review of past disasters, input from residents *Loss Estimation:* None	*Vulnerability Analysis:* Assessment of historical tornado events based on data supplied by the NCDC: Storm Paths and F-scale mapping from NCDC; Social vulnerability/housing stock analysis for vulnerable community identification. *Loss Estimation:* Narrative; Loss estimates based on historical events reported by NCDC
Winter Storm	*Vulnerability Analysis:* Emergency response records, business interruption reports, traffic reports, NWS reports, news articles, public input, utility input *Loss Estimation:* None	*Vulnerability Analysis:* Vulnerability Analysis: Narrative of historical events from NCDC, Larimer OEM, CDEM *Loss Estimation*: Narrative; Loss estimates based on historical events reported by NCDC
Geologic Hazards		
Earthquake	*Vulnerability Analysis:* Geological reports, history of incidents in the area *Loss Estimation:* Narrative	*Vulnerability Analysis:* Hazus Level 2 analysis of a Golden Fault scenario using: CGS fault, soil, and landslide inputs and FEMA Region VIII updated enhanced (Level 2) building inventory derived from local, state, and federal data sources; Critical facilities also assessed separately; Narrative of historical earthquake events from COGS and the current State Hazard Mitigation Plan Loss Estimation: Hazus Level 2 analysis of a Golden Fault scenario using: CGS fault, soil, and landslide inputs and FEMA Region VIII updated enhanced

	2010 Northern Colorado Regional Hazard Mitigation Plan	2016 Larimer County Multi-Jurisdictional Hazard Mitigation Plan
		(Level 2) building inventory derived from local, state, and federal data sources; Critical facilities also assessed separately.
Erosion / Deposition	*Not profiled in previous plan*	*Vulnerability Analysis:* GIS mapping and analysis using building stock data and COGS expansive soil, collapsible soil, subsidence, and undermined areas; Narrative of historical land subsidence events from CGS and the current State Hazard Mitigation Plan. *Loss Estimation:* Loss estimates representing 10 percent, 50 percent and 100 percent of the assessed value of exposed building stock/critical facilities; Counts and estimated losses focused on those areas classified at potential risk.
Landslide / Rockslide	*Vulnerability Analysis:* CDOT Records, input from utilities *Loss Estimation*: None	*Vulnerability Analysis:* GIS mapping and analysis using building stock/critical facility data and CGS rockfall and historical/potential landslide areas; Narrative of historical land subsidence events from COGS and the current State Hazard Mitigation Plan. *Loss Estimation:* Loss estimates representing 10 percent, 50 percent and 100 percent of the assessed value of exposed building stock/critical facilities; Counts and estimated losses focused on those areas classified at potential risk.
Other Hazards		
Biological Hazards / Contagion	*Vulnerability Analysis:* Input from health officials, Review of local plans *Loss Estimation:* None	*Vulnerability Analysis:* Narrative based on records of historical occurrences (Colorado CDPHE) *Loss Estimation:* Assessment of loss using CDC's FluWorkLoss 1.0 tool. The tool estimates the potential number of days lost from work due to a pandemic based on Census 2010 data (Source: CO-specific Census data in the CDC's FluAid program)

	2010 Northern Colorado Regional Hazard Mitigation Plan	2016 Larimer County Multi-Jurisdictional Hazard Mitigation Plan
Civil Disturbance	*Vulnerability Analysis:* Review of past incidents, input from local law enforcement, input from residents *Loss Estimation:* None	*Vulnerability Analysis:* Review of past incidents, input from local law enforcement, input from residents *Loss Estimation:* Narrative
Fire — Wildland	*Vulnerability Analysis:* County Wild and Plan, input from USFS, review of past disasters *Loss Estimation:* None	*Vulnerability Analysis:* GIS mapping and analysis using building stock/critical facility data and COWRAP wildfire and wildland urban interface risk analysis; Reference analysis included in County CWPPs; Narrative of historical prairie fire events. *Loss Estimation:* Loss estimates representing 10 percent, 50 percent and 100 percent of the assessed value of exposed building stock/critical facilities; Counts and estimated losses focused on those areas classified as most vulnerable across the county based on COWRAP analysis.
Hazmat – Fixed and Transport	*Vulnerability Analysis:* Public input, risk assessments, review of past incidents *Loss Estimation:* None	*Vulnerability Analysis:* Incident report Database-PHMSA - Office of Hazardous Materials Safety- Historical Hazmat incidents *Loss Estimation:* Narrative
Utility Disruption	*Vulnerability Analysis:* Input received during public meeting process *Loss Estimation:* None	*Vulnerability Analysis:* Input received during public meeting process *Loss Estimation:* Narrative

The following table shows a summary of each participating jurisdictions' self-identified vulnerability to the hazards identified in the Plan. The results are a product of each jurisdiction's review of the multi-hazard risk assessment and their individual RF value obtained by assigning varying degrees of risk to the five categories for each hazard: *probability, impact, spatial extent, warning time*, and *duration*.

Table 16. Hazard Vulnerability Summary by Jurisdiction

	Biological Hazards	Civil Disturbance	Earthquake	Erosion / Deposition	Fire - Wildland	Flood	Hazmat	Landslide / Rockslide	Spring / Summer Storm	Tornado	Utility Disruption	Winter Storm
Larimer County	High Risk	Moderate Risk	High Risk	Moderate Risk	High Risk	High Risk	High Risk	High Risk	High Risk	High Risk	Moderate Risk	High Risk
Town of Berthoud	Moderate Risk	Moderate Risk	Low Risk	Low Risk	Low Risk	Low Risk	High Risk	Low Risk	Moderate Risk	Moderate Risk	Low Risk	High Risk
Berthoud Fire Protection District	Low Risk	Low Risk	Low Risk	Low Risk	High Risk	High Risk	Low Risk	Low Risk	High Risk	Moderate Risk	Moderate Risk	High Risk
Crystal Lakes Fire Protection District	Moderate Risk	Low Risk	Low Risk	Moderate Risk	Low Risk	High Risk	Low Risk	Moderate Risk	High Risk	Low Risk	High Risk	High Risk
Colorado State University	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	High Risk	Low Risk	Low Risk	High Risk	Low Risk	Low Risk	High Risk
Town of Estes Park	Low Risk	Low Risk	Low Risk	Low Risk	High Risk	High Risk	Low Risk	Low Risk	Moderate Risk	Low Risk	High Risk	High Risk
Estes Park Medical Center	High Risk	Low Risk	Low Risk	High Risk	High Risk	High Risk	Low Risk	High Risk	High Risk	Low Risk	High Risk	High Risk
Estes Valley Fire Protection District	Low Risk	Low Risk	Low Risk	Moderate Risk	High Risk	High Risk	Moderate Risk	High Risk	High Risk	Low Risk	High Risk	High Risk
Estes Valley Recreation and Park District	Low Risk	Low Risk	Low Risk	Low Risk	High Risk	High Risk	Low Risk	Moderate Risk	High Risk	Low Risk	Moderate Risk	Moderate Risk
City of Fort Collins	Low Risk	Low Risk	Low Risk	Low Risk	High Risk	High Risk	Low Risk	Low Risk	High Risk	Moderate Risk	Moderate Risk	Moderate Risk
Glacier View Fire Protection District	Low Risk	Low Risk	Low Risk	Low Risk	High Risk	Moderate Risk	Low Risk	Low Risk	Moderate Risk	Low Risk	Moderate Risk	High Risk
Town of Johnstown	Moderate Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
Livermore Fire Protection District	Low Risk	Low Risk	Low Risk	Moderate Risk	High Risk	High Risk	Moderate Risk	Low Risk	Moderate Risk	Low Risk	High Risk	High Risk

	Biological Hazards	Civil Disturbance	Earthquake	Erosion / Deposition	Fire - Wildland	Flood	Hazmat	Landslide / Rockslide	Spring / Summer Storm	Tornado	Utility Disruption	Winter Storm
City of Loveland	Low Risk	Low Risk	Low Risk	Moderate Risk	Moderate Risk	High Risk	Low Risk	Low Risk	High Risk	Moderate Risk	Moderate Risk	High Risk
Loveland Fire Rescue Authority	Low Risk	Moderate Risk	Moderate Risk	Moderate Risk	High Risk	High Risk	High Risk	High Risk	High Risk	High Risk	High Risk	High Risk
Northern CO Water Conservation District	Low Risk	Low Risk	Moderate Risk	Moderate Risk	High Risk	Moderate Risk	Moderate Risk	Low Risk	Moderate Risk	Moderate Risk	Moderate Risk	High Risk
Pinewood Springs Fire Protection District	Moderate Risk	Low Risk	Low Risk	Low Risk	High Risk	Moderate Risk	Moderate Risk	Moderate Risk	Moderate Risk	Low Risk	Moderate Risk	High Risk
Platte River Power Authority	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Moderate Risk	Low Risk	Low Risk	Low Risk
Poudre Canyon Fire Protection District	Low Risk	Low Risk	Low Risk	Moderate Risk	High Risk	Moderate Risk	Low Risk	Moderate Risk	Moderate Risk	Low Risk	High Risk	High Risk
Poudre Fire Authority	High Risk	Moderate Risk	Low Risk	Low Risk	High Risk	High Risk	High Risk	Moderate Risk	Moderate Risk	High Risk	Moderate Risk	High Risk
Thompson Valley EMS	Moderate Risk	Low Risk	Moderate Risk	Moderate Risk	High Risk	High Risk	High Risk	Moderate Risk	High Risk	High Risk	High Risk	High Risk
Town of Timnath	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Moderate Risk	Low Risk	Low Risk	High Risk	High Risk	Low Risk	High Risk
Upper Thompson Sanitation District	Low Risk	Low Risk	Low Risk	Moderate Risk	Moderate Risk	High Risk	Low Risk	Moderate Risk	High Risk	Low Risk	Moderate Risk	High Risk
Town of Wellington	Moderate Risk	Low Risk	Moderate Risk	Low Risk	High Risk	Moderate Risk	Moderate Risk	Low Risk	High Risk	High Risk	High Risk	High Risk
Wellington Fire Protection District	Low Risk	Low Risk	Low Risk	Moderate Risk	High Risk	Moderate Risk	Moderate Risk	Low Risk	High Risk	High Risk	High Risk	High Risk
Town of Windsor	Low Risk	Moderate Risk	Moderate Risk	Low Risk	Low Risk	High Risk	Low Risk	Low Risk	High Risk	High Risk	High Risk	High Risk

	Biological Hazards	Civil Disturbance	Earthquake	Erosion / Deposition	Fire - Wildland	Flood	Hazmat	Landslide / Rockslide	Spring / Summer Storm	Tornado	Utility Disruption	Winter Storm
Windsor Severance Fire Rescue	High Risk	Moderate Risk	Low Risk	Low Risk	Moderate Risk	High Risk	High Risk	Low Risk	High Risk	High Risk	High Risk	High Risk

The following sections provide hazard profiles and risk assessments for each of the hazards identified by the Larimer County Hazard Mitigation Planning Team for the 2016 Plan update. The hazards are presented in alphabetical order rather than by their levels of risk.

5.3.1 Biological Hazards / Contagion

NATURAL HAZARD	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Biological Hazards / Contagion	1.2	0.6	0.4	0.1	0.4	2.70
HIGH RISK (2.5 or higher)						

Hazard Identification

Biological hazards and contagions, including epidemics and pandemics, have the potential to cause serious illness and death, especially among those who have compromised immune systems due to age or underlying medical conditions. There are several contagious and infectious diseases present in the State of Colorado that constitute a public health risk. Emergency Support Function 8 (ESF 8) of the State Emergency Operations Plan provides an organizational framework for public health and medical service preparedness, response, and recovery efforts for various emergency epidemics. During the 2016 planning process, pandemic flu was identified as the key public health hazard in the county. This hazard risk assessment includes an analysis of pandemic flu risk in Larimer County and an analysis of the impacts of the hazards profiled in this plan on biological hazards and contagions.

A pandemic can be defined as a disease that attacks a large population across great geographic distances. Pandemics are larger than epidemics in terms of geographic area and number of people affected. Epidemics tend to occur seasonally and affect much smaller areas. Pandemics, on the other hand, are most often caused by new subtypes of viruses or bacteria for which humans have little or no natural resistance. Consequently, pandemics typically result in more deaths, social disruption, and economic loss than epidemics.

According to data from the Colorado Reportable Disease Statistics (CDPHE) database, Influenza viruses represent the most common cause of hospitalization due to disease in Larimer County. Seasonal influenza (often referred to as the flu) is a common infection that affects large numbers of people in Colorado every year. Influenza is an acute respiratory disease caused by influenza type A or B viruses. The typical features of seasonal influenza include abrupt onset of fever and respiratory symptoms such as cough, sore throat, as well as headache, muscle ache, and fatigue. For seasonal influenza, the incubation period ranges from 1 to 4 days and the clinical severity of infection can range from asymptomatic infection to primary viral pneumonia and death. Most people experience influenza as a very-uncomfortable but ultimately benign illness. However, the influenza virus can mutate, causing it to be much more dangerous to humans. Yearly seasonal influenza remains a significant disease in the U.S. and Colorado, and seasonal epidemics can result in high morbidity and mortality, as well as create strains on the health care system and communities.

Unlike influenza viruses that have achieved ongoing transmission in humans, the sporadic human infections with avian A (H5N1) viruses are far more severe with high mortality. Initial symptoms include

high fever and other influenza-like symptoms. It also appears that the incubation period in humans may be longer for avian (H5N1) viruses, ranging from 2 to 8 days, and possibly as long as 17 days. Diarrhea, vomiting, abdominal pain, chest pain, and bleeding from the nose and gums have also been reported. The disease often manifests as a rapid progression of pneumonia with respiratory failure ensuing over several days.

With the increase in global transport, as well as urbanization, epidemics due to new influenza viruses are likely to occur in and around Larimer County. A new flu virus, which eventually became known as H1N1, came to the world's attention in March 2009. The symptoms of pandemic H1N1 2009 influenza were similar to those of seasonal influenza. Illness in most cases was mild but there were cases of severe disease requiring hospitalization and a number of deaths. The initial experience with the emerging pandemic of H1N1 prompted the World Health Organization (WHO) to redefine their phase descriptions for an influenza pandemic.

The six-phase approach was designed for the easy incorporation of recommendations into existing national and local preparedness and response plans. Phases 1—3 correlate with preparedness in the **pre-pandemic interval**, including capacity development and response planning activities, while Phases 4—6 signal the need for response and mitigation efforts during the **pandemic interval**.

Pre-Pandemic Interval

In nature, influenza viruses circulate continuously among animals (primarily birds). Even though such viruses might develop into pandemic viruses, in Phase 1 no viruses circulating among animals have been reported to cause infections in humans.

- **Phase 1** is the natural state in which influenza viruses circulate continuously among animals but do not affect humans.

In Phase 2 an animal influenza virus circulating among domesticated or wild animals is known to have caused infection in humans, and is thus considered a potential pandemic threat.

- **Phase 2** involves cases of animal influenza that have circulated among domesticated or wild animals and have caused specific cases of infection among humans.

In Phase 3 an animal or human-animal influenza virus has caused sporadic cases or small clusters of disease in people, but has not resulted in human-to-human transmission sufficient to sustain community-level outbreaks. Limited human-to-human transmission may occur under some circumstances, for examples, when there is close contact between an infected person and an unprotected caregiver. Limited transmission under these circumstances does not indicate that the virus has gained the level of transmissibility among humans necessary to cause a pandemic.

- **Phase 3** represents the mutation of the animal influenza virus in humans so that it can be transmitted to other humans under certain circumstances (usually very close contact between individuals). At this point, small clusters of infection have occurred.

Pandemic Interval

Phase 4 is characterized by verified human to human transmission of the virus able to cause "community-level outbreaks." The ability to cause sustained disease outbreaks in a community marks a significant upward shift in the risk for a pandemic.

- **Phase 4** involves community-wide outbreaks as the virus continues to mutate and become more easily transmitted between people (for example, transmission through the air)

Phase 5 is characterized by verified human to human spread of the virus into at least two countries in one World Health Organization (WHO) region. While most countries will not be affected at this stage, the declaration of Phase 5 is a strong signal that a pandemic is imminent and that the time to finalize the organization, communication, and implementation of the planned mitigation measures is short.

- **Phase 5** represents human-to-human transmission of the virus in at least two countries

Phase 6, the pandemic phase, is characterized by community-level outbreaks in at least one other country in a different WHO region in addition to the criteria defined in Phase 5. Designation of this phase will indicate that a global pandemic is underway.

- **Phase 6** is the pandemic phase, characterized by community-level influenza outbreaks.

Zoonotic Diseases

Zoonotic diseases are diseases that can be spread through animals and humans. These diseases can be caused by bacteria, viruses, parasites, and fungi that are carried by animals and insects.

Previous Occurrences

Public health hazards can manifest as primary events by themselves, or they may be secondary to another disaster or emergency, such as a flood, a severe storm, or a hazardous materials incident. The common characteristic of most public health emergencies is that they adversely impact, or have the potential to adversely impact, a large number of people.

The Colorado Department of Public Health and Environment releases an annual reportable disease summary for each county. The events with the highest incidences in Larimer County between 2010 and 2014 are summarized in the table below.

Table 17. Colorado Reportable Disease Statistics CDPHE, Larimer County

	Year					
Disease	**2010**	**2011**	**2012**	**2013**	**2014**	**Total**
CAMPYLOBACTER	91	78	49	80	62	360
CRYPTOSPORIDIOSIS	8	14	5	3	11	41
GIARDIASIS	21	16	15	13	16	81

	Year					
Disease	**2010**	**2011**	**2012**	**2013**	**2014**	**Total**
HAEMOPHILUS INFLUENZAE	5	4	7	3	4	23
HEPATITIS B, CHRONIC	14	19	16	18	22	89
HEPATITIS C, CHRONIC	115	104	94	80	80	473
INFLUENZA-hospitalized	1	40	69	103	169	382
KAWASAKI SYNDROME	3	1	-	2	1	7
MENINGITIS ASEPTIC/VIRAL	29	24	19	6	7	85
PERTUSSIS	8	7	79	81	79	254
SALMONELLOSIS	34	21	37	28	39	159
SHIGELLOSIS	2	5	11	7	3	28
STEC (shiga toxin producing E.coli)	21	14	15	14	5	69
STREP PNEUMO INVASIVE	16	20	17	15	18	86
VARICELLA(CHICKEN POX)	22	29	43	20	41	155
WEST NILE VIRUS	14	2	-	-	-	16
Total:	**404**	**398**	**476**	**473**	**557**	**2,308**

Source: Division of Disease Control and Environmental Epidemiology, CDPHE

Chronic Hepatitis C and hospitalizations from influenza represent the largest disease incidence in Larimer County between 2010 and 2014.

Inventory Exposed

The information in the table below is from the Impact Analysis of Potential for Detrimental Impacts of Hazards for the Emergency management Accreditation Program (EMAP). The table explains possible impacts to various subjects due to public health emergencies.

Table 18. Impacts to Subjects Impacted by Public Health Emergencies

Subject	Detrimental Impacts
Health and Safety of Persons in the Area as the Time of Incident	Adverse impacts are expected to be severe for unprotected personnel and moderate to light for protected personnel.
Health and Safety of Persons Responding to the Incident	Adverse impacts are expected to be severe for unprotected personnel and uncertain for trained and protected personnel, depending on the nature of the incident.
Continuity of Operations	Danger to personnel in the area of the incident may require relocation of operations and lines of succession execution.
Property, Facilities, and Infrastructure	Access to facilities and infrastructure in the area of the incident may be denied until decontamination is complete.
Delivery of Services	Stress on resources and facilities due to increased volume and demand may overwhelm and/or extensively postpone delivery of services.
The Environment	Incident may cause denial or delays in the use of some areas.
Economic and Financial Condition	Local economy and finances may be adversely affected, possibly for an extended period of time.
Regulatory and Contractual Obligations	Regulatory waivers may be needed. Fulfillment of contracts may be difficult. Demands may exceed the ability to deliver.
Reputation of, or Confidence in, Management and Response Authorities	Ability to respond and recover may be questioned and challenged if planning, response, and recovery are not timely and effective.

Potential Losses

FluWorkLoss 1.0 is a tool developed by the CDC to estimate the potential impact of pandemic influenza on a community in terms of cost. Based on local demographic data, the tool allows communities to estimate the potential number of days lost from work due to a pandemic. Users of FluWorkLoss can change input values, such as the number of workdays lost due to a worker staying come to care for a family member. Users can also change the length and virulence of the pandemic so that a range of possible impacts can be estimated.

Days missed from work cost both employees (in lost wages) and employers (in work not completed). The following table shows the total estimated number of days lost from work in Larimer County due to a four-week long influenza pandemic with a 25% clinical attack rate. The available workdays are calculated as a

product of the total population in the working age group (Census 2010), the employment rate of Larimer County (Census 2010), and the number of workdays in a week (5).

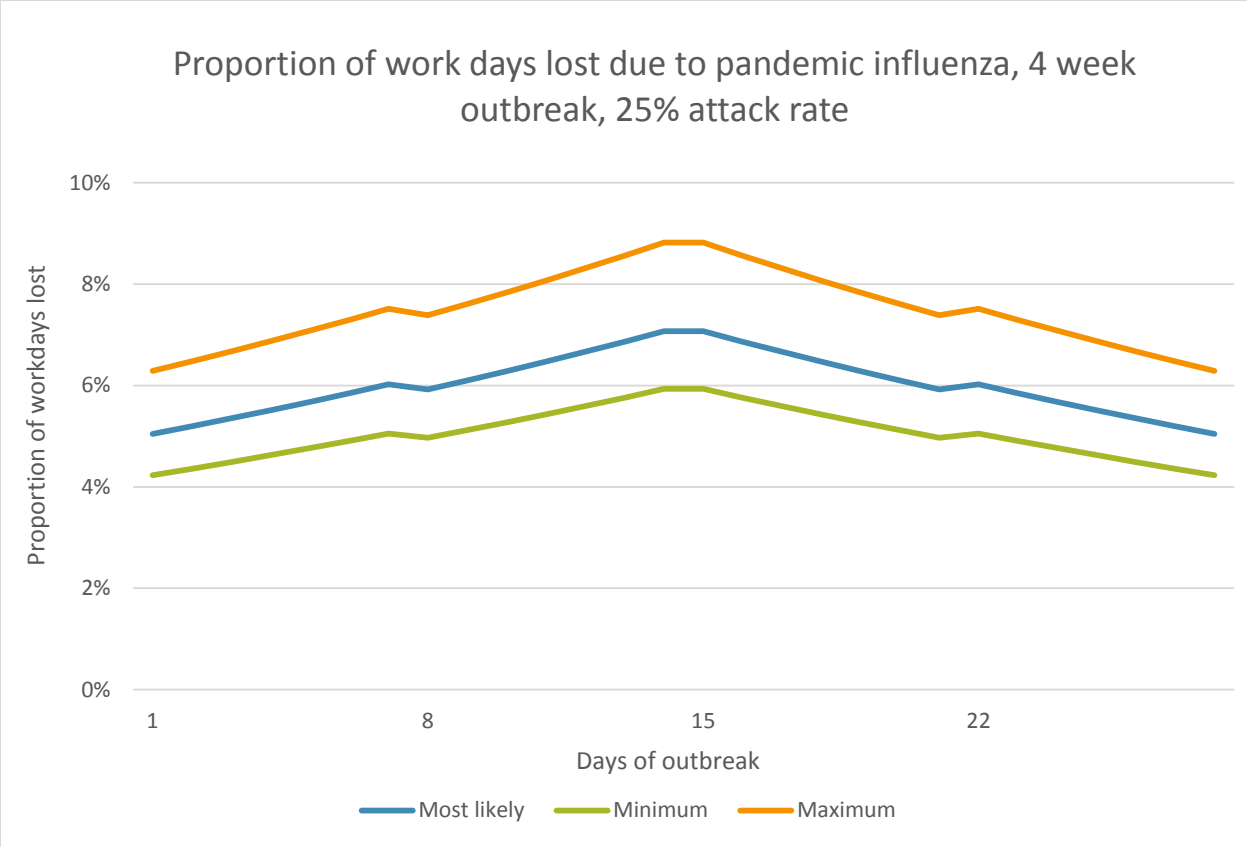
Table 19. Total Workdays Lost (Pandemic Influenza)

Scenario	Workdays Lost
Most Likely Scenario	144,596
Minimum Loss Scenario	121,312
Maximum Loss Scenario	180,307

Source: FluWorkLoss 1.0, CDC

The number of workdays lost includes the workdays lost for both self-care and care of sick family members due to the pandemic. Although the workdays lost do not include those lost due to factors such as fear and school closings, the model does provide a general picture of the impact on the productivity of the local economy due to an influenza pandemic. Results are estimated to create three scenarios of pandemic impact: the minimum (the best case scenario), which estimates the fewest possible number of hospitalizations/outpatient visits/deaths (i.e., the fewest possible days lost from work); the mean (the most likely scenario); and the maximum (the worst case scenario), which estimates the largest number of hospitalizations/outpatient visits/deaths (i.e., the largest possible number of days lost from work).

The following graph shows the proportion of workdays lost for each day of the modeled influenza outbreak for the three loss scenarios. Again, the scenario assumes a four-week long pandemic with a 25% clinical attack rate.



The numbers and projections generated through FluWorkLoss are not considered predictions of what *will* happen during an influenza pandemic. Rather, the results should be treated as estimates of what *could* happen.

Probability of Future Occurrences

Climate change threatens to increase the spread of infectious diseases because changing heat, rain, and humidity levels allow disease carrying vectors and pathogens to come into closer contact with humans. Climate change has the potential to expand the habitats and infectivity of disease-carrying insects and rodents, thus increasing the risk of disease transmission. For example, mosquitoes capable of transmitting West Nile virus are already present in Colorado. If Colorado's climate becomes warmer, mosquito populations could swell, making the region more favorable for disease transmission.

Hantavirus is another infectious disease that may pose a higher risk to Larimer County residents in the future. Deer mice are the primary reservoir for Hantaviruses and climate change (warmer weather) plays a role in elevated seasonal deer mouse populations.

Based on historical record of 2,308 recorded diseases in Larimer County since 2010, public health hazards have affected Larimer County residents and visitors more than once every year from 2010 through 2014. The historic frequency suggests that there is a 100% chance of some type of public health hazard will affect Larimer County every year.

Land Use and Development

Future development in and around Larimer County has the potential to change how infectious diseases spread through the community and impact human health in both the short and long term. New development may increase the number of people and facilities exposed to public health hazards and greater population concentrations (often found in special needs facilities and businesses) put more people at risk. During a disease outbreak those in the immediate isolation area would have little to no warning, whereas, the population further away in the dispersion path may have some time to prepare and mitigate against disease depending on the hazard, its transmission, and public notification.

Due to the nature of public health hazards, jurisdictions within Larimer County with higher numbers of vulnerable individuals are expected to be impacted to a greater extent than others. In the context of extreme temperature events, the most vulnerable members of the Larimer County community are:

- The elderly (people over 65 years of age)
- Children (under 5 years old)
- The infirm

The following table highlights a number of key pandemic vulnerability factors in Larimer County jurisdictions.

Table 20. Biological Hazards / Contagion Vulnerability Factor Data

Jurisdiction	Age: 5 and Under (%)	Age: 65 and Over (%)	Persons Below Poverty Level (%)
Colorado	6.8	10.9	13.2
Larimer County	5.9	11.9	14.1
Town of Berthoud	5.7	12.4	9.3
Town of Estes Park	4.8	25.2	4.2
City of Fort Collins	5.7	8.8	18.6
Town of Johnstown	9.4	8.7	5.1
City of Loveland	6.8	14.9	10.5
Town of Timnath	11.3	7.4	< 1.0
Town of Wellington	10.6	4.8	9.2
Town of Windsor	7.3	10.0	4.8

Source: U.S. Census

The communities of Berthoud, Estes Park, Loveland and Windsor all have higher percentages of elderly residents than the average for the State of Colorado. The communities of Johnstown, Timnath, Wellington, and Windsor have higher percentage of residents who are children, as compared to the

State's average. The City of Fort Collins is the only community in the county with higher than state-average poverty rates. These demographic trends are important to monitor over time as they will present unique challenges for the management and mitigation of biological hazards/contagions.

Preparing for, responding to, and recovering from pandemic influenza will require a strategy that includes a holistic suite of public health activities designed to lessen the impact on morbidity and mortality. These activities include education, vaccination, prophylaxis, isolation/quarantine, and the closure of public facilities. In addition, clear, concise communication with the public and with other agencies remains a critical component, as does the ability of the involved agencies to achieve collaboration and coordination. By its very nature, an influenza pandemic, once started, will not be stopped until it has run its course. This course can be shortened and weakened by a number of factors, with vaccination being the gold standard for protecting the population. Pandemic plans describe strategies of preparedness, response, and recovery to attempt to decrease illnesses and deaths during the pandemic period to manageable levels (i.e., that do not overwhelm the critical infrastructures of the State), and to promote community resiliency and rapid recovery.

The Colorado Department of Public Health and Environment has developed a number of resources related to pandemic health hazards to supplement the State Emergency Operations Plan. Listed below are a number of pandemic response plans, health alert networks, and resources currently available for residents and planners in the State of Colorado and Larimer County.

Table 21. Influenza Planning Resources and Guidelines

Title	Source
Pandemic Influenza Action Plan for Schools (2009)	Colorado Department of Public Health and Environment
Infectious Diseases in Child Care and School Settings: Guidelines for Childcare Providers, School Nurses and Other Personnel (2013)	Colorado Department of Public Health and Environment
Pandemic Influenza Planning Guidelines for Hospitals (2009)	Colorado Department of Public Health and Environment
Home Care Guide: Providing Care at Home During Pandemic Flu (2009)	Colorado Department of Public Health and Environment
Guidelines for Medical Office Pandemic Readiness (2007)	Colorado Department of Public Health and Environment
Social Distancing Support Guidelines for Pandemic Readiness (2008)	Colorado Department of Public Health and Environment
Colorado Health Alert Network (HAN)	Colorado Department of Public Health and Environment
Public Health Emergency Operations Plan	Larimer County
Continuity of Operations Plan	Larimer County
Epidemiology Plan	Larimer County
Quarantine and Isolation Plan	Larimer County
Risk Communication Plan	Larimer County
Strategic National Stockpile and Mass Prophylaxis/Vaccination Point-of-Dispensing Plan	Larimer County

Mass Fatality Plan	
Incident Recovery Plan	
Pandemic Influenza Plan	

Where necessary, details or public information templates unique to pandemic influenza have been included in the plans listed above. The guidelines and plans provide background information related to pandemic influenza and infectious diseases, outline concepts of operations for response, list primary and support functional areas, and outline available resources and tools to mitigate a pandemic and promote community resilience recovery.

Ongoing mitigation activities should focus on preventing infection during flu season. This includes, but is not limited to pre-season community outreach campaigns to educate the public about risks and available support; establishing convenient vaccination centers; reaching out to vulnerable populations and care givers; and issuing advisories and warnings.

5.3.2 Civil Disturbance

NATURAL HAZARD	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Civil Disturbance	0.6	0.6	0.4	0.4	0.2	2.20
MODERATE RISK (2.0 – 2.4)						

Hazard Identification

Civil Disturbance is a catch-all term that describes one or more forms of disturbance caused by a group of people. The term is typically used by law enforcement and includes acts of violence and disorder detrimental to the public law and order. Civil disturbance includes acts such as riots, acts of violence, insurrections, unlawful obstructions or assemblages, or other disorders prejudicial to public law and order. It also includes all domestic conditions requiring or likely to require the use of federal armed forces.

Acts of civil disturbance are usually a symptom and/or form of protest against major socio-political problems, and the severity of the event can coincide with public sentiment or expressions of displeasure. These acts may be spontaneous, such as when a group of people suddenly and unexpectedly erupts into violence, or it may be a planned event, such as a demonstration, a march, or a protest designed to intentionally interfere with another's lawful business or activity.

Universities, industry, government officials and buildings, research laboratories, medical facilities, and populated areas are all potential sites and targets for civil disturbances. All of the communities within the county region have the potential to experience civil disturbance events. The diverse (and rapidly growing) population of the region, coupled with the presence of numerous research facilities, universities, and other outlets for active political and/or social activity contribute to the increased risk for civil disturbance.

Previous Occurrences

The following table highlights a number of notable instances of civil disturbance in Larimer County.

Date	Event	Details
1987	College Daze riots	10,000-12,000 college students involved in disturbance for more than three days in Fort Collins.
1988	Baystone riots	10,000 people involved in civil disturbance over three day period.
1989	Baystone riots	10,000 people involved in civil disturbance over three day period.
1995	Football riots	CSU football team wins WAC Championship, nearly 3,000 people involved in riots over two days.
1997	Whitcomb/Howes	More than 3,000 people involved in two consecutive nights of riots on and near Colorado State University campus.
1998	Super Bowl riot	3,000 to 6, 000 people involved in riots along College Ave., Mountain Ave., and Plum St. after Denver Broncos won the Super Bowl football championship
2000	Stanley Cup riot	2,000 to 3,000 people involved in riots in Old Town Fort Collins after Colorado Avalanche won Stanley Cup hockey championship
2004	CSU Student riots	Fort Collins experienced two consecutive nights of out-of-control parties, which developed into riots near the CSU campus

2013	Riots	Fort Collins experienced riots near the CSU campus after an out-of-control party
2014	Riots	Fort Collins experienced riots near the CSU campus after an out-of-control party

The causes and perpetrators of civil disturbance events are broad. Many of the most recent civil disturbance incidents in the county were located in Fort Collins and were related to annual CSU sporting events and/or large parties that devolved in to riots. Other civil disturbance events have occurred when protesters gathered near Pineridge Reservoir in Larimer County to protest the planned removal of prairie dog colonies. Additionally, extremist groups such as the Animal Liberation Front and the Environmental Liberation Front have been known to be involved in several civil disturbance incidents in Larimer County and the surrounding region. Intelligence reports gathered by law enforcement indicate that several research facilities have been burglarized and/or vandalized, and this included having laboratory facilities destroyed and/or research animals being released.

Recently, "Right to Life" groups have participated in civil disturbance activity by obstructing sidewalks and entryways to certain medical facilities within the communities of Fort Collins, Loveland, and Larimer County. Since 2001, several small-scale civil disturbances involving religious groups have occurred within the City of Fort Collins and other local jurisdictions at local mosques.

Inventory Assets Exposed

All areas of the County and its local jurisdictions are vulnerable to the impacts of civil disturbances. This includes 324,122 people, or 100% of the County's population, and all buildings and infrastructure within the County. The county's critical facilities should be given special attention when planning for and mitigating against future civil disturbance events.

Potential Losses

Generally, civil disturbance events have the potential to cause both injuries and casualties. Additionally, participants in these events often destroy private, commercial, and public property. Additional costs stem from debris removal, maintenance, repair, and response. Indirect costs include loss of industrial and commercial productivity as a result of damage to infrastructure, facilities, or interruption of services. Because no specific, countywide loss estimation process exists for civil disturbance, potential losses are related to historical property damage and injuries/deaths for events of various size.

Probability of Future Occurrences

Although previous civil disturbance events in Larimer County have occurred most frequently in Loveland and Fort Collins, civil disturbance events have the potential to affect the entire planning area. Due to the nature of the hazard, it is an extremely difficult to predict when a civil disturbance event may erupt. The probability of Larimer County and its jurisdictions experiencing a civil disturbance event can be difficult to quantify. However, based on historic record of previous events, it is reasonable to assume that civil disturbance activity will be most probable during certain times of the year (specifically, annual sporting events, holidays, or elections). Keeping aware of these annual events, their anticipated size, and any history of contention between communities will help local law enforcement plan and anticipate potential risks. Civil disturbance will remain a highly likely occurrence for Larimer County over time.

Future Land Use and Development Trends

As Larimer County continues to experience rapid population growth, development, and diversification, it is anticipated that there will be increased exposure to potential casualties, injuries, and property damage due to civil disturbance incidents.

5.3.3 Earthquake

NATURAL HAZARD	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Earthquake	0.6	0.9	0.6	0.4	0.3	2.80
HIGH RISK (2.5 or higher)						

Hazard Identification

An earthquake is the motion or trembling of the ground produced by sudden displacement of rock usually within the upper 10 – 20 miles of the Earth's crust. Earthquakes can affect hundreds of thousands of square miles, cause damage to property measured in the tens of billions of dollars, result in loss of life and injury to hundreds of thousands of people, and disrupt the social and economic functioning of the affected area. Most property damage and earthquake-related deaths are caused by the failure and collapse of structures due to ground shaking which is dependent upon amplitude and duration of the earthquake (FEMA, 1997).

Earthquake Mechanics

Regardless of the source of the earthquake, the associated energy travels in waves radiating outward from the point of release. When these waves travel along the surface, the ground shakes and rolls, fractures form, and water waves may be generated. Earthquakes generally last a matter of seconds but the waves may travel for long distances and cause damage well after the initial shaking at the point of origin has subsided.

Breaks in the crust associated with seismic activity are known as "faults" and are classified as either active or inactive. Faults may be expressed on the surface by sharp cliffs or scarps or may be buried below surface deposits.

"Foreshocks," minor releases of pressure or slippage, may occur months or minutes before the actual onset of the earthquake. "Aftershocks," which range from minor to major, may occur for months after the main earthquake. In some cases, strong aftershocks may cause significant additional damage, especially if the initial earthquake impacted emergency management and response functions or weakened structures.

Factors Contributing to Damage

The damage associated with each earthquake is subject to four primary variables:

- The nature of the seismic activity
- The composition of the underlying geology and soils
- The level and quality of development of the area struck by the earthquake
- The time of day

Seismic Activity: The properties of earthquakes vary greatly from event to event. Some seismic activity is localized (a small point of energy release), while other activity is widespread (e.g., a major fault shifting or slipping all at once). Earthquakes can be very brief (only a few seconds) or last for a minute or more.

The depth of release and type of seismic waves generated also play roles in the nature and location of damage; shallow quakes will hit the area close to the epicenter harder, but tend to be felt across a smaller region than deep earthquakes.

Geology and Soils: The surface geology and soils of an area influence the propagation (conduction) of seismic waves and how strongly the energy is felt. Generally, stable areas (e.g., solid bedrock) experience less destructive shaking than unstable areas (e.g., fill soils). The siting of a community or even individual buildings plays a strong role in the nature and extent of damage from an event**.**

Development: An earthquake in a densely populated area which results in many deaths and considerable damage may have the same magnitude as a shock in a remote area that has no direct impacts. Large magnitude earthquakes that occur beneath the oceans may not even be felt by humans.

Time of Day: The time of day of an event controls the distribution of the population of an affected area. On work days, the majority of the community will transition between work or school, home, and the commute between the two. The relative seismic vulnerability of each location can strongly influence the loss of life and injury resulting from an event.

Types of Damage

Often, the most dramatic evidence of an earthquake results from the vertical and/or horizontal displacement of the ground along a fault line. This displacement can sever transportation, energy, utility, and communications infrastructure potentially impacting numerous systems and persons. These ground displacements can also result in severe and complete damages to structures situated on top of the ground fault. However, most damage from earthquake events is the result of shaking. Shaking also produces a number of phenomena that can generate additional damage

- Additional ground displacement
- Landslides and avalanches
- Liquefaction and subsidence
- Seismic Seiches

Shaking: During minor earthquake events, objects often fall from shelves and dishes rattle. In major events, large structures may be torn apart by the forces of the seismic waves. Structural damage is generally limited to older structures that are poorly maintained, poorly constructed, or improperly (or not) designed for seismic events. Un-reinforced masonry buildings and wood frame homes not anchored to their foundations are typical victims of earthquake damage.

Loose or poorly secured objects also pose a significant hazard when they are loosened or dropped by shaking. These “non-structural falling hazard” objects include bookcases, heavy wall hangings, and building facades. Home water heaters pose a special risk due to their tendency to start fires when they topple over and rupture gas lines. Crumbling chimneys may also be responsible for injuries and property damage.

Dam and bridge failures are significant risks during stronger earthquake events, and due to the consequences of such failures, may result in considerable property damage and loss of life. In areas of severe seismic shaking hazard, shaking Intensity levels of VII or higher (see Table 35) can be experienced even on solid bedrock. In these areas, older buildings especially are at significant risk.

Ground Displacement: Ground displacement can also occur due to shaking, resulting in similar damages as mentioned previously.

Landslides and Avalanches: Even small earthquake events can cause landslides. Rock falls are common as unstable material on steep slopes is shaken loose, but significant landslides or even debris flows can be generated if conditions are ripe. Roads may be blocked by landslide activity, hampering response and recovery operations. Avalanches are possible when the snowpack is sufficient.

Liquefaction and Subsidence: Soils may liquefy and/or subside when impacted by the seismic waves. Fill and previously saturated soils are especially at risk. The failure of the soils has the potential to cause widespread structural damage. The oscillation and failure of the soils may result in increased water flow and/or failure of wells as the subsurface flows are disrupted and sometimes permanently altered. Increased flows may be dramatic, resulting in geyser-like water spouts and/or flash floods. Similarly, septic systems may be damaged creating both inconvenience and health concerns.

Seiches: Seismic waves may rock an enclosed body of water (e.g., lake or reservoir), creating an oscillating wave referred to as a "seiche." Although not a common cause of damage in past Colorado earthquakes, there is a potential for large, forceful waves similar to a tsunami ("tidal waves") to be generated on the large reservoirs. Such a wave would be a hazard to shoreline development and pose a significant risk on dam-created reservoirs. A seiche could either overtop or damage a dam leading to downstream flash flooding.

Environmental impacts of earthquakes can be numerous, widespread, and devastating, particularly if indirect impacts are considered. Some examples of impacts are listed below:

- Induced flooding and landslides
- Poor water quality
- Damage to vegetation
- Breakage in sewage or toxic material containments

HAZARD PROFILE

The impact an earthquake event has on an area is typically measured in terms of earthquake intensity. Intensity is most commonly measured using the Modified Mercalli Intensity (MMI) Scale based on direct and indirect measurements of seismic effects.

Another way to express an earthquake's severity is to compare its acceleration to the normal acceleration due to gravity. Peak ground acceleration (PGA) measures the strength of ground movements in this manner. PGA represents the rate in change of motion of the earth's surface during an earthquake as a percent of the established rate of acceleration due to gravity. PGA can be partly determined by what soils and bedrock characteristics exist in the region. Unlike the Richter scale, PGA is not a measure of the total energy released by an earthquake, but rather of how hard the earth shakes at a given geographic area (the intensity). PGA is measured by using instruments including accelerographs and correlates well with the Mercalli scale.

When the peak ground acceleration nears 0.04 – 0.092g, an earthquake can be felt by people walking outside. As PGA nears 0.19 – 0.34g the intensity is considered to be very strong. At this level, plaster can break off and fall away from structures and cracks in walls often occur. PGA magnitudes of 1.24g are

considered to be very disastrous. This magnitude of ground acceleration represents an earthquake of roughly 6.9 to 8.1 on the Richter Scale. A detailed description of the Modified Mercalli Intensity Scale is shown in the table below.

Table 22. Modified Mercalli Intensity Scale

SCALE	INTENSITY	DESCRIPTION OF EFFECTS	PGA (g)	RICHTER SCALE MAGNITUDE
I	Instrumental	Detected only on seismographs	< 0.0017	< 4.2
II	Feeble	Some people feel it	0.0018 – 0.014	
III	Slight	Felt by people resting; like a truck rumbling by		
IV	Moderate	Felt by people walking	0.015 – 0.039	
V	Slightly Strong	Sleepers awake; church bells ring	0.040 – 0.092	< 4.8
VI	Strong	Trees sway; suspended objects swing; objects fall off shelves	0.093 – 0.18	< 5.4
VII	Very Strong	Mild alarm, walls crack, plaster falls	0.19 – 0.34	< 6.1
VIII	Destructive	Moving cars uncontrollable, masonry fractures, poorly constructed buildings damaged	0.34 – 0.65	< 6.9
IX	Ruinous	Some houses collapse, ground cracks, pipes break open	0.65 – 1.24	
X	Disastrous	Ground cracks profusely, many buildings destroyed, liquefaction and landslides widespread	> 1.24	< 7.3
XI	Very Disastrous	Most buildings and bridges collapse, roads, railways, pipes and cables destroyed, general triggering of other hazards	> 124	< 8.1
XII	Catastrophic	Total destruction, trees fall, ground rises and falls in waves	> 124	> 8.1

Studies indicate that there are about 100 potentially active fault lines in Colorado. Over 500 earthquake tremors of magnitude 2.5 or higher have been recorded across the state since 1870. It is likely that more earthquakes of similar magnitude occurred during that time, but were not recorded due to low population densities and limited coverage of sensors across most of the state. For comparison, over 20,500 similarly sized events have been recorded in the State of California since 1870.

Relative to other western states, Colorado's earthquake risk is higher than Kansas or Oklahoma, lower than Utah, and much lower than Nevada and California (Colorado OEM, 2003). Despite Colorado's lower earthquake risk, based on geologic observations and characteristics of faults located in the region, seismologists predict that Colorado will indeed experience a magnitude 6.5 earthquake at some point in the future.

Earthquakes are extremely difficult to predict and their occurrence rate is determined in one of two ways. If geologists can find evidence of distinct, datable earthquakes in the past, the number of these ruptures is used to define an occurrence rate. If evidence of ruptures is not available, geologists estimate fault slip rates from accumulated scarp heights and estimated date for the oldest movement on the scarp. Because a certain magnitude earthquake is likely to produce a displacement (slip) of a certain size, we can estimate the rate of occurrence of earthquakes of that magnitude.

Recurrence rates are different for different assumed magnitudes thought to be "characteristic" of that fault type. Generally, a smaller magnitude quake will produce a faster recurrence rate, and for moderate levels of ground motion, a higher hazard risk. Future earthquakes are assumed to be likely to occur where earthquakes have produced faults in the geologically recent past. Quaternary faults are faults that have slipped in the last 1.8 million years and it is widely accepted that they are the most likely source of future large earthquakes. For this reason, quaternary faults are used to make fault sources for future earthquake models.

CLIMATE CHANGE IMPACTS

Climate change is not expected at this time to have any impacts on geological hazards such as earthquakes. There is potential for increased heat and reduced soil moisture to contribute to the instability of regional soils. In theory, these subtle changes to the surface of the earth may affect the damage profile of local earthquake events in the future. However, it is unlikely that earthquake events in Larimer County will be affected by climate change in a measurable way.

Previous Occurrences

Earthquakes are relatively infrequent in Colorado and records of historical earthquakes in and around Larimer County are limited. The following Table provides a list of Colorado's larger earthquakes recorded since 1870.

Table 23. Notable Earthquake Events in Colorado (1870 – 2015)

Date	Location	Magnitude	Intensity
1870	Pueblo/Ft. Reynolds	-	VI
1871	Lily Park, Moffat County	-	VI

Date	Location	Magnitude	Intensity
1880	Aspen	-	VI
1882	Larimer County	6.6*	VII
1891	Axial Basin (Maybell)	-	VI
1901	Buena Vista	-	VI
1913	Ridgeway Area	-	VI
1944	Montrose/Basalt	-	VI
1955	Lake City	-	VI
1960	Montrose/Ridgeway	5.5	V
1966	NE of Denver	5.0	V
1966	CO-NM border, near Dulce, NM	5.5	VII
1967	NE Denver	5.3	VII
1967	NE Denver	5.2	VI
2011	Southwest of Trinidad	5.3	VIII

*Estimated, based on historical felt reports
Source: Colorado Geological Survey

The most economically damaging earthquake in Colorado's history occurred on August 9th, 1967 in the Denver metro area. The 5.3 magnitude earthquake caused more than a million dollars of damage in Denver and the northern suburbs. The August 1967 earthquake was followed by an earthquake of magnitude 5.2 three months later in November 1967. Although these two earthquake events cannot be classified as "major earthquakes" they are significant because of their location along the Front Range Urban Corridor, an area where nearly 75 percent of Colorado residents and many critical facilities are located. Historically, earthquake risk in Colorado has been rated lower than most subject experts consider justified. It is critically important that local emergency managers in and around Larimer County become fully aware of the size and consequences of an earthquake that could occur.

Inventory Exposed

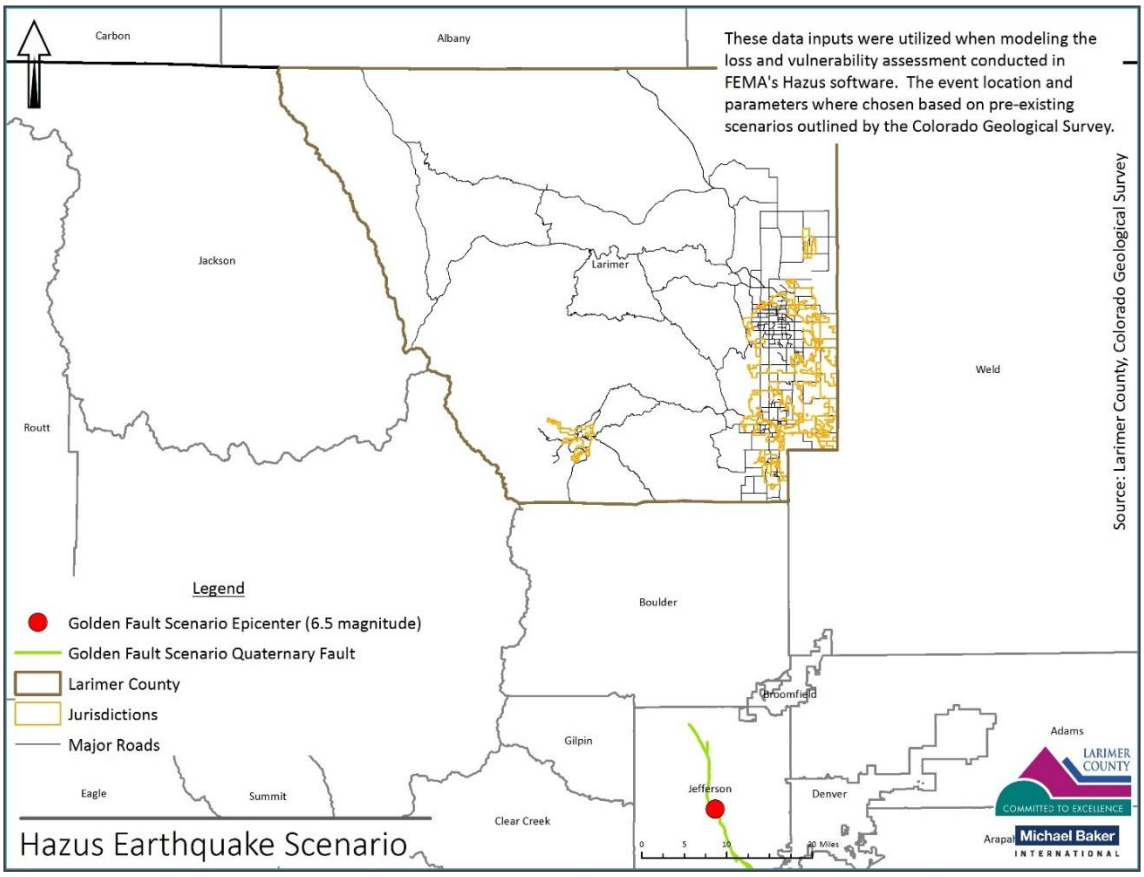
The most appropriate risk assessment methodology for seismic hazards involves scenario modeling using FEMA's Hazus loss estimation software. Hazus is a very useful planning tool because it provides an acceptable means of forecasting earthquake damage, loss of function of infrastructure, and casualties, among many other factors. There are three levels of Hazus analysis, from Level 1, which uses the default

FEMA-derived datasets and damage functions, to Level 3, which uses independently compiled and accurately verified structure and infrastructure inventories and damage functions.

Utilizing Hazus 2.2, FEMA's loss estimation and hazard modeling software, a detailed earthquake analyses was conducted for infrastructure within Larimer County. The risk assessment leveraged locally managed inventory, hazard, and terrain data, where available. Hazus is a regional earthquake loss estimation model developed by FEMA and the National Institute of Building Science. The primary purpose of Hazus is to provide a methodology and software application to develop earthquake loss at a regional scale.

The Hazus earthquake scenario modeled a 6.5 event along the Golden Fault, located approximately 36 miles south of Larimer County. This scenario was used because it represents the "worst case scenario": a large earthquake event along the closest quaternary fault to the county. Statewide soil type and landslide layers were incorporated into the model in order to further refine the results of the analysis. Ground motion was modeled for the event at each structure point in order to provide building loss estimates as well as at the census tract level to estimate debris generation and shelter requirements.

Figure 7. Hazus Earthquake Scenario – Larimer County[10]



Structure point data was leveraged from a previous FEMA losses avoided study that was done in region. Additional pre-processing was necessary to prepare these points for the countywide analysis in Hazus and in some cases field assumptions were made based on the standards set forth in FEMA's regional guidance as well as the Hazus manuals. It should be noted that point location was not further refined, and FEMA manually adjusted those points only within their particular areas of interest/analysis. Finally, areas without an assessed or improved value were removed from the resulting loss estimates as it was assumed that there was no structure present in these land parcels.

Potential Losses

In Colorado, earthquakes are considered low probability, high-consequence events. Although earthquakes may occur infrequently they can have devastating impacts. Ground shaking can lead to the collapse of buildings and bridges; disrupt gas, life lines, electric, and phone service. Deaths, injuries, and extensive property damage are possible vulnerabilities from this hazard. Some secondary hazards caused by earthquakes may include fire, hazardous material release, landslides, flash flooding, avalanches, tsunamis, and dam failure. Moderate and even very large earthquakes are inevitable, although very

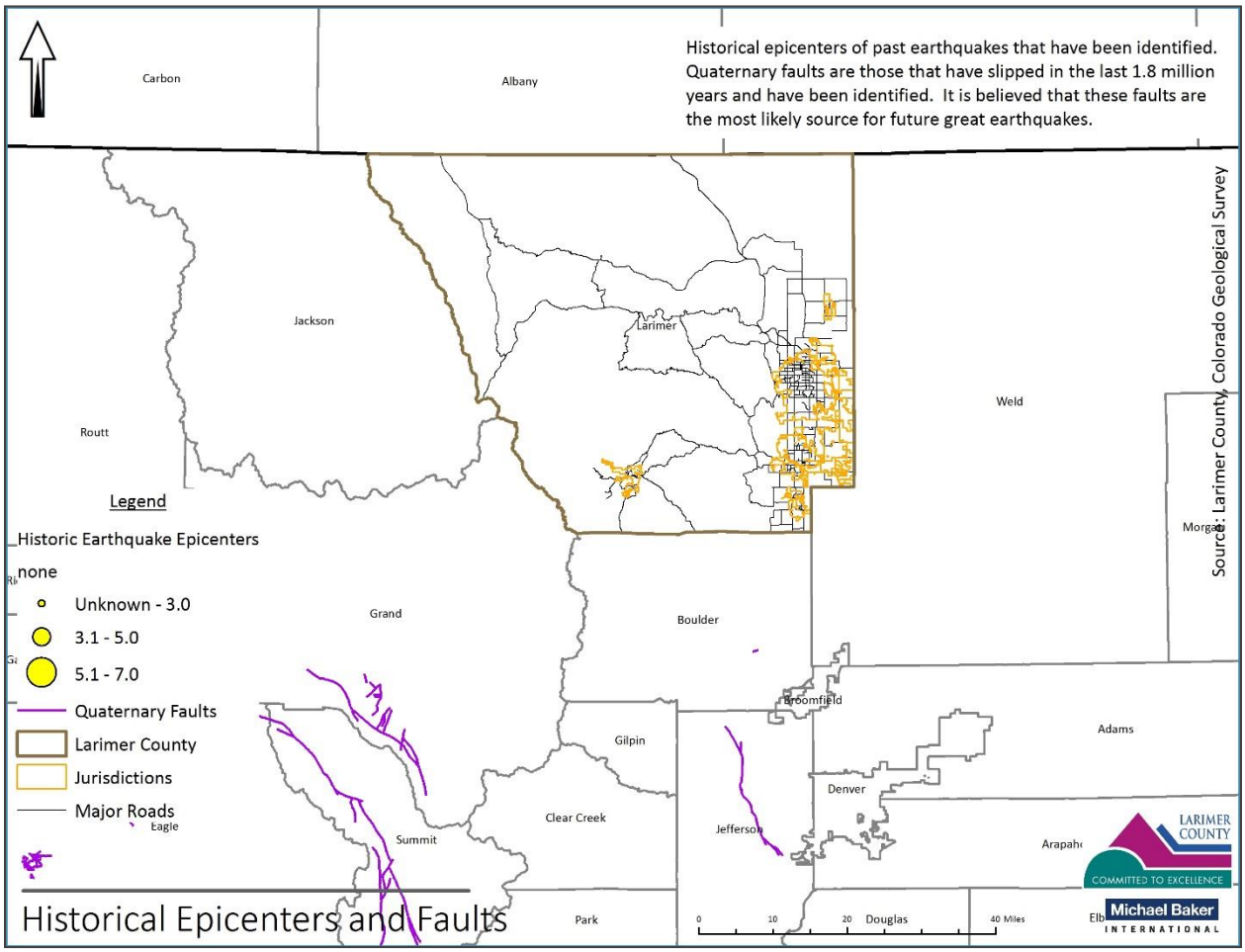
[10] Scenario with an epicenter defined along the golden fault at a Latitude of 39.65 and a Longitude of -104.38 Decimal Degrees. The moment magnitude of this epicenter was defined as 6.5.

infrequent, in areas of normally low seismic activity. Consequently, buildings in these regions are seldom designed to deal with an earthquake threat; therefore, they are extremely vulnerable.

Most property damage and earthquake-related injuries and deaths are caused by the failure and collapse of structures due to ground shaking. The level of damage depends upon the amplitude and duration of the shaking, which are directly related to the earthquake size, distance from the fault, site, and regional geology. Other damaging earthquake effects include landslides, the down-slope movement of soil and rock (mountain regions and along hillsides), and liquefaction, in which ground soil loses shear strength and the ability to support foundation loads. In the case of liquefaction, anything relying on the substrata for support can shift, tilt, rupture, or collapse.

For the risk assessment conducted as part of the 2016 Plan, a 6.5-magnitude earthquake scenario with an epicenter on the Golden Fault was simulated in Hazus. Again, this scenario's event parameters and locations were chosen based on pre-existing scenarios outlined by the Colorado Geological Survey. The Front Range is defined by a 500- to 1,000-m-high, east-facing escarpment called the Golden Fault that is both a tectonic and erosional feature. The Golden Fault is a quaternary fault that bounds the eastern side of the Front Range near the town of Golden, adjacent to the Denver Metropolitan Area. The Golden Fault was selected as an epicenter because it is the closest proximity quaternary fault to Larimer County. The map below depicts Larimer County and the location and magnitude of historical earthquake events in the region.

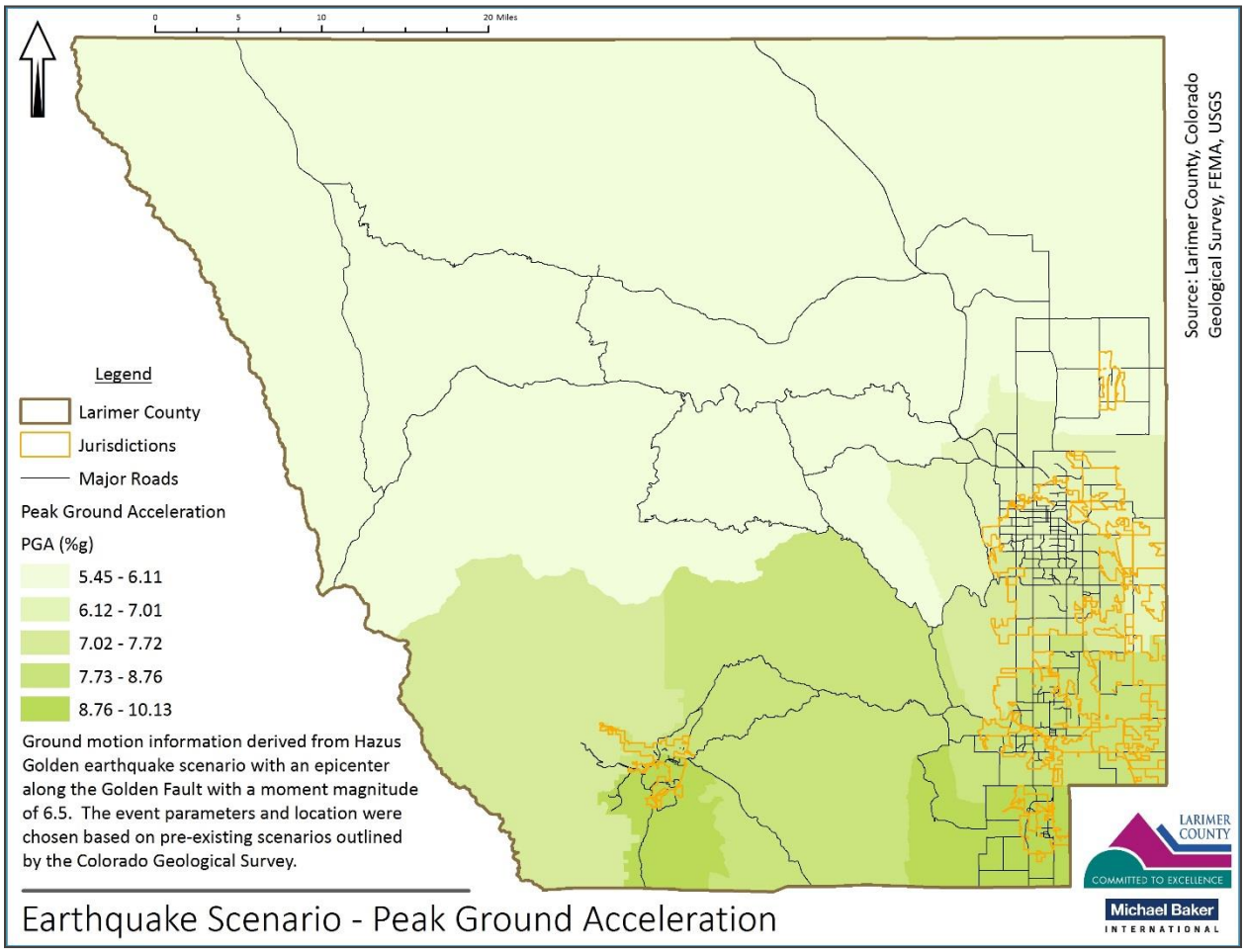
Figure 8. Historic Earthquake Epicenters – Larimer County[11]



In the following two maps Peak Ground Acceleration (PGA) for the Golden Fault scenario is represented as %g. The Golden Fault model shows relatively low PGA in the northern part of Larimer County as the energy released from the Golden fault radiates away from the epicenter. The majority of the high PGA values are found in southern part of the County.

[11] Statewide historical reported earthquake epicenters, as of 12-9-2013. Source: Colorado Geological Survey

Figure 9. Peak Ground Acceleration – Larimer County[12]



Loss estimates from the Hazus scenario is included in the following Tables and maps. Data summarized for the scenario includes the following:

- Expected building damage (number of structures) by occupancy
- Expected building damage (number of structures) by building type
- Expected damage to essential facilities (number of structures)
- Expected building loss estimates ($)

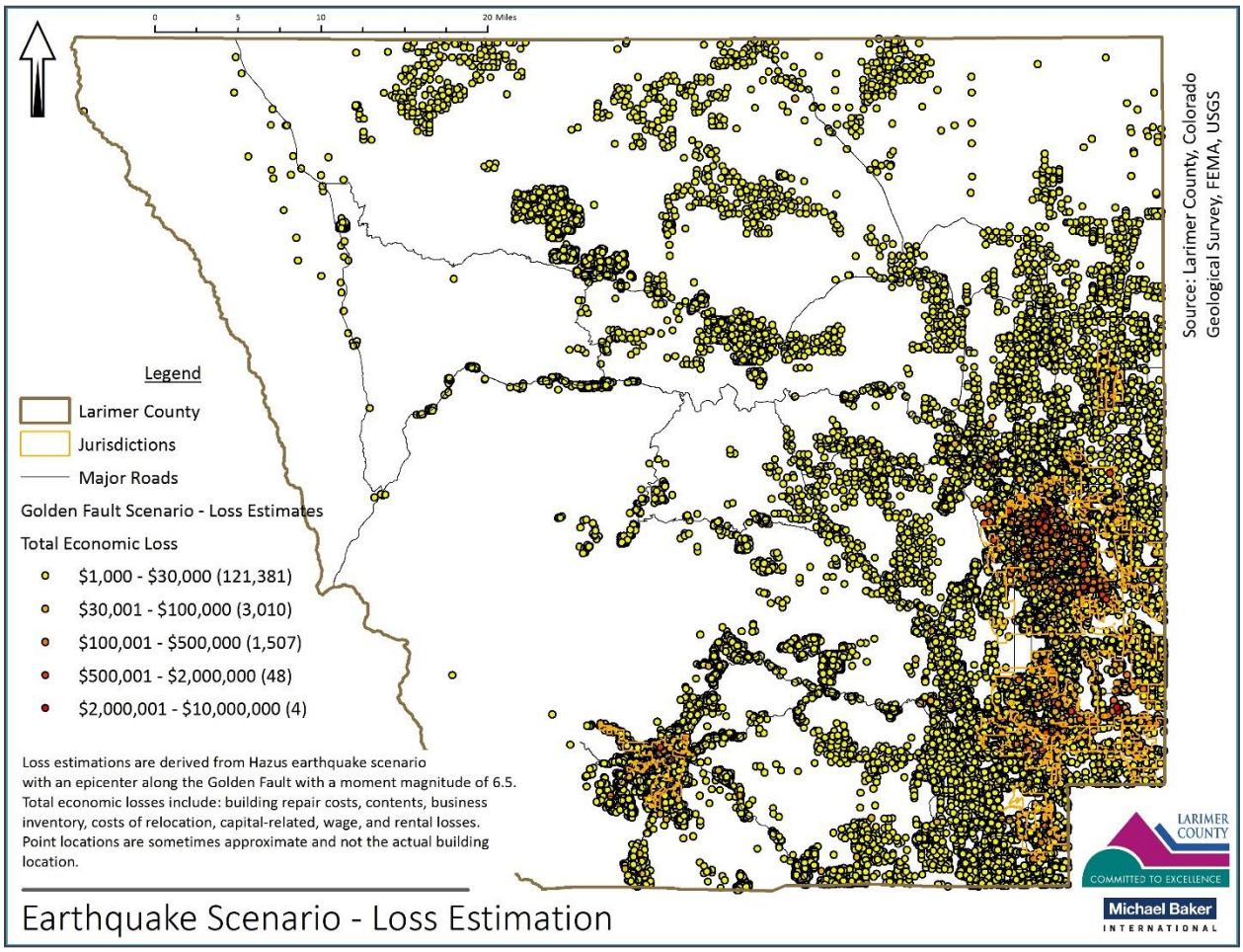
Economic Losses and Building Damage

The following Figure provides a map of total economic losses in Larimer County projected by the Golden Fault earthquake scenario. Total economic losses include losses from building/infrastructure damage, relocation, and business interruption. For the Golden Fault earthquake scenario, the total losses were

[12] Ground motion information derived from Hazus-MH 2.1 earthquake scenario with an epicenter defined along the golden fault at a Latitude of 39.74 and a Longitude of -105.22 Decimal Degrees. The moment magnitude of this epicenter was defined as 6.5.

estimated to be approximately $726,604,919. Spatially, a majority of the high loss areas were located in the eastern, urban portion of the county. Generally, these are areas which are more densely/highly populated and more closely located to the Golden epicenter.

Figure 10. Earthquake Scenario Loss Estimation – Larimer County[13]



Hazus measures direct building economic losses. The direct building losses are the estimated costs to repair or replace the damage caused to a building and its contents. The following Table details the Hazus loss estimates for the Golden Fault event.

[13] FEMA's loss estimation modeling software, Hazus, was utilized to produce this data set. A 6.5 magnitude earthquake scenario was defined along the Golden fault and losses were calculated for each point (structure) based on the Hazus damage curves for specific structure attributes (such as foundation type, building type, and first flood height). Information derived from Hazus-MH 2.2 earthquake scenario. Total Losses equals a sum of building losses, content losses, and inventory losses.

Table 24. Economic Losses – Golden Fault Scenario (Losses in Millions of Dollars)

Category	Single Family	Other Residential	Commercial	Industrial	Other	Total
Direct Structural Losses	$217.4	$ 41.7	$147.9	$7.0	$312.6	$726.6

The expected damages in Larimer County are defined by the following parameters:

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

Hazus estimates that approximately 101,822 buildings in the County will have no damage, approximately 8,153 buildings will be at least slightly damaged, approximately 765 buildings will be at least moderately damaged, approximately 37 buildings will be at least extensively damaged, and approximately 5 buildings in the County will be completely damaged if a 6.5 earthquake were to occur on the Golden Fault.

Damages to Critical Facilities/Infrastructure

The Hazus earthquake model also provides estimates relating to the expected damages to and functionality of the County's critical facilities and critical infrastructure, as defined by Hazus. The tables on the following pages detail these estimates.

For the Golden Fault scenario, the following Table provides post-event damage and functionality estimates for specific types of essential facilities within Larimer County. In addition to estimating the number of facilities what will suffer either moderate or complete damage to over 50% of the structure, the table shows the number of facilities that will be operating at or over 50% functionality almost immediately after the earthquake event.

Table 25. Golden Fault Scenario – Expected Damage to Critical Facilities

Classification	Total	# of Facilities		
		At Least Moderate Damage >50%	Complete Damage >50%	With Functionality >50% on day 1
Church	178	<6	<1	177
Day Care	31	<1	<1	31

Classification	Total	# of Facilities		
		At Least Moderate Damage >50%	Complete Damage >50%	With Functionality >50% on day 1
Distribution Warehouse	28	<1	<1	28
Dormitory	16	<1	<1	16
Elderly Housing/Care	36	<1	<1	36
Fire Station	29	<1	<1	29
Government	17	<1	<1	17
Jail/Correctional Facility	1	<1	<1	1
Laboratories	9	<1	<1	9
Library	10	<1	<1	10
Medical Facilities	372	<6	<1	372
Mortuary	5	<1	<1	5
Post Office	8	<1	<1	8
Schools	118	<4	<1	118
Supermarket	12	<1	<1	12
Visitor Center	3	<1	<1	3
Miscellaneous	31	<1	<1	31

Probability of Future Occurrences

Even though the seismic hazard risk in Larimer County is low to moderate, it is likely that earthquakes will occur in the county in the future. It is reasonable to expect future earthquakes as large as magnitude 6.5, the largest event on record in Colorado. Calculations based on the historical earthquake records and geological evidence of recent fault activity suggest that an earthquake of magnitude 6 or greater may be expected somewhere in Colorado every several centuries.

Earthquakes strike with little to no warning and they are capable of having multiple impacts on an area. After-effects from an earthquake can include impacted roadways, downed power and communication

lines, fires, and damages to structures (especially poorly built, or those already in disrepair). Earthquakes are not a seasonal hazard, and thus can be experienced year round. This fact presents its own set of planning and preparedness concerns.

Ultimately, the probability of an earthquake occurring in Larimer County is low. Additionally, if an earthquake were to occur in the near future it is likely to be of a low magnitude, with expected damages to property and people to be minimal. History has shown, however, that Larimer County and Colorado are at risk to a larger magnitude seismic event. Should that type of event occur, major damages and losses should be expected. This fact makes these low probability, high impact hazards a challenge to deal with when planning a mitigation strategy to combat all hazards faced by a community.

Standard building codes have the opportunity to provide Larimer County with reasonable guidance for development throughout unincorporated and incorporated areas. Contractors and builders should be aware of applicable codes and regulations designed to reduce losses sustained by new and existing construction due to seismic hazards.

For example, the light weight of wood frame buildings results in less force from inertia. Less force means less damage. Wood's natural flexibility also is an advantage when seismic forces are brought to bear and the nailed joints in wood frame buildings dissipate energy and motion. Wood's inherent earthquake resistance must be accompanied by design and construction techniques that take advantage of those characteristics.

Structural wood panels nailed to wall framing add rigid bracing, help resist lateral loads and help tie framing members together. Bolted connections at the sill plate/foundation joint help keep the structure in one spot. Securely connected wall, floor, and roof framing also help tie a structure together and make it a single, solid structural unit. Proper connections will do more to hold a house together during an earthquake than any other single seismic design element.

As development grows in the County and its municipalities, it will be important for citizens to consult with local building codes as modern building codes generally require seismic design elements for new construction.

Land Use and Development

With the unpredictable nature of earthquake epicenter locations, it is not feasible to identify specific areas where development may exacerbate the risk to an earthquake. It should be assumed that all development increases the risk to the County from the threat of earthquakes. As population and development continue to expand in Larimer County, continued enforcement of the unified construction code has great potential to mitigate increasing vulnerability and development pressure.

Earthquakes are relatively uncommon in Larimer County and the probability is low that they will occur regularly in the future. However, if an event was to occur within the county, there is potential for significant structural damage to occur near the epicenter. Due to the nature of earthquake hazards, areas in Larimer County with high population densities and large numbers of structures and critical facilities are expected to experience greater damage and loss from an earthquake event. This includes jurisdictions located primarily in the southern, central eastern and southwestern portion of the county, including:

- Fort Collins
- Loveland

- Windsor
- Berthoud
- Johnstown
- Estes Park

Communities located in the eastern part of the County, may experience differential impacts from an earthquake event if transportation or utility infrastructure is damaged and prevents communities from responding or evacuating.

5.3.4 Erosion / Deposition

NATURAL HAZARDS	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Erosion/Deposition	0.9	0.6	0.2	0.4	0.2	2.30
MODERATE RISK HAZARD (2.0 - 2.4)						

Hazard Identification

Erosion and deposition is the removal and transportation of earth materials from one location to another by water, wind, waves, or moving ice. It occurs when soil is removed at a greater rate than it is formed. The natural geologic process of erosion has occurred since the Earth's formation and continues at a very slow and uniform rate. Soil erosion hazard is the term used to describe how likely it is for soil in a given area to erode. It depends on the inherent properties of the soil, the topography, vegetative cover, soil disturbance (including over-grazing, drought, flooding, wind, etc.), and rainfall intensity.

Although soil erosion is a natural process, rapid erosion can lead to a serious loss of topsoil and a reduction of cropland productivity. It can also contribute to the pollution of adjacent watercourses, wetlands, and lakes. During the processes of wind and water erosion, infrastructure and mechanical equipment can be damaged by soil build-up and dust. Additionally, blowing soils can affect human and animal health and create public safety hazards.

Land Subsidence describes any depressions, cracks, and/or sinkholes in the earth's surface which can threaten people and property. Causes of subsidence include, but are not limited to, the removal or reduction of sub-surface fluids (water, oil, gas, etc.), mine subsidence, and hydro compaction. Of these causes, hydro compaction and mine subsidence usually manifest as localized events, while fluid removal may occur either locally or regionally.

HAZARD PROFILE

Soil erosion and deposition have the potential to cause substantial losses to Larimer County assets. Erosion and deposition alone pose little harm to the county; however, when assets are placed in close proximity to erosion and deposition-prone environments such as a valley near a stream or riverbed, hazard vulnerability increases significantly. For example, when heavy rain and snowmelt result in increased stream flow, the erosion of riverbanks can pose significant risks to transportation infrastructure, including roads and bridges. Severe erosion can remove earth from beneath bridges, roads, and foundations of structures adjacent to streams. In Larimer County, the deposition of material can block culverts, aggravate flooding, destroy crops and lawns, and reduce capacity in water reservoirs.

Due to the difficulties in truly defining an "erosional" event and the lack of identified subsidence occurrences, it is not possible to attempt to calculate any type of probability for future events. It can be assured though, that erosion will continue to slowly alter the landscape of Larimer County going forward.

CLIMATE CHANGE IMPACTS

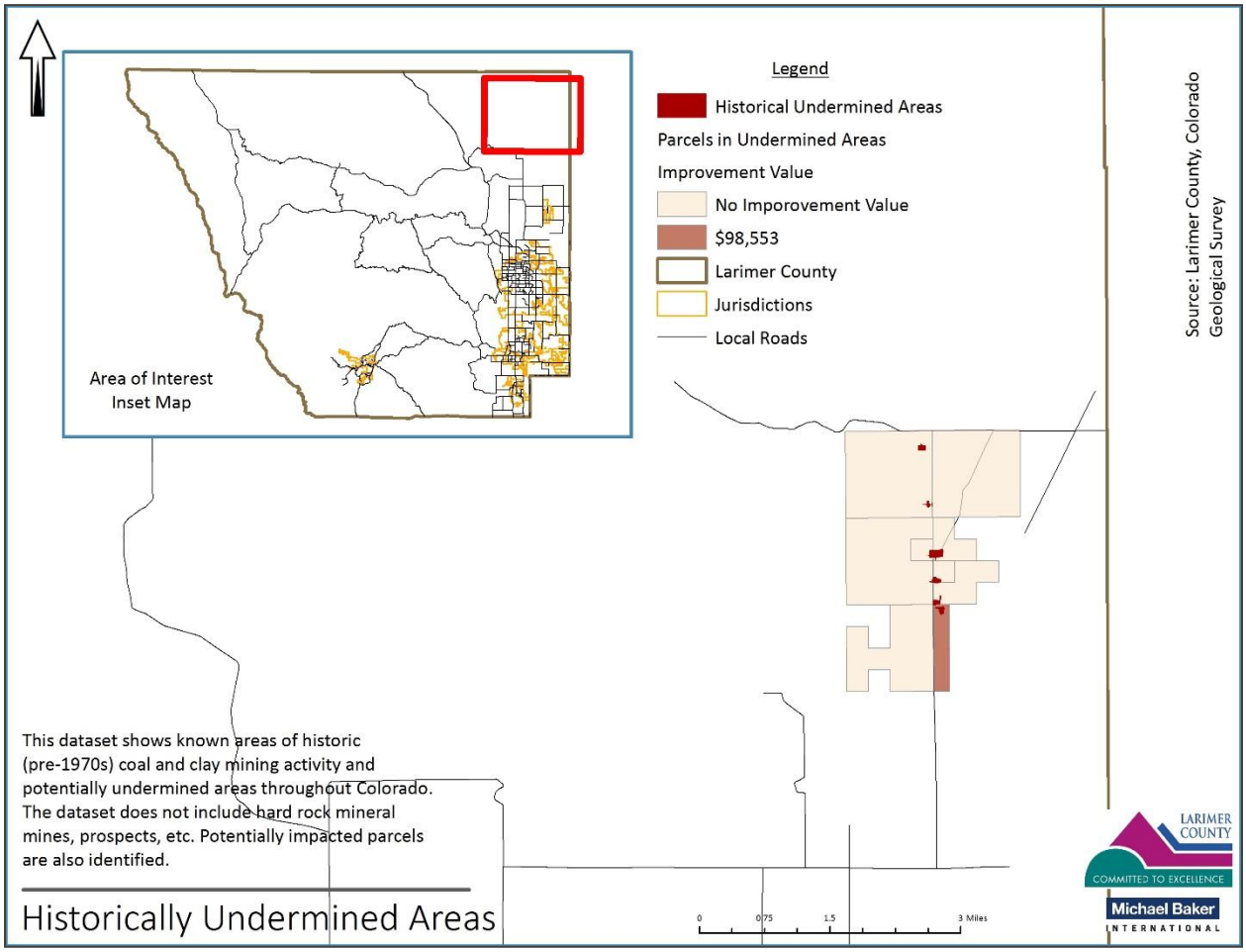
Changing climate norms are expected to affect soil resources in many ways. During hot, dry years annual grasses that stabilize and protect topsoil often fail to germinate or do not grow well. This leaves soil

surfaces highly vulnerable to erosion from wind and precipitation.[14] Without the availability of nutrient-rich topsoil, crops struggle to survive and flourish. As discussed previously, higher rates of erosion can have a profound effect on agricultural production and on the economies of rural areas of the county.

Previous Occurrences

Based on data provided by CGS, there are undermined areas within northeastern Larimer County that are more vulnerable to subsidence. The following Figure presents a map identifying the locations within Larimer County that have potential for subsidence due to historical mining activity.

Figure 11. Historically Undermined Areas – Larimer County[15]



Parcels were identified using CGS data. This dataset shows areas of historic (pre-1970s) coal and clay mining activity and potentially undermined areas throughout Colorado. The dataset does not include hard rock mineral mines, prospects, etc. Due to incomplete historic mine records and survey errors, the dataset

[14] Belnap, J., and D.J. Eldridge. (2003). *Disturbance and recovery of biological soil crusts*.

[15] This dataset shows areas of historic (pre-1970s) coal and clay mining activity and potentially undermined areas throughout Colorado. The dataset does not include hard rock mineral mines, prospects, etc. Due to incomplete historic mine records and survey errors, the dataset should NOT be considered complete or perfectly accurate. The dataset was developed from multiple sources and digitized by the Colorado Geological Survey in 2008.

should NOT be considered complete or perfectly accurate. The dataset was developed from multiple sources and digitized by the Colorado Geological Survey in 2008.

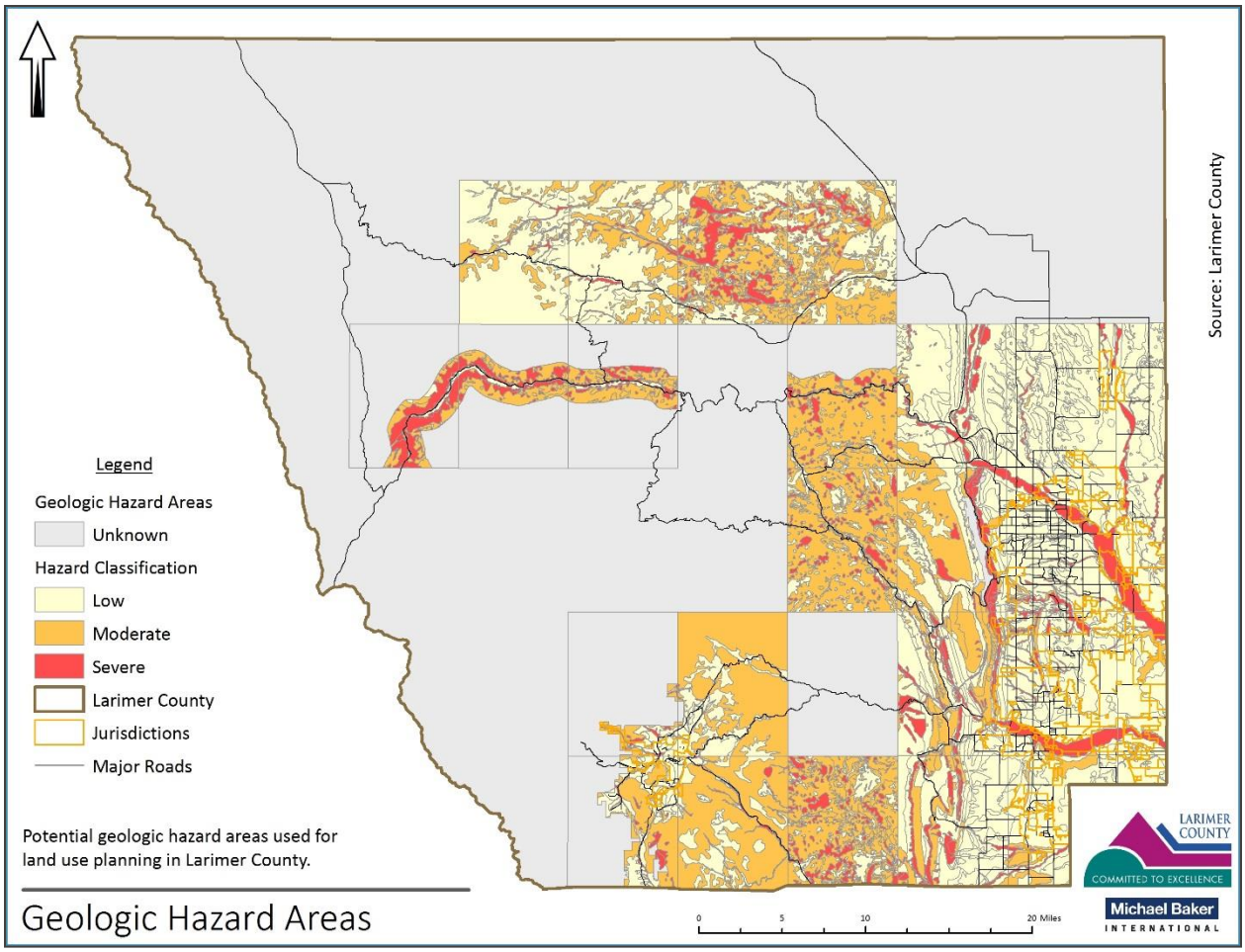
The map of undermined areas shows areas of historic (pre-1970s) coal and clay mining activity and potentially undermined areas throughout Larimer County. The dataset was developed from multiple sources and digitized by the Colorado Geological Survey in 2008 and presents a spatial view of potential risk.

There is no historical data available for collapsible soil areas, expansive soil areas, or subsidence areas.

Inventory Exposed

There are a number of locations across Larimer County that are vulnerable to erosion and deposition. As population growth brings new development into available land in the county, more inventory assets may become exposed to erosion and deposition hazards. The following figure shows geological hazard areas in Larimer County.

Figure 12. Geological Hazard Areas – Larimer County[16]

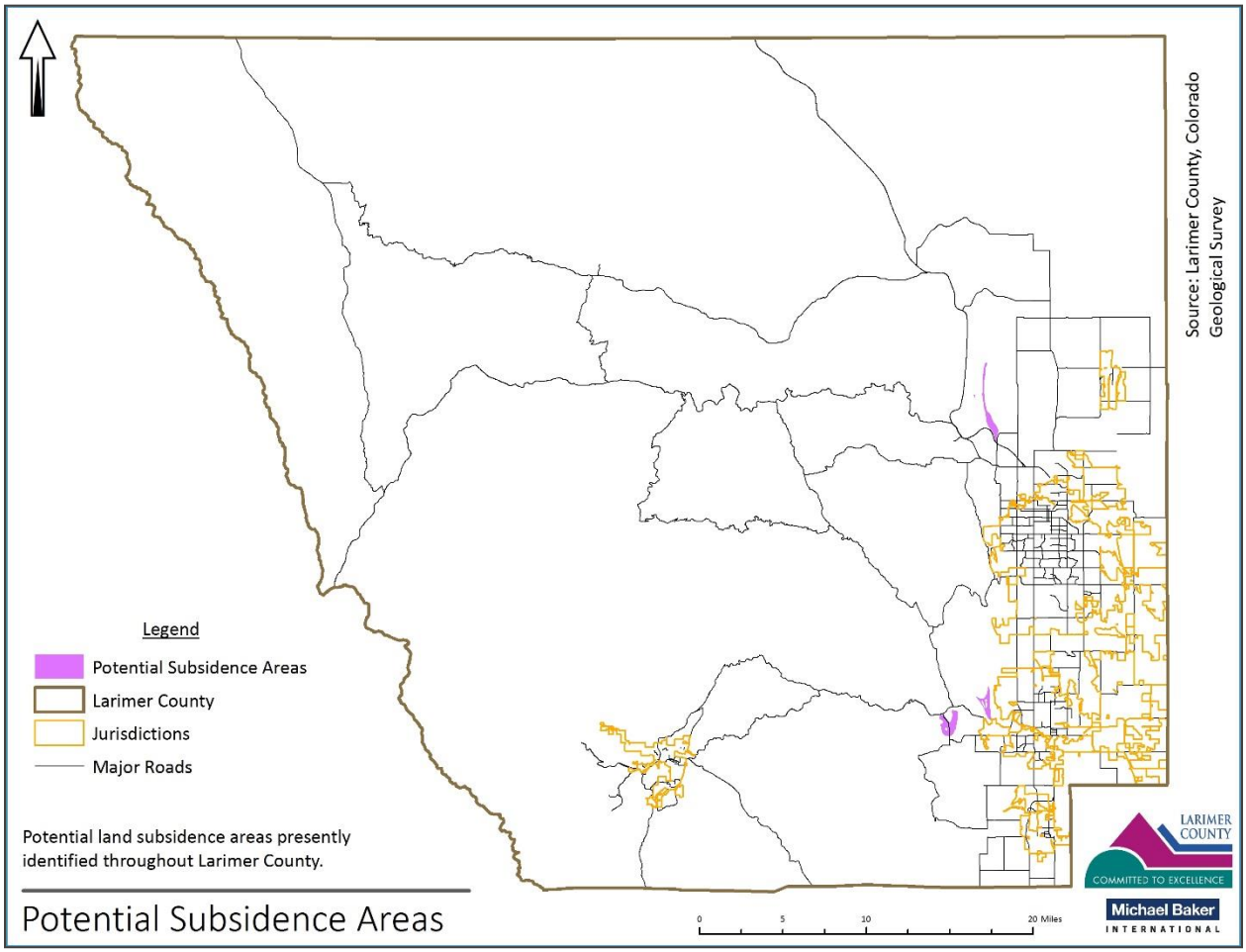


[16] Used for identifying geologic hazard areas for land use. Source: Larimer County, CGS

Land subsidence can occur rapidly due to sinkholes, the collapse of underground mines, or during an earthquake. Subsidence can also take place slowly, becoming evident over the time span of many years. Soils that tend to collapse and settle are those characterized by low-density materials that shrink in volume when they become wet and/or are subjected to weight from development. Subsidence events, depending on their location, can pose significant risks to health, safety, and local agricultural economies and interruption to transportation, and other services.

There are hundreds of abandoned underground coal mines scattered throughout Colorado that present potential subsidence hazards to structures and surface improvements. The Colorado Geological Society (CGS) operates the Colorado Mine Subsidence Information Center (MSIC) which is the repository for all of the known existing maps of inactive or abandoned coal mines in the state. Subsidence tends to be problematic along the Colorado Front Range, Western Slope, and in the central mountains near Eagle and Garfield Counties.[17] The following figure presents a map identifying the locations within Larimer County that have potential for subsidence. The highest potential for land subsidence are located in the eastern region of the county.

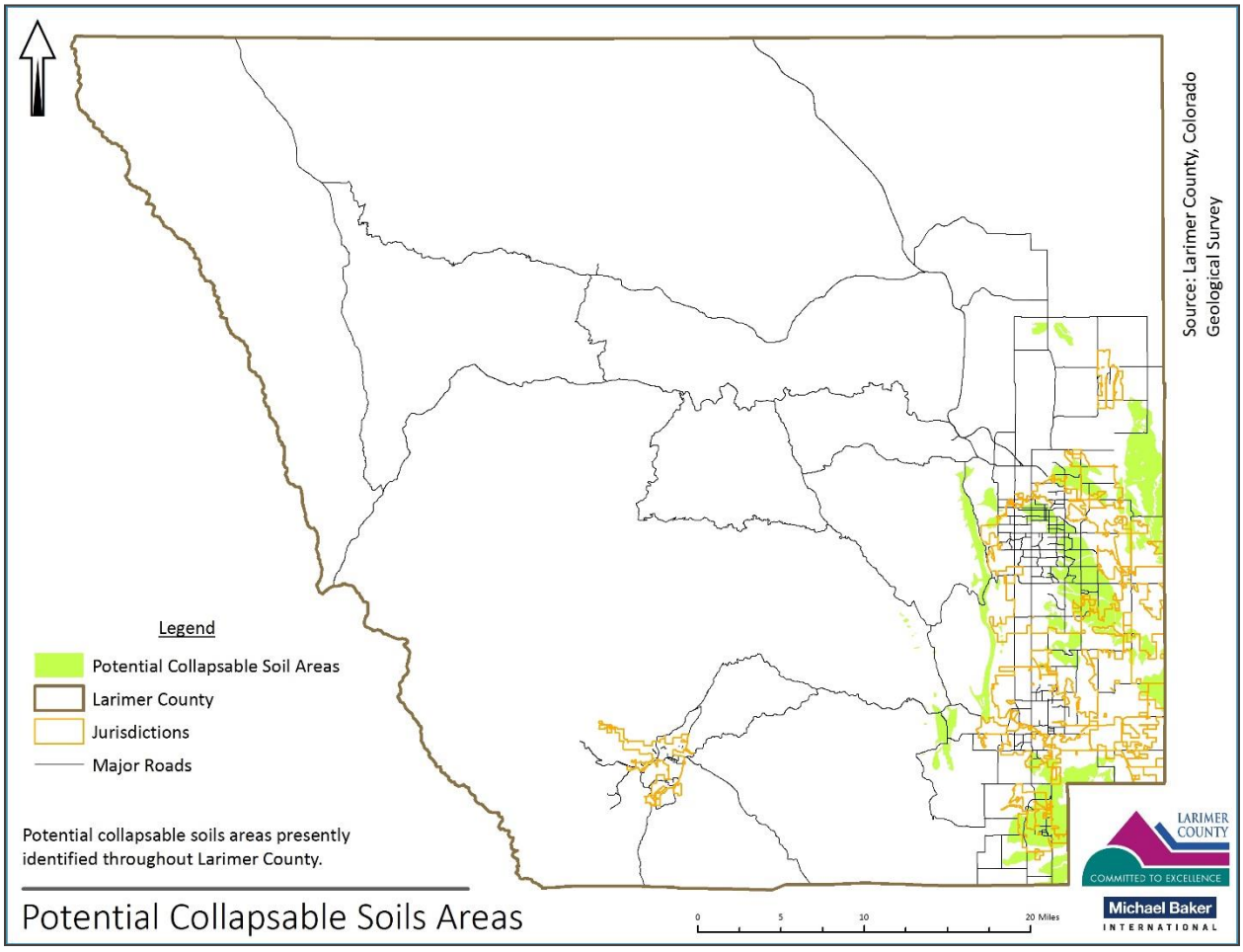
Figure 13. Potential Subsidence Areas – Larimer County[18]



[17] 2013 Colorado Natural Hazards Mitigation Plan
[18] Potential expansive soils areas presently identified by the Colorado Geological Survey.

"Collapsible Soil" describe soils that can quickly settle or collapse the ground. This settling of the ground can cause damage to manmade structures. The most common type of collapsible soil is Hydrocompactive soil. This type of soil occurs in semi-arid to arid climates and consist of low density and low moisture content soil. The soil grains in these areas are not compact tightly together but rather stacked loosely. These soils are considered strong while in a dry state. However, when moisture is introduced the stacked soil grains can collapse causing ground surface subsidence or settlement.[19] The following figure presents a map identifying the locations within Larimer County that have potential for collapsible soil. The highest potential for collapsible soil are located in the eastern region of the county.

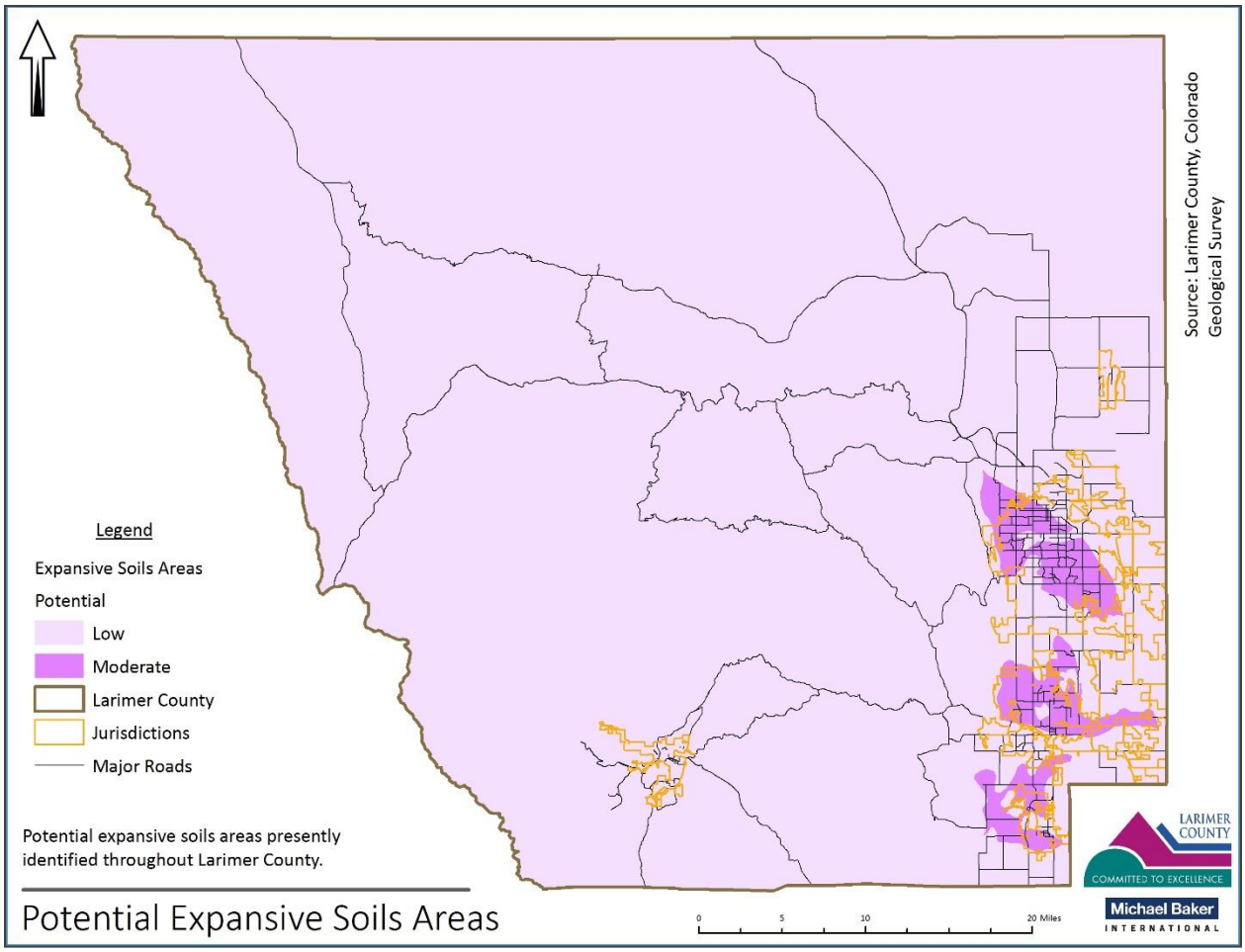
Figure 14. Potential Collapsible Soils Areas – Larimer County[20]



"Expansive Soils" describes soils that contain minerals that are capable of absorbing water. As the soil absorbs water it expands and increases in volume. The change in soil volume can cause damage to man-made structures such as foundations. As the soils begin to dry they will then shrink. The shrinking of the soils can deplete the structural support of soil and cause damaging subsidence. The following figure presents a map identifying the locations within Larimer County that have potential for expansive soil. The highest potential for expansive soil are located in the eastern region of the county.

[19] Colorado Geological Survey (CGS)
[20] Potential collapsible soils areas presently identified by the Colorado Geological Survey.

Figure 15. Potential Expansive Soils Areas – Larimer County[21]



Potential Losses

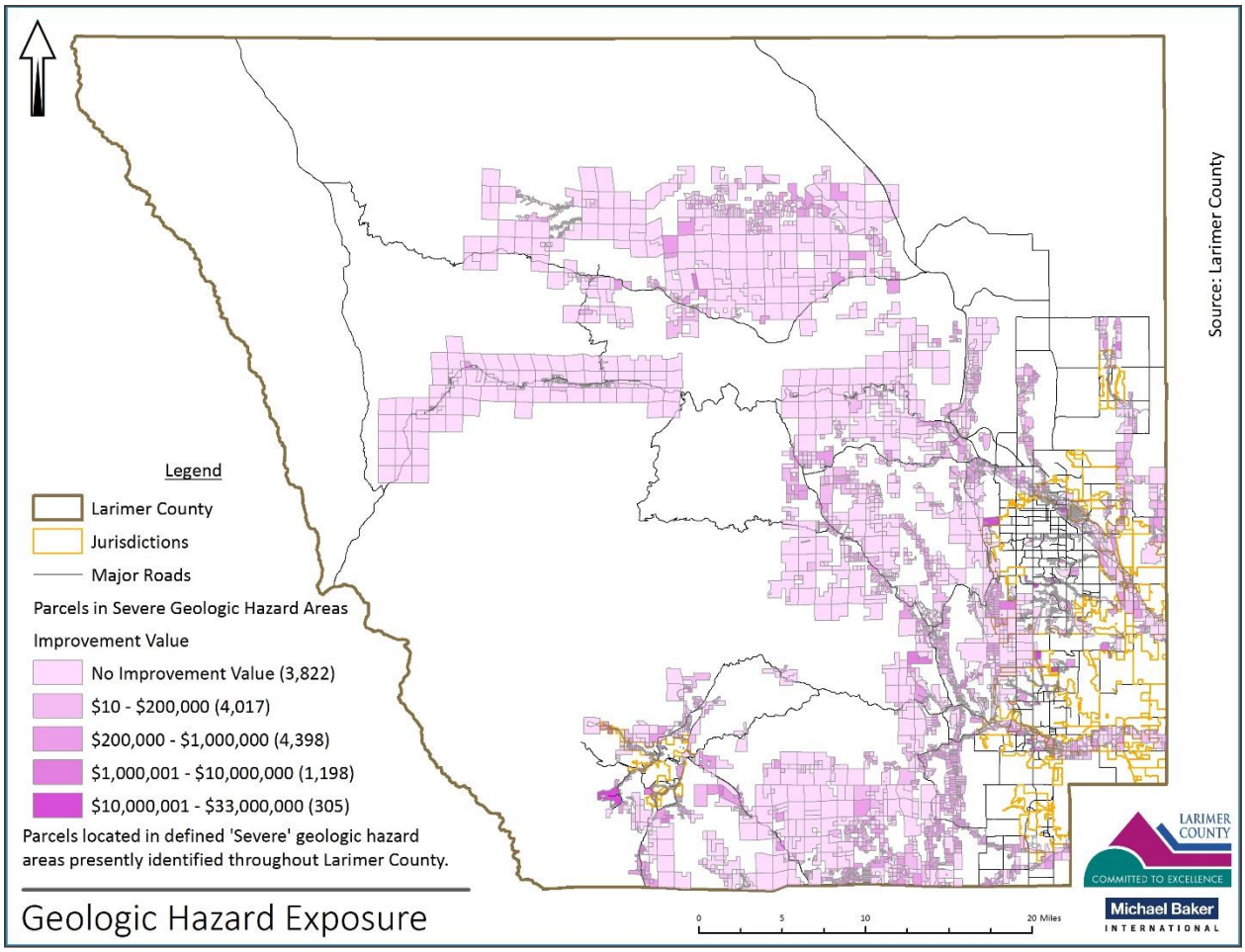
Damages to property due to erosion and deposition are usually classified as cosmetic, functional, or structural. Cosmetic damages refer to slight problems where only the physical appearance of a structure is affected (e.g. cracking in plaster or drywall). Functional damage refers to situations where the use of a structure has been impacted due to subsidence. Structural damages include situations where entire foundations require replacement due to subsidence-caused cracking of supporting walls and footings.

Buildings and infrastructure across the county may be vulnerable to the impacts of erosion and deposition. In September of 2013, Colorado's Front Range (including parts of Larimer County) experienced a catastrophic flood event. This flood event provides a benchmark for infrastructure losses associated with a large-scale flood and the associated erosion hazards.

The critical facility and structure exposure analysis estimates that there are 89 critical facility and 13,651 structures in Larimer County that are prone to severe geological hazards (not including the total miles of severe geological hazard prone infrastructure). The appraised value of the exposed critical facilities is approximately $246 million dollars and the exposed structures is over $13 billion dollars.

[21] Potential expansive soils areas presently identified by the Colorado Geological Survey.

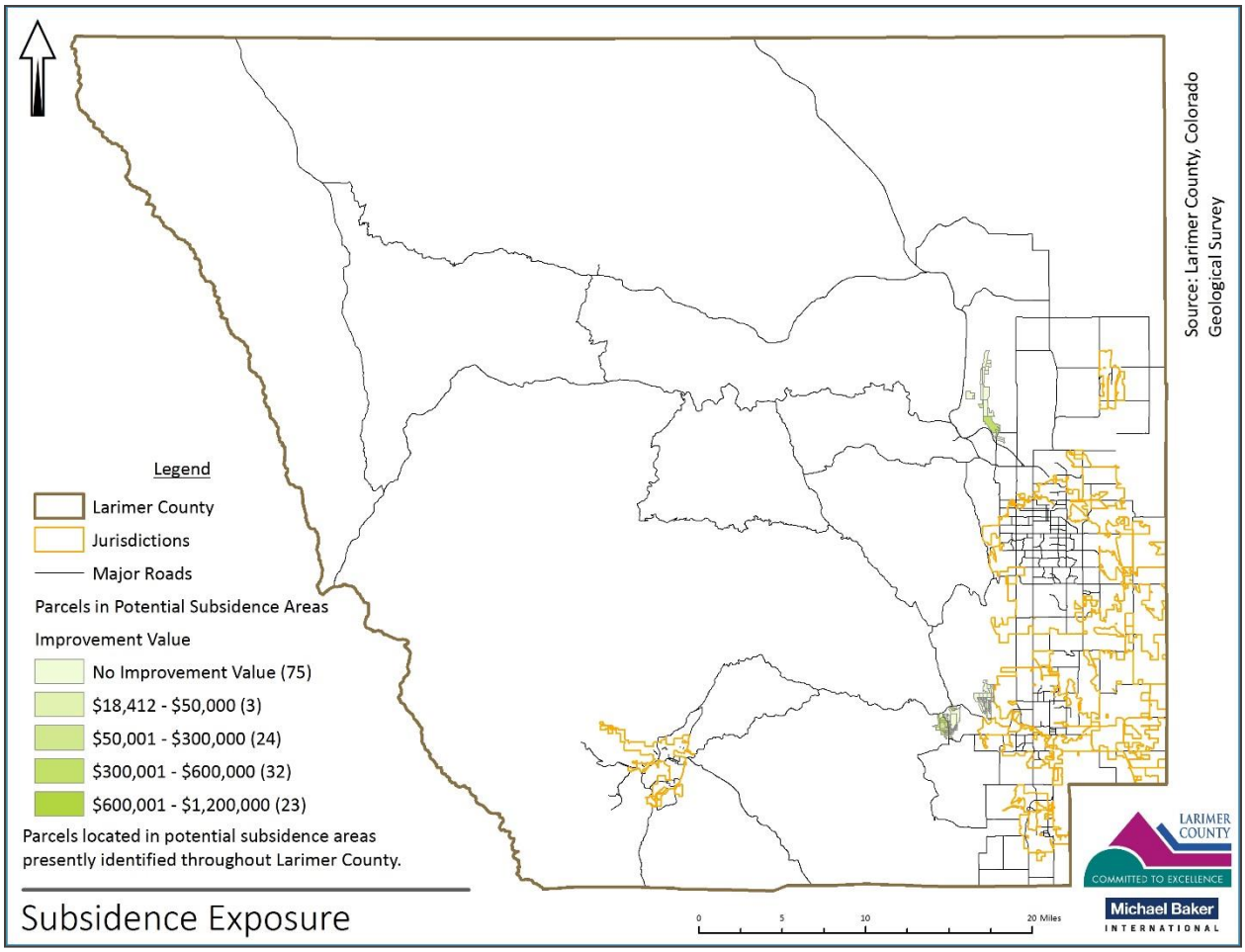
Figure 16. Geologic Hazard Exposure – Larimer County[22]



The critical facility and structure exposure analysis estimates that there are no critical facility and 157 structures in Larimer County that are located in subsidence areas (not including the total miles of infrastructure within subsidence areas). The appraised value of the exposed structures is over $38.5 million dollars. The following Figure presents a map identifying the parcels within Larimer County that have potential for collapsible soil.

[22] Parcels that intersect the 'Severe' geologic hazard areas used for identifying county land use. Source: Larimer County, CGS

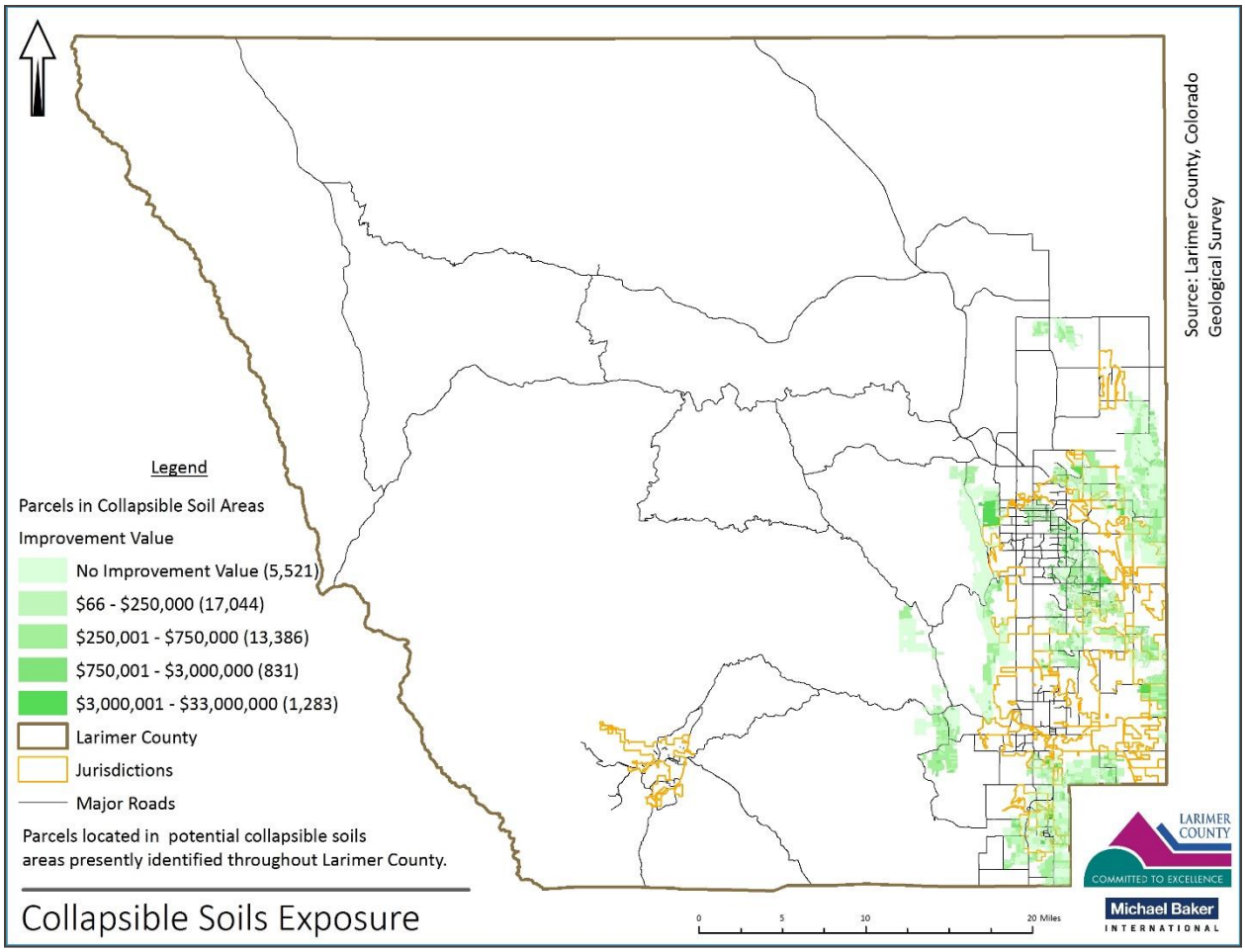
Figure 17. Subsidence Exposure – Larimer County[23]



The critical facility and structure exposure analysis estimates that there are 349 critical facility and 37,739 structures in Larimer County that are located in collapsible soil areas (not including the total miles of infrastructure within collapsible soil areas). The appraised value of the exposed critical facilities is over $1.6 billion dollars and the exposed structures is over $26.8 billion dollars. The following Figure presents a map identifying the parcels within Larimer County that have potential for collapsible soil.

[23] Potential subsidence areas presently identified by the Colorado Geological Survey.

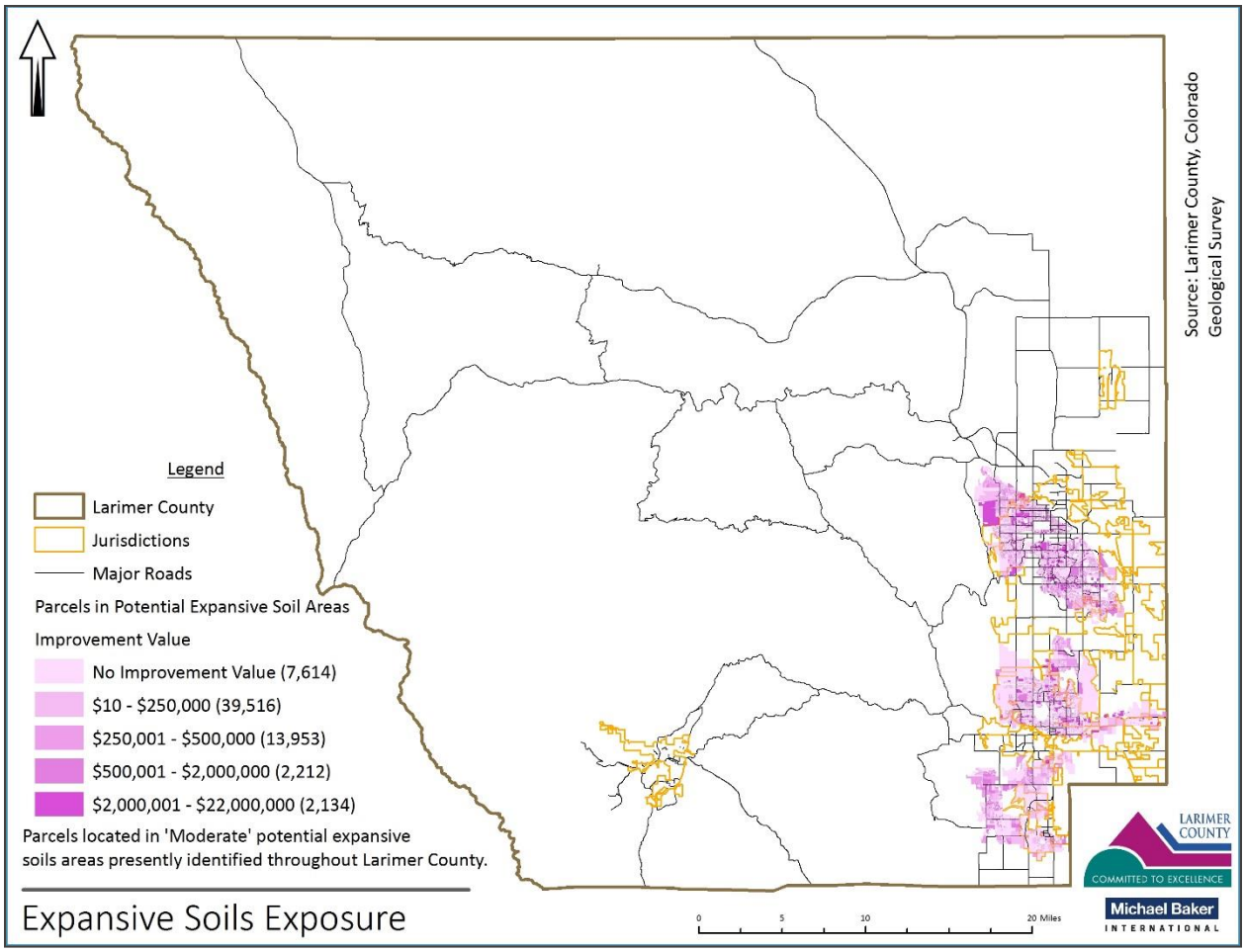
Figure 18. Collapsible Soils Exposure – Larimer County[24]



The critical facility and structure exposure analysis estimates that there are 571 critical facility and 65,413 structures in Larimer County that are located in expansive soil areas (not including the total miles of infrastructure within expansive soil areas). The appraised value of the exposed critical facilities is over $3 billion dollars and the exposed structures is over $45.5 billion dollars. The following Figure presents a map identifying the parcels within Larimer County that have potential for expansive soil.

[24] Potential collapsible soils areas presently identified by the Colorado Geological Survey.

Figure 19. Expansive Soils Exposure – Larimer County[25]



Probability of Future Occurrences

Due to the uncertainty associated with existing data, it is challenging to accurately calculate probability for future events related to landslide and rockslide hazards. It can be assured however, that these hazards will continue to alter the landscape of Larimer County in the future.

In areas where climate change results in decreased precipitation in the summer months and reduced surface-water supplies, communities are often forced to pump more ground water to meet their needs. In Colorado, the major aquifers are composed primarily of compressed clay and silt, soil types that are prone to compact when ground-water is pumped. In the past, major land subsidence has occurred in agricultural settings where ground-water has been pumped for irrigation. It is probable that the eastern region of Larimer County will experience more frequent land subsidence hazards over time as a result of local climate change. It is important that Larimer County consider future mitigation actions that will address this hazard, particularly in rapidly growing areas.

[25] Parcels intersecting potential expansive soils areas deemed a moderate risk, presently identified by the Colorado Geological Survey.

Land Use and Development Trends

Rapid and sustained population growth across Colorado and the Front Range has contributed to increasing trends in geologic hazard risk, exposure, and vulnerability across Larimer County. Larimer County and the surrounding areas are rich in natural resources and the continued development of industries related to these natural resources is a distinct possibility. Continued water and mineral resource extraction has the potential to exacerbate geologic hazards further and planning efforts should remain pro-active towards assessing changing geologic hazard risks.

The natural process of erosion and deposition will continue in Larimer County. While erosion and deposition have been categorized as moderate risk hazards in Larimer County, there have been property and infrastructure damages associated with these hazards within Colorado. In the semi-arid climate of Colorado, increases in seasonal precipitation, coupled with periods of prolonged drought, may accelerate processes of erosion.

Based on past and projected population growth, it is very likely that future development will lead to the intersection of erosion-prone soils. As development pressures continue in un-developed areas of the county, vulnerability erosion and deposition may increase along the I-25 corridor and the central region of eastern Larimer County.

Typically, the process of erosion does not limit land use, especially if efforts are made to minimize it. Erosion impacts can be reduced and controlled by surface drainage management, re-vegetation or disturbed lands, controlling stream-carried eroded materials in sediment catchment basins, and riprapping of erosion-prone stream banks (especially adjacent to structures). Ground modification and structural solutions can help mitigate the threats of localize erosion and deposition. Proper drainage and water management are also important to prevent increasing vulnerability to erosion and deposition hazards.

5.3.5 Fire - Wildland

NATURAL HAZARDS	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Fire – Wildland	1.2	0.9	0.4	0.4	0.4	3.30
HIGH RISK (2.5 or higher)						

Hazard Identification

Wildfires are defined as unwanted or unplanned wildland fires. They include unauthorized human caused fires, escaped prescribed burn projects, and all other wildland fires where the objective is to put the fire out.

Wildfires are fueled by natural ground cover, including native and non-native species of trees, brush and grasses, and crops along with weather conditions and topography. While available fuel, topography, and weather provide the conditions that allow wildfires to spread, most wildfires are caused by people through criminal or accidental misuse of fire.

Wildfires pose serious threats to human safety and property in Larimer County. They can destroy crops, timber resources, recreation areas, and critical wildlife habitat. Wildfires are commonly perceived as hazards in the western part of the state; however, wildfires are a growing problem in the wildland-urban interfaces of eastern Colorado, including communities within Larimer County.

Wildfire behavior is dictated in part by the quantity and quality of available fuels. Fuel quantity is the mass of material per unit area. Fuel quality is determined by a number of factors, including fuel density, chemistry, and arrangement. Arrangement influences the availability of oxygen surrounding the fuel source. Another important aspect of fuel quality is the total surface area of the material that is exposed to heat and air. Fuels with large area-to-volume ratios, such as grasses, leaves, bark and twigs, are easily ignited when dry.

Climatic and meteorological conditions that influence wildfires include solar insulation, atmospheric humidity, and precipitation, all of which determine the moisture content of wood and leaf litter. Dry spells, heat, low humidity, and wind increase the susceptibility of vegetation to fire. Additional natural agents can be responsible for igniting wildfires, including lightning, sparks generated by rocks rolling down a slope, friction produced by branches rubbing together in the wind, and spontaneous combustion.

Arson and accidents, including sparks from equipment and vehicles, can also cause wildfires. Human-caused wildfires are typically worse than those caused by natural agents. Arson and accidental fires usually start along roads, trails, streams, or at dwellings that are generally on lower slopes or bottoms of hills and valleys. Nurtured by updrafts, these fires can spread quickly uphill. Arson fires are often set deliberately at times when factors such as wind, temperature, and dryness contribute to the spread of flames.

HAZARD PROFILE

Local impacts from wildfire events include the following:

- Loss of life (human, livestock, wildlife)
- Damage to municipal watersheds
- Loss of property
- Evacuations
- Transportation interruption (closing highways)
- Reductions in air quality and human health
- Injuries – burns, smoke inhalation, etc.
- Coal seam or other energy facility ignitions
- Loss of vegetation (erosion, loss of forage and habitat for livestock and wildlife)
- Expense of responding (equipment, personnel, supplies, etc.)
- Loss of revenue from destroyed recreation and tourism areas

Predicting the intensity of a wildfire, its rate of spread, and its duration are important for wildfire mitigation activity, response, and firefighter safety. Three key factors affect wildfire behavior in the WUI:

1. *Fuels:* The type, density, and continuity of surrounding vegetation and, sometimes, flammable structures, that provide fuel to keep a wildfire burning. Fuels consist of combustible materials and vegetation (including grasses, leaves, ground litter, plants, shrubs, and trees) that feed a fire.

2. *Weather:* Relative humidity, wind, and temperatures all affect wildfire threat and behavior.

3. *Topography:* The steepness and aspect (direction) of slopes, as well as building-site locations, are features that affect fire behavior.

Very often the only factor that a community can have direct influence over is fuel.

Wildfires are often rated based on their ability of their fuels to ignite. Descriptions for the commonly used "Fire Danger Rating" system are listed below:

- **Low:** Fuels do not ignite readily from small firebrands. However, an intense heat source, such as lightning, may start fires in duff or rotted wood. Fires in open grasslands may burn freely for a few hours after rain, but wood fires spread slowly by creeping or smoldering, and burn in irregular fingers. There is little danger of spotting.
- **Moderate:** Fires can start from most accidental causes, with the exception of lightning. Fires in open grasslands will burn briskly and rapidly on windy days. Timber fires spread slowly to moderately fast. The average fire is of moderate intensity, although heavy concentrations of fuel

may burn hot. Short-distance spotting may occur. Fires are not likely to become serious and control is relatively easy.

- **High:** All fine dead fuels ignite readily and fires start easily from most causes. Unattended brush and campfires are likely to escape. Fires spread rapidly and short-distance spotting is common. High-intensity burning may develop on slopes or in concentrations of fine fuels. Fires may become serious and their control difficult unless they are attacked successfully while small.
- **Extreme/Very High:** Fires start easily from all causes and immediately after ignition, spread rapidly and increase quickly in intensity. Spot fires are a constant danger. Fires burning in light fuels may quickly develop intensity characteristics such as long-distance spotting and fire whirlwinds when they burn into heavier fuels.

For the purpose of wildfire mitigation strategy development, this Plan divides the various land use types within Larimer County into four categories: *cultivated agricultural land*, *forested land*, *grazing land*, and *miscellaneous*. Cultivated agricultural lands include both irrigated and non-irrigated crop land. Typically, this category of land has very dynamic burning characteristics and seasons. Crops and dormant stands located on Larimer County's cultivated agricultural land can both serve as fuel for wildfires. What makes agricultural land unique is the dynamic nature of the fuel locations and seasons of availability. These factors add to the challenge of wildfire suppression and mitigation.

In the context of the Larimer County landscape, forested land includes the riparian forest, windbreaks, shelterbelts, living snow fences, and urban forests. Much of the forested land in Larimer County occurs along rivers, seasonal water courses, lakes, and ponds. Other forested lands include farmsteads and urban areas. Here, trees are often planted near homes and outbuildings, which contribute to elevated wildfire risk. In addition to the trees, forested lands include a surface cover of dry brush and grasses, which are primary fuel sources for rapidly moving fires.

Grazing lands are primarily made up of sandhill steppe and prairie landscapes. Sandhill steppe is a combination of mixed grasses and sage, and is widely used for livestock grazing. Fuel loads on grazing lands are moderate to heavy and large fires have occurred with this fuel type during springtime wind events. In some areas within

Income 65: Wildfire Mitigation Measures Income Tax Subtraction

Individuals, estates, and trusts may subtract from their federal taxable income certain costs incurred while performing wildfire mitigation measures on their property.

Limitations:

- The taxpayer must own the property upon which the wildfire mitigation measures are performed.
- The property must be located in Colorado and within the wildland urban interface area.
- For tax tears 2009 - 2012 only, the wildfire mitigation measures must be authorized by a community wildfire protection plan adopted by a local government within the interface area.
- The total amount of the subtraction cannot exceed $2,500 or the owner's federal taxable income, whichever is less.
- The deduction is available for tax years 2009 – 2024.

For more information about eligible mitigation projects, please contact the Colorado Department of Revenue's Taxation Division.

Larimer County livestock grazing maintains a rather sparse fuel load. Miscellaneous areas include transportation right of ways, fence lines, disturbed areas, and other locations that contain grasses, tumbleweeds, wild sunflowers, and other vegetation.

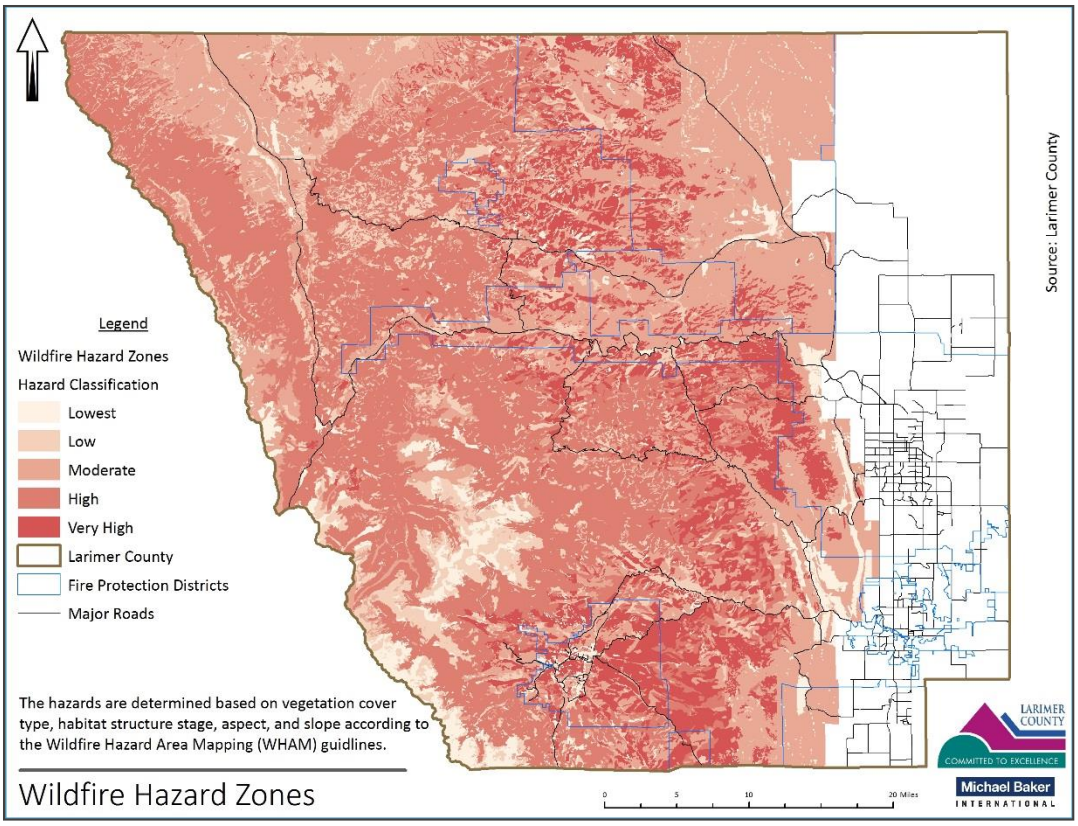
Long-term weather patterns in Larimer County have followed a cyclical pattern of wet years (characterized by average to high precipitation levels for the region), followed by a series of drought years (characterized by below average precipitation levels). During wet years, the typical fire season is from March through November. During drought years, the fire season in Colorado has been as long as a full year.

"Wildfire hazard" can be described as the relative likelihood that a wildfire, once started, will become disastrous. Predicting where and when a detrimental wildfire will occur is difficult. However, forest cover type and fire regime are important, and measurable, indicators of wildfire potential. Guidelines have been established for identifying wildfire hazards for the state and private lands in Larimer County. For this analysis the information needed to identify wildfire hazards are vegetative cover type, habitat structural stage, slope, aspect.

Vegetative cover type is identified by first determining if the area is forest land, non-forest land, or water. The dominant plant species with the most canopy cover is used to determine cover type. Habitat Structural Stage determines the size, diameter, and percent of crown cover. Slope helps determine steepness and wind effects on spreading the fire. The steeper the slope, the faster the fire will spread across a surface. The aspect determines the direction the surface faces. Wildfire Hazard Class is determined by identifying the expected fire behavior based on the above data.

The following Wildfire Hazard Zone map identifies the expected wildfire behavior. The highest wildfire hazard zones in the district are located in the western region, in areas where there are lower population densities.

Figure 20. Wildfire Hazard Zone Map – Larimer County[26]

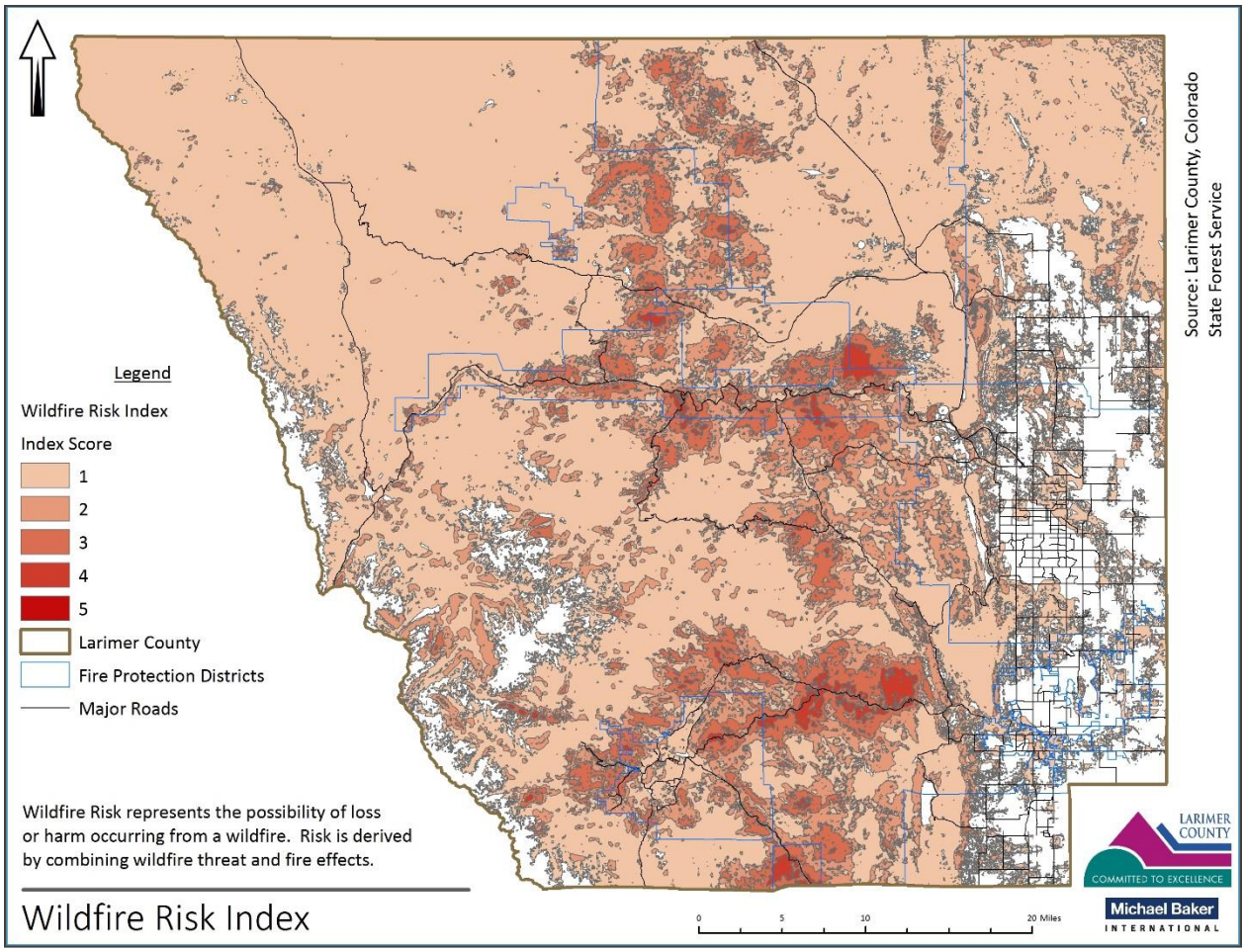


Before discussing wildland fire risk in Larimer County, a key wildfire management term must first be defined. The term ''wildland-urban interface", or WUI, is widely used within the wildland fire management community to describe any area where manmade buildings are constructed close to or within a boundary of natural terrain and fuel, where high potential for wildland fires exist. Communities are able to establish the definition and boundary of their local WUI, and the boundaries often help in meeting local management needs. WUIs can include both public and private land, and can help improve local access to funding sources.

“Wildfire Risk” represents the possibility of loss or harm occurring from a wildfire. For the purpose of this Plan, risk has been derived by combining “Wildfire Threat” and “Fire Effects.” Fire Effects is comprised of several inputs that identify damaged assets. These inputs include the following: information on where people live (derived from 2012 LandScan data from Colorado), Colorado forest assets, riparian assets, and drinking water assets. The following Wildfire Risk map (Figure 57) identifies areas with the greatest potential impacts from a wildfire, in other words, those areas most at risk. The highest wildfire risk areas in the county are located in the central region, in areas where there are lower population densities.

[26] To be used to identify wildfire hazards within the Wildfire Mitigation Area. The hazards are determined based on vegetation cover type, habitat structure stage (cover type, tree size and crown cover percentage), southern facing aspects and 30% and greater slopes according to the Wildfire Hazard Area Mapping (WHAM) guidelines.

Figure 21. Wildfire Risk Index Map – Larimer County[27]



As was discussed previously, understanding the location of people living in the wildland-urban interface is essential for defining potential wildfire impacts to people and homes. The WUI Risk analysis provides a rating of the potential impact of a wildfire on people and their homes. The key input, the wildland-urban interface, reflects housing density (houses per acre).

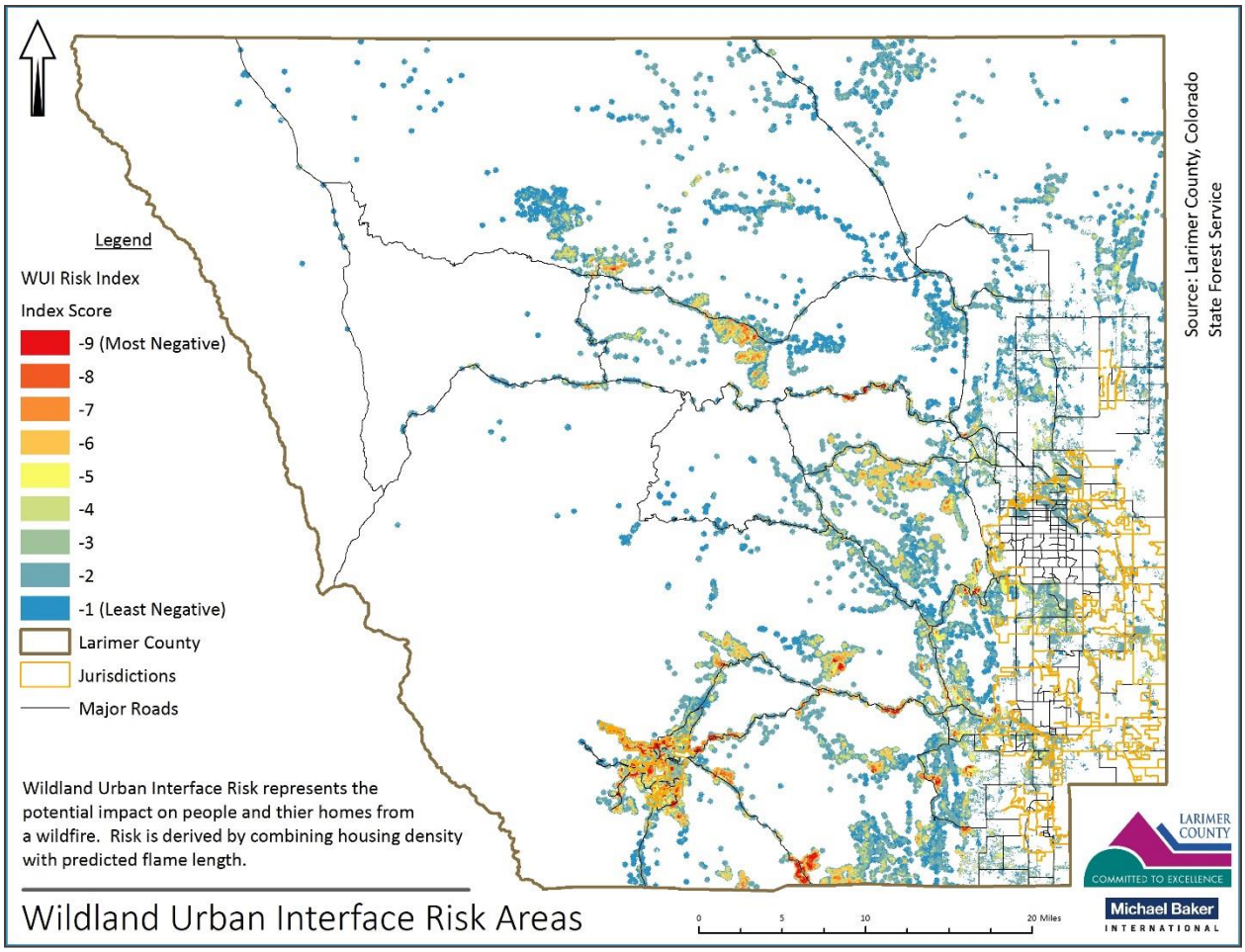
To calculate WUI risk, WUI housing density data was combined with response function data. Response functions are a method of assigning a net change in the value of a resource or asset based on its susceptibility to fire at various intensity levels (such as flame length). The response functions were defined by a team of experts led by Colorado State Forest Service mitigation planning staff. By combining these data sets it is possible to determine where the greatest potential impact to homes and people are likely to occur in Larimer County.

[27] Wildfire Risk represents the possibility of loss or harm occurring from a wildfire. Risk is derived by combining wildfire threat and fire effects. The COWRAP data set was produced statewide and ranks areas on a scale that includes: lowest risk to highest risk. All risk rankings are present in Larimer County.

Fire in Larimer County, CO. Photo: Poudre Fire Authority

The following Figure shows the various levels of WUI Risk within Larimer County. The range of values is from -1 to -9, with -1 representing the least negative impacts and -9 representing the most negative impact. For example, areas with high housing density and high flame lengths are rated -9, while areas with low housing density and low flame lengths are rated -1. Understandably so, the Map of WUI Risk shows a number of high risk areas concentrated around densely populated parts of the county. Like the Wildfire Risk and Threat analyses, Wildland-Urban Interface Risk was calculated in the 2013 Colorado State Hazard Mitigation Plan using the same methodology. This allows for comparison and ordination to be made across the state.

Figure 22. WUI Map – Larimer County[28]



As evidenced by the wildfire risk map, areas within Larimer County that are characterized by dense development and single family homes along the wildland-urban interface are most vulnerable to wildfire. The jurisdictions with the highest WUI Risk Index rating include areas Estes Park, and portions of unincorporated Larimer County.

CLIMATE CHANGE IMPACTS

Wildfires can occur at any time of day and during any month of the year. The length of the wildfire season and peak months may vary considerably from year to year. Land use, vegetation, available fuels, and weather conditions (including wind, low humidity, and lack of precipitation) are chief factors in determining the number of fires and acreage burned in Colorado each year. Generally, fires are more likely when vegetation is dry from a winter with little snow and/or a spring and summer with sparse

[28] Wildland Urban Interface Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length. The COWRAP data set was produced statewide and ranks areas on a scale that includes: least negative to most negative impacts. This scale stretched from -1 (least) to -9 (most) statewide.

rainfall. For these reasons, climate change in Colorado (specifically, a pattern of extended drought conditions) had contributed to increased concern about wildfire in Larimer County.

The frequency, intensity, and duration of wildfires have increased across the Western United States since the 1980s. A 2012 federal report released by the U.S. Department of Agriculture found that the Colorado region, among others, will face an even greater fire risk over time. The report expects Colorado to experience up to a five-fold increase in acres burned by 2050.[29] The report's findings are consistent with previous studies on the relationship between climate change and fire risk. Colorado landscapes, including those that characterize Larimer County, are expected to become hotter and drier as the planet warms, which will in turn increase regional wildfire risk.

Previous Occurrences

The High Park fire near homes just northwest of Horsetooth Reservoir, Monday, June 11, 2012, near Fort Collins. (RJ Sangosti, The Denver Post)

According to the best available data there have been 950 wildfire events in Larimer County from 1980 to 2013. Of the 950 wildfires, 62% were natural caused, 35% were human caused, and 3% were unknown caused.

The largest and most destructive fire in Larimer County's history began on June 9, 2012. This fire is known as the High Park Fire and was started by a lightning strike. The High Park fire occurred in the mountains west of Fort Collins. This fire burned over 87, 200 acres, destroyed at least 259 homes, and resulted in the death of one person. (Source: High Park Fie Burned Area Emergency response (BAER) Report).

Another notable fire is the Bobcat Gulch Fire. This fire burned approximately 10,599 acres in Arapaho-Roosevelt National Forest west of Loveland. The fire began on June 12, 2000.

[29] US Department of Agriculture. Effects of Climate Variability and Change on Forest Ecosystems. General Technical Report, December 2012

Figure 23. Historical Federal Wildfire Map – Larimer County[30]

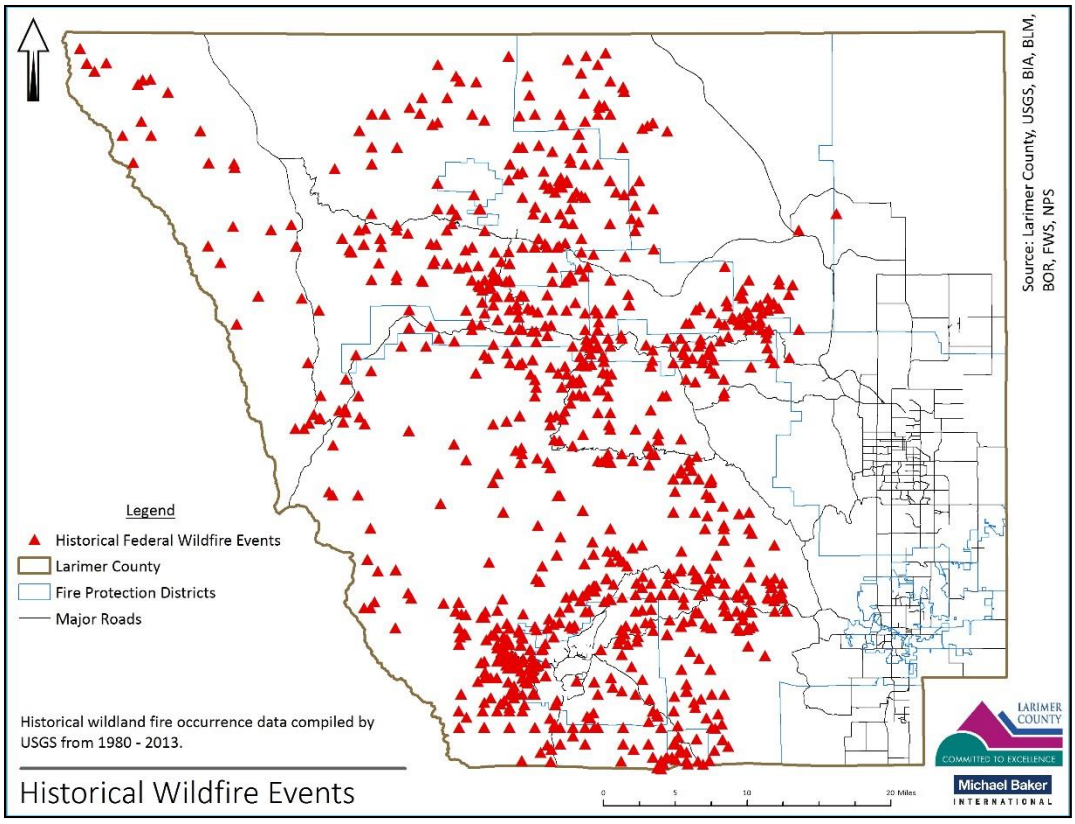


Table 26. Historical Wildfires – Larimer County[31]

Fire Name	Cause	Year	Start Date	Out Date	Total Acres
WIND RIVER	Human	1980	10/6/1980	10/8/1980	0.1
FALL RIVER	Human	1980	9/11/1980	9/18/1980	0.1
THOMPSON	Human	1980	6/18/1980	6/18/1980	0.1
HANDICAMP	Human	1981	6/24/1981	6/24/1981	0.1
ALBERTA FL	Human	1981	10/1/1981	10/1/1981	0.1
BONE YARD	Human	1982	3/11/1982	3/12/1982	1
UPPER MORA	Human	1982	11/8/1982	11/8/1982	0.1
HUBCAP	Natural	1983	Not Available	7/10/1983	0.1
HOLLOWELL	Human	1984	5/23/1984	5/23/1984	0.1
IRON DIKE	Human	1985	Not Available	9/6/1985	0.1
RED FEATHER	--	1986	6/19/1986	Not Available	2
--	Human	1986	9/16/1986	9/16/1986	0.1

[30] Historical wildland fire occurrence data compiled by USGS from 1980 - 2013, from BIA, BLM, BOR, USGS, FWS, and NPS.

Fire Name	Cause	Year	Start Date	Out Date	Total Acres
--	Human	1986	8/17/1986	8/18/1986	0.1
--	Natural	1986	10/15/1986	10/15/1986	0.5
--	Natural	1986	8/8/1986	8/9/1986	0.1
--	Natural	1986	8/3/1986	8/3/1986	0.1
--	Natural	1986	8/6/1986	8/7/1986	0.3
--	Natural	1986	8/5/1986	8/8/1986	4
--	Natural	1986	7/14/1986	7/15/1986	1
--	Human	1986	7/13/1986	7/16/1986	1
--	Human	1986	6/19/1986	6/21/1986	2
--	Natural	1986	8/18/1986	8/20/1986	0.1
--	Natural	1986	8/18/1986	8/19/1986	0.2
--	Human	1986	8/18/1986	8/19/1986	0.8
--	Natural	1986	8/18/1986	8/20/1986	2.5
--	Natural	1986	8/16/1986	8/17/1986	0.1
--	Natural	1986	8/11/1986	8/12/1986	0.1
--	Natural	1986	8/9/1986	8/10/1986	0.1
--	Natural	1986	8/9/1986	8/10/1986	0.1
--	Human	1986	8/8/1986	8/10/1986	0.1
--	Human	1986	8/5/1986	8/8/1986	3
--	Human	1986	8/5/1986	8/10/1986	48
--	Natural	1986	8/3/1986	8/5/1986	0.3
--	Natural	1986	8/2/1986	8/5/1986	0.3
--	Human	1986	7/17/1986	7/20/1986	1
--	Natural	1986	6/14/1986	6/17/1986	1
--	Natural	1986	5/23/1986	5/23/1986	0.4
--	Natural	1986	3/8/1986	3/10/1986	1
ESTES CONE	Natural	1986	8/11/1986	8/11/1986	0.1
--	Human	1987	10/11/1987	10/17/1987	6
--	Natural	1987	9/21/1987	9/23/1987	10
--	Natural	1987	9/2/1987	9/5/1987	100
--	Natural	1987	8/14/1987	8/16/1987	0.1
--	Human	1987	7/26/1987	7/28/1987	0.1
--	Natural	1987	7/8/1987	7/10/1987	0.3
--	Natural	1987	7/5/1987	7/6/1987	0.1
--	Natural	1987	6/27/1987	6/30/1987	1.5
--	Human	1987	6/6/1987	6/8/1987	1
--	Natural	1987	10/23/1987	10/25/1987	0.3
--	Natural	1987	10/26/1987	10/28/1987	5

Fire Name	Cause	Year	Start Date	Out Date	Total Acres
--	Natural	1987	10/11/1987	10/13/1987	0.3
--	Natural	1987	10/20/1987	10/24/1987	0.1
--	Natural	1987	9/25/1987	9/26/1987	0.1
--	Natural	1987	8/16/1987	8/19/1987	1.5
--	Human	1987	8/6/1987	8/7/1987	0.3
--	Human	1987	7/29/1987	8/2/1987	1.7
--	Human	1987	7/24/1987	7/31/1987	0.3
--	Human	1987	7/21/1987	7/27/1987	20
--	Natural	1987	7/9/1987	7/12/1987	0.2
--	Natural	1987	6/25/1987	6/28/1987	0.1
--	Human	1987	6/13/1987	6/13/1987	0.1
--	Human	1987	8/5/1987	8/7/1987	3
--	Natural	1987	7/7/1987	7/8/1987	0.3
EAGLE CLIF	Natural	1987	7/21/1987	7/21/1987	0.1
JOHNSTON	Natural	1987	7/27/1987	7/27/1987	0.1
WIND RIVER	Human	1987	8/19/1987	8/20/1987	0.8
KNIFES EDGE	Natural	1987	9/12/1987	9/14/1987	0.1
ASPENGLEN	Human	1987	10/10/1987	10/10/1987	0.1
--	Natural	1988	10/22/1988	10/22/1988	0.1
--	Natural	1988	9/8/1988	9/11/1988	2
GRACE CREEK	Natural	1988	9/6/1988	10/26/1988	2800
--	Natural	1988	9/4/1988	9/5/1988	0.1
--	Natural	1988	8/31/1988	9/1/1988	0.5
--	Natural	1988	8/30/1988	9/1/1988	0.3
--	Natural	1988	8/27/1988	8/29/1988	0.1
--	Natural	1988	8/23/1988	8/25/1988	0.1
--	Human	1988	8/18/1988	8/20/1988	0.3
--	Human	1988	8/7/1988	8/9/1988	0.1
--	Natural	1988	7/31/1988	8/4/1988	0.2
--	Natural	1988	8/1/1988	8/7/1988	0.1
--	Natural	1988	7/25/1988	7/27/1988	1
--	Natural	1988	7/25/1988	7/28/1988	3
--	Natural	1988	7/17/1988	7/19/1988	0.1
--	Human	1988	7/17/1988	7/18/1988	0.2
--	Human	1988	7/14/1988	7/27/1988	200
--	Human	1988	7/3/1988	7/3/1988	0.1
--	Natural	1988	6/15/1988	6/16/1988	0.1
--	Human	1988	6/13/1988	6/16/1988	3

Fire Name	Cause	Year	Start Date	Out Date	Total Acres
--	Human	1988	6/8/1988	6/16/1988	0.1
--	Natural	1988	9/19/1988	9/21/1988	0.8
--	Natural	1988	9/17/1988	9/19/1988	0.1
--	Natural	1988	9/10/1988	9/13/1988	2
--	Natural	1988	8/31/1988	9/5/1988	0.2
--	Natural	1988	8/25/1988	8/25/1988	0.1
--	Natural	1988	8/23/1988	8/28/1988	20
--	Human	1988	7/31/1988	8/1/1988	0.2
--	Natural	1988	7/13/1988	7/15/1988	0.2
--	Natural	1988	7/10/1988	7/13/1988	0.1
--	Human	1988	7/6/1988	7/7/1988	0.1
--	Natural	1988	7/5/1988	7/8/1988	0.2
--	Natural	1988	7/2/1988	7/3/1988	0.2
--	Natural	1988	6/13/1988	6/13/1988	0.1
--	Human	1988	6/22/1988	6/23/1988	0.2
--	Natural	1988	6/21/1988	6/22/1988	0.1
--	Natural	1988	6/17/1988	6/25/1988	20
--	Natural	1988	6/8/1988	6/11/1988	0.1
--	Natural	1988	6/8/1988	6/11/1988	2
--	Natural	1988	11/1/1988	11/1/1988	0.1
--	Natural	1988	7/11/1988	7/11/1988	0.1
--	Natural	1988	6/29/1988	6/30/1988	0.1
FALLRIVER	Natural	1988	6/19/1988	6/19/1988	0.1
CUBLAKE	Natural	1988	6/21/1988	6/22/1988	0.2
ESTES CONE	Natural	1988	6/30/1988	7/3/1988	0.1
SWITCHBACK	Natural	1988	8/27/1988	8/28/1988	0.1
WILLOWPARK	Human	1988	Not Available	9/7/1988	0.1
BIERSTADT	Natural	1988	10/9/1988	10/9/1988	0.1
--	Natural	1989	10/20/1989	10/21/1989	0.1
--	Natural	1989	10/7/1989	10/9/1989	0.2
--	Human	1989	9/4/1989	9/10/1989	100.1
--	Human	1989	9/3/1989	9/3/1989	0.1
--	Natural	1989	8/29/1989	8/31/1989	0.1
--	Human	1989	8/14/1989	8/14/1989	0.1
--	Natural	1989	7/10/1989	7/10/1989	0.1
--	Human	1989	7/8/1989	7/9/1989	0.1
#6	Natural	1989	7/8/1989	7/30/1989	1967
--	Natural	1989	6/29/1989	6/30/1989	0.1

Fire Name	Cause	Year	Start Date	Out Date	Total Acres
--	Natural	1989	6/29/1989	7/30/1989	364
--	Natural	1989	6/11/1989	6/13/1989	0.1
--	Natural	1989	5/31/1989	5/31/1989	0.1
--	Natural	1989	5/23/1989	5/24/1989	0.3
--	Human	1989	4/22/1989	4/22/1989	0.1
--	Natural	1989	4/22/1989	4/25/1989	1.5
--	Human	1989	10/1/1989	10/3/1989	3
--	Natural	1989	9/21/1989	9/27/1989	10
--	Natural	1989	8/14/1989	8/15/1989	0.1
--	Natural	1989	8/12/1989	8/13/1989	0.1
--	Human	1989	8/8/1989	8/9/1989	0.1
--	Human	1989	8/6/1989	8/6/1989	0.1
--	Natural	1989	8/7/1989	8/7/1989	0.1
--	Human	1989	7/14/1989	7/15/1989	0.1
--	Natural	1989	7/29/1989	7/30/1989	0.1
--	Human	1989	7/7/1989	7/8/1989	0.1
--	Human	1989	7/6/1989	7/7/1989	0.1
--	Natural	1989	6/1/1989	6/2/1989	0.1
STORMY PK	Natural	1989	Not Available	7/8/1989	1
MCCULOUGH	Human	1989	Not Available	8/1/1989	0.1
VTS LOT	Natural	1989	Not Available	8/9/1989	0.1
CUB LAKE	Human	1989	8/11/1989	8/11/1989	0.1
OVER HILL	Human	1989	10/14/1989	10/16/1989	1
--	Natural	1990	9/2/1990	9/3/1990	0.1
--	Natural	1990	9/2/1990	9/3/1990	0.1
--	Natural	1990	8/30/1990	8/31/1990	0.1
--	Natural	1990	8/27/1990	8/29/1990	1
--	Human	1990	8/11/1990	8/12/1990	0.1
--	Natural	1990	7/17/1990	7/18/1990	0.1
--	Human	1990	6/25/1990	6/26/1990	0.1
--	Natural	1990	6/25/1990	6/28/1990	1
--	Natural	1990	6/30/1990	6/30/1990	0.1
--	Natural	1990	6/26/1990	6/27/1990	0.1
--	Natural	1990	6/25/1990	7/5/1990	141
--	Natural	1990	6/26/1990	6/27/1990	0.1
--	Natural	1990	6/25/1990	6/28/1990	2.5
--	Human	1990	8/30/1990	9/1/1990	0.2
--	Natural	1990	7/28/1990	7/30/1990	0.1

Fire Name	Cause	Year	Start Date	Out Date	Total Acres
--	Natural	1990	7/16/1990	7/18/1990	0.3
--	Natural	1990	7/6/1990	7/6/1990	0.1
--	Natural	1990	7/3/1990	7/3/1990	0.2
--	Human	1990	6/27/1990	6/30/1990	1
--	Natural	1990	6/26/1990	6/26/1990	0.2
--	Natural	1990	6/26/1990	6/26/1990	0.1
--	Natural	1990	6/26/1990	6/27/1990	0.1
--	Natural	1990	6/24/1990	6/26/1990	0.5
--	Natural	1990	6/25/1990	6/27/1990	5
--	Human	1990	6/19/1990	6/22/1990	6
--	Natural	1990	1/11/1990	1/14/1990	1
MORAINE PK	Natural	1990	Not Available	7/4/1990	0.1
STEEP	Natural	1990	7/29/1990	7/30/1990	0.1
CHAOS	Natural	1990	9/11/1990	9/12/1990	0.4
MANY PARKS	Natural	1990	9/26/1990	9/27/1990	0.3
--	Natural	1991	10/11/1991	10/13/1991	0.5
--	Human	1991	9/8/1991	9/9/1991	0.1
--	Natural	1991	8/23/1991	8/28/1991	0.1
--	Natural	1991	8/23/1991	8/24/1991	0.1
--	Natural	1991	7/19/1991	7/21/1991	0.1
--	Natural	1991	7/18/1991	7/20/1991	0.1
--	Natural	1991	7/15/1991	7/18/1991	0.1
--	Natural	1991	7/15/1991	7/16/1991	0.8
--	Natural	1991	7/12/1991	7/13/1991	0.3
--	Natural	1991	7/6/1991	7/6/1991	0.1
--	Natural	1991	7/5/1991	7/6/1991	0.1
--	Natural	1991	6/24/1991	6/25/1991	0.1
--	Human	1991	4/29/1991	5/1/1991	0.1
--	Natural	1991	3/30/1991	3/31/1991	0.1
--	Natural	1991	9/20/1991	9/22/1991	0.2
--	Natural	1991	9/3/1991	9/5/1991	0.1
--	Natural	1991	7/19/1991	7/20/1991	0.3
--	Natural	1991	7/19/1991	7/19/1991	0.1
--	Natural	1991	7/16/1991	7/21/1991	11
--	Natural	1991	9/28/1991	9/29/1991	0.1
--	Natural	1991	7/5/1991	7/8/1991	0.8
--	Natural	1991	7/5/1991	7/6/1991	0.1
--	Natural	1991	6/28/1991	6/29/1991	0.1

Fire Name	Cause	Year	Start Date	Out Date	Total Acres
--	Human	1991	6/28/1991	6/30/1991	5
--	Natural	1991	5/14/1991	5/16/1991	1
PUMPHOUSE	Natural	1991	6/29/1991	6/29/1991	0.1
FLAT TOP	Human	1991	Not Available	7/4/1991	0.1
MORAINE PK	Natural	1991	9/21/1991	9/22/1991	0.1
BEAR LAKE	Human	1991	9/29/1991	9/30/1991	0.1
UTE TRAIL	Human	1991	10/17/1991	10/19/1991	0.5
--	Human	1992	10/18/1992	10/18/1992	0.1
--	Natural	1992	10/11/1992	10/19/1992	0.8
--	Natural	1992	9/20/1992	9/20/1992	0.1
--	Human	1992	9/8/1992	9/8/1992	0.1
--	Natural	1992	8/20/1992	8/22/1992	0.2
--	Natural	1992	8/4/1992	8/4/1992	0.1
--	Natural	1992	5/20/1992	5/20/1992	0.1
--	Human	1992	2/6/1992	2/6/1992	0.1
--	Natural	1992	10/26/1992	10/26/1992	0.1
--	Natural	1992	10/7/1992	10/9/1992	0.1
--	Natural	1992	9/15/1992	9/16/1992	0.1
--	Natural	1992	8/21/1992	8/21/1992	0.1
--	Natural	1992	8/14/1992	8/15/1992	0.1
--	Natural	1992	8/11/1992	8/11/1992	0.1
--	Natural	1992	8/10/1992	8/10/1992	0.1
--	Natural	1992	8/9/1992	8/10/1992	0.1
--	Natural	1992	7/4/1992	7/5/1992	0.1
--	Human	1992	6/17/1992	6/17/1992	0.1
--	Natural	1992	6/12/1992	6/13/1992	0.1
--	Natural	1992	6/12/1992	6/12/1992	0.1
--	Natural	1992	6/12/1992	6/13/1992	0.1
--	Natural	1992	5/25/1992	5/26/1992	0.1
--	Natural	1992	5/19/1992	5/20/1992	0.5
--	Natural	1992	5/8/1992	5/11/1992	0.1
WINDRIVER	Natural	1992	7/31/1992	8/2/1992	0.1
STEEP MT	Natural	1992	8/23/1992	8/24/1992	0.1
--	Natural	1993	9/11/1993	9/15/1993	0.1
--	Natural	1993	9/3/1993	9/5/1993	0.1
--	Natural	1993	9/2/1993	9/5/1993	0.1
--	Natural	1993	8/24/1993	8/25/1993	0.1
--	Natural	1993	8/17/1993	8/25/1993	0.1

Fire Name	Cause	Year	Start Date	Out Date	Total Acres
--	Human	1993	8/5/1993	8/5/1993	0.1
--	Human	1993	7/31/1993	8/5/1993	0.1
--	Natural	1993	7/29/1993	7/29/1993	0.1
--	Human	1993	7/16/1993	7/18/1993	0.1
--	Human	1993	7/11/1993	7/14/1993	0.1
--	Natural	1993	6/27/1993	6/30/1993	30
--	Natural	1993	8/7/1993	8/7/1993	0.1
--	Natural	1993	7/20/1993	7/24/1993	0.1
SNOWTOP	Natural	1993	7/9/1993	7/19/1993	275
--	Natural	1993	6/22/1993	6/24/1993	0.1
--	Natural	1993	6/10/1993	6/11/1993	0.1
--	Natural	1993	5/14/1993	5/15/1993	0.1
--	Human	1993	5/6/1993	5/7/1993	1
--	Natural	1993	7/30/1993	8/1/1993	0.1
TWINSISTER	Human	1993	8/14/1993	8/15/1993	0.1
BEAVER II	Natural	1994	7/21/1994	7/21/1994	0.5
BEAVER'S	Natural	1994	7/21/1994	7/21/1994	0.3
ROACH	Natural	1994	9/8/1994	9/10/1994	0.1
LINK CREEK	Natural	1994	8/15/1994	8/18/1994	0.1
--	Natural	1994	8/16/1994	8/18/1994	3
GREY ROCK	Natural	1994	8/5/1994	8/7/1994	0.1
ELKHOOF	Natural	1994	8/5/1994	8/8/1994	0.1
HEWLETT GULCH	Natural	1994	8/5/1994	8/8/1994	7
INDIAN	Natural	1994	7/30/1994	8/3/1994	0.1
MEADOWS 2		1994	7/27/1994	7/28/1994	
ROCKPILE	Natural	1994	7/22/1994	7/24/1994	0.7
GREY ROCK	Natural	1994	7/19/1994	9/4/1994	0.5
CAMERON	Natural	1994	7/16/1994	7/16/1994	3
NUNN CREEK	Natural	1994	7/15/1994	7/17/1994	0.1
LONG DRAW	Natural	1994	7/15/1994	7/16/1994	1
EATON	Natural	1994	7/15/1994	7/15/1994	0.5
FISH CREEK	Natural	1994	7/23/1994	7/24/1994	0.2
NICOMAS	Natural	1994	7/12/1994	7/18/1994	0.1
JUG GULCH	Natural	1994	7/11/1994	7/12/1994	30
CREEDMORE	Natural	1994	7/11/1994	7/12/1994	0.1
LONE PINE	Natural	1994	7/10/1994	7/30/1994	0.3
EGGERS	Natural	1994	7/4/1994	7/6/1994	370
DEVIL'S CREEK	Natural	1994	6/29/1994	6/30/1994	0.7

Fire Name	Cause	Year	Start Date	Out Date	Total Acres
LADY MOON	Natural	1994	6/25/1994	6/25/1994	1
DERBY	Natural	1994	5/12/1994	5/12/1994	0.1
SWAMP CREEK	Human	1994	1/19/1994	1/19/1994	0.1
HOOD INCIDENT	Natural	1994	9/9/1994	9/10/1994	3
ROARING CREEK	Natural	1994	8/5/1994	8/8/1994	0.1
SALT CABIN	Natural	1994	8/1/1994	8/2/1994	0.1
SEAM ROCK	Natural	1994	7/22/1994	7/24/1994	1
POWER PLANT	Natural	1994	7/23/1994	7/24/1994	0.1
ANSEL	Natural	1994	7/18/1994	7/19/1994	0.1
MOUNT	Natural	1994	7/16/1994	7/16/1994	1
OLYMPUS		1994	7/11/1994	7/15/1994	
INDIAN	Natural	1994	7/12/1994	7/13/1994	0.1
MEADOWS I		1994	7/11/1994	7/15/1994	
POLE HILL	Natural	1994	7/11/1994	7/16/1994	3.5
WHITE PINE	Natural	1994	7/1/1994	7/2/1994	0.1
HELLS CANYON	Natural	1994	6/23/1994	6/24/1994	50
PALISADE	Natural	1994	4/3/1994	4/10/1994	1
ALEXANDER 3	Natural	1994	7/13/1994	7/14/1994	0.1
LONETREE	Natural	1994	6/14/1994	6/14/1994	0.1
TWIN CABIN	Natural	1994	6/18/1994	6/18/1994	3
GULCH		1994	6/19/1994	6/19/1994	
COUNTYLINE	Natural	1994	7/11/1994	7/13/1994	0.1
LILY LAKE	Human	1994	7/29/1994	7/30/1994	0.5
TUXEDO	Natural	1994	Not Available	8/4/1994	0.1
BIERSTADT	Natural	1994	Not Available	8/8/1994	0.1
MCGRAW	Natural	1994	8/10/1994	8/11/1994	0.1
GEM LAKE	Natural	1994	8/27/1994	8/28/1994	0.1
SOUTH COW	Natural	1994	7/29/1994	7/30/1994	0.1
SKI SLOPE	Natural	1994	Not Available	8/4/1994	0.1
FALL RIVER	Natural	1994	Not Available	8/8/1994	0.1
LITTLE	Natural	1994	8/10/1994	8/11/1994	0.1
GEM LAKE	Natural	1994	8/27/1994	8/28/1994	0.1
SOUTH COW	Natural	1995	9/3/1995	9/3/1995	0.1
SKI SLOPE	Natural	1995	8/13/1995	8/14/1995	0.1
FALL RIVER	Natural	1995	8/17/1995	8/18/1995	0.1
LITTLE	Natural	1995	8/18/1995	8/19/1995	0.1
CEDAR GULCH	Natural	1995	8/4/1995	8/6/1995	0.1
NORTH BALD	Natural	1995	8/1/1995	8/3/1995	0.1

Fire Name	Cause	Year	Start Date	Out Date	Total Acres
BALD	Natural	1995	4/5/1995	4/8/1995	0.1
ALMOST	Natural	1995	9/14/1995	9/15/1995	0.1
HODGE	Natural	1995	8/31/1995	9/3/1995	0.1
GREYROCK	Natural	1995	8/20/1995	8/22/1995	1
NORTH	--	1995	8/18/1995	8/19/1995	---
GREYROCK	Human	1995	8/9/1995	8/13/1995	0.1
DEVILS GULCH	Natural	1995	8/5/1995	8/5/1995	0.3
BALLARD	Natural	1995	8/3/1995	8/5/1995	1
PIERSON PARK	Natural	1995	8/2/1995	8/3/1995	0.1
SHAKEDOWN	Natural	1995	7/29/1995	8/2/1995	1.5
BIG SOUTH TRAIL	Human	1995	6/21/1995	6/23/1995	0.3
PALISADE MTN	Natural	1995	7/14/1995	7/15/1995	0.5
HYATT HILL	Natural	1995	7/23/1995	7/30/1995	0.1
POVERTY FLATS	Natural	1996	7/7/1996	7/8/1996	5
STRATTON	Natural	1996	8/28/1996	8/29/1996	12
BENNETT	Natural	1996	10/3/1996	10/6/1996	14
CALIFORNIA	Natural	1996	7/23/1996	7/26/1996	0.1
GULCH	--	1996	9/10/1996	9/12/1996	--
EAGLE CLIF	Natural	1996	9/10/1996	9/12/1996	0.1
NORTH FORK	Natural	1996	8/29/1996	8/30/1996	0.1
DUCK LAKE	Natural	1996	8/20/1996	8/24/1996	0.1
STONE	Natural	1996	8/2/1996	8/4/1996	0.1
MOUNTAIN	--	1996	8/18/1996	8/26/1996	--
DRAKE	Natural	1996	8/24/1996	8/25/1996	0.3
ROARING CREEK	Human	1996	8/15/1996	8/21/1996	0.1
SHEEP CREEK	Human	1996	8/11/1996	8/13/1996	0.1
HEWLETT	Natural	1996	7/23/1996	7/25/1996	0.1
CIRQUE MEADOW	Human	1996	5/17/1996	5/29/1996	0.1
DIVERSION	Natural	1996	6/11/1996	6/15/1996	0.1
WALTONIA	Natural	1996	6/10/1996	6/15/1996	8
MINERAL	Natural	1996	5/12/1996	5/13/1996	0.2
SPRINGS	--	1996	5/9/1996	5/10/1996	--
PROSPECT	Natural	1996	Not Available	7/3/1996	2.5
RUSTIC	Human	1996	5/23/1996	5/23/1996	33
LONE PINE I	Natural	1996	6/10/1996	6/10/1996	0.1
CRYSTAL	Human	1996	Not Available	7/3/1996	178.1
BENNETT CREEK	Natural	1996	7/24/1996	7/25/1996	1.3
STORM	Natural	1996	Not Available	8/9/1996	8

Fire Name	Cause	Year	Start Date	Out Date	Total Acres
STOVE PRAIRIE	Human	1996	Not Available	7/3/1996	1
EGGERS	Natural	1996	Not Available	7/3/1996	0.1
CRYSTAL	--	1997	9/26/1997	9/29/1997	0
MCGREGOR	Natural	1997	9/3/1997	9/3/1997	0.1
INDIANHEAD	Natural	1997	9/14/1997	9/17/1997	0.1
STORM	--	1997	7/21/1997	7/23/1997	0.2
COTTONTAIL	Natural	1997	7/16/1997	7/20/1997	0.1
MOSQUITO	Natural	1997	7/16/1997	7/21/1997	0.1
RUSTIC	--	1997	7/16/1997	7/18/1997	0
WALTONIA	--	1997	7/5/1997	7/10/1997	0
ROARING BONE	Human	1997	7/5/1997	7/17/1997	0.1
ZIMMERMAN	Human	1997	6/21/1997	6/24/1997	0.1
BUCKHORN	Human	1997	7/23/1997	7/28/1997	1.2
NORTH FORK	Natural	1997	7/17/1997	7/31/1997	0.8
PRAIRIE GULCH	Natural	1997	7/18/1997	7/24/1997	0.1
BEAR GULCH	Natural	1997	7/18/1997	7/20/1997	0.1
SYLVANDALE	Natural	1997	7/18/1997	7/18/1997	0.1
MANY	Natural	1997	7/16/1997	7/31/1997	0.1
THUNDERS	--	1997	7/12/1997	7/21/1997	--
FALLS GULCH	Natural	1997	7/11/1997	7/12/1997	0.3
PALISADE	Natural	1997	5/20/1997	5/21/1997	0.1
BUCK GULCH	Natural	1997	Not Available	5/14/1997	15
DEADMAN	Natural	1997	Not Available	Not Available	0.1
CROSIER 2	Natural	1997	Not Available	10/15/1997	0.1
BIG SOUTH	Human	1997	Not Available	4/4/1997	0.1
CROSIER 1	Natural	1997	Not Available	9/30/1997	0.1
LIVERMORE	Natural	1997	Not Available	10/27/1997	3.5
LOST LAKE	Human	1997	Not Available	10/27/1997	0.3
KIOWA ROAD	Human	1997	6/25/1997	6/26/1997	0.1
FISH CREEK	Natural	1997	7/13/1997	7/13/1997	0.3
BALDPATE	Human	1997	7/16/1997	7/22/1997	5
SUGARLOAF	--	1997	7/18/1997	7/21/1997	0
GLACIERCK1	Human	1997	7/23/1997	7/24/1997	13.2
MORAINEDMP	Human	1997	8/23/1997	8/28/1997	0.1
HIDDEN VAL	Human	1997	8/14/1997	8/16/1997	2
GLACIERCK2	Human	1998	9/8/1998	9/14/1998	8.2
GLACIERCK3	Human	1998	9/8/1998	9/25/1998	4.3
BIERSTADT	Natural	1998	9/8/1998	9/21/1998	0.1

Fire Name	Cause	Year	Start Date	Out Date	Total Acres
HONDIUS	Human	1998	9/8/1998	9/14/1998	0.1
BIGHORN	Natural	1998	9/8/1998	9/9/1998	0.5
DEER RIDGE	Natural	1998	9/8/1998	9/11/1998	0.1
BEAVER	Natural	1998	9/8/1998	9/10/1998	0.1
NCOWCREEK	Natural	1998	8/16/1998	8/20/1998	0.1
MIRRORLAKE	Human	1998	8/10/1998	8/13/1998	0.1
PINGREE HILL	Natural	1998	8/10/1998	8/15/1998	0.1
COMANCHE	Natural	1998	7/27/1998	7/29/1998	0.1
STONE	Natural	1998	7/20/1998	7/25/1998	80
MOUNTAIN #2	--	1998	7/15/1998	7/19/1998	--
JUG GULCH	Natural	1998	7/13/1998	7/14/1998	2
PARROTT	Natural	1998	7/3/1998	7/5/1998	0.1
SPRUCE	Human	1998	7/2/1998	7/2/1998	1
MOUNTAIN	--	1998	6/30/1998	8/14/1998	--
SUNDANCE	Natural	1998	2/28/1998	3/18/1998	0.1
CROSIER	Natural	1998	Not Available	5/15/1998	0.2
LIGHTNING	--	1998	Not Available	6/5/1998	--
SHEEP	Natural	1998	Not Available	5/1/1998	0.3
HOME MORAINE	Natural	1998	Not Available	Not Available	0.1
GREENWOOD	Natural	1998	Not Available	Not Available	0.1
PINEWOOD	Natural	1998	Not Available	10/27/1998	0.1
LOST LAKE	Human	1998	Not Available	9/22/1998	0.1
PIERSON PARK	Human	1998	Not Available	9/30/1998	0.1
MAXWELL	Natural	1998	Not Available	10/28/1998	0.1
TOM BENNETT	Human	1998	Not Available	10/16/1998	0.1
MINERAL	Natural	1998	Not Available	10/30/1998	0.8
SPRINGS	--	1998	Not Available	10/28/1998	--
GREYROCK	Human	1998	Not Available	11/17/1998	142
DEERRIDGEB	Human	1998	Not Available	12/13/1998	58
DEERRIDGEP	Human	1998	3/30/1998	4/10/1998	45
MCGRAWLEAF	Human	1998	Not Available	7/8/1998	0.9
MCGRWRANCH	--	1998	8/14/1998	8/18/1998	0
OLDFALLRIV	--	1998	10/14/1998	10/15/1998	0
MORAINEPKH	Human	1999	6/26/1999	6/29/1999	6.5
DEERRDGPLS	Human	1999	8/22/1999	8/22/1999	0.5
HIDENVALY2	Human	1999	6/19/1999	6/20/1999	0.1
MORAINEPKC	Human	1999	3/29/1999	3/29/1999	14.7
DEER RDG 3	Human	1999	12/4/1999	12/13/1999	0.2

Fire Name	Cause	Year	Start Date	Out Date	Total Acres
MORAINEPF1	Human	1999	10/9/1999	10/10/1999	8
MORAINEPKB	Human	1999	10/9/1999	10/9/1999	15.6
VALHALLA	Human	1999	9/13/1999	9/15/1999	3
VALHALAP2	Human	1999	9/2/1999	9/3/1999	1
SNOWY OWLS	Human	1999	8/26/1999	8/29/1999	0.1
SHEEPMTN	Natural	1999	8/26/1999	8/28/1999	0.1
HIGHDRIVE	Natural	1999	8/18/1999	8/21/1999	0.1
SURPRISE	Human	1999	8/3/1999	8/5/1999	0.1
PALISADE	Human	1999	7/13/1999	7/14/1999	0.2
PINGREE HILL	Natural	1999	7/8/1999	7/14/1999	0.1
HUMMINGBIRD	Natural	1999	7/2/1999	7/8/1999	0.1
NARROWS	Human	1999	6/21/1999	6/23/1999	0.1
PIPER MEADOWS	Human	1999	10/25/1999	11/3/1999	0.2
FIRE	--	1999	11/5/1999	11/6/1999	--
KILLPECKER	Human	1999	Not Available	1/20/1999	0.2
LOST LAKE	Human	1999	Not Available	1/22/1999	0.1
LONE PALM	Natural	1999	Not Available	1/29/1999	0.1
MITCHELL DITCH	Natural	1999	Not Available	3/6/1999	0.1
SEAMAN	Natural	1999	Not Available	4/14/1999	2.4
HONEY DO	Natural	1999	Not Available	4/14/1999	0.5
GREEN RIDGE	Natural	1999	Not Available	4/18/1999	1
LEPRICHAUN	Natural	1999	Not Available	4/22/1999	0
FISH CREEK	Natural	1999	Not Available	5/12/1999	4.2
BUTTON ROCK	Natural	1999	Not Available	5/23/1999	2
BEAVER FIRE	Human	1999	Not Available	6/19/1999	0.1
ARROW	Natural	1999	Not Available	8/14/1999	0.2
NUNN CREEK	Human	1999	Not Available	8/14/1999	0.2
SALT CABIN FIRE	Human	1999	Not Available	10/15/1999	0.1
VALHALLAP3	Human	1999	Not Available	10/21/1999	0.7
VALHALLAP4	Human	1999	Not Available	10/21/1999	1.2
MORAINPKP1	Human	1999	Not Available	10/24/1999	1
MRAINDUMPP	Human	1999	Not Available	12/14/1999	0.3
DEERRIDGE2	Human	1999	Not Available	9/10/1999	126
DEERRIDGE5	Human	1999	3/30/1999	3/30/1999	53
MORAINEPK2	Human	1999	5/24/1999	5/25/1999	75
GLACIER CR	Human	1999	Not Available	7/26/1999	20
NLATRLMRNE	Human	1999	Not Available	7/26/1999	1
MORAINEPKP	Human	2000	Not Available	8/3/2000	5

Fire Name	Cause	Year	Start Date	Out Date	Total Acres
MRNPK3PILE	Human	2000	8/11/2000	8/13/2000	2
Moraine2h	Human	2000	9/12/2000	9/12/2000	25
Moraine G	Human	2000	9/9/2000	9/11/2000	40
BEAVERBROK	Human	2000	9/6/2000	9/8/2000	60
LAWNLAKEPL	Human	2000	9/5/2000	9/8/2000	0.1
VALHALLAPL	Human	2000	9/6/2000	9/8/2000	1.5
HIDDENVLLY	Human	2000	9/5/2000	9/5/2000	1
BEAVBRKPLS	Human	2000	9/5/2000	9/6/2000	0.1
NRTHFRKPIL	Human	2000	9/1/2000	9/3/2000	0.2
LIONSCMPFR	Human	2000	8/26/2000	8/29/2000	0.1
CASTLEMTN.	Natural	2000	8/15/2000	8/16/2000	0.1
Bighorn Mt	Natural	2000	8/13/2000	8/16/2000	1.5
DEER FIRE	Natural	2000	8/13/2000	8/15/2000	1.5
ForesterCk	Natural	2000	8/7/2000	8/22/2000	1
SHEEP MTN	Natural	2000	8/4/2000	8/6/2000	0.5
CR 47	Human	2000	8/3/2000	8/4/2000	0.1
PIPER MEADOWS	Natural	2000	8/2/2000	8/4/2000	0.1
GRACE CREEK	Natural	2000	7/26/2000	7/31/2000	0.1
CHICKEN PARK	Natural	2000	7/26/2000	7/28/2000	0.2
WALTONIA	Natural	2000	7/26/2000	7/28/2000	0.1
CHICKEN LEG	Natural	2000	7/26/2000	7/28/2000	0.1
ELKHORN	Natural	2000	7/25/2000	7/25/2000	0.1
PINEWOOD	Natural	2000	7/22/2000	7/23/2000	0.1
SEAMAN	Natural	2000	7/17/2000	7/27/2000	3
CROSIER MTN	Natural	2000	7/11/2000	7/19/2000	0.1
ARROWHEAD	Natural	2000	6/25/2000	6/27/2000	0.1
HOME TO ROOST	Natural	2000	6/8/2000	6/8/2000	2
NORTH FORK	Human	2000	6/7/2000	6/7/2000	180
GREY ROCK	Natural	2000	6/5/2000	6/10/2000	15
SWAMP CREEK	Natural	2000	6/12/2000	7/19/2000	0.1
DRUMMER FLATS	Natural	2000	5/29/2000	6/1/2000	0.1
STRATTON PARK	Human	2000	5/28/2000	5/30/2000	0.2
TURKEY ROOST	Natural	2000	4/29/2000	5/1/2000	4
LOWER	Natural	2000	4/8/2000	4/10/2000	0.1
LATITUDE	--	2000	2/8/2000	2/9/2000	
LADY MOON	Natural	2000	1/22/2000	1/28/2000	0.1
TWIN CABIN	Natural	2000	Not Available	5/5/2000	0.1
SIGNAL	Human	2000	Not Available	Not Available	0.1

Fire Name	Cause	Year	Start Date	Out Date	Total Acres
MAXWELL	Natural	2000	Not Available	Not Available	18
RANCH	--	2000	Not Available	Not Available	--
LONG DRAW	Natural	2000	Not Available	Not Available	61
BOSWELL	Natural	2000	Not Available	7/9/2000	0.2
KILLPECKER	Natural	2000	Not Available	7/10/2000	0.1
ENGLEBERT	Natural	2001	9/21/2001	9/22/2001	0.1
BEAVER CREEK	Natural	2001	6/18/2001	6/19/2001	4
BOBCAT	Human	2001	7/7/2001	7/15/2001	10599
PRAIRIE GULCH	Natural	2001	8/11/2001	8/11/2001	2.5
PALISADE 2K	Natural	2001	8/28/2001	8/30/2001	0.5
CACHE LA	Natural	2001	7/6/2001	7/7/2001	0.1
POUDRE	--	2001	10/1/2001	10/3/2001	--
GREER	Human	2001	8/26/2001	8/26/2001	1
FROZEN RIVER	Human	2001	8/4/2001	8/4/2001	0.1
PALISADE	Human	2001	7/3/2001	7/5/2001	15
HIGHDRTEST	Human	2001	2/2/2001	2/2/2001	0.2
EMERLDSTMP	--	2001	1/6/2001	1/6/2001	0
BIGHORNFA	--	2001	8/2/2001	8/3/2001	0
AVC F.A.	--	2001	7/4/2001	7/16/2001	0
LONGSPEAK	--	2001	7/7/2001	7/8/2001	0
MCGREGOR	Natural	2001	8/28/2001	8/29/2001	0.1
MARMOT	Natural	2001	6/22/2001	6/22/2001	0.1
PINEGREE HILL	Human	2001	6/23/2001	6/24/2001	0.1
FIRE	--	2001	7/12/2001	7/12/2001	--
WISHFUL	Human	2001	9/1/2001	9/6/2001	0.1
THINKING	--	2001	8/6/2001	8/8/2001	--
SYLVANDALE	Natural	2001	6/23/2001	6/24/2001	1.7
KILLER BEE	Natural	2001	7/13/2001	7/21/2001	0.1
A1A	Natural	2001	6/25/2001	6/28/2001	0.2
EVELYN	Natural	2001	7/7/2001	7/9/2001	0.1
SPENCER	Human	2001	7/5/2001	7/8/2001	0.1
HEIGHTS	--	2001	7/5/2001	7/7/2001	--
BRONCO	Human	2001	6/23/2001	6/28/2001	0.1
SWAMP CREEK	Human	2001	7/5/2001	7/6/2001	0.1
INDEPENDENCE	Natural	2001	6/25/2001	6/26/2001	0.5
PIERSON PARK	Human	2001	7/2/2001	7/4/2001	0.1
BULWORK	Human	2001	6/24/2001	6/25/2001	0.1
LOST LAKE FIRE	Human	2001	7/2/2001	7/5/2001	0.1

Fire Name	Cause	Year	Start Date	Out Date	Total Acres
BLACK	Natural	2001	6/22/2001	6/24/2001	1
MOUNTAIN	--	2001	7/6/2001	7/11/2001	--
SEAMAN	Natural	2001	6/22/2001	6/24/2001	2.7
BEAR	Natural	2001	6/24/2001	6/28/2001	0.2
SOUTH LONE	Natural	2001	7/14/2001	7/17/2001	0.1
PINE	--	2001	8/25/2001	8/26/2001	--
BENNETT CREEK	Human	2001	8/6/2001	8/9/2001	0.1
BELL ROCK	Natural	2001	6/2/2001	6/3/2001	0.1
KIM	Natural	2001	Not Available	Not Available	0.1
FISH STICK	Natural	2001	6/30/2001	8/6/2001	4
YOUNG GULCH	Human	2001	Not Available	8/6/2001	0.1
BELAY	Natural	2001	10/1/2001	10/1/2001	0.1
POUDRE	Natural	2001	6/14/2001	6/18/2001	0.1
HERMIT PARK	Natural	2002	11/23/2002	11/24/2002	0.1
GLENHAVEN	Natural	2002	6/1/2002	6/1/2002	0.2
BIG THOMPSON	Natural	2002	5/2/2002	5/3/2002	0.1
BENNETT CREEK	Natural	2002	9/28/2002	9/29/2002	2.5
DUNRAVEN	Natural	2002	9/20/2002	9/22/2002	0.1
BRINKER CREEK	Natural	2002	8/29/2002	9/2/2002	0.5
SOUTH	Natural	2002	8/29/2002	9/2/2002	0.1
STRINGTOWN	--	2002	8/29/2002	8/30/2002	--
KELLY FLATS	Natural	2002	8/29/2002	9/2/2002	0.1
FISH CREEK	Natural	2002	8/30/2002	9/9/2002	0.1
ROARING CREEK	Natural	2002	8/29/2002	9/2/2002	0.1
GREEN RIDGE	Natural	2002	8/29/2002	9/2/2002	2.3
PENDERGRASS	Natural	2002	8/24/2002	8/26/2002	1
SOUTH FORK	Natural	2002	8/23/2002	8/26/2002	0.2
MILL CREEK	Natural	2002	7/28/2002	7/28/2002	0.1
POL HILL	Human	2002	7/24/2002	8/30/2002	0.1
BONNER PEAK	Natural	2002	7/26/2002	7/27/2002	0.2
GLEN COMFORT	Natural	2002	7/23/2002	7/25/2002	0.1
DEVIL'S GULCH	Human	2002	7/18/2002	7/25/2002	0.3
TWINOWLSFA	--	2002	7/20/2002	7/22/2002	0
DARK	Natural	2002	7/17/2002	8/20/2002	0.5
WUH	Natural	2002	7/12/2002	7/14/2002	0.1
POWERLINE2	Human	2002	7/9/2002	7/10/2002	0.1
LILY LAKE	Human	2002	6/30/2002	7/14/2002	0.1
PRE-TURKEY	Human	2002	6/28/2002	7/26/2002	2

Fire Name	Cause	Year	Start Date	Out Date	Total Acres
BALD MOUNTAIN	Human	2002	6/27/2002	6/28/2002	0.1
PIERSON PARK	Human	2002	6/22/2002	6/24/2002	0.1
TRIANGLE	Natural	2002	6/19/2002	6/23/2002	0.1
MOUNTAIN 2	--	2002	6/19/2002	6/22/2002	--
BOSWELL	Natural	2002	6/19/2002	6/20/2002	0.3
YOUNGS GULCH	Natural	2002	6/15/2002	6/18/2002	0.1
CHICKEN PARK	Natural	2002	6/5/2002	6/9/2002	0.1
ACME CREEK	Natural	2002	6/7/2002	6/8/2002	0.1
EAST MCGRAW	Natural	2002	6/1/2002	6/6/2002	0.6
SEVEN MILE	Natural	2002	5/31/2002	6/1/2002	7
SOUTH LONE	Natural	2002	4/17/2002	5/21/2002	0.1
PINE	--	2002	2/23/2002	2/25/2002	--
MARY BETH	Natural	2002	Not Available	2/2/2002	0.1
DARKSIDE	Natural	2002	Not Available	Not Available	0.2
MATTERHORN	Natural	2002	Not Available	Not Available	0.1
KIOWA	Natural	2002	4/24/2002	4/24/2002	0.1
ROCKY	Natural	2002	6/20/2002	9/5/2002	1
PINGREE HILL	Natural	2002	6/23/2002	9/5/2002	0.1
BULL CREEK	Natural	2002	6/27/2002	9/5/2002	0.2
TANKER 123	Human	2002	7/25/2002	7/27/2002	1
CRASH	--	2002	8/30/2002	9/3/2002	--
GPS	Natural	2002	9/24/2002	9/24/2002	0.1
BIG ELK	Human	2003	7/13/2003	7/13/2003	4348
POWER LINE	Human	2003	12/16/2003	12/18/2003	0.3
POWELL HILL	Human	2003	12/2/2003	12/4/2003	0.1
NORTH BALD	Natural	2003	8/16/2003	8/19/2003	5
MOUNTAIN	--	2003	9/6/2003	9/7/2003	--
FISH CREEK	Natural	2003	8/15/2003	8/17/2003	48
KILLPECKER	Natural	2003	7/6/2003	7/9/2003	0.1
CEDAR CREEK	Natural	2003	8/2/2003	8/6/2003	0.3
PENNOCK CREEK	Natural	2003	8/25/2003	8/29/2003	1
BIG ELK	Natural	2003	8/16/2003	8/18/2003	0.1
MEADOWS	--	2003	8/18/2003	8/23/2003	--
DOUBLE SPOT	Natural	2003	8/7/2003	8/8/2003	0.1
WINTERSTEEN	Natural	2003	8/6/2003	8/9/2003	0.1
GREEN	Natural	2003	8/8/2003	8/10/2003	1
MOUNTAIN	--	2003	8/3/2003	8/6/2003	--
GAP	Natural	2003	7/30/2003	8/2/2003	0.1
TRIANGLE	Natural	2003	7/29/2003	7/30/2003	0.2

Fire Name	Cause	Year	Start Date	Out Date	Total Acres
THOMPSON	Natural	2003	7/29/2003	7/30/2003	0.1
HEWLITT GULCH	Human	2003	7/26/2003	8/1/2003	500
PREVENT	Human	2003	7/25/2003	8/2/2003	190
DEER RDGE	Human	2003	7/22/2003	7/25/2003	15
DEER RG FA	--	2003	7/19/2003	7/21/2003	0
CRDSMOKE 3	--	2003	7/17/2003	7/18/2003	0
WEST CREEK	Human	2003	7/17/2003	7/19/2003	0.1
Chiq'ta Ck	Natural	2003	7/18/2003	7/22/2003	0.1
UTE TRAIL	Natural	2003	7/16/2003	7/19/2003	0.1
GLACIER	Natural	2003	7/5/2003	7/9/2003	0.1
TUXEDO PRK	Human	2003	7/5/2003	7/8/2003	0.1
E MCGRAW	Natural	2003	5/14/2003	5/22/2003	0.6
LONE PEAK	Human	2003	6/13/2003	6/16/2003	0.2
KEG MEADOW	Human	2003	6/13/2003	6/18/2003	0.1
BIG ELK PARK	Human	2003	5/30/2003	6/1/2003	0.1
ROUND	Human	2003	7/29/2003	8/7/2003	1
MOUNTAIN	--	2004	3/21/2004	3/30/2004	--
CASCADE	Natural	2004	7/12/2004	8/5/2004	0.1
GREEN RIDGE	Natural	2004	6/24/2004	6/25/2004	0.1
MOODY HILL	Human	2004	1/11/2004	1/13/2004	0.1
CREEDMORE	Natural	2004	6/9/2004	6/11/2004	0.1
RIDGE	--	2004	6/4/2004	6/13/2004	--
ALLOTMENT	Natural	2004	6/4/2004	6/11/2004	0.3
HELLS CANYON	Natural	2004	3/30/2004	4/19/2004	2
CHAMBERS LAKE	Human	2004	3/29/2004	4/6/2004	0.1
NORTH FORK	Natural	2004	3/24/2004	3/29/2004	2
WILLOW CREEK	Natural	2004	3/21/2004	3/30/2004	0.2
LONG	Natural	2004	3/18/2004	3/22/2004	1
LAZY D	Natural	2004	Not Available	Not Available	0.1
PINGREE HILL	Natural	2004	Not Available	2/2/2005	0.3
MONUMENT	Natural	2004	Not Available	2/2/2005	0.5
BUCK RIDGE #2	Natural	2004	Not Available	2/2/2005	0.1
BUCK RIDGE #1	Natural	2005	8/16/2005	8/20/2005	0.1
BENNETT	Natural	2005	12/12/2005	12/19/2005	0.2
ALEXANDER	Natural	2005	6/28/2005	7/3/2005	1
SPRING GULCH	Natural	2005	9/27/2005	10/15/2005	2.5
DRAKE	Natural	2005	10/1/2005	10/3/2005	0.1
BULL ROCK	Natural	2005	9/25/2005	9/28/2005	0.1

Fire Name	Cause	Year	Start Date	Out Date	Total Acres
NUNN	Human	2005	9/15/2005	9/17/2005	1
COMANCHE	Natural	2005	9/4/2005	9/15/2005	0.1
ELK RIDGE	Natural	2005	9/5/2005	9/9/2005	5
MOUNT	Human	2005	8/29/2005	8/29/2005	1
MARGARET	--	2005	8/12/2005	8/12/2005	--
TRAIL CREEK	Natural	2005	8/9/2005	8/13/2005	0.1
NARROWS	Human	2005	8/1/2005	8/3/2005	0.2
PINGREE	Natural	2005	7/31/2005	8/2/2005	0.2
CHELSEA	Natural	2005	7/31/2005	8/1/2005	1
PALLISADE	Natural	2005	7/28/2005	7/30/2005	10.8
LOST FALLS	Natural	2005	7/10/2005	7/11/2005	0.1
LEFTHAND SPUR	Human	2005	7/23/2005	7/24/2005	0.2
ROAD	--	2005	7/22/2005	7/22/2005	--
GREY ROCK 2	Human	2005	7/20/2005	8/5/2005	28.4
SAINT VRAIN	Natural	2005	7/20/2005	7/25/2005	0.1
WEST CREEK	Human	2005	7/18/2005	7/21/2005	0.2
ARROWHEAD	Natural	2005	7/16/2005	7/24/2005	0.1
YONDER	Natural	2005	7/16/2005	7/25/2005	1
GREY ROCK	Natural	2005	7/7/2005	7/8/2005	0.25
PICNIC ROCK	Human	2005	7/6/2005	7/7/2005	8908
BIG ELK	Natural	2005	7/4/2005	7/9/2005	0.1
MOODY	Natural	2005	7/2/2005	7/9/2005	1.2
LEFTHAND SPUR	Human	2005	7/2/2005	7/4/2005	0.2
ROAD	--	2005	6/28/2005	6/30/2005	--
LAKE FIELD	Human	2005	6/20/2005	6/25/2005	4
FALSEAL05	--	2005	6/16/2005	6/16/2005	0
DEERPILES1	Human	2005	5/21/2005	5/21/2005	15
DEERPILES2	Human	2005	Not Available	2/2/2005	133
EAGLEPILE1	Human	2005	Not Available	8/28/2005	6
NORTH RIM	Natural	2005	Not Available	12/15/2006	0.1
CROSIER	Human	2005	Not Available	12/3/2005	0.25
BRIGHT	Natural	2005	Not Available	4/20/2005	0.1
SHEEP CREEK	Natural	2005	Not Available	12/7/2005	30.5
COMPLEX	--	2005	Not Available	Not Available	--
DEER MEADOW	Human	2005	6/30/2005	7/1/2005	0.1
SWAMP LADY	Human	2005	Not Available	Not Available	1.9
NO BULL	Human	2005	7/21/2005	7/21/2005	0.1
DEVILS CREEK	Natural	2005	9/23/2005	9/26/2005	11

Fire Name	Cause	Year	Start Date	Out Date	Total Acres
S.PANHANDLE CK	Human	2005	Not Available	Not Available	0.1
EGGERS	Human	2005	10/8/2005	10/9/2005	0.1
KELLY FLAT	Human	2005	10/15/2005	10/15/2005	0.1
WET SADDLE	Natural	2005	10/23/2005	10/23/2005	0.1
BULL CREEK	Natural	2006	6/20/2006	6/25/2006	0.25
TRELL	Natural	2006	8/6/2006	8/8/2007	0.1
OLD FLOWERS	Human	2006	5/26/2006	5/30/2006	0.2
SCOTT	Natural	2006	5/21/2006	5/28/2006	0.25
PIERSON	Human	2006	7/20/2006	7/24/2006	0.1
SOUTH LONE	Natural	2006	8/30/2006	8/31/2006	0.1
PINE	--	2006	8/18/2006	8/18/2006	--
COW RIDGE	Natural	2006	8/11/2006	8/21/2006	0.1
NORTH BALD	Natural	2006	6/29/2006	7/5/2006	45
ALEXANDER 2	Natural	2006	9/12/2006	9/22/2006	4.4
LOST LAKE	Natural	2006	8/15/2006	8/31/2006	2
HELL'S CANYON	Natural	2006	8/8/2006	8/10/2006	5.9
DRAKE	Natural	2006	7/17/2006	7/21/2006	14
BOBCAT GULCH	Natural	2006	8/17/2006	8/20/2006	0.1
BLUE SOCK	Human	2006	8/7/2006	8/12/2006	0.1
TURKEY ROOST	Natural	2006	8/23/2006	9/24/2006	4.1
BLACK	Natural	2006	5/17/2006	5/30/2006	1.4
MOUNTAIN	--	2006	8/17/2006	8/19/2006	--
RABBIT CREEK	Natural	2006	7/6/2006	7/9/2006	0.1
ALEXANDER	Natural	2006	8/15/2006	9/1/2006	0.3
MOODY HILL	Human	2006	7/24/2006	7/27/2006	0.4
RIST CANYON	Human	2006	3/3/2006	3/13/2006	0.1
GREER 19	Human	2006	5/21/2006	5/30/2006	0.1
EAGLEPILE2	Human	2006	6/18/2006	6/24/2006	12
WillowCrk	Natural	2006	5/21/2006	5/24/2006	0.1
Emerald Mt	Human	2006	5/22/2006	5/25/2006	8
Deer Mt RX	Human	2006	5/24/2006	5/27/2006	15
Pontiac Pt	Human	2006	5/22/2006	5/23/2006	0.4
Lily Lake	Human	2006	Not Available	1/21/2006	0.4
Highlands	--	2006	Not Available	12/31/2006	0
Moraine130	Natural	2006	Not Available	1/10/2006	0.1
LongGulch	--	2006	Not Available	3/23/2006	0
Chasm Fall	Human	2006	Not Available	10/19/2006	0.1
Black Cyn	Human	2006	Not Available	10/20/2006	0.1

Fire Name	Cause	Year	Start Date	Out Date	Total Acres
Big Bend	Natural	2006	Not Available	11/15/2006	0.1
Dark Vale	Natural	2006	Not Available	1/7/2006	0.1
Dream	Human	2006	4/20/2006	4/24/2006	0.1
Sock	Human	2006	5/23/2006	5/25/2006	0.1
Halligan	Natural	2006	5/29/2006	5/29/2006	30
PINGREE PARK	Human	2006	Not Available	6/22/2006	0.1
PINEWOOD	Natural	2006	Not Available	7/1/2006	3
SPRINGS	--	2006	Not Available	7/6/2006	--
QUIGLEY	Natural	2006	8/11/2006	8/21/2006	5
MOUNTAIN	--	2006	8/14/2006	8/21/2006	--
THOMPSON	Natural	2006	9/13/2006	9/16/2006	0.2
GREEN RIDGE	Natural	2007	11/3/2007	11/7/2007	0.1
SALT	Natural	2007	7/17/2007	7/19/2007	0.1
LILY MTN.	Human	2007	9/20/2007	9/23/2007	0.1
MILL CREEK	Natural	2007	6/15/2007	6/17/2007	8
RABBIT GULCH	Natural	2007	7/17/2007	7/18/2007	0.3
CEDAR CREEK	Natural	2007	6/22/2007	6/25/2007	4.6
MUMMY	Human	2007	7/19/2007	7/22/2007	0.1
TRAIL CREEK	Natural	2007	7/17/2007	7/19/2007	0.4
BULL ROCK	Natural	2007	7/17/2007	7/20/2007	2.2
FISH CREEK II	Human	2007	8/15/2007	8/17/2007	1.3
BELL ROCK	Natural	2007	6/21/2007	7/2/2007	1.2
CROWN POINT	Natural	2007	6/16/2007	6/20/2007	3
SPRUCE GULCH	Natural	2007	8/3/2007	8/4/2007	0.1
MILL CREEK 2	Natural	2007	7/22/2007	7/29/2007	1.1
JUG GULCH	Natural	2007	7/21/2007	7/30/2007	15.4
PODUNK	Natural	2007	6/22/2007	6/25/2007	0.2
SWITCHBACK	Human	2007	7/1/2007	7/5/2007	9
CAMMON FIRE	Natural	2007	6/28/2007	6/29/2007	0.1
PRICKLEY PEAR	Natural	2007	5/17/2007	5/21/2007	0.8
FOX ACRES	Natural	2007	6/21/2007	6/24/2007	0.1
GREY ROCK	Natural	2007	5/18/2007	5/19/2007	0.1
POLE HILL	Natural	2007	6/13/2007	6/15/2007	0.5
TERRY	Natural	2007	6/26/2007	6/27/2007	0.2
Emerald Mt. 06	Human	2007	Not Available	7/5/2007	20
Deer Mountain 06	Human	2007	7/17/2007	7/19/2007	100
Deer Mtn. West	Human	2007	7/17/2007	7/17/2007	0.3
Burn	--	2007	7/22/2007	Not Available	--

Fire Name	Cause	Year	Start Date	Out Date	Total Acres
Eagle Cliff 06	Human	2007	Not Available	9/4/2007	8
Moraine Park Ad	Human	2007	Not Available	Not Available	0.3
Site	--	2007	11/15/2007	11/19/2007	--
Glacier Basin Ad	Human	2008	5/8/2008	5/12/2008	6
Sit	--	2008	6/8/2008	6/8/2008	--
Emer. Mtn. Phase 5	Human	2008	11/1/2008	11/18/2008	4
Olympus	Human	2008	11/20/2008	11/28/2008	0
Hoffmeiste	Human	2008	11/24/2008	12/7/2008	0.3
Eagle	Natural	2008	10/30/2008	10/31/2008	0.2
Abandoned	Human	2008	7/21/2008	7/24/2008	0.1
Campfire	--	2008	10/25/2008	10/31/2008	--
Beaver Mountain	Natural	2008	10/2/2008	10/6/2008	0.1
TOM	Natural	2008	9/22/2008	9/23/2008	0
Eagle North	Natural	2008	9/29/2008	10/4/2008	0.1
Lily Mtn	Human	2008	10/2/2008	10/5/2008	0.1
Bighorn	Natural	2008	10/2/2008	10/5/2008	0.1
Rabbit Gulch	Natural	2008	6/14/2008	6/15/2008	0.1
GREY ROCK	Human	2008	9/26/2008	Not Available	1.1
NORTH RIM	Natural	2008	7/31/2008	9/9/2008	0.1
DIAMOND TAIL	Human	2008	9/17/2008	9/26/2008	0.8
TODD	Human	2008	6/22/2008	6/24/2008	0.1
RUSTIC	Natural	2008	9/28/2008	11/17/2008	0.1
HYATT MINE	Human	2008	9/20/2008	9/22/2008	0.1
STUCK	Natural	2008	7/7/2008	7/15/2008	0.1
BLACK CREEK	Natural	2008	8/14/2008	9/7/2008	0.1
WEST CREEK	Natural	2008	6/22/2008	6/23/2008	0.2
JOSEPHINE	Natural	2008	8/2/2008	8/3/2008	0.1
GREY ROCK	Natural	2008	8/2/2008	8/9/2008	3.5
MEADOW	--	2008	8/14/2008	9/7/2008	--
COMMANCHE	Natural	2008	7/1/2008	7/19/2008	0.7
FISH	--	2008	7/5/2008	7/19/2008	--
JELLYSTONE	Natural	2008	7/26/2008	7/28/2008	0.01
FIRE	--	2008	5/10/2008	5/14/2008	--
CROSIER MTN.	Natural	2008	1/24/2008	1/29/2008	8
PENDERGRASS	Natural	2008	Not Available	Not Available	0
PEARL BEAVER	Natural	2008	Not Available	1/7/2009	0.1
LOST LAKE	Human	2008	6/18/2008	Not Available	1
MANHEAD	Natural	2008	Not Available	7/1/2008	0.1

Fire Name	Cause	Year	Start Date	Out Date	Total Acres
MOUNTAIN	--	2008	Not Available	9/12/2008	--
DEADHORSE	Natural	2008	7/13/2008	7/27/2008	3.6
MOUNTAIN	--	2009	11/9/2009	11/9/2009	--
PINGREE HILL	Human	2009	Not Available	6/30/2009	0.9
Dump Fire	Human	2009	9/16/2009	9/19/2009	0.1
GLACIER BASIN	Human	2009	9/6/2009	9/6/2009	0.1
DUMP	--	2009	8/31/2009	9/3/2009	--
Deer Ridge Fire	Natural	2009	8/31/2009	9/6/2009	0.1
MORAINE 115	Natural	2009	8/9/2009	8/9/2009	0.1
WEST CREEK	Natural	2009	8/7/2009	8/7/2009	0.3
INDIAN SPIRIT	Natural	2009	Not Available	7/19/2009	0
CROSIER	Natural	2009	7/5/2009	7/5/2009	0
TWIN OWLS	Natural	2009	9/5/2009	9/10/2009	0.1
Estes Park Assist	--	2009	9/8/2009	Not Available	0
Endovalley Fire	Human	2009	9/3/2009	9/6/2009	0.1
GREYROCK CAMP	Human	2009	7/19/2009	7/21/2009	0.01
ANSEL WATROUS	Human	2009	7/23/2009	7/28/2009	0.01
GROUSE CREEK	Natural	2009	4/5/2009	4/15/2009	0.1
SUMMIT TRAIL	Human	2009	Not Available	2/13/2009	0.01
PARADISE	Human	2009	1/20/2009	1/21/2009	83
63E	Human	2009	1/13/2009	1/22/2009	0.05
SOUL SHINE	Human	2009	Not Available	9/29/2009	0.61
BIG ELK	Human	2009	Not Available	10/13/2009	7
RIVER CROSSING	Natural	2009	7/22/2009	9/5/2009	0.1
SHEEP	Human	2009	8/26/2009	8/29/2009	0.01
MILL CREEK	Human	2009	Not Available	Not Available	3
SULZER 2	Natural	2009	Not Available	Not Available	0.3
MARGARET	Natural	2009	Not Available	9/12/2009	0.2
SWAMP LADY	Human	2009	11/7/2009	11/8/2009	0.1
HEWLETTE	Natural	2010	7/10/2010	7/12/2010	0.1
GULCH	--	2010	6/19/2010	6/20/2010	--
PENNOCK CREEK	Natural	2010	8/7/2010	Not Available	1.2
CREEK	Natural	2010	Not Available	9/1/2010	0.1
STARVIEW	Natural	2010	9/26/2010	10/13/2010	0.3
QUILLAN GULCH	Natural	2010	9/8/2010	9/13/2010	10
SULZER	Natural	2010	7/10/2010	7/12/2010	0.1
HELLS CANYON	Natural	2010	7/10/2010	7/12/2010	0.4
HESSELBARTH	Natural	2010	7/29/2010	7/31/2010	0.1

Fire Name	Cause	Year	Start Date	Out Date	Total Acres
DUMPSTER	Human	2010	4/28/2010	4/29/2010	0.1
GREYROCK	Natural	2010	6/29/2010	6/29/2010	0.1
DIANE	Natural	2010	4/11/2010	4/20/2010	0.1
FORREST	Natural	2010	Not Available	4/2/2010	0.1
RIVERBEND	Natural	2010	Not Available	Not Available	0.1
YOUNG	Natural	2010	9/14/2010	Not Available	0.25
WOODY	Natural	2010	1/31/2010	2/1/2010	0.1
WINTERSTEEN	--	2010	Not Available	7/16/2010	--
PA	--	2010	6/24/2010	12/8/2010	--
BURNT CAR	Human	2010	7/29/2010	9/3/2010	0.34
CROSIER	Human	2011	Not Available	11/18/2011	0.34
MOUNTAIN	--	2011	8/27/2011	8/28/2011	--
HOLLOWELL	Natural	2011	3/23/2011	3/23/2011	0
Beaver Meadows Rx	Human	2011	7/29/2011	7/31/2011	600
POWERLINE	Natural	2011	Not Available	8/23/2011	0
ENDO	Human	2011	8/9/2011	8/13/2011	0.1
Bier Fire	Natural	2011	9/5/2011	9/5/2011	0.1
Longs Fire	Human	2011	9/5/2011	9/5/2011	0.1
LOST LAKE	Human	2011	9/3/2011	9/5/2011	0.1
BADGE	Natural	2011	8/16/2011	8/21/2011	0.1
COON	Natural	2011	8/22/2011	Not Available	0.1
CAYMEN	Human	2011	8/16/2011	8/21/2011	0.1
FOX CREEK	Natural	2011	8/19/2011	8/21/2011	0.25
WEST CREEK	Natural	2011	8/1/2011	8/4/2011	1
BENNET	Human	2011	7/31/2011	7/31/2011	0.1
TENT POLE	Human	2011	Not Available	8/1/2011	0.1
ELK	Human	2011	7/18/2011	7/27/2011	0.1
PINGREE PARK	Human	2011	7/2/2011	7/3/2011	0.1
RD	--	2011	6/24/2011	6/26/2011	--
LARAMIE	Natural	2011	Not Available	6/29/2011	0.1
DUNRAVEN	Human	2011	4/1/2011	5/10/2011	44.4
ZIMMERMAN	Human	2011	7/11/2011	7/13/2011	0.35
GATEWAY FIRE	Natural	2011	Not Available	6/29/2011	0.1
WINTERSTEEN	Natural	2011	Not Available	5/28/2011	8.8
LONE TREE III	Human	2011	3/23/2011	3/23/2011	6.1
GREYROCK	Human	2011	3/14/2011	3/29/2011	28
MEADOW	--	2011	Not Available	2/11/2011	--
COMBAT	Human	2011	Not Available	4/5/2011	0.01

Fire Name	Cause	Year	Start Date	Out Date	Total Acres
SULLIVAN	Human	2011	Not Available	4/13/2012	0.15
Upper Beaver	Human	2011	Not Available	4/13/2012	150
Meadows	--	2011	Not Available	6/5/2011	--
G.B. VTS Lot Rx	Human	2011	6/19/2011	Not Available	1
Rabbit Ears	Natural	2011	7/22/2011	Not Available	0.3
Boyd Gulch	--	2011	10/1/2011	11/2/2011	11
West Creek	Natural	2012	Not Available	8/14/2012	0
Fox Creek	Natural	2012	6/9/2012	8/14/2012	0
Fall River Fire	Natural	2012	5/27/2012	5/27/2012	0.1
Cub Lake	Human	2012	5/26/2012	5/26/2012	0.1
SWAMP POL	Human	2012	5/18/2012	5/19/2012	0
SITE 9	Human	2012	5/14/2012	8/13/2012	0
BOSWELL	Natural	2012	11/6/2012	11/11/2012	10.2
FORT	Human	2012	8/27/2012	9/20/2012	0.1
WEST WHITE	Human	2012	9/22/2012	9/23/2012	0.35
PINE	--	2012	9/16/2012	9/20/2012	--
LAKEFIELD 2	Human	2012	9/21/2012	9/22/2012	0.1
GALUCHIE 2	Natural	2012	9/5/2012	9/14/2012	0.1
GALUCHIE	Natural	2012	9/5/2012	9/10/2012	0.1
NORTH ST VRAIN	Natural	2012	8/10/2012	8/19/2012	0.1
FIRE	--	2012	Not Available	8/11/2012	--
DUTCH GEORGE	Human	2012	8/10/2012	8/11/2012	0.3
LYON'S GULCH	Human	2012	7/24/2012	7/27/2012	0.1
SULLIVAN PARK	Human	2012	7/2/2012	7/12/2012	6.3
Deer Mtn. Rx	Human	2012	6/15/2012	6/16/2012	60
Endo Valley	--	2012	6/10/2012	6/19/2012	0
RESERVOIR	Human	2012	6/3/2012	6/5/2012	0
Eagle Cliff	Human	2012	4/29/2012	5/15/2012	0.1
Forest Canyon	Human	2012	4/24/2012	5/2/2012	0.1
Cow Creek	Natural	2012	3/26/2012	3/31/2012	1200
Castle Mountain	Natural	2012	Not Available	4/13/2012	0.1
Fire	--	2012	Not Available	4/13/2012	--
PINGREE	Human	2012	Not Available	4/13/2012	3.5
CAMMAN	Human	2012	Not Available	4/13/2012	0.01
SPRINGS	--	2012	Not Available	4/13/2012	--
MM 114	Human	2012	Not Available	7/1/2012	0.01
CAYMAN	Human	2012	6/17/2012	6/18/2012	0.01
SPRINGS	--	2012	7/30/2012	7/31/2012	--
ELKHORN	Human	2012	4/24/2012	Not Available	0.25

Fire Name	Cause	Year	Start Date	Out Date	Total Acres
MIDDLE BALD	Human	2012	Not Available	6/8/2012	1
MONUMENT	Human	2012	5/14/2012	Not Available	0.1
GULCH	--	2012	Not Available	Not Available	--
GREEN RIDGE	Human	2012	Not Available	Not Available	0.01
CREEDMORE	Human	2013	5/18/2013	5/22/2013	0.01
LAKES	--	2013	7/10/2013	7/19/2013	--
FORRESTER	Natural	2013	2/5/2013	2/28/2013	0.1
CREEK	--	2013	9/3/2013	9/4/2013	--
SPRING GULCH	Natural	2013	9/3/2013	9/4/2013	0.01
STRATTON	Natural	2013	8/28/2013	9/3/2013	1.82
WHITE ROCK	Natural	2013	8/5/2013	8/10/2013	0.1
LOST	Natural	2013	9/1/2013	9/2/2013	0.1
MANHATTAN 16	Human	2013	8/12/2013	8/14/2013	0.01
OVERLOOK	Natural	2013	5/26/2013	5/26/2013	6.5
COMANCHE	Natural	2013	5/26/2013	5/26/2013	0.1
LIGHTNING BUST	Natural	2013	9/5/2013	9/7/2013	0.1
NORTH FORK	Natural	2013	8/7/2013	8/8/2013	0.75
LADY MOON	Natural	2013	9/6/2013	9/7/2013	0.3
CRYSTAL	Human	2013	6/2/2013	6/14/2013	2939
EAGLES NEST	Natural	2013	5/16/2013	5/20/2013	8.3
OLD SCHOOL	Natural	2013	5/17/2013	5/17/2013	2.1
JACK'S GULCH	Human	2013	6/2/2013	6/2/2013	2.6
MM 111	Human	--	Not Available	Not Available	0.1
GREY ROCK	Human	--	Not Available	Not Available	17
Leiffer Cabin Rx	Human	--	Not Available	Not Available	1.5
Lily Lake RX	Human	--	Not Available	Not Available	0.5
West Deer Mtn. RX	Human	--	Not Available	Not Available	28
North Deer Mtn.	Human	--	Not Available	Not Available	85
RX	--	--	Not Available	Not Available	--
Camp Site Six	Human	--	Not Available	Not Available	0
Buck Creek Fire	Natural	--	Not Available	Not Available	0
Overlook	Natural	--	Not Available	Not Available	0
West Creek	Natural	--	Not Available	Not Available	0.2
High Park	Natural	--	Not Available	Not Available	87263
HIGH PARK	Natural	--	Not Available	Not Available	87275
SWAMP CREEK	Human	--	Not Available	Not Available	0.1
LOST LAKE	Human	--	Not Available	Not Available	0.1
BURNETT GULCH	Natural	--	Not Available	Not Available	0.1

Fire Name	Cause	Year	Start Date	Out Date	Total Acres
HEWLETT	Human	--	Not Available	Not Available	7685
HUSTED	Human	--	Not Available	Not Available	1.9
ROACH	Human	--	Not Available	Not Available	117
MOLLY	Human	--	Not Available	Not Available	0.1
LOST LAKE	Human	--	Not Available	Not Available	0.1
IRON MOUNTAIN	Human	--	Not Available	Not Available	0.1
FIRE	--	--	Not Available	Not Available	--
NARROWS	Human	--	Not Available	Not Available	2.7
MIDDLE BALD	Natural	--	Not Available	Not Available	0.2
BENNETT CREEK	Natural	--	Not Available	Not Available	0.75
DADD GULCH	Natural	--	Not Available	Not Available	0.1
SEVEN MILE	Natural	--	Not Available	Not Available	0.1
HAYSTACK ROCK	Natural	--	Not Available	Not Available	0.35
COMANCHE	Natural	--	Not Available	Not Available	0.1
CHETCO	Natural	--	Not Available	Not Available	0.1
COLUMBINE	Human	--	Not Available	Not Available	0.01
CANYON	--	--	Not Available	Not Available	--
SALT CABIN	Human	--	Not Available	Not Available	0.8
PARK	--	--	Not Available	Not Available	--
FLOWER	Human	--	Not Available	Not Available	0.1
GOAT MOUNTAIN	Natural	--	Not Available	Not Available	8.5
GALUCHIE	Human	--	Not Available	Not Available	14
East Portal Rx	Human	--	Not Available	Not Available	20
Deer Jct to H.S. Rx	Human	--	Not Available	Not Available	15
Upper Bear Lake	Human	--	Not Available	Not Available	14
RX		--	Not Available	Not Available	
Sleepy Hollow & D	Human	--	Not Available	Not Available	72
RX		--	Not Available	Not Available	
Moraine Park	Human	--	Not Available	Not Available	140
Dump Rx		--	Not Available	Not Available	
High Park	Natural	--	Not Available	Not Available	87000
Book	Natural	--	Not Available	Not Available	0.1
Sundance	Natural	--	Not Available	Not Available	0.1
Goat Mountain	Natural	--	Not Available	Not Available	0
West Alluvial	Human	--	Not Available	Not Available	0.1
Hewlett	Human	--	Not Available	Not Available	7685
High Park Fire	Natural	--	Not Available	Not Available	0
High Park		--	Not Available	Not Available	0
LITTLE DEER	Natural	--	Not Available	Not Available	0.1

Fire Name	Cause	Year	Start Date	Out Date	Total Acres
HELL CANYON	Natural	--	Not Available	Not Available	5.7
ALEXANDER	Human	--	Not Available	Not Available	1.1
CEDAR CREEK	Natural	--	Not Available	Not Available	0.01
SULZER GULCH	Natural	--	Not Available	Not Available	0.01
MOODY	Natural	--	Not Available	Not Available	0.2
CHAMBERS	Human	--	Not Available	Not Available	0.01
CROWN POINT	Natural	--	Not Available	Not Available	0.01
ZIMMERMAN	Natural	--	Not Available	Not Available	0.1
MANHATTAN 2	Human	--	Not Available	Not Available	0.01
MANHATTAN	Human	--	Not Available	Not Available	0.01
SHEEP	Natural	--	Not Available	Not Available	0.1
MOUNTAIN		--	Not Available	Not Available	
BEAR TRAP	Natural	--	Not Available	Not Available	0.01
LOST	Natural	--	Not Available	Not Available	0.01
HOHNHOLZ	Human	--	Not Available	Not Available	29.3
Beaver Ponds	Human	--	Not Available	Not Available	0.1
Moraine	Human	--	Not Available	Not Available	0.1
Many Parks	Human	--	Not Available	Not Available	0.1

Inventory Exposed

Fires can extensively impact the economy of an affected area, including the agricultural, recreation and tourism industries, water resources, and the critical facilities upon which Larimer County depends.

The following two critical facilities tables summarize the exposure data of Wildfire Threat to Critical Facilities by showing the number of critical facilities located within areas of High and Very High wildfire threat levels. The critical facilities have been organized into the following two categories:

- Emergency Services
- Community Services

There are 23 identified county assets located in areas with the highest wildfire threat total. There are, 2 county assets located in areas categorized as having high wildfire threat. The appraisal value of the assets within these very high threat areas is approximately $13,820,147. The appraisal value of the assets within these high threat areas is approximately $2,689,558.

Larimer County fire (Source: Poudre Fire Authority)

Table 27. Wildfire Exposure Table – Emergency Services

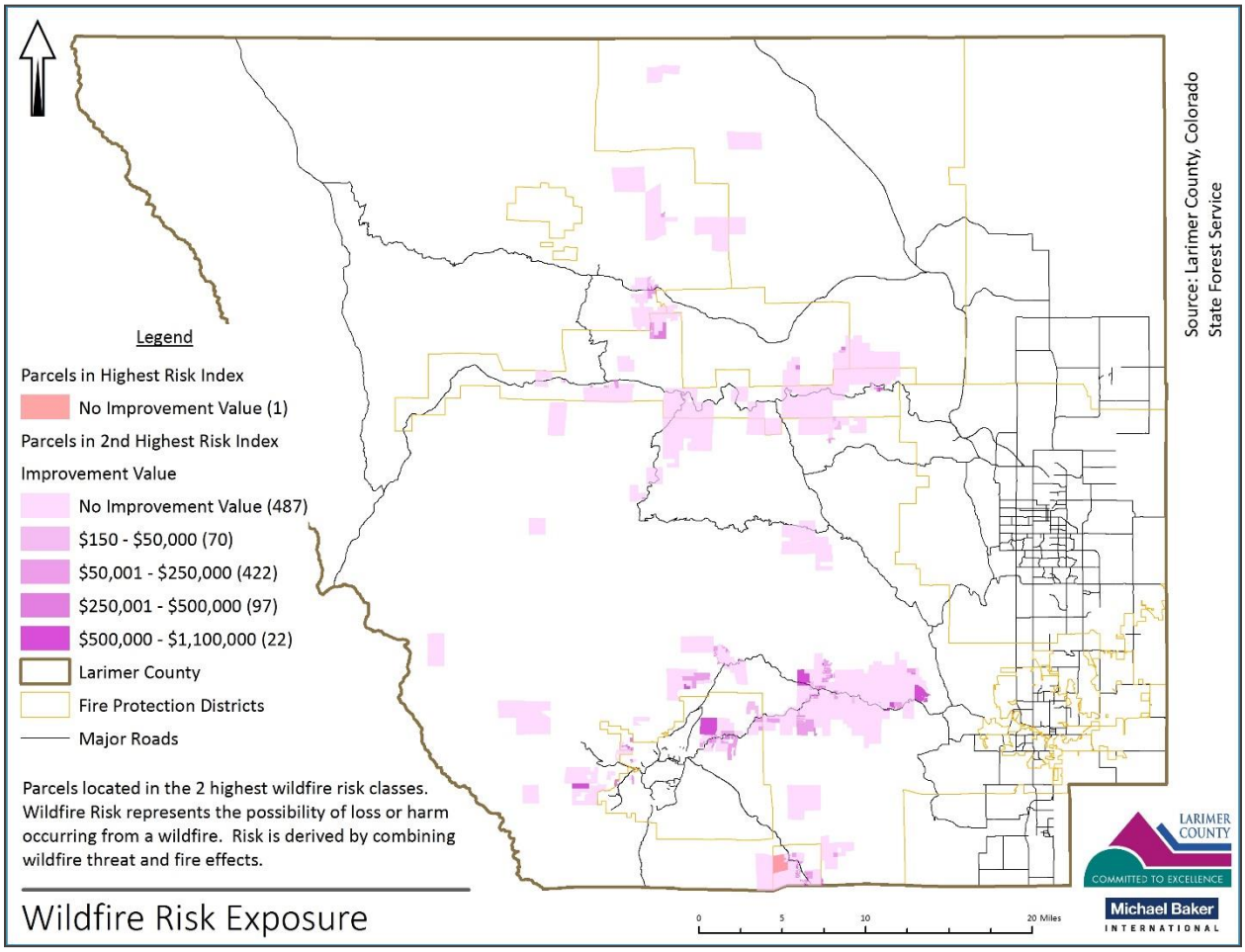
Critical Facilities: Emergency Services				
	Fire Stations		Hospital	
Wildfire Threat Level	Count	Appraised Value	count	Appraised Value
High	0	-	0	-
Very High	4	$882,202	1	$1,215,659
Total	4	$882,202	1	$1,215,659

Table 28. Wildfire Exposure Table – Community Services

Critical Facilities: Community Services				
Community Services	**High Wildfire Threat Level (Count)**	**High Appraised Value**	**Very High Wildfire Threat Level (count)**	**Very High Appraised Value**
Church	1	$1,888,390	10	4768871
Clubhouse	-	-	1	$32,603
Dormitory	-		2	$1,086,195
Government Building	-	-	3	$1496199
Post Office	-	-	1	$142700

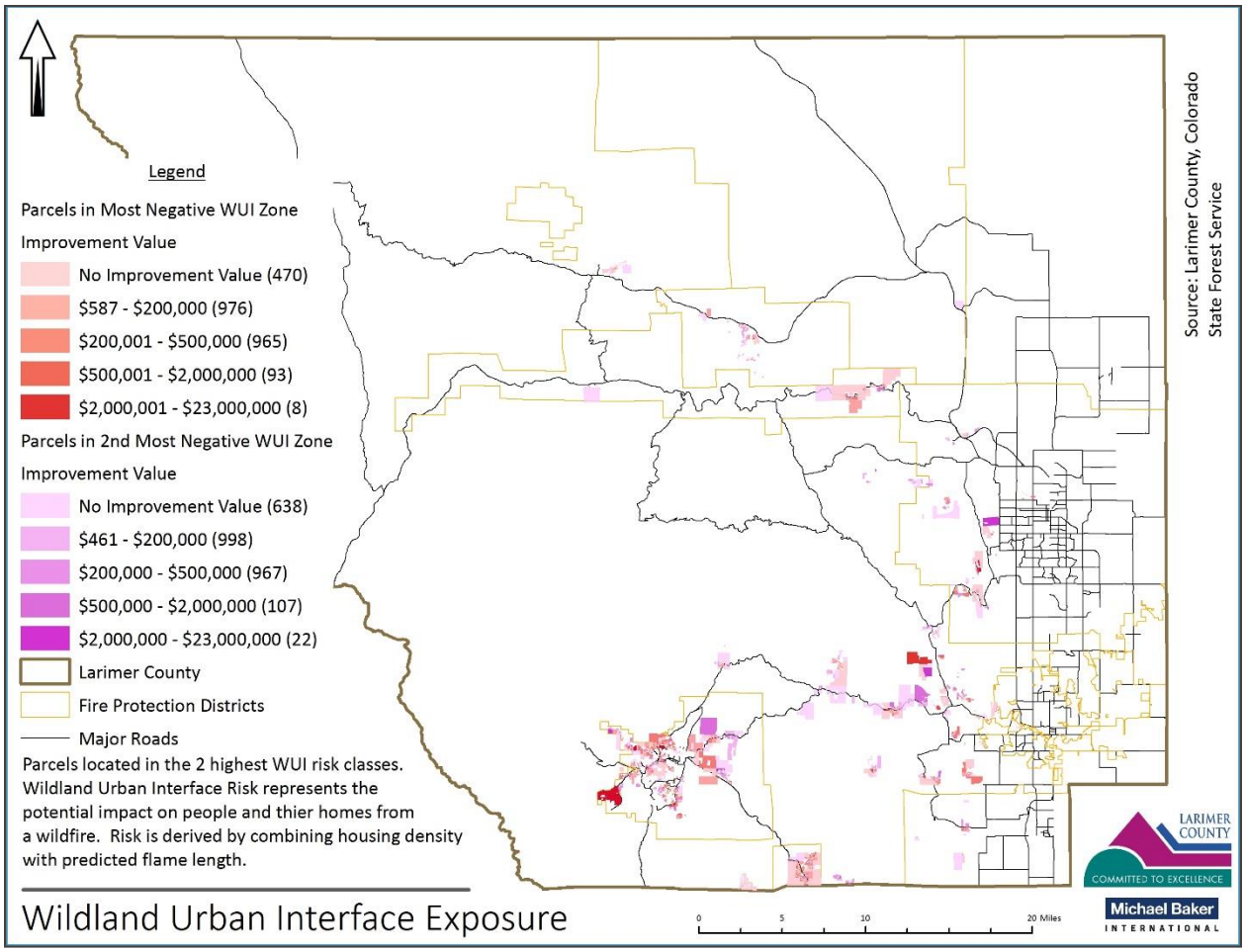
Critical Facilities: Community Services				
Community Services	**High Wildfire Threat Level (Count)**	**High Appraised Value**	**Very High Wildfire Threat Level (count)**	**Very High Appraised Value**
School	-	-	1	$1221793
Visitor Center	1	$801,168		
Total	**2**	**$2,689,558**	**18**	**$8,748,361**

Figure 24. Parcels in the highest and 2nd highest Wildfire Risk Index – Larimer County[32]



[32] Parcels intersecting with the highest the 2nd highest wildfire risk index areas. Wildfire Risk represents the possibility of loss or harm occurring from a wildfire. Risk is derived by combining wildfire threat and fire effects. The COWRAP data set was produced statewide and ranks areas on a scale that includes: lowest risk to highest risk. All risk rankings are present in Larimer County.

Figure 25. Parcels in the highest and 2nd highest WUI – Larimer County[33]



Potential Losses

Currently, there is no method for estimating wildfire loss. In most cases, the emergency management community equates potential losses to assets exposed to wildfire as a method of quantifying and comparing potential losses across communities. The exposure data provided in the previous section (Inventory Assets Exposed) provides the clearest picture of potential losses to wildfire in Larimer County.

Probability of Future Occurrences

Recent wildfires and brush fires across Colorado have forced school closures, disrupted telephone services by burning fiber optic cables, damaged railroads and other infrastructure, and adversely affected tourism, outdoor recreation, and hunting. The likelihood of one of those fires attaining significant size and intensity is unpredictable and highly dependent on environmental conditions and firefighting response. Weather conditions, particularly drought events, increase the likelihood of wildfires occurring. That said, it is important to note that 98% of wildfires are human-caused. Ultimately, the occurrence of future wildfire

[33] Parcels intersected with the most negative and 2nd most negative WUI Zone. Wildland Urban Interface Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length. The COWRAP data set was produced statewide and ranks areas on a scale that includes: least negative to most negative impacts. This scale stretched from -1 (least) to -9 (most) statewide, within Larimer County values present span this entire range.

events will strongly depend on patterns of human activity and events are more likely to occur in wildfire-prone areas experiencing new or additional development.

Wildfires can occur at any time of day and during any month of the year. Moreover, the length of a wildfire season and/or peak months may vary appreciably from year to year. As evidenced by the wildfire risk assessment, areas within Larimer County that are characterized by dense development and single family homes along the wildland-urban interface are most vulnerable to wildfire. The map of Wildland-Urban Interface Risk illustrates the difference in wildfire risk between jurisdictions within the County. The jurisdictions with the highest WUI Risk Index rating include areas of the Town of Estes Park and portions of unincorporated Larimer County located along the foothills.

Land Use and Development Trends

Future development is an important factor to consider in the context of wildfire mitigation because development and population growth can contribute to increased exposure of people and property to wildfire. During the past few decades, population growth in the Larimer County WUI has increased greatly. Subdivisions and other high-density developments have created a situation where wildland fires can involve more buildings than any amount of fire equipment can possibly protect. By identifying areas with significant potential for population growth and/or future development in high-risk areas, communities can identify areas of mitigation interest and reduce hazard risks associated with increased exposure.

Wildfire mitigation activity in Larimer County
Source: Colorado State University

As development expands into wildland areas, people and property are increasingly at risk from wildfire. Wildfire mitigation in the wildland-urban interface has primarily been the responsibility of property owners who choose to build and live in vulnerable zones. In practice, successful wildfire mitigation strategies can be quite involved. The most important aspect of successful suppression is disruption of the continuity of fuels, achieved by creating breaks or defensible areas. For interface fires, where homes and other structures fill the space, fuel reduction is best accomplished before the fires begin. Larimer County does have land use codes in place that specifically deal with construction in the WUI. Some of these codes include and/or focus on mandatory mitigation measures.

Safety zones can be created around structures by reducing or eliminating brush, trees, and vegetation around a home or facility. FEMA recommends using a 30-foot safety zone; including keeping grass below 2 feet tall and clearing all fallen leaves and branches promptly. Additionally, only fire-resistant or non-

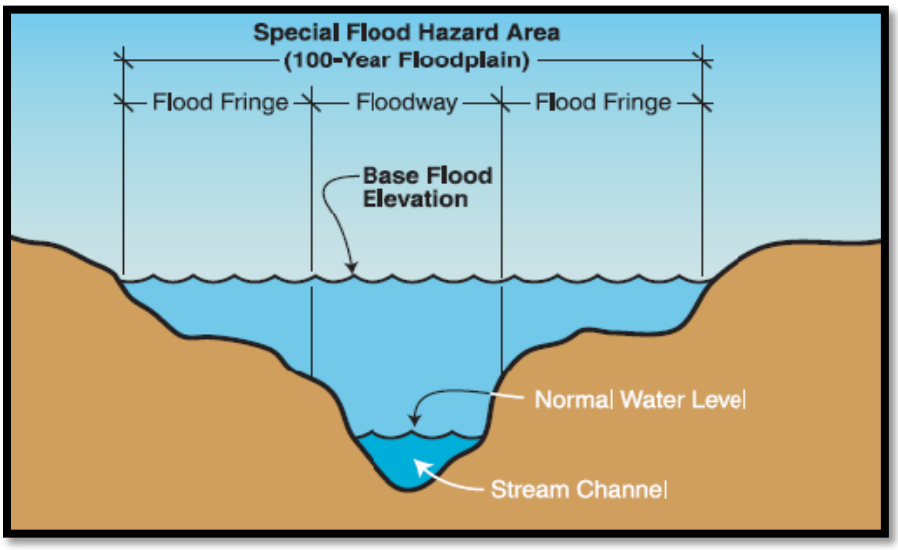
combustible materials should be used on roofs and exterior surfaces. Firebreaks -- areas of inflammable materials that create a fuel break and reduce the ability for fires to spread and roads and pathways -- can be planned and designed to serve as wildfire mitigation.

5.3.6 Flood – Flash and Riverine

NATURAL HAZARDS	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Flood – Flash and Riverine	0.9	1.2	0.6	0.3	0.4	3.40
HIGH RISK (2.5 or higher)						

Hazard Identification

A flood is a naturally occurring event for rivers and streams and occurs when a normally dry area is inundated with water. Excess water from snowmelt or rainfall accumulates and overflows onto the stream banks and adjacent floodplains. As illustrated in the figure below, floodplains are lowlands, adjacent to rivers, streams, and creeks that are subject to recurring floods. Flash floods, usually resulting from heavy rains or rapid snowmelt, can flood areas not typically subject to flooding, including urban areas. Additionally, extreme cold temperatures can cause streams and rivers to freeze, causing ice jams and creating flood conditions.



Floodplain Terminology

Floods are considered hazards when people and property are affected. Nationwide, hundreds of floods occur each year, making it one of the most common hazards in all 50 states and U.S. territories. Most injuries and deaths from flooding happen when people are swept away by flood currents and most property damage results from inundation by sediment-filled water. Fast-moving water can wash buildings off of their foundations and sweep vehicles downstream. Pipelines, bridges, and other infrastructure can be damaged when high water combines with flood debris. Basement flooding can also cause extensive damage. Flooding can cause extensive damage to crop lands and bring about the loss of livestock. Several factors determine the severity of floods including rainfall intensity and duration, topography, and ground cover.

Riverine flooding originates from a body of water, typically a river, creek, or stream, as water levels rise onto normally dry land. Water from snowmelt, rainfall, freezing streams, ice flows, or a combination

thereof, causes the river or stream to overflow its banks into adjacent floodplains. Winter flooding usually occurs when ice in the rivers creates dams or streams freeze from the bottom up during extreme cold spells. Spring flooding is usually the direct result of melting winter snow packs, heavy spring rains, or a combination of the two.

Flash floods can occur anywhere when a large volume of water flows or melts over a short time period, usually from slow moving thunderstorms or rapid snowmelt. Because of the localized nature of flash floods, clear definitions of hazard areas do not exist. These types of floods often occur rapidly with significant impacts. Rapidly moving water, only a few inches deep, can lift people off their feet, and only a depth of a foot or two, is needed to sweep cars away. Most flood deaths result from flash floods.

Previous flash flooding events have occurred within Larimer County. Although data does not currently exist to perform robust assessments of flash flood risk within Larimer County, local jurisdictions have expressed a desire and a need for data and information specifically related to flash flooding so that appropriate mitigation strategies can be identified and implemented.

Urban flooding is the result of development and the ground's decreased ability to absorb excess water without adequate drainage systems in place. Typically, this type of flooding occurs when land uses change from fields or woodlands to roads and parking lots. Urbanization can increase runoff two to six times more than natural terrain. The flooding of developed areas may occur when the amount of water generated from rainfall and runoff exceeds a storm water system's capability to remove it.

Stream Bank Erosion is measured as the rate of the change in the position or horizontal displacement of a stream bank over a period of time. It is generally associated with riverine flooding and discharge, and may be exacerbated by human activities such as bank hardening and dredging.

Ice Jams are stationary accumulations of ice that restrict flow through a waterway. Ice jams can cause considerable increases in upstream water levels, while at the same time, downstream water levels may drop. Types of ice jams include freeze up jams, breakup jams, or combinations of both. When an ice jam releases, the effects downstream can be similar to that of a flash flood or dam failure. Ice jam flooding generally occurs in the late winter or spring.

Dam Break Flooding

The Dam Safety Branch of the Colorado Division of Water Resources is tasked with tracking dams located across the state. In Larimer County, they have identified 216 dams, of which 91 have existing Emergency Action Plans (EAP). These plans provide details about each dam and include mapping of potential inundation areas should the structure fail. The Dam Safety Branch also classifies each dam's current hazard classification level. The following table shows a breakdown of this information.

Table 29. Dam Hazard Classification Levels

Hazard Classification	Dam Count
1	58
2	34
3	93
4	5
N	26

Flooding events are typically measured in terms of magnitude and the statistical probability that they will occur. The 1% annual chance flood event is the standard national measurement for flood mitigation and insurance. A 1% annual chance flood, also known as the '100-year flood', has a 1 in 100 chance of being equaled or exceeded in any 1 year and has an average recurrence interval of 100 years. It is important to note that this recurrence interval is an average; it does not necessarily mean that a flood of such a magnitude will happen exactly every 100 years. Sometimes, only a few years may pass between one 1% annual chance flood and another while two other 1% annual chance floods may be separated by 150 years. The 0.2% annual chance flood event, or the '500-year flood', is another measurement which represents a 0.2% chance (or 1 in 500 chance) of occurring in a given year.

Flood Magnitude and Probability

According to the NFIP's Community Information System (CIS) Larimer County has been mapped for flood hazards and participates in the National Flood Insurance Program (NFIP). Details of local jurisdiction participation status are shown in the table below.

Table 30. Communities Participating in the FEMA NFIP

CID	COMMUNITY NAME	COUNTY	INITIAL FIRM IDENTIFIED	CURRENT EFFECTIVE MAP DATE
080101	Larimer County	Larimer	04/02/79	02/06/13
080296	Town of Berthoud	Larimer	12/19/06	02/06/13
080193	Town of Estes Park	Larimer	01/17/79	12/19/06
080102	City of Fort Collins	Larimer	12/04/84	01/06/12
080103	City of Loveland	Larimer	09/01/78	02/06/13
080005	Town of Timnath	Larimer	12/19/06	12/19/06
080104	Town of Wellington	Larimer	02/15/79	12/19/06
080264	Town of Windsor	Larimer and Weld	09/27/91	09/27/91

*Participation status current as of May, 04, 2015

Larimer County has a total of 706 NFIP policies. In addition to participating in the NFIP, Larimer County participates in the Community Rating System (CRS). CRS is a voluntary program for NFIP participating communities. The goals of the CRS are to reduce flood damages to insurable property, to strengthen and support the insurance aspects of the NFIP, and to encourage a comprehensive approach to floodplain management.

The CRS was developed to provide incentives in the form of insurance premium discounts to communities that go above and beyond the minimum floodplain management requirements and develop extra measures to reduce flood risk. There are 10 CRS classes and the classification determines the insurance premium discount for policy holders. The discounts range from 5% to a maximum of 45%.

Table 31. CRS Premium Discounts

Class	Discount	Class	Discount
1	45%	6	20%
2	40%	7	15%

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

All CRS participating communities start out with a Class 10 rating (which provides no premium discount). Class 1 requires the most credit points and offers the largest premium discount. Within the CRS program, there are 18 activities recognized as measures for eliminating local exposure to flooding. Credit points are assigned to each activity, which have been organized under four main categories:

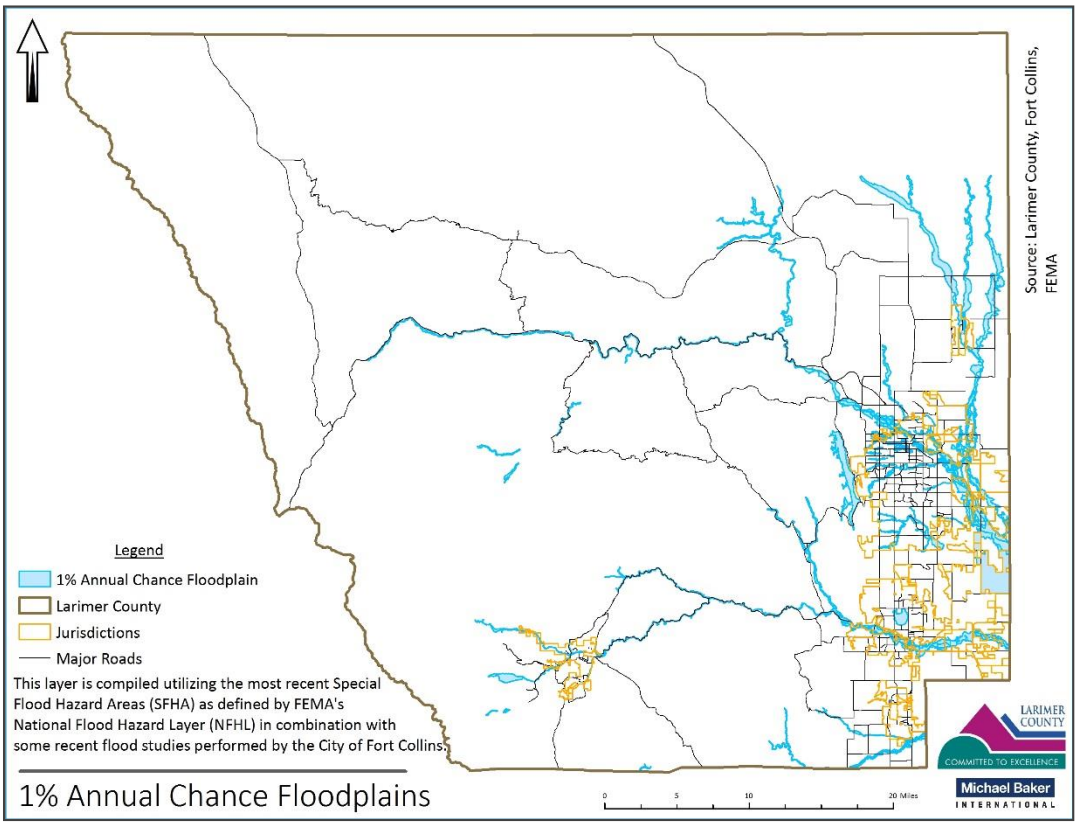
- Public Information
- Mapping and Regulation
- Flood Damage Reduction
- Flood Preparedness

Larimer County entered the CRS in October of 1992. Currently, Larimer County is a Class 10 CRS community. The City of Fort Collins also participates in CRS and is a Class 4 community.

Previous Occurrences

Seasonally, Larimer County is confronted with the possibility of flooding and flood-related hazards. Floods have the potential to inflict tremendous damages with significant losses of life and property. They can also pose a threat to the health, safety, and welfare of Larimer County citizens. Previous flooding events have caused thousands of dollars in damage in just a few hours or days in the region and current development and population growth trends necessitate a heightened awareness that the impact of flooding may likely increase in Larimer County over time. The map below depicts the current special flood hazard areas (SFHA) for Larimer County. The SFHA areas span roads, infrastructure, property, and jurisdictions across the county.

Figure 26. Special Flood Hazard Areas – Larimer County[34]



Hazus is a regional multi-hazard loss estimation model developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Buildings Sciences (NIBS). The Hazus delineations developed for this Plan were generated using the fully-automated tools within the software, which use generalized regional regression equations to estimate flows and normal depth calculations to estimate flood depths. Hazus floodplain delineations were post-processed to remove artifacts and flow areas less than 0.5 feet deep. Where Hazus could not determine floodplain delineations, the automated tools within HEC-GeoRAS were used to generate geometry data that was then used in HEC-RAS to model the floodplain. Flows used in HEC-RAS were either taken from the Hazus analysis or were developed using the U.S. Geological Survey's online StreamStats tool to implement the Colorado regional regression equations. HEC-GeoRAS was used to post-process the HEC-RAS model results and produce floodplain delineations.

The type of property damage caused by flood events depends on the depths and velocity of the floodwaters. Faster moving floodwaters can wash buildings off their foundations and sweep cars downstream. Pipelines, bridges, and other infrastructure can be damaged when high waters combine with flood debris. Extensive damage can be caused by basement flooding and landslide damage related to soil saturation from flood events. Seepage into basements is common during flood events. Most flood damage is caused by water saturating materials susceptible to loss (e.g., wood, insulation, wallboard,

[34] This layer is compiled utilizing the most recent Special Flood Hazard Areas (SFHA) as defined by FEMA's National Flood Hazard Layer (NFHL) in combination with some recent flood studies performed by the City of Fort Collins. These areas are also referred to as the 1% Annual Chance Floodplain. Source: FEMA, City of Fort Collins, Michael Baker International

fabric, furnishings, floor coverings, and appliances). Homes in flooded areas can also suffer damage to septic systems and drain fields. In many cases, flood damage to homes renders them uninhabitable.

Flood events impact businesses by damaging property and by interrupting business. Flood events can cut off customer access to a business as well as close a business for repairs or permanently. A quick response to the needs of businesses affected by flood events can help a community maintain economic vitality in the face of flood damage. Responses to business damages can include funding to assist owners in elevating or relocating flood-prone business structures.

During flooding events, homes, businesses, and people face the threat of explosions and fires caused by leaking gas lines along with the possibility of being electrocuted. Domestic and wild animals forced out of their homes and brought into contact with humans by floodwaters can also pose a threat. In rural areas, property damage caused by flooding can be devastating to ranchers and farmers. When flooding occurs during the growing season, farmers can suffer widespread crop loss. Stock growers may lose livestock if they are unable to find safety from rising floodwaters. Flooding may also cause damage to pasture land, fences, barns, and out buildings.

Publicly owned facilities are a key component of daily life for all citizens of the county. Public buildings are of particular importance during flood events because they house critical assets for government response and recovery activities. Damage to public water and sewer systems, transportation networks, flood control facilities, emergency facilities, and offices can hinder the ability of the government to deliver services. Loss of power and communications can be expected. Drinking water and wastewater treatment facilities may be temporarily out of operation.

Mitigation against flood events is accomplished through sensible floodplain management and regulations as well as identifying flood prone areas, tributary watersheds that experience instability or sediment loading problems, and channel instability hazards. This involves strategies to modify flooding and to modify infrastructure to decrease the likelihood of damage. To modify the impact of flooding, measures must be taken to decrease susceptibility to flood damage and disruptions. Natural and cultural resources must also be protected and managed. Coordination with mitigation plans by Floodplain Managers will increase effectiveness of flood mitigation projects. City and County Planners will be valuable resources to incorporate flood mitigation plans into their respective plans.

Documentation of flooding in Colorado collected by the National Climatic Data Center (NCDC) and the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI) goes back to 1950. The table below provides a history of major flood events that affected Larimer County between 1950 and 2015.

Table 32. Larimer County Historical Flood Events (1950 – 2015)

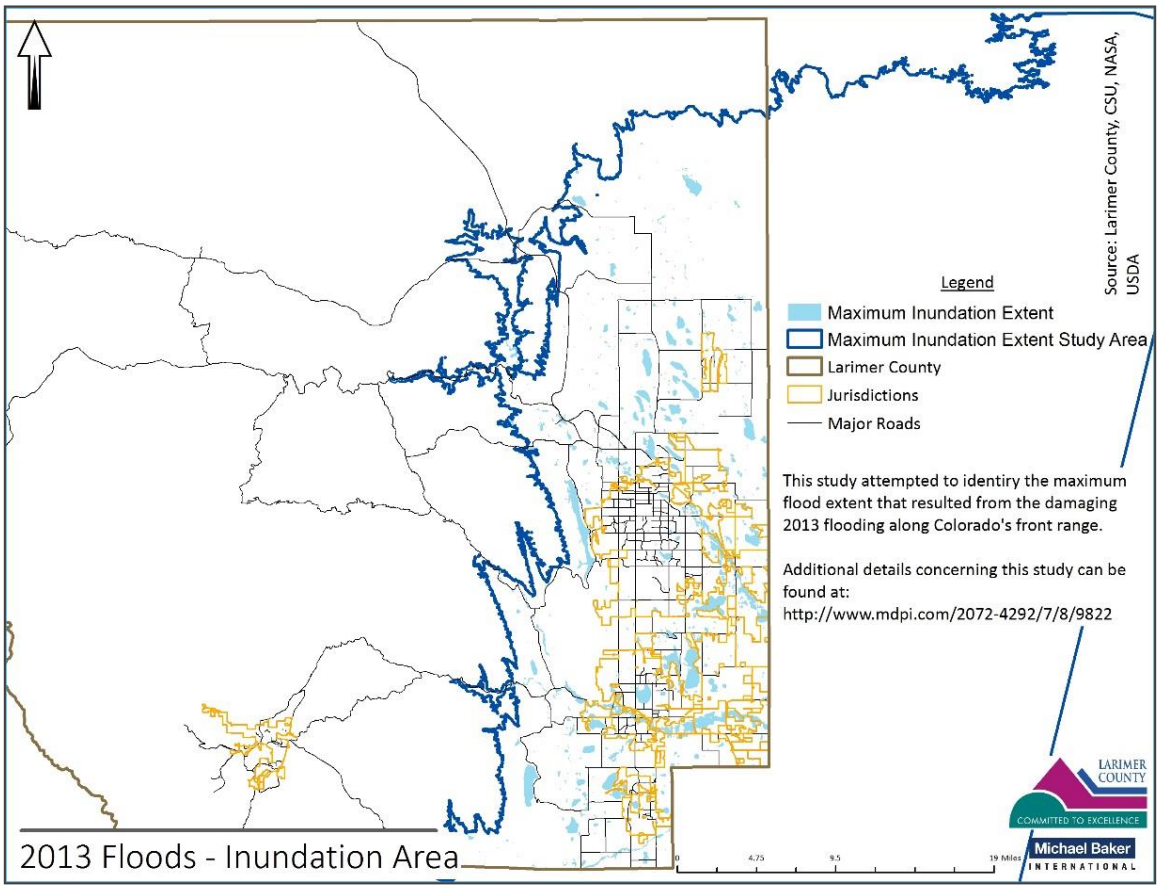
Date	Hazard Type	Injuries	Deaths	Property Damage	Crop Damage
9/14/1996	Flood	0	0	0	0
6/2/1997	Flash Flood	0	0	$500,000	0
6/13/1997	Flood	0	0	0	0
7/28/1997	Flood	0	0	0	0

Date	Hazard Type	Injuries	Deaths	Property Damage	Crop Damage
7/28/1997	Flash Flood	5	40	$190,000,000	0
8/4/1997	Flash Flood	0	0	0	0
9/1/1998	Flash Flood	0	0	0	0
4/28/1999	Flood	0	0	0	0
5/1/1999	Flood	0	0	$200,000	0
8/4/1999	Flood	0	0	0	0
8/16/2000	Flash Flood	0	0	0	0
7/12/2001	Flash Flood	0	0	0	0
6/18/2003	Flash Flood	0	0	0	0
8/18/2004	Flash Flood	0	0	0	0
6/3/2005	Flash Flood	0	0	0	0
8/2/2007	Flash Flood	0	0	$20,000	0
6/22/2009	Flash Flood	0	0	$10,000	$50,000
7/4/2010	Flash Flood	0	0	$10,000	$5,000
7/6/2012	Flash Flood	0	0	$20,000	$20,000
7/7/2012	Flash Flood	0	0	$10,000	$25,000
7/16/2012	Flash Flood	0	0	$15,000	$10,000
7/27/2012	Flash Flood	0	0	$15,000	$10,000
7/5/2013	Flash Flood	0	0	$25,000	0
7/12/2013	Flash Flood	0	0	$10,000	$10,000
7/18/2013	Flash Flood	0	0	$10,000	$5,000
7/25/2013	Flash Flood	0	0	0	0
9/6/2013	Flash Flood	0	0	$5,000	$5,000
9/11/2013	Flash Flood	0	0	0	0
9/12/2013	Flood	2	0	$109,000,000	0
9/14/2013	Flash Flood	0	0	0	0
5/23/2014	Flash Flood	0	0	$10,000	0
5/23/2014	Flash Flood	0	0	$15,000	0
6/24/2014	Flash Flood	0	0	$10,000	$5,000
7/13/2014	Flash Flood	0	0	$10,000	$5,000
7/14/2014	Flash Flood	0	0	$10,000	$10,000
7/29/2014	Flash Flood	0	0	$25,000	$50,000
7/29/2014	Flash Flood	0	0	$10,000	$20,000
	TOTAL:	7	40	$299,950,000	$235,000

Source: NOAA (NCDC Storm Events Database)

The most significant flooding event to collectively impact the State of Colorado occurred during September 2013. During the week beginning on September 9th, a slow moving cold front circulated over the state, clashing with warm, humid monsoonal air from the south. While damages are still being assessed for the 2013 flooding event, NOAA's National Climatic Data Center (NCDC) Storm Events Database estimates that Larimer County sustained approximately $109 million dollars in property damage.

Figure 27. 2013 Flood Inundation Area – Larimer County[35]



The preceding figure was created utilizing data produced by a team which included Colorado State University, NASA, and USDA, who performed a study attempting to better identify areas which were inundated by the 2013 floods (note the study area, which only covers portions of Larimer County). Maximum flood extent—a key data need for disaster response and mitigation—is rarely quantified due to storm-related cloud cover and the low temporal resolution of optical sensors. While change detection approaches can circumvent these issues through the identification of inundated land and soil from post-flood imagery, their accuracy can suffer in the narrow and complex channels of increasingly developed and heterogeneous floodplains. The data depicted above is from a study that explored the utility of the Operational Land Imager (OLI) and Independent Component Analysis (ICA) for addressing these challenges in the unprecedented 2013 Flood along the Colorado Front Range, USA. The approach was able to simultaneously distinguish flood-related water and soil moisture from pre-existing water bodies and other spectrally similar classes within the narrow and braided channels of the study site. Visual assessment against aerial orthophotography showed close agreement with high water marks and scoured riverbanks, and a pixel-to-pixel validation with WorldView-2 imagery captured near peak flow yielded an overall accuracy of 87% and Kappa of 0.73. Additional tests showed a twofold increase in flood class accuracy over the commonly used modified normalized water index. Although flooding beneath moderate and sparse riparian vegetation canopy was captured, dense vegetation cover and paved regions of the

[35] Multi-Temporal Independent Component Analysis and Landsat 8 for Delineating Maximum Extent of the 2013 Colorado Front Range Flood.

floodplain were main sources of omission error, and commission errors occurred primarily in pixels of mixed land use and along the flood edge. Nevertheless, the unsupervised nature of ICA, in conjunction with the global availability of Landsat imagery, offers a straightforward, robust, and flexible approach to flood mapping that requires no ancillary data for rapid implementation. Finally, the spatial layer of flood extent and a summary of impacts were provided for use in the region's ongoing hydrologic research and mitigation planning.

Repetitive Loss properties (RL) are structures covered by a contract for flood insurance made available under the National Flood Insurance Program (NFIP) that: (a) have incurred flood-related damage on two occasions, in which the cost of repair, on the average, equaled or exceeded 25% of the market value of the structure at the time of each flood event; and (b) at the time of the second incidence of flood-related damage, the contract for flood insurance contains increased cost of compliance coverage. As of January 2015, there were no repetitive loss properties (RL) within the unincorporated areas of Larimer County.[36]

A Severe Repetitive Loss property (SRL) is defined as a residential property that is covered under an NFIP flood insurance policy and: a) has at least four NFIP claim payments (including building and contents) over $5,000 each, and the cumulative amount of such claims payments exceeds $20,000; or, b) a property for which at least two separate claim payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building. For both a) and b) above, at least two of the referenced claims must have occurred within any ten-year period, and must be greater than ten days apart. As of January 2015, there were no severe repetitive loss (SRL) structures located within the unincorporated areas Larimer County.[37]

CLIMATE CHANGE IMPACTS

In addition to increasing drought potential (and therefore increasing runoff), climate change has the potential to intensify rain events and storms in the Colorado region. These events can lead to increased infrastructure damage, injury, illness, and death. Additionally, warmer temperatures in the winters may cause increased precipitation to fall as rain instead of snow in mountain regions of Colorado. This may lead to elevated stream flows and increased flood risk across the state. As climate science and data evolves it will be important for communities in and around Larimer County to address how our changing climate will affect how water moves through local streams and regional landscapes.

Inventory Exposed

The critical facility exposure analysis estimates that there are 19 critical facilities in Larimer County that are flood prone (not including the total miles of flood prone infrastructure). The appraised value of these exposed structures is approximately $22.6 million.

[36] Source: Colorado DHSEM (FEMA FMA-RL-SRL-GSTF Document)
[37] Source: Colorado DHSEM (FEMA FMA-RL-SRL-GSTF Document)

The tables below summarize the results of the critical facility flood exposure analysis.

Table 33. Flood Prone Critical Facilities – City and County Facilities

	City Facility		County Facility	
	Count	*Appraised Value*	*Count*	*Appraised Value*
Within SFHA	11	$17,255,630	8	$5,364,877
Total	829	$3,818,314,182	108	$138,338,155
% Flood Prone	1%	< 1%	7%	4%

Table 34. Flood Prone Critical Facilities – Emergency Services

	Armory		Nursing Home		Fire Station		Government Building	
	Count	*Appraised Value*	*Count*	*Appraised Value*	*Count*	*Appraised Value*	*Count*	*Appraised Value*
Within SFHA	0	$ -	0	$ -	0	$ -	0	$ -
Total	3	$2,428,413	17	$58,189,784	37	$26,172,358	19	$127,627,256
% Flood Prone	0	0	0	0	0	0	0	0
	Group Care Home		**Home for the Elderly**		**Hospital**		**Jail-Correction Facility**	
	Count	*Appraised Value*	*Count*	*Appraised Value*	*Count*	*Appraised Value*	*Count*	*Appraised Value*
Within SFHA	0	$ -	0	$ -	0	$ -	0	$ -
Total	6	$12,330,207	36	$193,243,738	8	$400,909,748	1	$19,408,740
% Flood Prone	0	0	0	0	0	0	0	0
	Laboratories		**Medical Facilities**		**Surgical Center**			
	Count	*Appraised Value*	*Count*	*Appraised Value*	*Count*	*Appraised Value*		
Within SFHA	2	$1,510,630	2	$245,702	0	$ -		
Total	11	$28,998,250	355	$439,107,686	2	$4,767,190		
% Flood Prone	18%	5%	< 1%	< 1%	0	0		

Table 35. Flood Prone Critical Facilities – Community Services

	Church		Community Recreation Center		Commuter Terminal, Airline, Bus	
	Count	*Appraised Value*	*Count*	*Appraised Value*	*Count*	*Appraised Value*

Within SFHA	8	$9,002,069	1	$883,253	0	$ -
Total	178	$276,065,031	10	$21,275,404	4	$4,420,883
% Flood Prone	4.5%	3.3%	1%	4%	0	0
	Day Care Center		**Distribution Warehouse**		**Dormitory Residence Halls**	
	Count	*Appraised Value*	*Count*	*Appraised Value*	*Count*	*Appraised Value*
Within SFHA	0	$ -	1	$608,140	0	$ -
Total	31	$20,743,280	40	$54,059,475	14	$652,663,012
% Flood Prone	0	0	2.5%	1%	0	0
	Kennel		**Library**		**Mausoleums**	
	Count	*Count*	*Count*	*Appraised Value*	*Count*	*Appraised Value*
Within SFHA	0	$ -	0	$ -	0	$ -
Total	4	$1,292,065	7	$29,300,999	1	$722,100
% Flood Prone	0	0	0	0	0	0
	Mortuary		**Municipal Service Garage**		**Post Office**	
	Count	*Appraised Value*	*Count*	*Appraised Value*	*Count*	*Appraised Value*
Within SFHA	0	$ -	2	$178656	1	$71,900
Total	4	$2,914,840	2	$178656	12	$ 17,754,059
% Flood Prone	0	0	100%	100%	8%	< 1%
	School		**Supermarket**		**Visitors Center**	
	Count	*Appraised Value*	*Count*	*Appraised Value*	*Count*	*Appraised Value*
Within SFHA	2	$10,120,157	0	$ -	0	$ -
Total	120	$1,493,674,645	11	$50,628,871	3	$3,384,445
% Flood Prone	2%	< 1%	0	0	0	0

Potential Losses

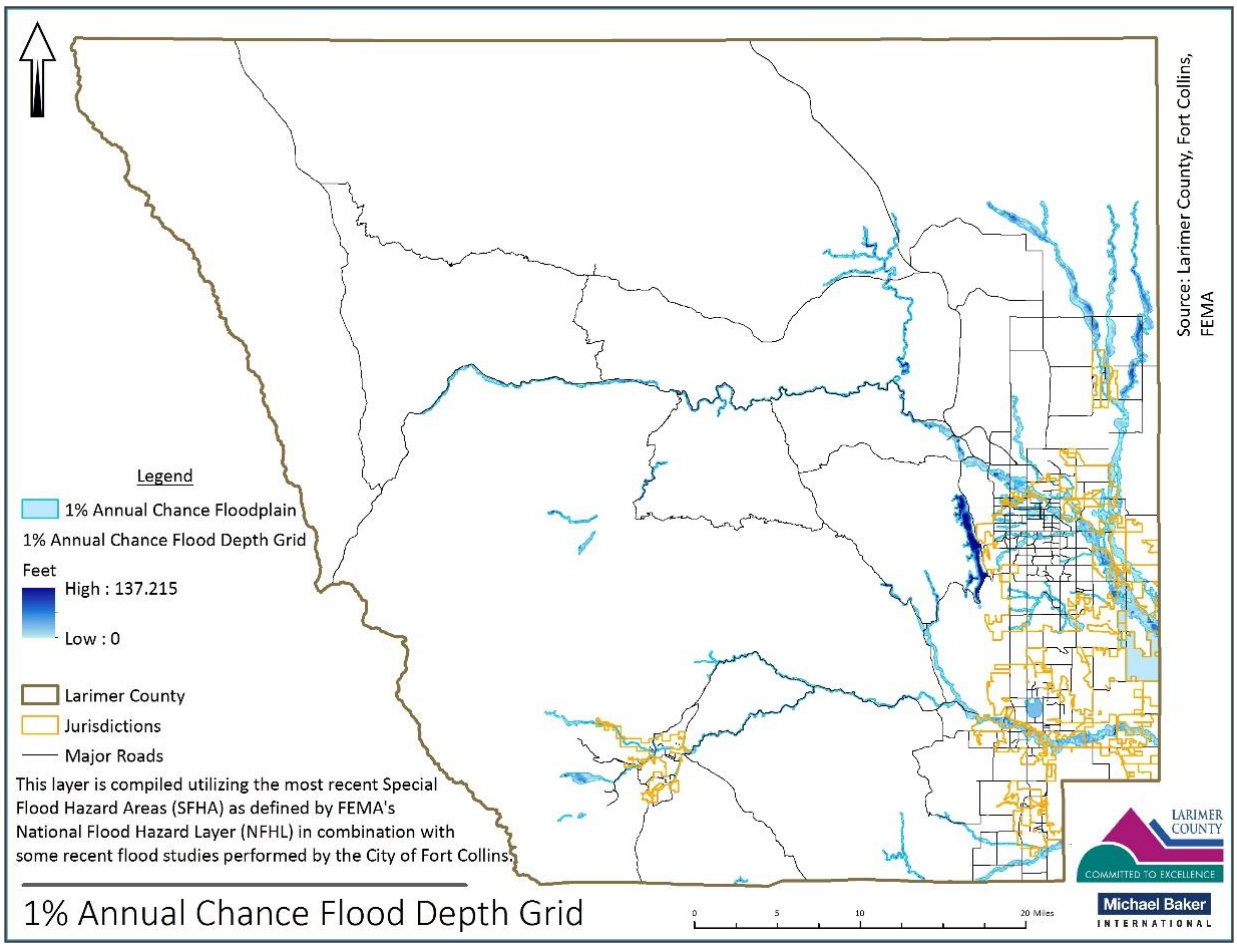
The methodology used to determine potential losses to flooding was conducted using FEMA's Hazus loss estimation software. For this Plan, a 100-year flood scenario was modeled for the County. The results are presented below.

HAZUS 100-YEAR FLOOD SCENARIO

In addition to the SFHA boundaries, the flood risk analysis for this Plan integrates DFIRM depth grids, a digital dataset that shows flood depths at various locations within the floodplain. This enhanced data input allows Hazus to more accurately approximate floodplain boundaries and their associated flood depths for a 100-year flood event.

Due to the availability of LiDAR elevation data, as well as complete countywide floodplain coverage, a detailed depth grid was locally developed for this planning effort. This depth grid was developed by combining the effective FEMA 100 year floodplains with several Urban Drainage Flood Control District FHADs (Flood Hazard Area Delineations) that covered the area of analysis. The resulting floodplain represents the most detailed and temporally accurate depiction of the current flood hazards in Larimer County. A water surface elevation surface was created from the aforementioned floodplains and this surface was intersected with the most accurate elevation data available (2013 LiDAR and NED data) to obtain a flood depth surface. The map below shows the SFHA and the associated flood depths within Larimer County generated for the 100-year risk analysis. Note that the maximum flood depth is skewed by the presence of Horsetooth Reservoir (the dark blue area on the following figure).

Figure 28. 1% Annual Chance Flood Depth Grid – Larimer County[38]



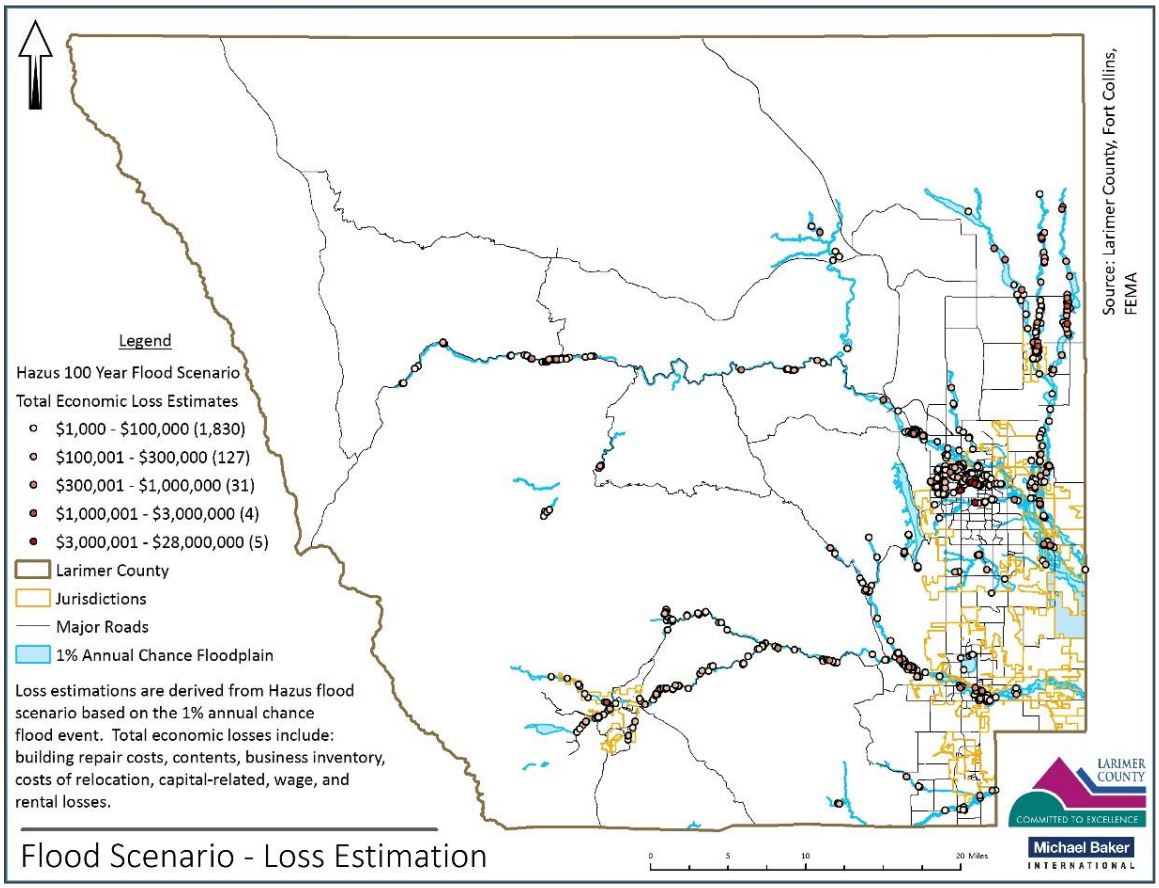
The flood depth grid and the parcel centroid points served as the primary inputs into Hazus. The parcel centroid points were produced by utilizing parcel and assessor data provided by Larimer County GIS. This

[38] This layer is compiled utilizing the most recent Special Flood Hazard Areas (SFHA) as defined by FEMA's National Flood Hazard Layer (NFHL) in combination with some recent flood studies performed by the City of Fort Collins. These areas are also referred to as the 1% Annual Chance Floodplain. 1% Annual Chance Flood flooding depth grid, produced from the best available topographic and floodplain data. Source: FEMA, City of Fort Collins, Michael Baker International

data was converted to parcel centroid (point) data and spatially corrected to ensure geographical accuracy of the points and the associated structures in all areas within the designated 100-year floodplain. In some cases there were multiple, distinctly different, structures within a single designated parcel. In these cases, points were generated on top of each individual structure and the total appraised value of the parcel was divided up equally among the structures. Important attributes such as year built and land use were missing for many parcels throughout the county. In these cases the average value of the associated census block was used in the risk assessment.

A 100-year flood scenario was defined in Hazus and losses were calculated for each point that intersected the depth grid based on the Hazus depth damage curves for specific structure attributes (such as foundation type, building type, and first flood height). The map below shows the results of the Hazus 100-year flood scenario economic loss analysis for Larimer County.

Figure 29. Flood Scenario Loss Estimation – Larimer County[39]



The map of total building losses illustrates a clear loss pattern in which damages are clustered around the most populated areas of the county. These places represent areas where resources and people are concentrated, making those areas of high potential loss and clear priority areas for focused mitigation action.

Hazus estimates for Larimer County estimate that for a 100-year flood event, approximately 1,997 buildings will be at least moderately damaged. The total economic loss estimated for the 100-year flood is over $145 million dollars. A number of variables are included in Hazus analyses in order to arrive at the estimated values of loss due to flooding. For this reason, it is important to note that the Hazus loss

[39] Parcels FEMA's loss estimation modeling software, Hazus, was utilized to produce this data set. A 100 year flood scenario was defined and losses were calculated for each point (structure) that intersected the depth grid based on the Hazus depth damage curves for specific structure attributes (such as foundation type, building type, and first flood height). Information derived from Hazus-MH 2.2 flood scenario. Total Losses equals a sum of building losses, content losses, and inventory losses.

estimates detailed below should not be used as a precise measure, but rather viewed from the perspective of the potential magnitudes of expected losses.

When calculating building losses Hazus breaks loss values into two categories: direct economic losses and indirect economic losses. Direct economic losses are the estimated costs to repair or replace the damage caused to a building and its contents. These values are organized in terms of Building Losses and Building Content Losses. Indirect economic losses include Inventory Losses and other losses associated with business interruption and the inability to operate a business because of the damage sustained during the flood.

The total building losses for the 100-year flood event were estimated to be over $63.5 million. This represents over 43% of total economic losses in the county. Building content losses were estimated to be over $56.9 million, representing roughly 39% of total economic losses. Inventory losses were estimated to be over $24.6 million. This represents roughly 17% of total economic losses due to the 100-year flood modeled in the Hazus scenario.

The table below provides a summary of the economic losses associated with building damage by jurisdiction. Only those jurisdictions with expected losses are included in the table (unlisted jurisdictions do not have structures that are expected to sustain damage from the 100-year flood scenario).

Table 36. Economic Loss Estimates by Jurisdiction (Hazus 100-year Flood Scenario)*

Jurisdiction	Total Parcel Count	Number of Damaged Parcels	Building Losses	Building Content Losses	Inventory Losses	Total Losses
Town of Berthoud	2,595	0	0	0	0	0
Berthoud Fire Department District	4,522	14	$629,890	$424,740	$189,530	$1,244,160
Crystal Lake Volunteer Fire District	869	0	0	0	0	0
Colorado State University	0	0	0	0	0	0
Town of Estes Park	4,537	42	$1,805,100	$1,462,910	0	$3,268,000
Estes Park Medical Center						
Estes Valley Fire Protection District	7,680	106	$4,210,630	$2,965,690	$240,910	$7,417,230
Estes Valley Recreation and Park District	12,112	163	$5,332,240	$3,762,720	$561,040	$9,655,990
City of Fort Collins	51,961	1,082	$34,471,150	$30,343,890	$14,979,360	$79,794,390
Glacier View Volunteer Fire District	777	0	0	0	0	0
Town of Johnstown	801	0	0	0	0	0
Livermore Volunteer Fire District	708	5	$211,690	$178,290	$171,350	$561,330
City of Loveland	26,705	42	$1,433,410	$1,797,000	$388,140	$3,618,550

Jurisdiction	Total Parcel Count	Number of Damaged Parcels	Building Losses	Building Content Losses	Inventory Losses	Total Losses
Loveland Fire and Rescue District	26,705	42	$1,433,410	$1,797,000	$388,140	$3,618,550
Northern CO Water Conservation District	16,258	287	$9,107,470	$6,342,390	$1,650,500	$17,100,350
Pinewood Springs Volunteer Fire District	396	0	0	0	0	0
Platte River Power Authority	130	0	0	0	0	0
Poudre Canyon Volunteer Fire District	535	76	$2,791,300	$2,711,720	0	$5,503,030
Poudre Fire Authority District	65,418	1,347	$41,691,920	$35,131,380	$16,470,500	$93,293,800
Thompson Valley EMS	51,996	242	$6,361,210	$6,623,230	$3,071,220	$16,055,660
Town of Timnath	997	1	$790	$1,580	$3,160	$5,530
Upper Thompson Sanitation District	6,381	56	$1,443,670	$1,072,730	$14,740	$2,531,130
Town of Wellington	2,839	114	$3,310,550	$4,547,330	$514,300	$8,372,170
Wellington Fire District	4,154	183	$7,259,940	$8,748,890	$4,696,310	$20,705,130
Town of Windsor	2,457	0	0	0	0	0
Windsor Severance Fire District	2,457	0	0	0	0	0
Unincorporated Larimer County	10,534	223	$22,497,780	$18,763,000	$8,791,650	$50,052,440
Total	**126,553**	**1,997**	**$63,518,780**	**$56,915,710**	**$24,676,610**	**$145,111,080**

*Many of the special districts overlap the incorporated jurisdictions. Unincorporated Larimer county data includes the special jurisdiction data where the area limits coincide. The same goes for the incorporated jurisdictions of the Towns of Berthoud, Estes Park, Johnstown, Timnath, Wellington, and Windsor, and the Cities of Fort Collins and Loveland.

*Loss estimates have been rounded to the nearest $10, $1,000, and $1,000,000

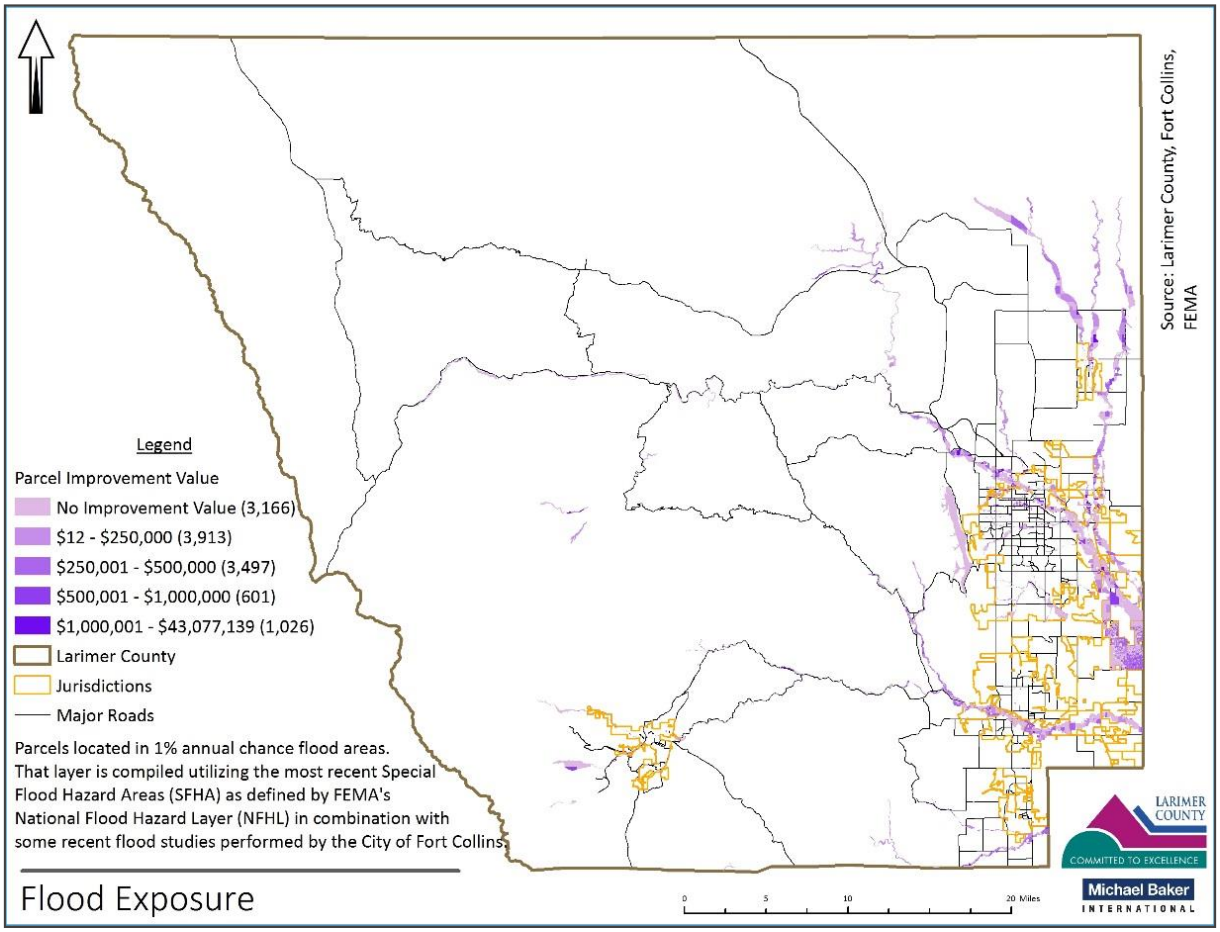
Probability of Future Occurrences

Frequency of previously reported flood events in Larimer County provide an acceptable framework for determining the probability of future flood occurrence in the area. The probability that the County and its municipalities will experience a flood event can be difficult to predict or quantify.

Severe flooding has the potential to inflict significant damage to people and property in Larimer County. Mitigating flood damage requires that communities throughout the county remain diligent and notify local officials of potential flood (and flash flood) prone areas near infrastructure such as roads, bridges, and buildings. While the potential for flooding is always present, Larimer County has existing land-use policies and regulations for development to help lessen potential damage due to floods.

The exposure data provided provides the clearest picture of potential losses to flood in the Larimer County. There are 82 critical facilities located in areas the special flood hazard area. The appraisal value of the critical facilities within SFHA is over $244.59 million dollars. The appraisal value of the structures within the SFHA is over $11.2 billion dollars. The following figure shows parcels located in the SFHA.

Figure 30. Flood Exposure – Larimer County[40]



Land Use and Development Trends

As population continues to increase in Larimer County, future development trajectories can be expected to put more people and property, both private and public, at risk of flooding. It is essential that zoning and land use plans take into account not only the dollar amount of damage that buildings near waterways could incur, but also the added risk of floodplain development activity that alters the natural floodplain of the area (for example, narrowing the floodplains by building new structures close to rivers and streams). The county as a whole should plan for the likelihood of increased exposure of property and humans to flood events.

[40] Parcels that intersect the 1% Annual Chance Floodplain. Source: Larimer County, FEMA, Michael Baker International

The previous Table presented estimated losses summarized by jurisdiction. It shows a large range of expected damaged buildings due to a 1% annual chance flood event. Portions of Poudre Fire Authority District within Larimer County were estimated to have 1,347 structures damaged. While affecting 2% of the building stock in that area, the losses were expected to total over $93.2 million. Wellington Fire District had 183 structures estimated to be damaged, with total losses of $20.7 million dollars.

Severe flooding has the potential to inflict significant damage to people and property in Larimer County. Mitigating flood damage requires that communities throughout the County remain diligent and notify local officials of potential flood (and flash flood) prone areas near infrastructure such as roads, bridges, and buildings. While the potential for flooding is always present, Larimer County has existing land-use policies and regulations for development to help lessen potential damage due to floods.

Existing floodplain management ordinances are intended to addresses methods and practices to minimize flood damage to new and substantial home improvement projects as well as to address zoning and subdivision ordinances and state regulations. Additionally, Larimer County is a National Flood Insurance Program (NFIP) participant and continues to support floodplain management activity at the county and local scale.

The greatest protection against flooding is afforded by quality construction and compliance with local ordinances which exceed NFIP requirements. Code adoption by local jurisdictions, compliance by builders, and local government inspection of new homes can greatly reduce the risk of flooding. Moving forward, Larimer County will continue to support monitoring, analysis, modeling, and the development of decision-support systems and geographic information applications for floodplain management activities.

In addition to land-use planning, zoning, and codes applicable to new development, flood mitigation measures include structural and non-structural measures to address susceptibility of existing structures. Flood mitigation measures such as acquisition, relocation, elevation-in-place, wet/dry flood proofing, and enhanced storm drainage systems all have the potential to effectively reduce the impact of flood in Larimer County.

5.3.7 Hazmat – Fixed and Transport

NATURAL HAZARDS	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
HazMat – Fixed and Transport	0.6	0.9	0.4	0.4	0.2	2.50
HIGH RISK (2.5 or higher)						

Hazard Identification

A hazardous material (also known as HAZMAT) is defined by the U.S. Department of Transportation as "a threat that poses an unreasonable risk to health and safety of operating or emergency personnel, the public, and/or the environment if not property controlled during handling, storage, manufacturing, processing, packaging, use, disposal, or transportation."

Hazardous materials are defined and regulated in the United States primarily by laws and regulations administered by the U.S. Environmental Protection Agency (EPA), the U.S. Occupational Safety and Health Administration (OSHA), the U.S. Department of Transportation (DOT), and the U.S. Nuclear Regulatory Commission (NRC). Each has its own definition of a "hazardous material."

For the purpose of tracking and managing hazardous materials, the DOT divides regulated hazardous materials into nine classes:

Table 37. Hazardous Materials -- Classes and Descriptions

Hazard Class	Description
Class 1: Explosives	1.1 mass explosion hazard 1.2 projectile hazard 1.3 minor blast/projectile/fire 1.4 minor blast 1.5 insensitive explosives 1.6 very insensitive explosives
Class 2: Compressed Gases	2.1 flammable gases 2.2 non-flammable compressed 2.3 poisonous
Class 3: Flammable Liquids	Flammable (flash point below 141°) Combustible (flash point 141°-200°
Class 4: Flammable Solids	4.1 flammable solids 4.2 spontaneously combustible 4.3 dangerous when wet
Class 5: Oxidizers and Organic Peroxides	5.1 Oxidizer 5.2 Organic Peroxide
Class 6: Toxic Materials	6.1 Material that is poisonous 6.2 Infectious Agents

Hazard Class	Description
Class 7: Radioactive Material	Radioactive I Radioactive II Radioactive III
Class 8: Corrosive Material	Destruction of the human skin Corrode steel at a rate of 0.25 inches per year
Class 9: Miscellaneous	A material that presents a hazard during shipment but does not meet the definition of the other classes

Hazardous materials that are being transported must have specific packaging and labeling. Specific safety regulations also apply when handling and storing hazardous materials at fixed facilities. In general, there are three recognized sources for HAZMAT incidents within the County: delivery lines, fixed storage facilities and use locations, and transportation lines. Once a HAZMAT incident occurs, the area impacts will depend on the natural of the chemical and climate conditions. All areas should be considered at risk. However, some areas, such as those close to aquifers and other water supplies can expect greater impacts if a spill occurred in the area.

Transportation of hazardous materials through Larimer County happens at all times of day by way of rail, road, and air. Roadway transport account for the largest amount of hazardous materials moving though the county. That said, rail cars are able to carry much larger quantities of hazardous materials than trucks of cars and can be associated with a greater risk.

Title 42, Article 20 of the Colorado Revised Statutes governs the routing of hazardous materials by motor vehicles on all public roads in the state. CDOT Policy Directive 1903.0 (effective 5/20/2010), and CDOT Procedural Directive 1903.1 (effective 2/3/2011), govern CDOT's role in the designation of hazmat routes. In order to designate a state highway in Colorado as hazmat route, CDOT staff members, local governments, or private entities must request the Mobility Section of the Division of Transportation Development to perform an analysis of the route. To perform this analysis the Mobility Section convenes a "Hazmat Advisory Team" to determine if the proposed route meets the required criteria. If the required criteria are met and approved by the Transportation Commission, CDOT will file a petition with the Colorado State Patrol for approval. Once the Colorado State Patrol approves the petition, the route is designated a hazmat route.

The required criteria that the route must meet before it is brought before the Transportation Commission are as follows:

- The route(s) under consideration are feasible, practicable, and not unreasonably expensive for such transportation.
- The route(s) is continuous within a jurisdiction and from one jurisdiction to another.
- The route(s) does not unreasonably burden interstate or intrastate commerce.
- The route(s) designation is not arbitrary or intended by the petitioner merely to divert the transportation of hazardous materials to other communities.
- The route(s) designation will not interfere with the pickup or delivery of hazardous materials.

- The route(s) designation is consistent with all applicable state and federal laws and regulations; and
- The route(s) provides greater safety to the public than other feasible routes. Considerations include but are not limited to:
    - AADT, crash and fatality rates
    - Population within a one-mile swath of each side of the highway
    - Locations of schools, hospitals, sensitive environmental areas, rivers, lakes, etc.
    - Emergency response capabilities on the route
    - Condition of the route, i.e., vertical and horizontal alignment, pavement condition, level of access to the route, etc.

Colorado State Patrol
Hazardous Materials Unit

(303) 273-1900
http://csp.state.co.hazmat.html

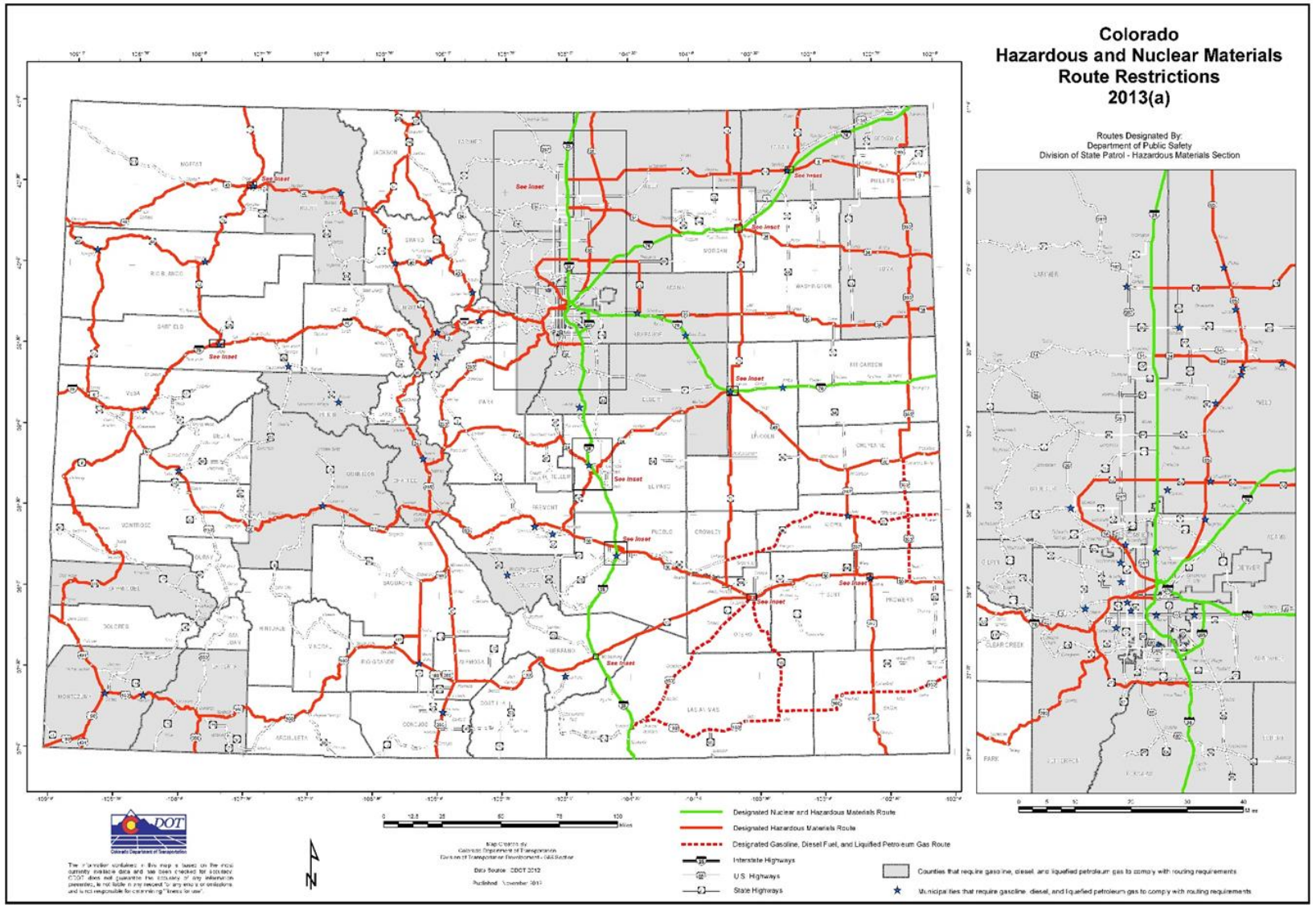
Troop 8-C is the Hazardous Materials Section of the Colorado State Patrol. Their mission is to contribute to the safety of hazardous materials transportation in order to protect citizens and the environment. Twenty-eight troopers trained a Hazardous Materials Technicians are deployed throughout the state.

Local Hazardous Materials Response Teams (most often housed in local fire departments and fire protection districts) are the designated emergency response authority for hazardous substance incidents in all areas of Larimer County except on highways, where the State Patrol has jurisdiction.

For security reasons, it is not within the scope of this plan to map the locations of all industrial and commercial fixed sites.

The following CDOT map shows the state's designated nuclear, hazardous materials, and gasoline, diesel fuel, and liquid petroleum gas routes, many of which pass through the western portion of Larimer County.

Figure 31. Colorado Hazardous and Nuclear Materials Route Restrictions



Previous Occurrences

Based on data collected by the Pipeline and Hazardous Materials Safety Administration's (PHMSA) Incident Reports Database, there have been a total of 204 HAZMAT incidents reported in Larimer County between 1971 and 2015. The large majority of these incidents occurred while the materials were moving along a highway (either in transit, loading, or unloading).

SB I-25 closed in Fort Collins after hazardous materials spill, March, 2015 (Source: KWGN)

Inventory Exposed

We can't accurately predict when or where a HAZMAT incident may occur. Therefore, for the purpose of this plan, all existing and future buildings, facilities, and populations in Larimer County are considered to be equally exposed and couple potentially be impacted. This includes 324,122 people, or 100% of the County's population, and all buildings and infrastructure within the County.

When hazardous materials are being transported they are particularly vulnerable to transportation related accidents, misuse, or terrorist threats. Most hazardous materials are transported in large quantities in order to reduce costs and security is difficult to maintain around moving vehicles that cross jurisdictional boundaries. When transported close to populated areas or critical infrastructure, HAZMAT releases can have serious consequences. The inventory that is most often exposed to HAZMAT risks are railways, roadways, and fixed facilities that contain hazardous materials, and all assets that lie within a mile of the potential release areas.

Potential Losses

HAZMAT related events occur throughout Larimer County every year. The intensity and magnitude of these incidents depend on weather conditions, the location of the event, the time of day, and the process by which the materials are released. *Was is raining when the event happened? Were the hazardous materials being transported by rail when they were released or were they at a fixed facility? Did the spill happen during rush hour traffic or in the middle of the night?* All of these considerations matter when determining the risk and potential damages associated with a HAZMAT incident.

HAZMAT events have the potential to threaten lives and disrupt business activity. Moreover, HAZMAT incidents can cause serious environmental contamination to non-renewable resources such as air, ground, and water sources.

Probability of Future Occurrences

As with most hazards that have limited spatial predictability or warning time, the probability of future occurrences of HAZMAT events is difficult to predict. However, as development continues to encroach into existing industrial areas and becomes more dense along high-risk designated hazardous materials transportation routes, the risk of future occurrences becomes greater. Even if the frequency of HAZMAT spills remains the same over time, population growth will increase the probability of a disaster event.

Land Use and Development

As Larimer County continues to experience population growth and development over time, it is anticipated that there will be increased exposure to potential life loss, injuries, and environmental damage resulting from a hazardous materials incident. Serious considerations must be made concerning land use and regulations as increasing development pressures push residential and commercial investment closer to railways and identified hazardous and nuclear materials routes.

5.3.8 Landslide / Rockslide

NATURAL HAZARDS	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Landslide / Rockslide	0.9	0.6	0.4	0.4	0.2	2.50
HIGH RISK (2.5 or higher)						

Hazard Identification

Landslides are one of the most common geologic hazards in Colorado and are characterized by the downward and outward movement of loose material on slopes. They include a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows. Although gravity acting on and over steepened slopes is the primary reason for a landslide, landslides are often prompted by the occurrence of other disasters such as seismic activity of heavy rain fall. Other contributing factors include the following:

- Erosion by rivers creating over-steepened slopes
- Rock and soil slopes weakened through saturation by snowmelt or heavy rains
- Earthquakes creating stresses that make weak slopes fail
- Excess weight from accumulation of rain or snow, stockpiling of rock or ore, from waste piles, or from manmade structures stressing weak slopes
- Floods or long duration precipitation events creating saturated, unstable soils that are more susceptible to failure

Slope material often becomes saturated with water and may develop a debris or mudflow. If the ground is saturated, the water weakens the soil and rock by reducing cohesion and friction between particles. Cohesion, which is the tendency of soil particles to "stick" to each other, and friction affect the strength of the material in the slope and contribute to a slope's ability to resist down slope movement. Saturation also increases the weight of the slope materials and, like the addition of material on the upper portion of a slope, increases the gravitational force on the slope. Undercutting of a slope reduces the slope's resistance to the force of gravity by removing much-needed support at the base of the slope. Alternating cycles of freeze and thaw can result in a slow, virtually imperceptible loosening of rock, thereby weakening the rock and making it susceptible to slope failure. The resulting slurry of rock and mud can pick up trees, houses, and cars, and block bridges and tributaries, causing flooding along its path. Additionally, removal of vegetation can leave a slope much more susceptible to superficial landslides because of the loss of the stabilizing root systems

Geologists identify active landslides and areas subject to slope instability so that they may be avoided or mitigated. Together, geologists and civil engineers develop and implement measures to improve the stability of slopes, repair existing landslides, and prevent damage from future landslides. Slope stability can be improved by removing material from the top of the slope, adding material or retaining structures to the base of the slope, and reducing the degree of saturation by improving drainage within the slope

Previous Occurrences

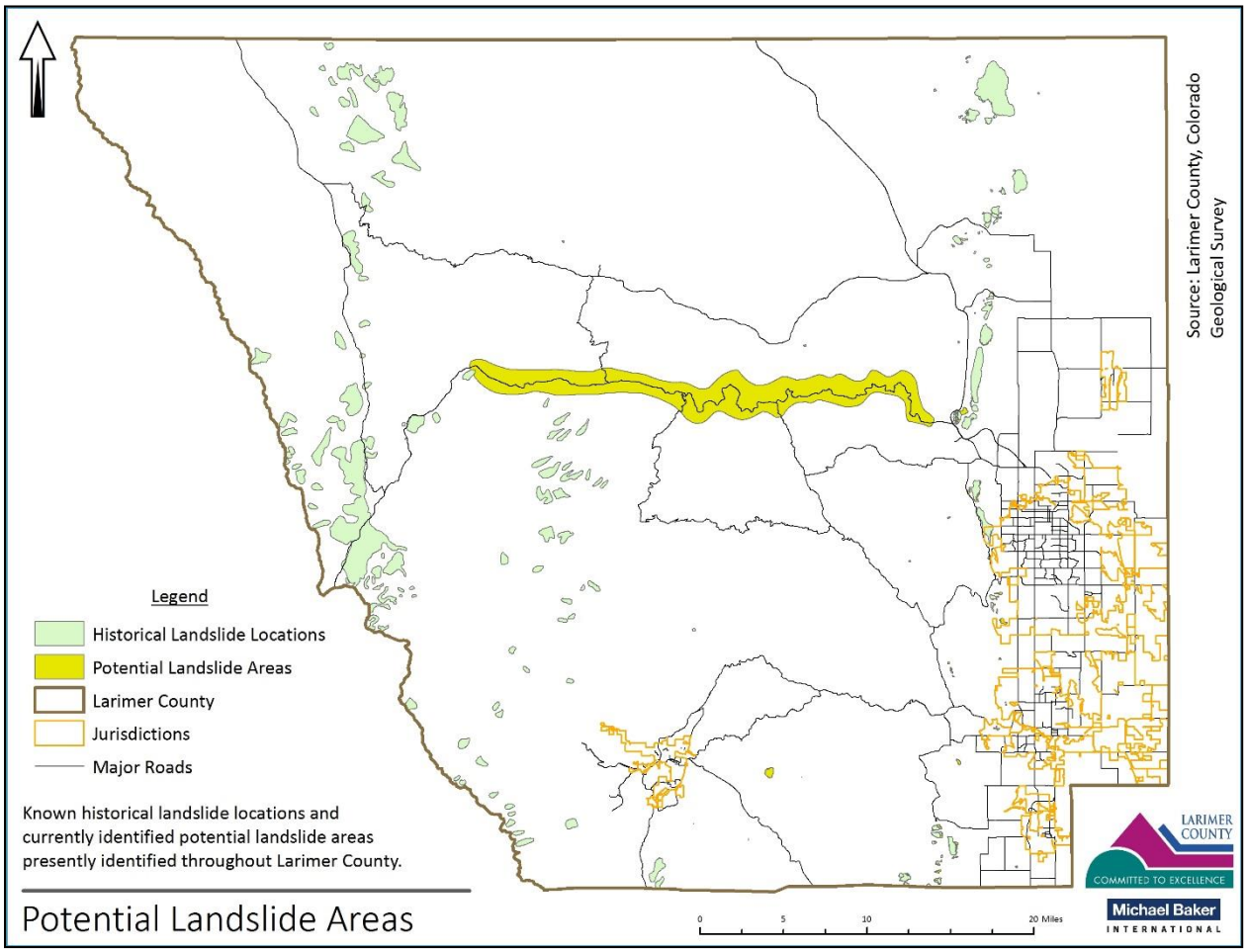
According to the Colorado Geological Survey there are 186 historical landslides in Larimer County. The following table lists major landslide incidents in Larimer County between 1989 and 2004 according to the Colorado Department of Transportation.

Date	Location	Length of Incident	Description
7/25/2004	Highway 14	closed – 24 hours	rockslide
7/14/2004	Highway 14	closed – 24 hours	rockslide
4/5/2002	Highway 34	closed – 24 hours	rockslide
6/19/1999	Highway 14	closed – 21 days	large rock/landslide
2/23/1993	Highway 14	closed – 72 hours	avalanche/rockslide
8/1/1989	Highway 34	closed – 8 hours	rockslide

Inventory Exposed

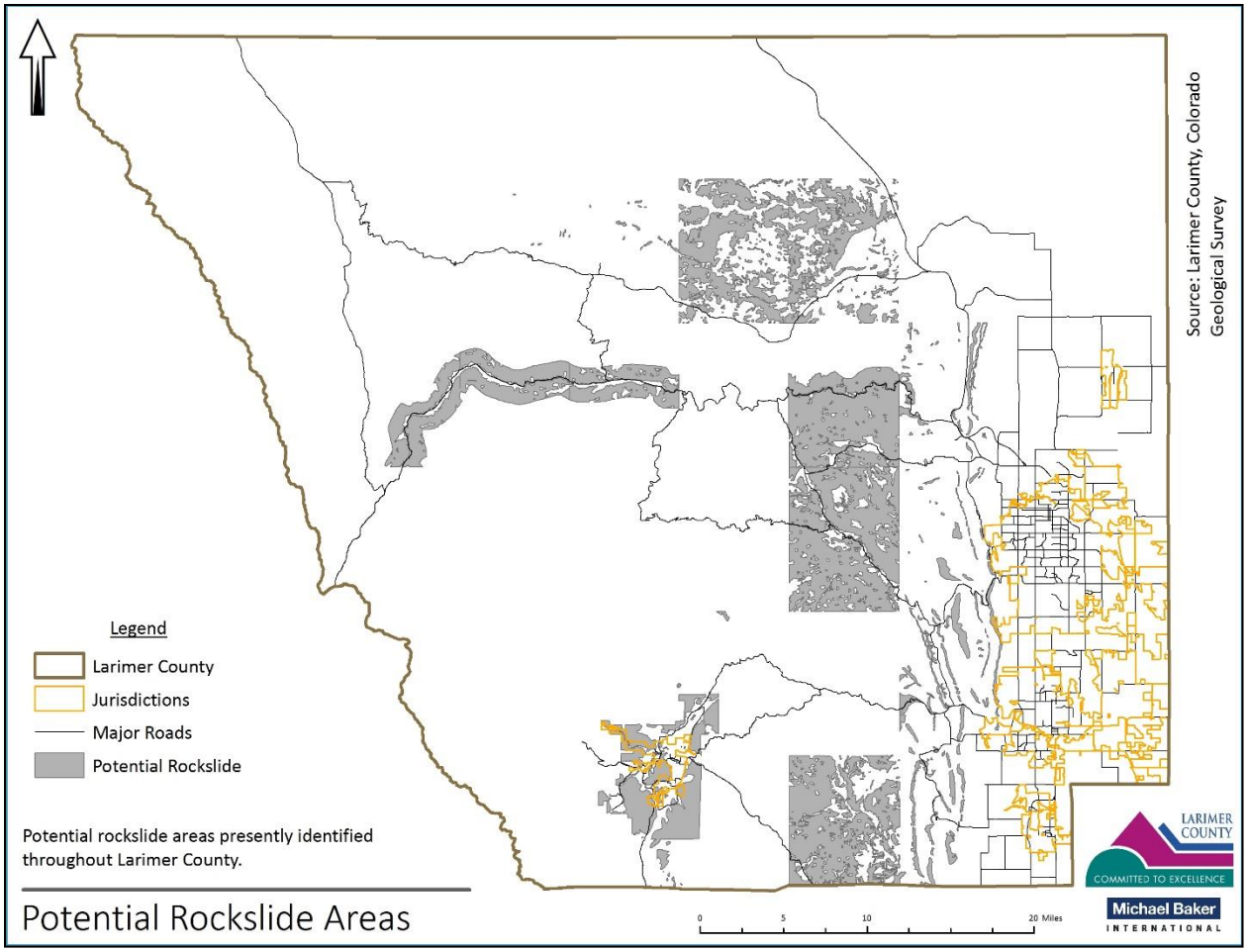
There are a number of locations across Larimer County that are vulnerable to landslides and rockslides. As population growth brings new development into available land in the county, more inventory assets may become exposed to landslides and rockslides hazards. The following figures show historical and potential landslide and rockslide areas in Larimer County. The western mountainous portion of Larimer County are more susceptible to Landslides and Rockslides

Figure 32. Potential Landslide Areas – Larimer County[41]



[41] Historical and potential landslide areas presently identified by the Colorado Geological Survey.

Figure 33. Potential Rockslide Areas – Larimer County[42]

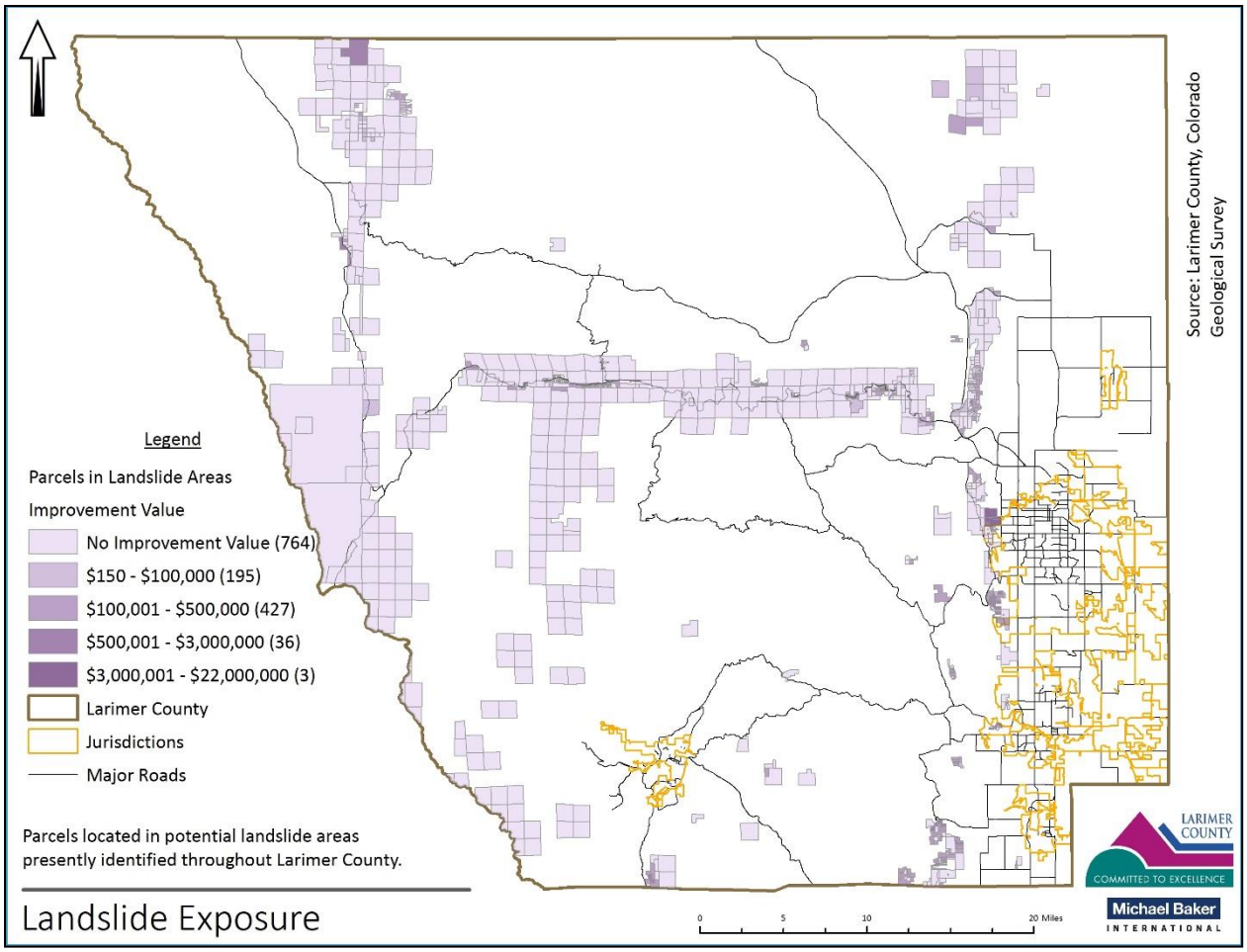


Potential Losses

The critical facility and structure exposure analysis estimates that there are 6 critical facility and 1,419 structures in Larimer County that are prone to landslides (not including the total miles of landslide prone infrastructure). The appraised value of the exposed critical facilities is over $45 million dollars and the exposed structures is over $139 million dollars.

[42] Potential rock fall areas presently identified by the Colorado Geological Survey.

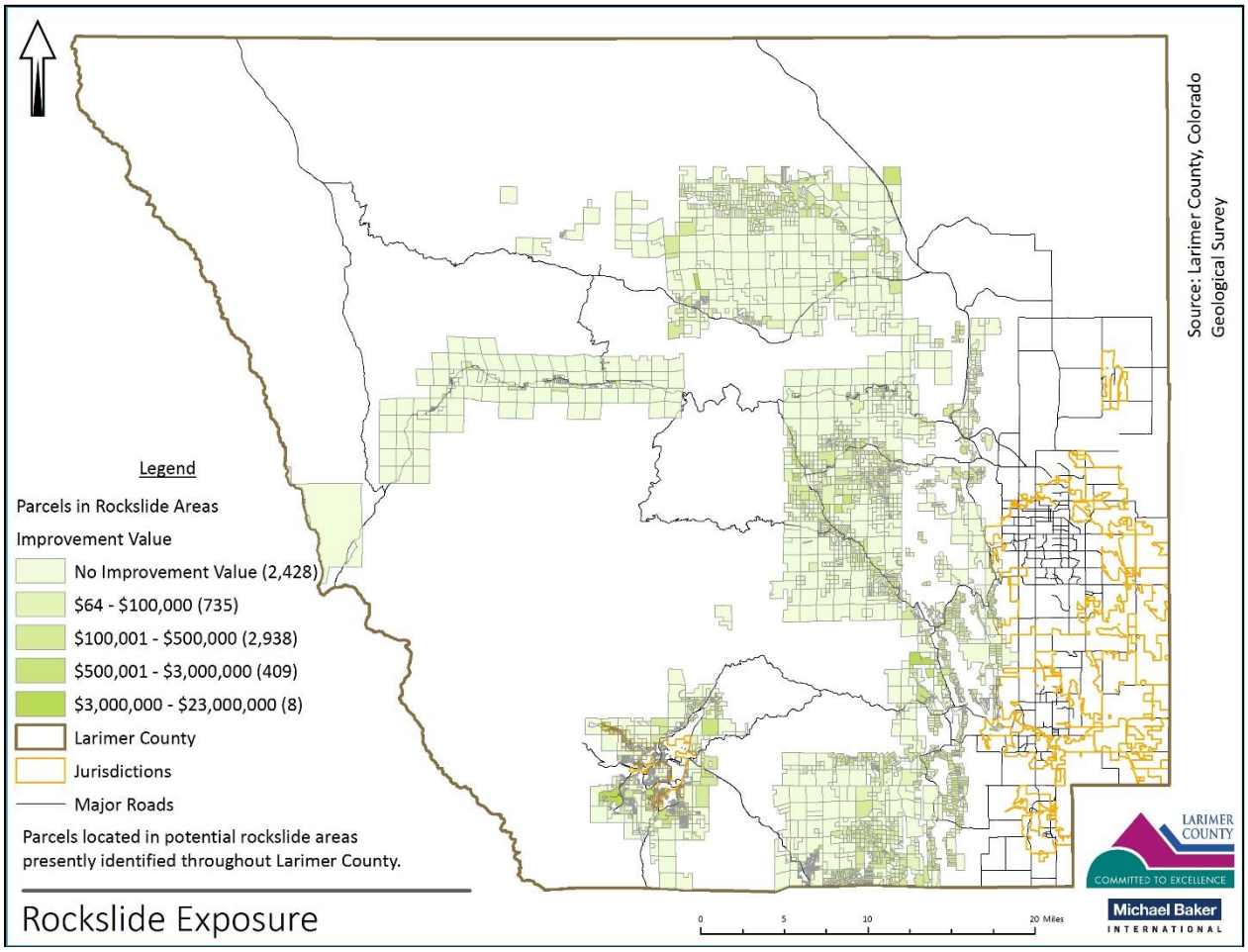
Figure 34. Parcels in Landslide Areas – Larimer County[43]



The critical facility and structure exposure analysis estimates that there are 12 critical facility and 6,506 structures in Larimer County that are prone to rockslides (not including the total miles of rockslide prone infrastructure). The appraised value of the exposed critical facilities is over $11.3 million dollars and the exposed structures is over $1.1 billion dollars.

[43] Parcels intersecting potential & historical landslide areas presently identified by the Colorado Geological Survey.

Figure 35. Parcels in Rockslide Areas – Larimer County[44]



Probability of Future Occurrences

Due to the uncertainty associated with existing data, it is challenging to accurately calculate probability for future events related to landslide and rockslide hazards. It can be assured however, that these hazards will continue to alter the landscape of Larimer County in the future.

Overall, the probability of future occurrences of rockslide and landslide events in Larimer County is moderate. Many areas in the western portion of the county are prone to these types of hazard events due to their proximity to previous landslide events, their location at the base or top of steep slopes and drainage basins, or their location on infill or steep slope cuts. Individual assessments of landslide-prone areas are recommended in the future. Moreover, as development and population increase in the county, increasing numbers of structures (and people) will be exposed to future landslide and rockslide events.

[44] Parcels that intersect potential rock fall areas presently identified by the Colorado Geological Survey.

Future Land Use and Development Trends

Rapid and sustained population growth across Colorado and the Front Range has contributed to increasing trends in geologic hazard risk, exposure, and vulnerability across Larimer County. There have been property and infrastructure damages associated with these hazards within the county and landslides and rockslides have been categorized as a high risk hazard. Moreover, the the natural process of landslides and rockslides will continue over time.

Based on past and projected population growth, it is very likely that future development will lead to the intersection of landslides and rockslides-prone areas. As development pressures continue in un-developed areas of the county, vulnerability to landslides and rockslides may increase across Larimer County.

Typically, the process of landslides and rockslides do not limit land use, especially if efforts are made to minimize it. Landslide and rockslide impacts can be reduced and controlled by road bank slope design, surface drainage management, and re-vegetation or disturbed lands. Ground modification and structural solutions can help mitigate the threats of localize landslides and rockslides. Proper drainage and water management are also important to prevent increasing vulnerability to landslide and rockslide hazards.

5.3.9 Spring / Summer Storm

NATURAL HAZARDS	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)	1.2	0.6	0.6	0.2	0.3	2.90
HIGH RISK (2.5 or higher)						

Hazard Identification

Spring is the season of the year that involves the transition period from winter to summer. As a result of this transition period, temperatures can swing back and forth causing extreme weather changes. Severe weather events occurring in the spring include heavy snow, thunderstorms, lightning, hail, strong winds, tornadoes and flooding. Summer storms consist typically of thunderstorms, lightning, and hail.

Lightning strikes can all be hazardous under the right conditions and locations. Large hail can damage crops, dent vehicles, break windows, and injure or kill livestock, pets, and people. Strong winds can take down trees and damage property and infrastructure.

The typical thunderstorm is 15 miles in diameter and lasts an average of 30 minutes. Of the estimated 100,000 thunderstorms that occur each year in the United States, about 10 percent are classified as severe. The National Weather Service considers a thunderstorm severe if it produces hail at least 3/4 inch in diameter, winds of 58 MPH or stronger, or a tornado. Every thunderstorm needs three basic components: (1) moisture to form clouds and rain, (2) unstable air which is warm air that rises rapidly, and (3) lift, which is a cold or warm front capable of lifting air to help form thunderstorms.

Thunderstorms can occur during strong winds, heavy rains, sleet, hail, snow, or even no precipitation at all. Thunderstorms are characterized by the presence of lightning and its audio effect on the Earth's atmosphere. Thunderstorms experience fast upward movement of warm air that contains moisture. When the air moves upwards it begins to cool and condense forming cumulonimbus clouds. Once the air cools enough to reach saturation water droplets and ice form and begin to fall. These falling droplets and ice create a downdraft of cold air, intern causing rain, strong winds, and occasionally fog.

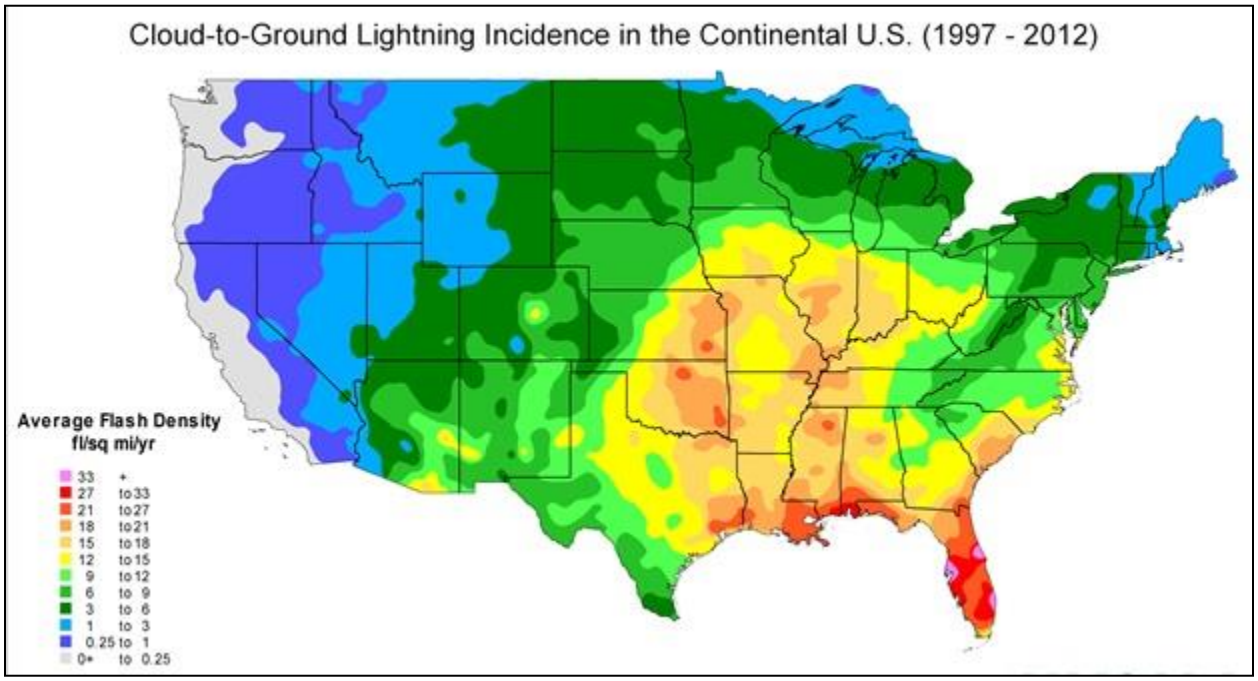
There are four types of thunderstorms: supercell, multicell lines, multicell cluster, and single cell. The strongest type of thunderstorm is the super cell and is associated with severe weather. Supercells are deep constantly rotating current of rising air called a mesocyclone.

Lightning, although not considered severe by the National Weather Service definition, can accompany heavy rain during thunderstorms. Lightning develops when ice particles in a cloud collide with other particles. These collisions cause a separation of electrical charges. Positively charged ice particles rise to the top of the cloud and negatively charged ones fall to the middle and lower sections of the cloud. The negative charges at the base of the cloud attract positive charges at the surface of the Earth. Invisible to the human eye, the negatively charged area of the cloud sends a charge called a stepped leader toward the ground. Once it gets close enough, a channel develops between the cloud and the ground. Lightning is the electrical transfer through this channel. The channel rapidly heats to 50,000 degrees Fahrenheit

and contains approximately 100 million electrical volts. The rapid expansion of the heated air causes thunder.

The following Figure depicts average cloud-to-ground lightning incidence in the US (or lightning flash densities) between 1997 and 2012.

Figure 36. Average Lightning Flash Density in the U.S.[45]

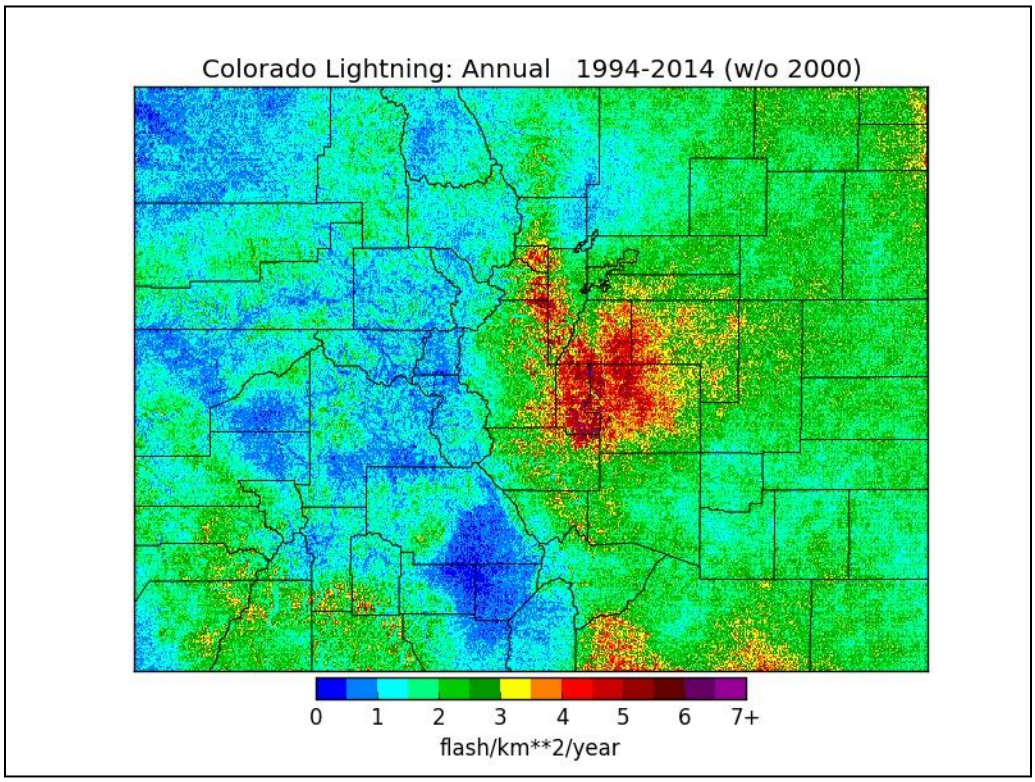


Although the state of Colorado ranks 32nd in terms of its cloud-to-ground lightning flash densities between 1997-2012, the state ranks 2nd in the country in terms of death rate from lightning per million people (between 2003 - 2012). Colorado's lightning death rate per million people from 2003-2012 is 0.51, second only to the state of Wyoming.

The following figure shows lightning flash densities for the State of Colorado for the years 1994 through 2014. Produced by National Weather Service, using data from Vaisala, the image is the result of contouring over 8 million cloud-to-ground lightning flashes for the State of Colorado and averaging annually. The result of the analysis is a picture of average lightning flashes/km^2 per year from 1994 through 2014 (the year 2000 was not included in the dataset).

[45] Source: http://www.lightningsafety.noaa.gov/statistics.htm

Figure 37. Colorado Lightning Flash Density Map



In general, the flash density map shows a wide range of values across the State of Colorado, ranging from less than 0.5 flashes/year/km^2 over the south central portion of the state to over 6.5 flashes/year/km^2 over the east central part of the state. The higher density of lightning flashes located in the central area of the state is driven by the topography of the area. Where the higher terrain of the Plains intersects with the Rocky Mountains conditions are ripe for lightning events. Here, moist air from lower altitudes initiates and sustains convection systems as they move off of the mountain slopes, generating thunderstorms.

Hail is precipitation that is formed when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere. The super cooled raindrops grow into balls of ice, which pose a hazard to property, people, livestock, and crops when they fall back to the earth.

Severe winter weather can cause hazardous driving conditions, communications and electrical power failure, community isolation, and can adversely affect business continuity. This type of snow-related weather may include one or more of the following winter factors:

Severe Wind events typically develop with strong pressure gradients and gusty frontal passages. The closer and stronger two systems (one high pressure, one low pressure) are, the stronger the pressure gradient, and therefore, the stronger the winds are.

Although severe wind events often garner less attention in the local media than tornadoes do, damaging **straight line winds** (or downbursts) can injure and kill animals and humans. Straight-line winds, which can cause more widespread damage than a tornado, occur when air is carried into a storm's updraft, cools rapidly, and comes rushing to the ground. Cold air is denser than warm air, and therefore, wants to fall to the surface. On warm summer days, when the cold air can no longer be supported up by the storm's

updraft, or when an exceptional downdraft develops, the air crashes to the ground in the form of strong winds. These winds are forced horizontally when they reach the ground and can cause significant damage. These types of strong winds can also be referred to as straight-line winds. Downbursts with a diameter of less than 2.5 miles are called microbursts and those with a diameter of 2.5 miles or greater are called macrobursts. A "derecho" is a series of downbursts associated with a line of thunderstorms.

Previous Occurrences

Thunderstorm

According to NOAA's Storm Events Database there have been 17 injuries and 2 deaths in Larimer County due to thunderstorm wind. There have been 117 thunderstorm wind events reported in Larimer County between 1955 and 2014. Of the 117 incidents, 5 reported property losses totaling $76,500 and no crop losses. Based on the historic data showing hazardous impacts on the county, there is a great potential for hail events to occur at any given time.

Table 38. Historical Thunderstorm Wind Events in Larimer County

Date	Location	Death	Injury	Damage to Property	Damage to Crops
7/3/1960	Not available	0	0	0	0
8/4/1963	Not available	0	0	0	0
8/23/1968	Not available	0	0	0	0
6/27/1970	Not available	0	0	0	0
7/1/1974	Not available	0	0	0	0
4/5/1976	Not available	0	0	0	0
5/10/1977	Not available	0	0	0	0
7/17/1977	Not available	0	0	0	0
8/29/1978	Not available	0	0	0	0
8/30/1979	Not available	0	0	0	0
7/2/1980	Not available	0	0	0	0
9/19/1980	Not available	0	0	0	0
2/16/1981	Not available	0	0	0	0
4/21/1981	Not available	0	0	0	0
4/21/1981	Not available	0	0	0	0
5/2/1981	Not available	0	0	0	0
5/7/1981	Not available	0	0	0	0
5/11/1981	Not available	0	0	0	0
5/21/1981	Not available	0	0	0	0
5/24/1981	Not available	0	0	0	0
6/23/1981	Not available	0	0	0	0
6/26/1981	Not available	0	0	0	0
7/23/1981	Not available	0	0	0	0
5/19/1982	Not available	0	0	0	0
6/29/1982	Not available	0	0	0	0
8/18/1983	Not available	0	0	0	0
8/18/1983	Not available	0	0	0	0
8/18/1983	Not available	0	0	0	0
8/18/1983	Not available	0	0	0	0

Date	Location	Death	Injury	Damage to Property	Damage to Crops
5/12/1984	Not available	0	0	0	0
5/14/1984	Not available	0	0	0	0
5/24/1984	Not available	0	0	0	0
6/3/1985	Not available	0	0	0	0
6/24/1985	Not available	0	0	0	0
7/7/1985	Not available	0	0	0	0
4/2/1986	Not available	0	0	0	0
6/17/1986	Not available	0	0	0	0
7/3/1986	Not available	0	0	0	0
7/4/1986	Not available	0	0	0	0
7/13/1986	Not available	0	0	0	0
7/19/1987	Not available	0	0	0	0
8/11/1987	Not available	0	0	0	0
9/26/1987	Not available	0	0	0	0
5/27/1988	Not available	0	0	0	0
6/7/1988	Not available	0	0	0	0
6/25/1988	Not available	0	0	0	0
8/3/1988	Not available	0	0	0	0
5/28/1989	Not available	0	0	0	0
6/27/1989	Not available	0	0	0	0
7/8/1989	Not available	0	0	0	0
8/1/1990	Not available	0	0	0	0
5/19/1991	Not available	0	0	0	0
5/19/1991	Not available	0	0	0	0
6/20/1991	Not available	0	0	0	0
7/12/1991	Not available	0	0	0	0
6/24/1992	Not available	0	0	0	0
5/5/1993	Carr	0	0	0	0
5/28/1993	Punkin Center	0	0	$50,000	0
8/15/1993	Fort Collins	0	0	0	0
9/7/1993	Loveland	0	0	0	0
5/28/1994	Not available	0	8	500	0
5/28/1994	Loveland	0	1	500	0
6/6/1994	Loveland	0	0	500	0
6/13/1994	Rustic	0	0	0	0
7/1/1994	Fort Collins	0	0	0	0
7/10/1994	Fort Collins	0	0	0	0
7/16/1994	Loveland	0	0	0	0
7/16/1994	Horsetooth Bay	0	0	0	0
8/10/1994	Fort Collins	0	0	0	0
8/22/1994	Kings Canyon	0	0	0	0
5/5/1995	Rand	0	0	0	0
6/17/1995	Fort	0	0	0	0
6/17/1995	South Fort Collins/No	0	0	0	0

Date	Location	Death	Injury	Damage to Property	Damage to Crops
7/17/1995	Bellview	0	0	0	0
7/20/1995	Hohnholz Ranch	0	0	0	0
7/20/1995	Red Feather Lakes	0	0	0	0
7/20/1995	West Fort Collins	0	0	0	0
7/22/1995	Red Feather Lakes	0	0	0	0
8/5/1995	Fort Morgan	0	0	0	0
6/12/1996	BERTHOUD	0	0	0	0
7/27/1996	WELLINGTON	0	0	0	0
7/28/1996	FT COLLINS	0	2	0	0
5/17/1998	RUSTIC	0	0	0	0
8/30/1998	LOVELAND	0	0	0	0
5/14/1999	CAMPION	0	0	0	0
5/21/1999	FT COLLINS	0	0	0	0
6/2/1999	CAMPION	0	0	0	0
8/27/1999	WELLINGTON	0	0	0	0
3/5/2000	FT COLLINS/LOVELAND	0	0	0	0
8/28/2001	LOVELAND	0	2	0	0
4/8/2005	MASONVILLE	0	0	0	0
6/3/2005	LOVELAND	0	0	0	0
6/25/2005	FT COLLINS	0	0	0	0
6/28/2005	BERTHOUD	0	0	0	0
6/28/2005	LOVELAND	0	0	0	0
7/2/2005	LOVELAND	2	4	0	0
7/3/2005	BERTHOUD	0	0	0	0
7/12/2007	FT COLLINS	0	0	0	0
5/22/2008	WELLINGTON	0	0	0	0
7/2/2008	LOVELAND ARPT	0	0	0	0
8/13/2008	MOUNTAIN VIEW	0	0	0	0
8/13/2008	MOUNTAIN VIEW	0	0	0	0
8/14/2008	FT COLLINS	0	0	0	0
6/26/2009	CAMPION	0	0	0	0
6/26/2009	FT COLLINS/LOVELAND	0	0	$25,000	0
7/27/2009	FT COLLINS/LOVELAND	0	0	0	0
5/26/2010	TIMNATH	0	0	0	0
7/22/2010	BERTHOUD	0	0	0	0
9/20/2010	BERTHOUD	0	0	0	0
6/29/2011	GLENDEVEY	0	0	0	0
7/24/2011	MOUNTAIN VIEW	0	0	0	0
6/28/2013	DRAKES	0	0	0	0
6/28/2013	DRAKES	0	0	0	0
6/28/2013	DRAKES	0	0	0	0
6/28/2013	HARMONY	0	0	0	0
5/22/2014	Not available	0	0	0	0
8/23/2014	FT COLLINS/LOVELAND	0	0	0	0

Date	Location	Death	Injury	Damage to Property	Damage to Crops
	Total:	2	17	$76,500	**0**

*Source: NOAA; NCDC Storm Events Database

Lightning

According to the best available data there have been 43 lightning events in Larimer County between 1996 and 2014. There have been 55 reported injuries, 8 deaths, $217,000 worth of property damage, and $15,000 worth of crop damage. On July 11th and 12th, 2014 two people were killed by separate lightning strikes in Rocky Mountain National park along Trail Ridge Road. In addition to the two deaths, 21 people were taken to the hospital because of lightning strikes. The national park outside of the Town of Estes Park attracts about 3 million visitors per year. Due to its high elevations and frequent thunderstorms in the summer, there is a high risk of lightning strikes. The events are summarized in the table below. Based on the historic data showing hazardous impacts on the county, there is a great potential for lightning events to occur at any given time, especially during the summer months when county residents are likely to be working and playing outdoors.

Table 39. Lightning Strikes in Larimer County*

Date	Location	Death	Injury	Damage to Property	Damage to Crops
5/9/1996	LOVELAND	0	0	0	0
6/4/1996	FORT COLLINS	0	1	0	0
6/10/1996	FORT COLLINS	0	0	$10,000	0
7/23/1996	LOVELAND	0	2	0	0
8/2/1996	FORT COLLINS	0	0	$50,000	0
8/15/1996	RED FEATHER LAKES	0	0	0	0
8/16/1996	RUSTIC	0	0	0	0
10/16/1996	FORT COLLINS	0	3	0	0
6/2/1997	FT COLLINS	0	0	0	0
6/14/1997	LOVELAND	0	0	$4,000	0
5/22/1998	LOVELAND	0	0	0	0
8/9/1998	ESTES PARK	0	6	0	0
6/19/1999	LIVERMORE	0	1	0	0
7/21/1999	ESTES PARK	1	2	0	0

Date	Location	Death	Injury	Damage to Property	Damage to Crops
8/7/1999	ESTES PARK	1	2	0	0
9/1/1999	FT COLLINS	0	0	0	0
5/17/2000	FT COLLINS	0	0	0	0
10/3/2000	ESTES PARK	0	2	0	0
8/15/2001	LOVELAND	1	0	0	0
4/17/2003	FT COLLINS	0	0	0	0
5/31/2003	LOVELAND	1	1	0	0
7/26/2003	POUDRE PARK	0	1	0	0
8/3/2003	RED FEATHER LAKES	0	1	0	0
8/18/2003	FT COLLINS/LOVELAND	0	0	0	0
4/19/2005	FT COLLINS	0	0	0	0
7/3/2005	LOVELAND	0	0	0	0
7/3/2005	LOVELAND	0	9	0	0
5/29/2007	FT COLLINS	0	0	$2,000	0
5/29/2007	FT COLLINS	0	0	$35,000	0
10/13/2007	FT COLLINS	0	0	$1,000	0
6/3/2008	FT COLLINS	0	0	$4,000	0
7/8/2008	DEER RIDGE	0	3	0	0
7/24/2008	FT COLLINS	2	0	0	0
7/20/2010	BERTHOUD	0	0	0	$10,000
7/22/2010	LOVELAND	0	0	$100,000	0
5/20/2011	FT COLLINS	0	0	$1,000	0
6/16/2011	FT COLLINS	0	0	$5,000	0
7/6/2011	ESTES PARK	0	0	$5,000	0
7/5/2013	FT COLLINS	0	0	0	$5,000
7/18/2013	DEER RIDGE	0	1	0	0
7/18/2013	WELLINGTON	0	9	0	0
7/11/2014	DEER RIDGE	1	7	0	0
7/12/2014	DEER RIDGE	1	4	0	0
	Total:	**8**	**55**	**$217,500**	**$15,000**

*Source: NOAA; NCDC Storm Events Database

Hail

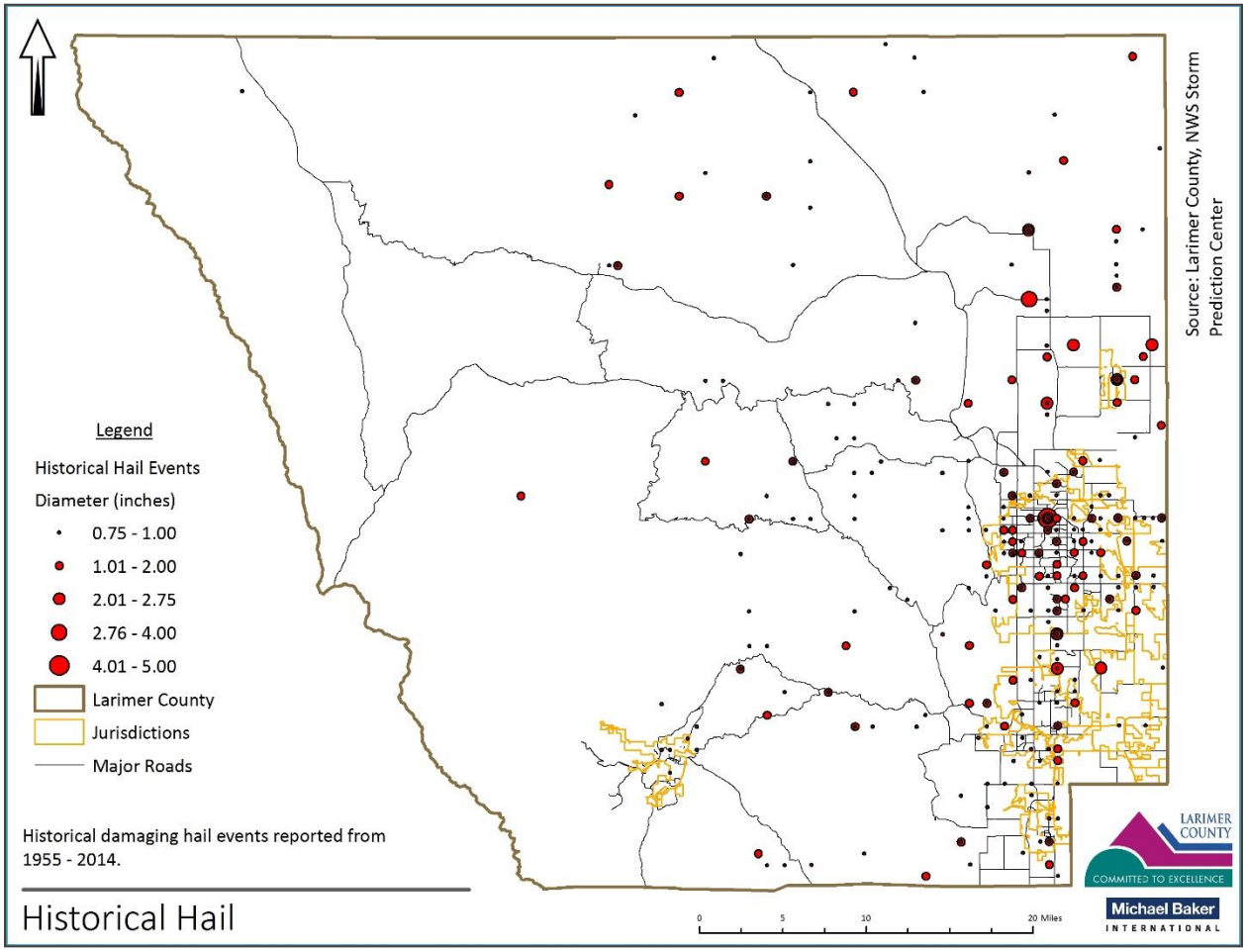
According to the best available data there are no reported injuries or deaths in Larimer County due to hail. There have been 443 hail events reported in Larimer County between 1955 and 2014. Of the 443 incidents, 10 reported property losses totaling $2,560,000 and 12 reported crop losses totaling $1,835,500. The events with loss to property in Larimer County between 1994 and 2009 are summarized in the table below. Based on the historic data showing hazardous impacts on the county, there is a great potential for hail events to occur at any given time.

Table 40. Historic Hail Events reporting loss in Larimer County

Date	Location	Hail Size Diameter (in)	Damage to Property	Damage to Crops
7/16/1994	Virginia Dale	1.75	0	$50000

7/16/1994	Virginia Dale	1.75	0	$50000
7/16/1994	Virginia Dale	2	$500000	$50000
7/16/1994	Virginia Dale	1.75	$50000	$50000
7/16/1994	Fort Collins	0.75	$5000	$500
7/16/1994	Wellington	2.75	$500000	$500000
7/16/1994	Wellington	2.5	$500000	$50000
7/16/1994	Wellington	1.75	$50000	$50000
7/16/1994	Wellington	2.5	$500000	$5000
7/16/1994	Fort Collins	1.5	$50000	$5000
7/16/1994	Loveland	1.75	$5000	0
8/10/1994	Laporte	2	$400000	0
6/22/2009	WELLINGTON	1	0	$25000
7/20/2009	DRAKES	2	0	$1000000
		Total:	$2,560,000	$1,835,500

Figure 38. Historical Hail Events (1955 – 2014) – Larimer County



Windstorm

Data from NOAA's NCDC Storm Events Database was used to complete the risk assessment for straight-line wind events in Larimer County. These events are defined as winds with speeds of at least fifty knots (58 mph), or winds of any speed (non-severe winds under fifty knots) that result in a fatality, injury and/or damage. The following Table summarizes severe wind history and damage totals in Larimer County from 1996 to 2014.

Table 41. Severe Wind Event History in Larimer County (1996 – 2014)

DATE	MAGNITUDE (KNOTS)[46]	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
1/3/1996	--	0	0	0	0
1/3/1996	--	0	0	0	0
1/11/1996	83	0	0	0	0
1/20/1996	78	0	0	0	0
1/27/1996	105	0	0	0	0
2/23/1996	65	0	0	0	0
4/19/1996	71	0	0	0	0
4/19/1996	--	0	0	0	0
4/24/1996	73	0	0	0	0
4/24/1996	58	0	0	0	0
4/24/1996	--	0	0	0	0
10/29/1996	87	0	0	$5,200,000	0
10/29/1996	61	0	0	0	0
11/18/1996	102	0	0	0	0
12/1/1996	91	0	0	0	0
12/2/1996	75	0	0	0	0
12/2/1996	82	0	0	0	0
12/4/1996	87	0	0	0	0
12/4/1996	96	0	0	0	0
12/4/1996	100	0	0	0	0
12/7/1996	64	0	0	0	0
12/15/1996	65	0	0	0	0
12/17/1996	56	0	0	0	0
12/27/1996	87	0	0	0	0
1/4/1997	62	0	0	0	0
1/4/1997	70	0	0	0	0
1/21/1997	77	0	0	0	0
1/23/1997	67	0	0	0	0
1/24/1997	86	0	0	0	0
3/27/1997	65	0	0	0	0
3/27/1997	--	0	0	0	0
10/11/1997	76	0	0	0	0

[46] 1 knot = 1.15 mph

DATE	MAGNITUDE (KNOTS)[46]	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
10/31/1997	62	0	0	0	0
10/31/1997	73	0	0	0	0
11/3/1997	110	0	0	0	0
12/27/1997	83	0	0	0	0
12/27/1997	64	0	0	0	0
1/15/1998	62	0	0	0	0
1/17/1998	109	0	0	0	0
2/25/1998	61	0	0	0	0
6/13/1998	68	0	0	0	0
6/13/1998	61	0	0	0	0
10/28/1998	62	0	0	0	0
11/10/1998	66	0	0	0	0
11/18/1998	64	0	0	0	0
11/21/1998	92	0	0	0	0
11/25/1998	70	0	0	0	0
12/26/1998	90	0	0	0	0
12/27/1998	99	0	0	0	0
12/27/1998	83	0	0	0	0
12/30/1998	78	0	0	0	0
12/30/1998	78	0	0	0	0
1/5/1999	87	0	0	0	0
1/5/1999	60	0	0	0	0
1/10/1999	85	0	0	0	0
1/14/1999	94	0	0	0	0
1/18/1999	73	0	0	0	0
1/26/1999	61	0	0	0	0
2/2/1999	93	0	0	0	0
2/2/1999	93	0	0	0	0
2/7/1999	78	0	0	0	0
2/17/1999	65	0	0	0	0
2/17/1999	61	0	0	0	0
2/22/1999	73	0	0	0	0
2/22/1999	70	0	0	0	0
2/22/1999	70	0	0	0	0
4/8/1999	90	0	0	0	0
4/8/1999	100	0	0	$7,200,000	0

DATE	MAGNITUDE (KNOTS)[46]	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
4/9/1999	84	0	0	0	0
4/9/1999	82	0	0	0	0
6/6/1999	62	0	0	0	0
9/25/1999	78	0	0	0	0
11/18/1999	77	0	0	0	0
11/18/1999	62	0	0	0	0
11/18/1999	109	0	0	0	0
11/25/1999	67	0	0	0	0
11/25/1999	87	0	0	0	0
11/25/1999	67	0	0	0	0
11/25/1999	67	0	0	0	0
11/25/1999	62	0	0	0	0
11/25/1999	76	0	0	0	0
12/15/1999	67	0	0	0	0
12/15/1999	108	0	0	0	0
12/16/1999	72	0	0	0	0
12/16/1999	64	0	0	0	0
12/18/1999	61	0	0	0	0
1/3/2000	81	0	0	0	0
1/3/2000	81	0	0	0	0
1/7/2000	67	0	0	0	0
1/7/2000	67	0	0	0	0
1/10/2000	70	0	0	0	0
2/15/2000	56	0	0	0	0
2/15/2000	70	0	0	0	0
2/25/2000	63	0	0	0	0
2/25/2000	84	0	0	0	0
2/26/2000	98	0	0	0	0
3/5/2000	76	0	0	0	0
3/7/2000	88	0	0	0	0
3/7/2000	88	0	0	0	0
4/5/2000	78	0	0	0	0
4/5/2000	78	0	0	0	0
4/18/2000	71	0	0	0	0
5/17/2000	77	0	0	0	0
6/13/2000	61	0	0	0	0

DATE	MAGNITUDE (KNOTS)[46]	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
6/13/2000	80	0	0	0	0
11/30/2000	62	0	0	0	0
12/15/2000	62	0	0	0	0
12/16/2000	82	0	0	0	0
12/16/2000	83	0	0	0	0
12/17/2000	52	0	1	0	0
2/2/2001	64	0	0	0	0
2/4/2001	63	0	0	0	0
2/4/2001	67	0	0	0	0
5/20/2001	61	0	0	$36,000	0
6/13/2001	66	0	0	0	0
10/31/2001	75	0	0	0	0
12/5/2001	70	0	0	0	0
12/5/2001	89	0	0	0	0
1/12/2002	71	0	0	0	0
1/13/2002	66	0	0	0	0
1/19/2002	64	0	0	0	0
1/19/2002	75	0	0	0	0
1/20/2002	90	0	0	0	0
1/20/2002	70	0	0	0	0
2/8/2002	62	0	0	0	0
2/8/2002	65	0	0	0	0
2/9/2002	72	0	0	0	0
2/9/2002	55	0	0	0	0
2/14/2002	71	0	0	0	0
3/8/2002	76	0	0	0	0
3/28/2002	83	0	0	0	0
1/15/2003	52	0	0	0	0
1/30/2003	52	0	0	0	0
1/30/2003	75	0	0	0	0
2/9/2003	65	0	0	0	0
3/5/2003	70	0	0	0	0
3/5/2003	90	0	0	0	0
4/15/2003	62	0	0	0	0
10/29/2003	62	0	0	$979,000	0
11/11/2003	70	0	0	0	0

DATE	MAGNITUDE (KNOTS)[46]	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
11/11/2003	70	0	0	0	0
3/6/2004	87	0	0	0	0
3/6/2004	72	0	0	0	0
6/10/2004	71	0	0	0	0
10/29/2004	65	0	0	0	0
12/20/2004	85	0	0	0	0
11/3/2005	61	0	0	0	0
11/14/2005	79	0	0	0	0
11/30/2005	51	0	0	0	0
12/5/2005	85	0	0	0	0
12/23/2005	58	0	0	0	0
12/29/2005	53	0	0	0	0
1/8/2006	93	0	0	0	0
1/12/2006	79	0	0	0	0
1/18/2006	70	0	0	0	0
4/2/2006	52	0	0	0	0
9/16/2006	67	0	0	0	0
11/14/2006	71	0	0	0	0
11/14/2006	52	0	0	0	0
1/7/2007	77	0	0	0	0
1/7/2007	77	0	0	0	0
2/16/2007	80	0	0	0	0
2/16/2007	80	0	0	0	0
6/6/2007	88	0	0	0	0
6/6/2007	88	0	0	0	0
10/19/2007	61	0	0	0	0
11/27/2007	69	0	1	0	0
12/4/2007	70	0	0	0	0
12/23/2007	70	0	0	0	0
12/29/2007	70	0	0	0	0
1/5/2008	78	0	0	0	0
2/8/2008	70	0	0	0	0
5/2/2008	63	0	0	0	0
6/11/2008	68	0	0	0	0
8/2/2008	52	0	6	0	0
11/13/2008	77	0	0	0	0

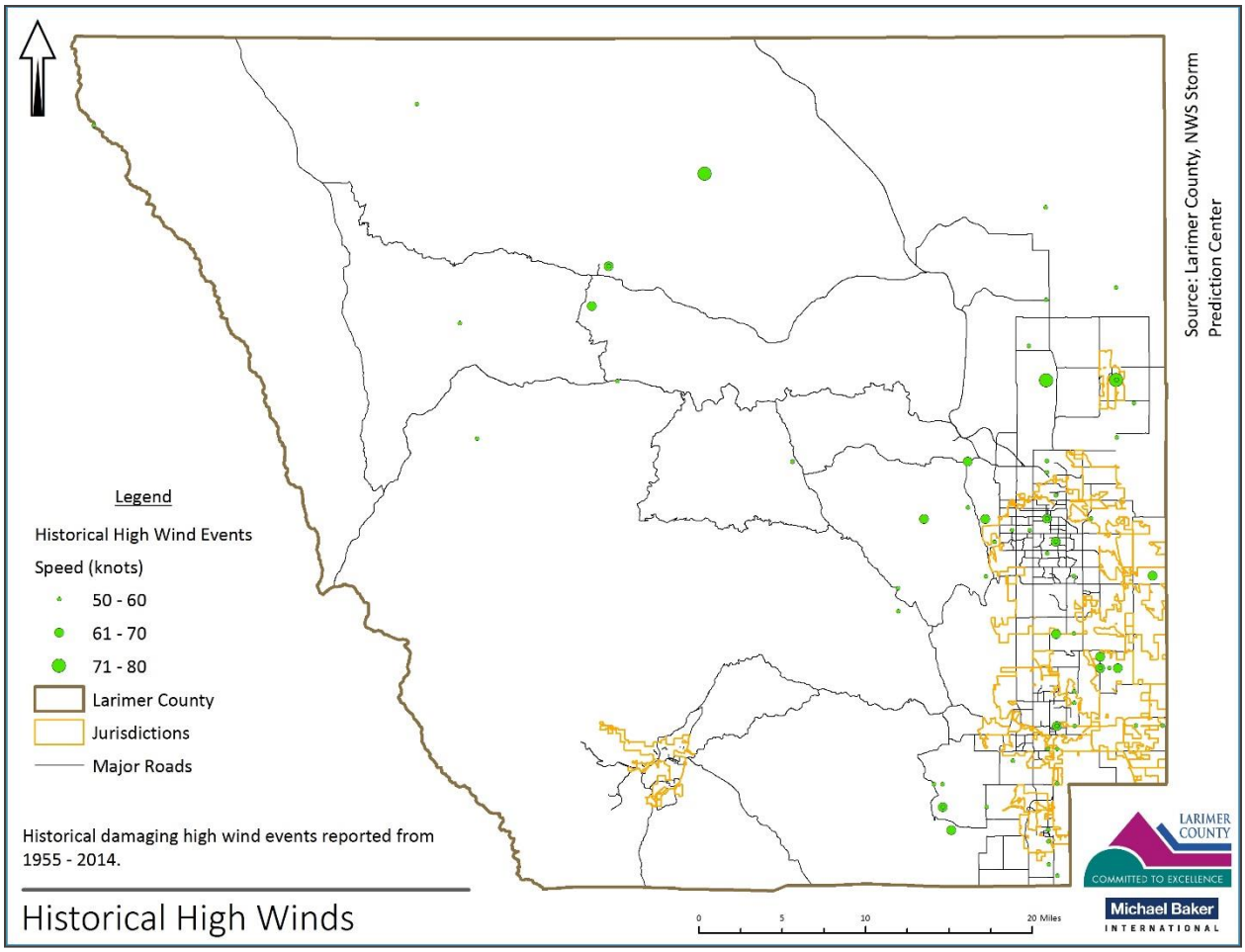
DATE	MAGNITUDE (KNOTS)[46]	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
12/25/2008	70	0	0	$50,000	0
12/29/2008	85	0	0	0	0
12/29/2008	96	0	0	0	0
12/31/2008	77	0	0	$25,000	0
1/1/2009	77	0	0	$25,000	0
1/7/2009	65	0	0	$5,000	0
1/7/2009	74	0	0	0	0
1/27/2009	87	0	0	$25,000	0
2/9/2009	70	0	0	0	0
5/11/2009	65	0	1	0	0
9/30/2009	81	0	0	0	0
10/1/2009	81	0	0	0	0
2/13/2010	70	0	0	0	0
5/4/2010	87	0	0	0	0
5/4/2010	58	0	0	$10,000	$50,000
5/24/2010	63	0	0	0	0
11/25/2010	70	0	0	0	0
2/13/2011	86	0	0	0	0
3/22/2011	43	0	0	0	0
3/22/2011	75	0	0	0	0
4/3/2011	80	0	0	0	0
6/16/2011	43	0	1	0	0
10/6/2011	54	0	0	0	0
11/12/2011	45	0	1	0	0
11/12/2011	73	0	0	0	0
12/31/2011	101	0	0	0	0
12/31/2011	63	0	0	0	0
12/31/2011	70	0	0	0	0
1/17/2012	80	0	0	0	0
1/17/2012	68	0	0	0	0
1/18/2012	56	0	0	0	0
1/19/2012	74	0	0	0	0
1/20/2012	76	0	0	0	0
1/20/2012	87	0	0	0	0
2/21/2012	55	0	0	0	0
2/21/2012	65	0	0	0	0

DATE	MAGNITUDE (KNOTS)[46]	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
2/29/2012	67	0	0	0	0
3/4/2012	70	0	0	0	0
4/15/2012	67	0	0	0	0
10/17/2012	62	0	0	0	0
10/11/2013	72	0	0	0	0
11/17/2013	67	0	0	$10,000	0
12/2/2013	69	0	0	0	0
12/24/2013	60	0	0	0	0
12/24/2013	79	0	0	0	0
1/29/2014	83	0	0	0	0
2/12/2014	72	0	0	0	0
2/14/2014	87	0	0	0	0
2/16/2014	54	0	0	0	0
2/16/2014	74	0	0	0	0
2/17/2014	89	0	0	0	0
2/20/2014	81	0	0	0	0
3/31/2014	85	0	0	0	0
11/10/2014	68	0	0	0	0
11/25/2014	75	0	0	0	0
	TOTAL	**0**	**11**	**$13,565,000**	**$50,000**

*Source: NOAA; NCDC Storm Events Database

Based on data provided by NCDC's Storm Events Database, 231 severe wind events have occurred in Lamer County between 1996 and 2014. There have been no deaths, 11 injuries, $13,565,000 in property damage, and $50,000 in crop damage. The following Figure provides a geospatial view of these historical severe wind events in Larimer County between 1996 and 2014. Severe winds affect all portions of the County.

Figure 39. Larimer County – Historical High Wind Events[47]



CLIMATE CHANGE IMPACTS

As a result of global climate change, the United States is already experiencing more intense precipitation. As Larimer County prepares for regional changes in climate, it will be important to consider scenarios in which larger amounts of precipitation will fall over shorter periods of time. The impacts have the potential to affect infrastructure, public safety, and the local economy in a diversity of (potentially) negative ways.

Inventory Exposed

All assets located in Larimer County can be considered at risk from spring and summer storms. This includes 324,122 people, or 100% of the County's population, and all buildings and infrastructure within the County. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and

[47] Source: NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

flooding. Most structures, including the County's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Inventory assets exposed to severe wind is dependent on the age of the building, type, construction material used, and condition of the structure. Possible losses to critical infrastructure include:

- Electric power disruption
- Communication disruption
- Water and fuel shortages
- Road closures
- Damaged infrastructure components, such as sewer lift stations and treatment plants
- Damage to homes, structures, and shelters

Potential Losses

Spring and summer storms affect the entire planning area of Larimer County and its jurisdictions including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Severe storms will remain a highly likely occurrence for Larimer County. It is likely that lightning and hail will also be experienced in the area due to such storms.

Generally, straight-line wind events destroy private, commercial, and public property. Additional costs stem from debris removal, maintenance, repair, and response. Indirect costs include loss of industrial and commercial productivity as a result of damage to infrastructure, facilities, or interruption of services. Because no specific, countywide loss estimation exists for wind, potential losses are related to historical property damage and injuries/deaths.

Probability of Future Occurrences

Spring and summer storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past spring and summer events provide benchmarks for projecting similar conditions into the future. The probability that Larimer County will experience a spring or summer storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in Larimer County at least once every year.

Reported straight-line wind events over the past nineteen years provide an acceptable framework for determining the future occurrence in terms of event. The probability of Larimer County and its

municipalities experiencing a severe wind event associated with damages or injuries can be difficult to quantify, but based on historical record of 231 severe wind events since 1996, there is a high chance of this type of event occurring each year.

Land Use and Development

All future structures built in Larimer County will likely be exposed to spring and summer extremes and damage. Since the previous statement is assumed to be uniform countywide, the location of development does not increase or reduce the risk necessarily. Larimer County and its jurisdictions must adhere to building codes, and therefore, new development can be built to current standards to account for adverse weather. Additionally, as homes go up in more remote parts of the county, accessing those rural residents may become impossible should sheltering or emergency services be needed in an extreme event.

All future structures built in Larimer County will likely be exposed to severe wind damage. As with other large extent hazards, increased development trends within Planning Reserve Areas and along the I-25 corridors will increase the vulnerability of these areas. Larimer County and its jurisdictions must continue to adhere to building codes and to facilitate new development that is built to the highest design standards to account for heavy winds.

Due to the nature of severe wind events, not all jurisdictions within Larimer County are expected to be impacted equally. For example, older homes, which are often subject to less advanced building codes, suffer increased vulnerability to wind over time. Mobile homes, which are most often occupied by low-income, socially vulnerable residents, are the most dangerous places during a windstorm. As communities across Larimer County continue to grow, it is important that local agencies monitor the inventory and locations of mobile homes, particularly in areas of high wind risk. Moreover, when discussing mitigation actions for straight-line winds, communities or geographic locations with large numbers of mobile homes deserve added attention.

5.3.10 Tornado

NATURAL HAZARDS	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Tornado	0.6	0.9	0.4	0.4	0.4	2.70
HIGH RISK (2.5 or higher)						

Hazard Identification

Tornadoes in Colorado are most often generated by thunderstorm activity when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The damage caused by a tornado is a result of high wind velocities and wind-blown debris. According to the National Weather Service, tornado wind speeds can range between 30 to more than 300 miles per hour. They are more likely to occur during the spring and early summer months of March through June and are most likely to form in the late afternoon and early evening. Most tornadoes are a few dozen yards wide and touchdown briefly, but even small, short-lived tornadoes can inflict tremendous damage. Destruction ranges from minor to catastrophic depending on the intensity, size, and duration of the storm. Structures made of light materials such as mobile homes are most susceptible to damage. Each year, an average of over eight hundred tornadoes is reported nationwide, resulting in an average of eighty deaths and fifteen hundred injuries (NOAA, 2002). The majority of Colorado tornadoes occur in the eastern plains, including all areas of Larimer County.

Tornadoes were previously classified by their intensity using the Fujita (F) Scale, with FO being the least intense and F6 being the most intense. The Fujita Scale (seen in the table below) is used to rate the intensity of a tornado by examining the damage caused by the tornado after it has passed over a man-made structure.

Table 42. Fujita Tornado Damage Scale[48]

Fujita Scale			
F-Scale Number	**Intensity Phrase**	**Wind Speed**	**Type of Damage**
F0	Gale tornado	40-72 mph	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages signboards.
F1	Moderate tornado	73-112 mph	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	Significant tornado	113-157 mph	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.

[48] Information provided by NOAA at http://www.spc.noaa.gov/faq/tornado/f-scale.html

Fujita Scale			
F-Scale Number	**Intensity Phrase**	**Wind Speed**	**Type of Damage**
F3	Severe tornado	158-206 mph	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted
F4	Devastating tornado	207-260 mph	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
F5	Incredible tornado	261-318 mph	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel reinforced concrete structures badly damaged.
F6	Inconceivable tornado	319-379 mph	These winds are very unlikely. The small area of damage they might produce would probably not be recognizable along with the mess produced by F4 and F5 wind that would surround the F6 winds. Missiles, such as cars and refrigerators would do serious secondary damage that could not be directly identified as F6 damage. If this level is ever achieved, evidence for it might only be found in some manner of ground swirl pattern, for it may never be identifiable through engineering studies

On February 1, 2007, the Fujita scale was decommissioned in favor of the more accurate Enhanced Fujita Scale (aka the EF Scale). The EF-Scale measures tornado strength and associated damages and classifies tornadoes into six intensity categories, as shown in the following table. The scale was revised to reflect better examinations of tornado damage surveys, so as to align wind speeds more closely with associated storm damage. The new scale takes into account how most structures are designed, and is thought to be a much more accurate representation of the surface wind speeds in the most violent tornadoes.

Table 43. Enhanced Fujita (EF) Scale[49]

Enhanced Fujita (EF) Scale		
Enhanced Fujita Category	**Wind Speed (mph)**	**Potential Damage**
EF0	65-85	**Light damage**: Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
EF1	86-110	**Moderate damage**: Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	111-135	**Considerable damage**: Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	136-165	**Severe damage**: Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	166-200	**Devastating damage**: Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
EF5	>200	**Incredible damage**: Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m (109 yds.); high-rise buildings have significant structural deformation; incredible phenomena will occur.

The Storm Prediction Center has developed damage indicators to be used with the Enhanced Fujita Scale for different types of buildings. These indicators can be also be used to classify any high wind event. Indicators for different building types are shown in the following tables.

[49] Source: http://www.spc.noaa.gov/faq/tornado/ef-scale.html

Table 44. Institutional Buildings

DAMAGE DESCRIPTION	WIND SPEED RANGE (Expected in Parentheses)
Threshold of visible damage	59-88 MPH (72 MPH)
Loss of roof covering (<20%)	72-109 MPH (86 MPH)
Damage to penthouse roof & walls, loss of rooftop HVAC equipment	75-111 MPH (92 MPH)
Broken glass in windows or doors	78-115 MPH (95 MPH)
Uplift of lightweight roof deck & insulation, significant loss of roofing material (>20%)	95-136 MPH (114 MPH)
Façade components torn from structure	97-140 MPH (118 MPH)
Damage to curtain walls or other wall cladding	110-152 MPH (131 MPH)
Uplift of pre-cast concrete roof slabs	119-163 MPH (142 MPH)
Uplift of metal deck with concrete fill slab	118-170 MPH (146 MPH)
Collapse of some top building envelope	127-172 MPH (148 MPH)
Significant damage to building envelope	178-268 MPH (210 MPH)

Source: Storm Prediction Center, 2009

Table 45. Educational Institutions (Elementary Schools, High Schools)

DAMAGE DESCRIPTION	WIND SPEED RANGE (Expected in Parentheses)
Threshold of visible damage	55-83 MPH (68 MPH)
Loss of roof covering (<20%)	66-99 MPH (79 MPH)
Broken windows	71-106 MPH (87 MPH)
Exterior door failures	83-121 MPH (101 MPH)
Uplift of metal roof decking; significant loss of roofing material (>20%); loss of rooftop HVAC	85-119 MPH (101 MPH)
Damage to or loss of wall cladding	92-127 MPH (108 MPH)
Collapse of tall masonry walls at gym, cafeteria, or auditorium	94-136 MPH (114 MPH)
Uplift or collapse of light steel roof structure	108-148 MPH (125 MPH)
Collapse of exterior walls in top floor	121-153 MPH (139 MPH)
Most interior walls of top floor collapsed	133-186 MPH (158 MPH)

DAMAGE DESCRIPTION	WIND SPEED RANGE (Expected in Parentheses)
Total destruction of a large section of building envelope	163-224 MPH (192 MPH)

Source: Storm Prediction Center, 2009

Table 46. Metal Building Systems

DAMAGE DESCRIPTION	WIND SPEED RANGE (Expected in Parentheses)
Threshold of visible damage	54-83 MPH (67 MPH)
Inward or outward collapsed of overhead doors	75-108 MPH (89 MPH)
Metal roof or wall panels pulled from the building	78-120 MPH (95 MPH)
Column anchorage failed	96-135 MPH (117 MPH)
Buckling of roof purlins	95-138 MPH (118 MPH)
Failure of X-braces in the lateral load resisting system	118-158 MPH (138 MPH)
Progressive collapse of rigid frames	120-168 MPH (143 MPH)
Total destruction of building	132-178 MPH (155 MPH)

Source: Storm Prediction Center, 2009

Table 47. Electric Transmission Lines

DAMAGE DESCRIPTION	WIND SPEED RANGE (Expected in Parentheses)
Threshold of visible damage	70-98 MPH (83 MPH)
Broken wood cross member	80-114 MPH (99 MPH)
Wood poles leaning	85-130 MPH (108 MPH)
Broken wood poles	98-142 MPH (118 MPH)

Source: Storm Prediction Center, 2009

Previous Occurrences

Colorado, lying just west of "tornado alley," is fortunate to experience less frequent and intense tornadoes than its neighboring states to the east. However, tornadoes remain a significant hazard in the region. Tornadoes are the most intense storm on earth having been recorded at velocities exceeding 315 mph. The phenomena results in a destructive rotating column of air ranging in diameter from a few yards to greater than a mile, usually associated with a downward extension of cumulonimbus clouds.

All portions of Larimer County have the potential to be affected by tornadoes; however, eastern portions have a greater potential. Historically, tornadoes have been relatively small on the EF Scale but F1

tornadoes can still produce dangerous winds up to 112mph. High winds can cause damage to buildings (tearing shingles from roofs, tearing awnings, collapsing structures, etc.).

The following Table summarizes tornado history and damage data for Larimer County from 1954 – 2015 collected by the NOAA Storm Prediction Center.

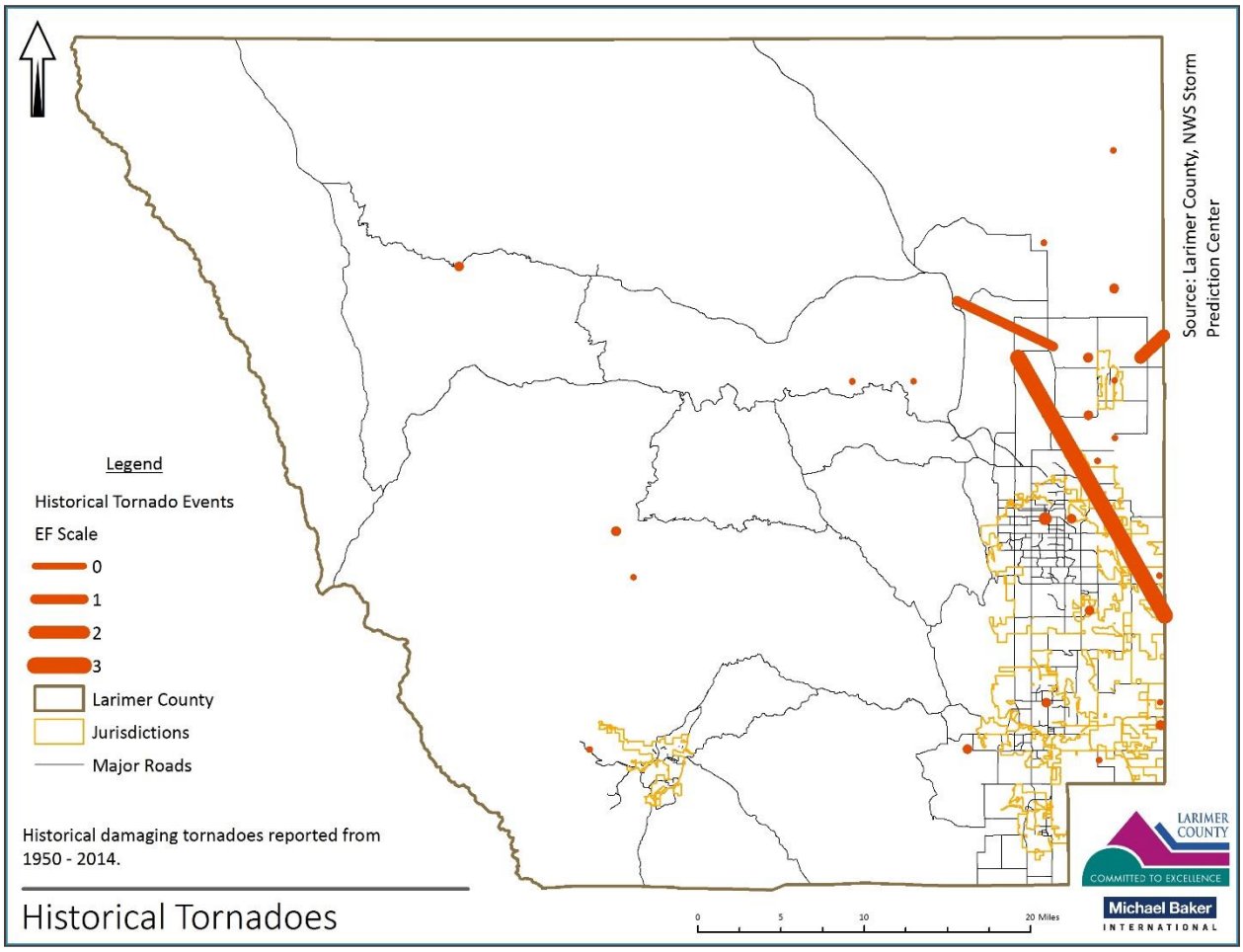
Table 48. Tornado History in Larimer County (1954-2015)

DATE	EF SCALE	INJURIES	DEATHS	ESTIMATED PROPERTY DAMAGE	ESTIMATED CROP DAMAGE
8/7/1954	unknown	0	0	$2,500	unknown
5/29/1957	F1	0	0	$250	unknown
5/30/1957	F2	0	0	$2,500	unknown
7/7/1963	F1	0	0	$2,500	unknown
6/23/1965	F0	0	0	unknown	unknown
6/4/1976	F2	0	0	unknown	unknown
7/22/1979	F0	0	0	unknown	unknown
5/24/1980	F1	0	0	$2,500	unknown
6/25/1982	F1	0	0	$30	unknown
7/7/1983	F1	0	0	$30	unknown
8/2/1985	F1	0	0	unknown	unknown
6/18/1987	F1	0	0	$25,000	unknown
8/7/1987	F1	0	0	unknown	unknown
6/15/1988	F1	0	0	$2,500	unknown
6/25/1988	F1	0	0	unknown	unknown
8/7/1988	F0	0	0	unknown	unknown
5/31/1989	F0	0	0	unknown	unknown
6/6/1990	F0	0	0	$2,500	unknown
6/9/1990	F1	0	0	unknown	unknown
6/9/1990	F2	0	0	$25,000	unknown
7/8/1990	F0	0	0	unknown	unknown
6/22/1991	F0	0	0	unknown	unknown
5/28/1993	F0	0	0	unknown	unknown
8/5/1993	F0	0	0	unknown	unknown
7/16/1994	F0	0	0	unknown	unknown
7/16/1994	F0	0	0	unknown	unknown
7/16/1994	F0	0	0	unknown	unknown
5/6/1995	F0	0	0	unknown	unknown
5/9/2002	F0	0	0	unknown	unknown
7/25/2005	F0	0	0	unknown	unknown
5/22/2008	EF1	0	0	unknown	unknown
6/4/2015	EF3	0	0	unknown	unknown
TOTALS:		**0**	**0**	**$65,300**	**unknown**

*Source: NOAA; NCDC Storm Events Database

NCDC's Storm Events Database estimates that 32 tornadoes have touched down in, or moved through, Larimer County between 1954 and 2015. The following Figure depicts historical tornado tracks and events in and around Larimer County. The map illustrates where tornadoes have touched down (and traveled) between 1954 and 2015. It is important to note that although all portions of the County are susceptible to tornado hazard, areas of the county located in the plains in the eastern portion of the county are more susceptible than those located in the western mountainous region.

Figure 40. Map of Tornado Events in Larimer County (1950 – 2013)[50]



Inventory Exposed

Inventory assets exposed to severe wind is dependent on the age of the building, type, construction material used, and condition of the structure. Possible losses to critical infrastructure include:

[50] Historical tornado events. NOAA's National Weather Service Storm Prediction Center, 1950 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

- Electric power disruption
- Communication disruption
- Water and fuel shortages
- Road closures
- Damaged infrastructure components, such as sewer lift stations and treatment plants
- Damage to homes, structures, and shelters

All assets located in Larimer County can be considered at risk from severe wind and tornadoes. This includes 324,122 people, or 100% of the County's population and all buildings and infrastructure within the County.[51] Most structures, including the county's critical facilities, should be able to withstand and provide adequate protection from tornadoes. Those facilities with back-up generators should be fully equipped to handle tornado events should the power go out.

Potential Losses

Generally, tornadoes destroy private, commercial, and public property. Additional costs stem from debris removal, maintenance, repair, and response. Indirect costs include loss of industrial and commercial productivity as a result of damage to infrastructure, facilities, or interruption of services. Because no specific, countywide loss estimation exists tornado hazards, potential losses are related to historical property damage and injuries/deaths.

Over the last 61 years there have been no deaths reported in Larimer County due to a tornado event. During the same time period, there have been no reported injuries from tornadoes. Monetary losses to property and crops are largely unknown.

Probability of Future Occurrences

Reported tornadoes over the past 61 years provide an acceptable framework for determining the future occurrence in terms of frequency for such events. The probability of the County and its municipalities experiencing a tornado associated with damages or injuries can be difficult to quantify. Historic tornado frequencies suggest that there is roughly a 100% chance of this type of event occurring somewhere in within the county boundaries each year.

Land Use and Development

All future structures built in Larimer County could likely be exposed to tornado damage. As with other large extent hazards, increased development trends within Planning Reserve Areas and along the I-25 corridor will increase the vulnerability of these areas. Larimer County and its jurisdictions must continue to adhere to building codes and to facilitate new development that is built to the highest design standards to account for tornadoes.

Due to the nature of tornadoes, not all jurisdictions within Larimer County are expected to be impacted equally. For example, older homes, which are often subject to less advanced building codes, suffer increased vulnerability to wind and tornadoes over time. Mobile homes, which are most often occupied by low-income, socially vulnerable residents, are the most dangerous places during a tornado. Studies

[51] 2010 Census

indicate that 45% of all fatalities during tornadoes occur in mobile homes, compared to 26% in traditional site-built homes.[52]

[52] Ashley, W.S., A.J. Krmenec, and R. Schwantes, 2008: Vulnerability due to nocturnal tornadoes. *Weather and Forecasting*, 23, 795 – 807.

5.3.11 Utility Disruption

NATURAL HAZARDS	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Utility Disruption	0.6	0.6	0.4	0.4	0.3	2.30
MODERATE RISK HAZARD (2.0 - 2.4)						

Hazard Identification

Utility disruption is defined as the interruption or loss of electricity, gas, communications, or water to a facility of a community for a period of time that compromises the integrity of the location, threatens human life, safety, and health, or interferes with vital services. Utility disruption may occur as a secondary effect of another hazard, or as the result of construction, accident, or terrorism. Severe summer and winter storms, and tornadoes and floods can bring trees and tree limbs down onto power lines. These events also cause serious safety hazards to the general public and emergency responders. For the purpose of the 2016 plan attention has been given to the following utility sources:

- Electricity
- Natural Gas
- Communications
- Water

Extended electrical outages can directly impact other utility systems, particularly water and wastewater systems. In areas where telephone service is provided by above-ground lines that share poles with electrical distribution lines, telecommunications providers may not be able to make repairs to the telephone system until electrical utilities restore power lines to a safe condition. Electrical outages can also adversely affect the availability of fueling facilities that require electrical power to physically move the fuel. The impacts of electric utility disruptions are felt most significantly by the general public during the winter and the summer due to heating and cooling demands. However, any extended electric disruption can lead to local economic losses when computers, lighting, refrigeration, gas pumps, and other equipment are without power during business hours.

The majority of homes in Larimer County are heated with natural gas. However, propane is a common heating fuel in the rural parts of the county. A large diameter natural gas pipeline travels through Larimer County along the Interstate 25 corridor. The distribution of natural gas through this pipeline could potentially be disrupted by an earthquake, construction accident, transportation accident, or serious fire along the corridor. The impacts of gas utility disruption can be severe in rural areas where a single-source heating is the norm.

Disruptions of communication systems happen frequently, especially now that society is more dependent on multiple means of communication. For example, when telephone lines are out of service, credit card and many internet transactions cannot be made. The potential loss of cellular phone communication has occurred in localized events but it has not yet been regionally experienced. Severe storms or atmospheric/solar activity have the potential to impact radio communications. Typically, local and regional communications plans address the need for redundancy within the local, regional, and state-wide communication systems.

Finally, the disruption of water utilities and systems often requires notification of the public and businesses in order to: curtail usage; boil available water; use bottled water; etc. This may also impact local firefighting activities.

Previous Occurrences

The county does not currently track incidences of utility disruption.

Inventory Exposed

All assets located in Larimer County are considered at risk from the impacts of utility disruption events. This includes 324,122 people, or 100% of the County's population, and all buildings and infrastructure within the County.

Utility disruption events of most concern include those large-scale disruption events that could potentially last for more than three days. Events of this magnitude could cause major disruptions to vital services, some of which would include hospitals, fuel suppliers, food suppliers, and the agricultural community.

Potential Losses

Utility disruption events have the potential to threaten lives and disrupt business activity. However, monetary losses and casualty estimates are largely unknown.

Probability of Future Occurrences

In general, utility outages result from failures in the distribution system as opposed to shortages of supply. Distribution systems are most susceptible to failure during extreme hot and cold temperatures as well as during violent weather conditions. Regional utility failures can threaten human life, particularly when outages affect hospitals, nursing homes, or other healthcare facilities. As both population and climate variability increase across the State of Colorado, and put more pressure on aging distribution systems, it is likely that utility disturbance events will become more frequent in and around Larimer County.

Future Land Use and Development Trends

As development expands into undeveloped areas, Larimer County may face higher risks of utility disruption. Sprawling development and the subsequent extension of utilities may increase the vulnerability of the county and its communities to utility disruption due to increased demand and increased exposure of utility lines. In developed areas, increased population densities and economic activity over time has potential to put additional stress on already overtaxed utility systems.

5.3.12 Winter Storm

NATURAL HAZARDS	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)	0.9	0.6	0.6	0.2	0.3	2.60
HIGH RISK (2.5 and higher)						

Hazard Identification

Winter storms can cause hazardous driving conditions, communications and electrical power failure, community isolation, and can adversely affect business continuity. This type of snow-related weather may include one or more of the following winter factors:

Winter storms can include blizzards, heavy snow, ice storms, and extreme cold.

Blizzards as defined by the National Weather Service, are a combination of sustained winds or frequent gusts of 35 mph or greater and visibilities of less than a quarter mile from falling or blowing snow for 3 hours or more. A blizzard, by definition, does not indicate heavy amounts of snow, although they can happen together. The falling or blowing snow usually creates large drifts from the strong winds. The reduced visibilities make travel, even on foot, particularly treacherous. The strong winds may also support dangerous wind chills. Ground blizzards can develop when strong winds lift snow off the ground and severely reduce visibilities.

Heavy snow, in large quantities, may fall during winter storms. Six inches or more in 12 hours or eight inches or more in 24 hours constitutes conditions that may significantly hamper travel or create hazardous conditions. The National Weather Service issues warnings for such events. Smaller amounts can also make travel hazardous, but in most cases, only results in minor inconveniences. Heavy wet snow before the leaves fall from the trees in the fall or after the trees have leafed out in the spring may cause problems with broken tree branches and power outages.

Ice storms develop when a layer of warm (above freezing), moist air aloft coincides with a shallow cold (below freezing) pool of air at the surface. As snow falls into the warm layer of air, it melts to rain, and then freezes on contact when hitting the frozen ground or cold objects at the surface, creating a smooth layer of ice. This phenomenon is called freezing rain. Similarly, sleet occurs when the rain in the warm layer subsequently freezes into pellets while falling through a cold layer of air at or near the Earth's surface. Extended periods of freezing rain can lead to accumulations of ice on roadways, walkways, power lines, trees, and buildings. Almost any accumulation can make driving and walking hazardous. Thick accumulations can bring down trees and power lines.

Extreme Cold, in extended periods, although infrequent, could occur throughout the winter months in Larimer County. Heating systems compensate for the cold outside. Most people limit their time outside during extreme cold conditions, but common complaints usually include pipes freezing and cars refusing to start. When cold temperatures and wind combine, dangerous wind chills can develop. Addition information pertaining to extreme cold can be found in the Extreme Temperatures section of the Plan.

Previous Occurrences

The National Climate Data Center (NCDC) archives past "Significant" winter storm, winter weather, and blizzard events in the NCDC Storm Events Database if the event has more than one significant hazard (i.e., heavy snow and blowing snow; snow and ice; snow and sleet; sleet and ice; or snow, sleet, and ice) and meets or exceeds locally/regionally defined twelve or twenty-four hour warning criteria for at least one of the precipitation elements on a widespread or localized basis. According to the best available data there was no reported injuries, deaths, or crop damage in Larimer County due to winter storm events between 1996 and 2015. There have been 281 winter storms reported in Larimer County between 1996 and 2015. Of these storms approximately 25% occurred in the eastern portion of the county typically below 6,000 feet in elevation. Approximately 57% occurred in the central portion of the county typically between 6,000 feet and 9,000 feet. The majority of winter storms occur in the western portion of the state typically above 9,000 feet. Of the 281 recorded storms, 61% of them occurred in the western part of the state. The NCDC storm data base categorizes storm location by both elevation and regional location. Therefore winter storms can occur across in multiple locations and elevations at the same time.

On March 17, 2003 a slow moving storm system moved into Colorado from the Pacific Ocean. In addition to this storm, moist air moved north from the Gulf of Mexico as well as strong winds from the east resulted in an upslope flow across the Front Range. As a result of this storm 3 feet of saturated snow fell in Denver and up to 7 feet of snow fell in the foothills from March 17th through the 20th. In Larimer County approximately 30 inches of heavy snow fell causing damages to homes and businesses, and the closure of local schools including Colorado State University. Property damage as a result of this storm are estimated to be around $31 million dollars. According to data there have been at least six significant winter storm events recorded in Larimer County each year.

Table 49. Historic Winter Storms- Larimer County[53]

Date	Location	Event Type	Injuries	Deaths	Damage to Property	Damage to Crops
1/1/1996	Larimer County between 6,000 & 9,000 feet, and above 9,000 feet	Heavy Snow	0	0	0	0
1/3/1996	Larimer County above 9,000 feet	Heavy Snow	0	0	0	0
1/4/1996	Larimer County between 6,000 & 9,000 feet	Heavy Snow	0	0	0	0
1/18/1996	Larimer County above 9,000 feet	Heavy Snow	0	0	0	0
1/24/1996	Larimer County above 9,000 feet	Heavy Snow	0	0	0	0
1/25/1996	Larimer County below 6,000 feet, Between 6,000 & 9,000 feet	Heavy Snow	0	0	0	0
1/27/1996	Larimer County above 9,000 feet	Heavy Snow	0	0	0	0

[53] NOAA storm data

Date	Location	Event Type	Injuries	Deaths	Damage to Property	Damage to Crops
1/30/1996	Larimer County above 9,000 feet	Heavy Snow	0	0	0	0
1/30/1996	Larimer County between 6,000 & 9,000 feet	Heavy Snow	0	0	0	0
2/17/1996	Larimer County above 9,000 feet	Heavy Snow	0	0	0	0
2/19/1996	Larimer County above 9,000 feet	Heavy Snow	0	0	0	0
2/20/1996	Larimer County above 9,000 feet	Heavy Snow	0	0	0	0
2/22/1996	Larimer County above 9,000 feet	Heavy Snow	0	0	0	0
3/13/1996	Larimer County below 6,000 feet, Between 6,000 & 9,000 feet	Heavy Snow	0	0	0	0
3/16/1996	Larimer County between 6,000 & 9,000 feet, and above 9,000 feet	Heavy Snow	0	0	0	0
3/23/1996	Larimer County below 6,000 feet, between 6,000 & 9,000 feet, and above 9,000 feet	Heavy Snow	0	0	0	0
4/3/1996	Larimer County between 6,000 & 9,000 feet	Heavy Snow	0	0	0	0
4/18/1996	Larimer County above 9,000 feet	Heavy Snow	0	0	0	0
5/25/1996	Larimer County between 6,000 & 9,000 feet, Above 9,000 feet	Heavy Snow	0	0	0	0
9/18/1996	Larimer County between 6,000 & 9,000 feet, Above 9,000 feet	Heavy Snow	0	0	0	0
9/24/1996	Larimer County between 6,000 & 9,000 feet	Heavy Snow	0	0	0	0
9/24/1996	Larimer County above 9,000 feet	Heavy Snow	0	0	0	0
10/16/1996	Larimer County above 9,000 feet	Heavy Snow	0	0	0	0
10/19/1996	Larimer County above 9,000 feet	Heavy Snow	0	0	0	0
10/25/1996	Larimer County between 6,000 & 9,000 feet, above 9,000 feet	Heavy Snow	0	0	0	0
11/14/1996	Larimer County above 9,000 feet	Heavy Snow	0	0	0	0
11/15/1996	Larimer County below 6,000 feet, between 6,000 & 9,000 feet, above 9,000 feet	Heavy Snow	0	0	0	0
12/1/1996	Larimer County above 9,000 feet	Heavy Snow	0	0	0	0

Date	Location	Event Type	Injuries	Deaths	Damage to Property	Damage to Crops
12/5/1996	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
12/6/1996	Larimer County between 6,000 & 9,000 feet, above 9,000 feet	Heavy Snow	0	0	0	0
12/16/1996	Larimer County below 6,000 feet	Winter Storm	0	0	0	0
1/10/1997	Larimer County below 6,000 feet, between 6,000 & 9,000 feet, above 9,000 feet	Heavy Snow	0	0	0	0
1/11/1997	Larimer County between 6,000 & 9,000 feet, above 9,000 feet	Heavy Snow	0	0	0	0
2/6/1997	Larimer County between 6,000 & 9,000 feet	Heavy Snow	0	0	0	0
2/12/1997	Larimer County between 6,000 & 9,000 feet	Heavy Snow	0	0	0	0
2/20/1997	Larimer County between 6,000 & 9,000 feet, above 9,000 feet	Heavy Snow	0	0	0	0
2/23/1997	Larimer County below 6,000 feet, between 6,000 & 9,000 feet	Heavy Snow	0	0	0	0
2/26/1997	Larimer County below 6,000 feet, between 6,000 & 9,000 feet	Heavy Snow	0	0	0	0
2/28/1997	Larimer County between 6,000 & 9,000 feet	Heavy Snow	0	0	0	0
3/3/1997	Larimer County above 9,000 feet	Heavy Snow	0	0	0	0
3/24/1997	Larimer County between 6,000 & 9,000 feet, above 9,000 feet	Heavy Snow	0	0	0	0
4/1/1997	Larimer County between 6,000 & 9,000 feet, above 9,000 feet	Heavy Snow	0	0	0	0
4/4/1997	Larimer County between 6,000 & 9,000 feet	Winter Storm	0	0	0	0
4/9/1997	Larimer County between 6,000 & 9,000 feet	Heavy Snow	0	0	0	0
4/10/1997	Larimer County between 6,000 & 9,000 feet, above 9,000 feet	Heavy Snow	0	0	0	0
4/21/1997	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
4/23/1997	Larimer County below 6,000 feet, between 6,000 & 9,000 feet, above 9,000 feet	Winter Storm	0	0	0	0

Date	Location	Event Type	Injuries	Deaths	Damage to Property	Damage to Crops
4/25/1997	Larimer County between 6,000 & 9,000 feet	Heavy Snow	0	0	0	0
4/29/1997	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
10/24/1997	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Rocky Mountain National Park, Medicine Bow Range, Eastern Larimer County	Blizzard	0	0	0	0
11/11/1997	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Central Larimer County	Heavy Snow	0	0	0	0
11/28/1997	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins	Winter Storm	0	0	0	0
12/24/1997	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Central Larimer County, Eastern Larimer County	Heavy Snow	0	0	0	0
1/5/1998	Rocky Mountain National Park, Medicine Bow Range, Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Central Larimer County, Western Larimer County	Winter Storm	0	0	0	0
1/17/1998	Rocky Mountain National Park, Medicine Bow Range, Western Larimer County	Blizzard	0	0	0	0
2/24/1998	Rocky Mountain National Park, Medicine Bow Range	Winter Storm	0	0	0	0
3/4/1998	Rocky Mountain National Park, Medicine Bow Range, Western Larimer County	Heavy Snow	0	0	0	0
3/6/1998	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Eastern Larimer County	Heavy Snow	0	0	0	0
3/18/1998	Rocky Mountain National Park, Medicine Bow Range, Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Eastern Larimer County	Winter Storm	0	0	0	0
4/2/1998	Rocky Mountain National Park, Medicine Bow Range,	Winter Storm	0	0	0	0

Date	Location	Event Type	Injuries	Deaths	Damage to Property	Damage to Crops
	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins					
4/7/1998	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Central Larimer County	Heavy Snow	0	0	0	0
4/15/1998	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Central Larimer County	Winter Storm	0	0	0	0
4/18/1998	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Central Larimer County	Winter Storm	0	0	0	0
4/20/1998	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins	Winter Storm	0	0	0	0
4/26/1998	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Central Larimer County	Winter Storm	0	0	0	0
6/4/1998	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins	Heavy Snow	0	0	0	0
10/28/1998	Rocky Mountain National Park, Medicine Bow Range	Winter Storm	0	0	0	0
11/7/1998	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Central Larimer County, Eastern Larimer County	Heavy Snow	0	0	0	0
11/8/1998	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins	Heavy Snow	0	0	0	0
12/9/1998	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Central Larimer County, Eastern Larimer County	Heavy Snow	0	0	0	0
12/18/1998	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Central Larimer County, Eastern Larimer County	Winter Storm	0	0	0	0
12/19/1998	Rocky Mountain National Park, Medicine Bow Range, Northern Front Range Foothills, Upper Larimer and	Winter Storm	0	0	0	0

Date	Location	Event Type	Injuries	Deaths	Damage to Property	Damage to Crops
	Cache La Poudre River Basins, Central Larimer County, Western Larimer County					
12/20/1998	Rocky Mountain National Park, Medicine Bow Range, Western Larimer County	Winter Storm	0	0	0	0
1/4/1999	Rocky Mountain National Park, Medicine Bow Range, Western Larimer County	Winter Storm	0	0	0	0
1/17/1999	Rocky Mountain National Park, Medicine Bow Range	Winter Storm	0	0	0	0
1/21/1999	Rocky Mountain National Park, Medicine Bow Range, Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Central Larimer County, Western Larimer County	Heavy Snow	0	0	0	0
1/24/1999	Rocky Mountain National Park, Medicine Bow Range, Western Larimer County, Eastern Larimer County	Heavy Snow	0	0	0	0
2/10/1999	Eastern Larimer County	Winter Storm	0	0	0	0
2/17/1999	Rocky Mountain National Park, Medicine Bow Range	Winter Storm	0	0	0	0
2/21/1999	Rocky Mountain National Park, Medicine Bow Range	Winter Storm	0	0	0	0
3/12/1999	Eastern Larimer County	Heavy Snow	0	0	0	0
4/1/1999	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins	Heavy Snow	0	0	0	0
4/14/1999	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins	Heavy Snow	0	0	0	0
4/21/1999	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins	Heavy Snow	0	0	0	0
4/28/1999	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins	Heavy Snow	0	0	0	0
4/29/1999	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins	Heavy Snow	0	0	0	0
5/1/1999	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Central Larimer County	Heavy Snow	0	0	0	0
9/28/1999	Northern Front Range Foothills, Upper Larimer and	Heavy Snow	0	0	0	0

Date	Location	Event Type	Injuries	Deaths	Damage to Property	Damage to Crops
	Cache La Poudre River Basins, Central Larimer County, Eastern Larimer County					
10/16/1999	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Eastern Larimer County	Heavy Snow	0	0	0	0
10/18/1999	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Central Larimer County	Heavy Snow	0	0	0	0
11/21/1999	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Central Larimer County, Eastern Larimer County	Winter Storm	0	0	0	0
12/18/1999	Rocky Mountain National Park, Medicine Bow Range, Western Larimer County	Heavy Snow	0	0	0	0
1/9/2000	Rocky Mountain National Park, Medicine Bow Range, Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Central Larimer County, Western Larimer County	Winter Storm	0	0	0	0
2/10/2000	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Eastern Larimer County	Heavy Snow	0	0	0	0
2/15/2000	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins	Heavy Snow	0	0	0	0
2/17/2000	Rocky Mountain National Park, Medicine Bow Range, Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins	Heavy Snow	0	0	0	0
3/15/2000	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Eastern Larimer County	Heavy Snow	0	0	0	0
3/30/2000	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins	Heavy Snow	0	0	0	0
4/2/2000	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins	Heavy Snow	0	0	0	0

Date	Location	Event Type	Injuries	Deaths	Damage to Property	Damage to Crops
5/17/2000	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Central Larimer County, Western Larimer County	Winter Storm	0	0	0	0
9/23/2000	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Eastern Larimer County	Heavy Snow	0	0	0	0
11/1/2000	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Western Larimer County, Central Larimer County	Heavy Snow	0	0	0	0
11/28/2000	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Western Larimer County	Heavy Snow	0	0	0	0
12/30/2000	Rocky Mountain National Park, Medicine Bow Range	Heavy Snow	0	0	0	0
1/15/2001	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins	Heavy Snow	0	0	0	0
1/15/2001	Eastern Larimer County	Heavy Snow	0	0	0	0
2/8/2001	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Central Larimer County	Heavy Snow	0	0	0	0
3/10/2001	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins	Heavy Snow	0	0	0	0
3/16/2001	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Central Larimer County	Heavy Snow	0	0	0	0
3/25/2001	Eastern Larimer County	Heavy Snow	0	0	0	0
3/25/2001	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins	Heavy Snow	0	0	0	0
4/10/2001	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Eastern Larimer County	Winter Storm	0	0	0	0
4/11/2001	Eastern Larimer County	Blizzard	0	0	0	0
4/21/2001	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Central Larimer County	Winter Storm	0	0	0	0
4/22/2001	Eastern Larimer County	Winter Storm	0	0	0	0

Date	Location	Event Type	Injuries	Deaths	Damage to Property	Damage to Crops
5/2/2001	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Western Larimer County, Central Larimer County	Heavy Snow	0	0	0	0
5/20/2001	Northern Front Range Foothills, Upper Larimer and Cache La Poudre River Basins, Central Larimer County	Heavy Snow	0	0	0	0
1/9/2002	Larimer County between 6,000 & 9,000 feet	Heavy Snow	0	0	0	0
1/23/2002	Larimer County between 6,000 & 9,000 feet	Heavy Snow	0	0	0	0
1/29/2002	Larimer County below 6,000 feet and between 6,000 & 9,000 feet	Heavy Snow	0	0	0	0
3/1/2002	Larimer County below 6,000 feet and between 6,000 & 9,000 feet	Winter Storm	0	0	0	0
3/14/2002	Larimer County between 6,000 & 9,000 feet	Heavy Snow	0	0	0	0
5/23/2002	Larimer County between 6,000 & 9,000 feet	Winter Storm	0	0	0	0
11/1/2002	Larimer County Below 6,000 feet	Winter Storm	0	0	0	0
11/8/2002	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
2/5/2003	Larimer County between 6,000 & 9,000 feet	Heavy Snow	0	0	0	0
3/17/2003	Larimer County between 6,000 & 9,000 feet, and above 9,000 feet	Winter Storm	0	0	15500000	0
3/17/2003	Larimer County Below 6,000 feet	Blizzard	0	0	15500000	0
4/23/2003	Larimer County between 6,000 & 9,000 feet, and above 9,000 feet	Winter Storm	0	0	0	0
5/9/2003	Larimer County between 6,000 & 9,000 feet, and above 9,000 feet	Heavy Snow	0	0	0	0
11/21/2003	Larimer County between 6,000 & 9,000 feet, and above 9,000 feet	Winter Storm	0	0	0	0
11/21/2003	Larimer County Below 6,000 feet, between 6,000 & 9,000 feet, and above 9,000 feet	Winter Storm	0	0	0	0
12/8/2003	Larimer County between 6,000 & 9,000 feet	Winter Storm	0	0	0	0

Date	Location	Event Type	Injuries	Deaths	Damage to Property	Damage to Crops
1/3/2004	Larimer County between 6,000 & 9,000 feet	Winter Storm	0	0	0	0
2/28/2004	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
4/9/2004	Larimer County Below 6,000 feet, between 6,000 & 9,000 feet, and above 9,000 feet	Winter Storm	0	0	0	0
4/21/2004	Larimer County between 6,000 & 9,000 feet	Winter Storm	0	0	0	0
5/12/2004	Larimer County between 6,000 & 9,000 feet	Winter Storm	0	0	0	0
9/4/2004	Larimer County between 6,000 & 9,000 feet	Winter Weather	1	0	0	0
11/28/2004	Larimer County Below 6,000 feet, between 6,000 & 9,000 feet, and above 9,000 feet	Winter Storm	0	0	0	0
1/30/2005	Larimer County between 6,000 & 9,000 feet	Winter Storm	0	0	0	0
2/15/2005	Larimer County Below 6,000 feet, between 6,000 & 9,000 feet, and above 9,000 feet	Winter Storm	0	0	0	0
3/13/2005	Larimer County Below 6,000 feet, between 6,000 & 9,000 feet, and above 9,000 feet	Winter Storm	0	0	0	0
4/10/2005	Larimer County Below 6,000 feet, between 6,000 & 9,000 feet, and above 9,000 feet	Winter Storm	0	0	0	0
4/24/2005	Larimer County between 6,000 & 9,000 feet	Winter Storm	0	0	0	0
4/28/2005	Larimer County Below 6,000 feet, between 6,000 & 9,000 feet, and above 9,000 feet	Winter Storm	0	0	0	0
10/9/2005	Larimer County between 6,000 & 9,000 feet, above 9,000 feet	Winter Storm	0	0	0	0
11/14/2005	Larimer County between 6,000 & 9,000 feet, above 9,000 feet	Winter Storm	0	0	0	0
10/16/2006	Larimer County above 9,000 feet	Heavy Snow	0	0	0	0
10/17/2006	Larimer County between 6,000 & 9,000 feet	Heavy Snow	0	0	0	0
10/20/2006	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
10/25/2006	Larimer County between 6,000 & 9,000 feet, above 9,000 feet	Winter Storm	0	0	0	0
11/13/2006	Larimer County above 9,000 feet	Winter Storm	0	0	0	0

Date	Location	Event Type	Injuries	Deaths	Damage to Property	Damage to Crops
11/28/2006	Larimer County below 6,000 feet, between 6,000 & 9,000 feet, and above 9,000 feet	Winter Storm	0	0	0	0
12/20/2006	Larimer County below 6,000 feet, between 6,000 & 9,000 feet, and above 9,000 feet	Blizzard	0	0	0	0
12/25/2006	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
12/28/2006	Larimer County below 6,000 feet, between 6,000 & 9,000 feet, and above 9,000 feet	Winter Storm	0	0	0	0
1/4/2007	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
1/5/2007	Larimer County below 6,000 feet, between 6,000 & 9,000 feet	Winter Storm	0	0	0	0
1/21/2007	Larimer County between 6,000 & 9,000 feet	Heavy Snow	0	0	0	0
2/16/2007	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
3/24/2007	Larimer County above 9,000 feet	Heavy Snow	0	0	0	0
5/4/2007	Larimer County between 6,000 & 9,000 feet	Winter Weather	0	0	0	0
10/20/2007	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
11/20/2007	Larimer County below 6,000 feet, between 6,000 & 9,000 feet, and above 9,000 feet	Winter Weather	0	0	0	0
12/1/2007	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
12/6/2007	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
12/7/2007	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
12/25/2007	Larimer County between 6,000 & 9,000 feet	Winter Weather	0	0	0	0
12/27/2007	Larimer County below 6,000 feet	Winter Storm	0	0	0	0
1/5/2008	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
1/10/2008	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
2/7/2008	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
2/8/2008	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
2/8/2008	Larimer County above 9,000 feet	Winter Weather	0	0	0	0

Date	Location	Event Type	Injuries	Deaths	Damage to Property	Damage to Crops
4/9/2008	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
4/9/2008	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
5/1/2008	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
11/29/2008	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
12/4/2008	Larimer County between 6,000 & 9,000 feet	Winter Weather	0	0	0	0
12/4/2008	Larimer County below 6,000 feet	Winter Weather	0	0	0	0
1/24/2009	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
3/26/2009	Larimer County below 6,000 feet, between 6,000 & 9,000 feet, and above 9,000 feet	Winter Storm	0	0	0	0
4/3/2009	Larimer County below 6,000 feet, between 6,000 & 9,000 feet, and above 9,000 feet	Winter Storm	0	0	0	0
4/16/2009	Larimer County between 6,000 & 9,000 feet, and above 9,000 feet	Winter Storm	0	0	0	0
10/9/2009	Larimer County below 6,000 feet, between 6,000 & 9,000 feet	Winter Storm	0	0	0	0
10/27/2009	Larimer County below 6,000 feet, between 6,000 & 9,000 feet, and above 9,000 feet	Winter Storm	0	0	0	0
11/14/2009	Larimer County between 6,000 & 9,000 feet	Winter Storm	0	0	0	0
12/5/2009	Larimer County below 6,000 feet, between 6,000 & 9,000 feet	Winter Weather	0	0	0	0
12/13/2009	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
12/22/2009	Larimer County below 6,000 feet, between 6,000 & 9,000 feet	Winter Weather	0	0	0	0
3/18/2010	Larimer County between 6,000 & 9,000 feet, and above 9,000 feet	Winter Storm	0	0	0	0
3/19/2010	Larimer County below 6,000 feet	Winter Weather	0	0	0	0
3/23/2010	Larimer County below 6,000 feet, between 6,000 & 9,000 feet, and above 9,000 feet	Winter Weather	0	0	0	0
4/1/2010	Larimer County above 9,000 feet	Winter Weather	0	0	0	0

Date	Location	Event Type	Injuries	Deaths	Damage to Property	Damage to Crops
4/6/2010	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
4/22/2010	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
4/23/2010	Larimer County between 6,000 & 9,000 feet	Winter Storm	0	0	0	0
5/11/2010	Larimer County below 6,000 feet, between 6,000 & 9,000 feet, and above 9,000 feet	Winter Storm	0	0	0	0
10/22/2010	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
10/25/2010	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
11/9/2010	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
11/15/2010	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
11/16/2010	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
11/21/2010	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
11/24/2010	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
11/28/2010	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
12/10/2010	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
12/14/2010	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
12/18/2010	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
12/30/2010	Larimer County below 6,000 feet, between 6,000 & 9,000 feet	Winter Weather	0	0	0	0
1/9/2011	Larimer County between 6,000 & 9,000 feet	Winter Weather	0	0	0	0
1/16/2011	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
2/1/2011	Larimer County below 6,000 feet	Extreme Cold/Wind Chill	0	0	0	0
2/5/2011	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
2/7/2011	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
2/24/2011	Larimer County between 6,000 & 9,000 feet, and above 9,000 feet	Winter Weather	0	0	0	0

Date	Location	Event Type	Injuries	Deaths	Damage to Property	Damage to Crops
3/17/2011	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
3/28/2011	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
4/3/2011	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
4/11/2011	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
4/13/2011	Larimer County between 6,000 & 9,000 feet, and above 9,000 feet	Winter Storm	0	0	0	0
4/23/2011	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
4/29/2011	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
5/10/2011	Larimer County between 6,000 & 9,000 feet, and above 9,000 feet	Winter Storm	0	0	0	0
5/18/2011	Larimer County between 6,000 & 9,000 feet, and above 9,000 feet	Winter Weather	0	0	0	0
5/20/2011	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
10/25/2011	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
10/25/2011	Larimer County between 6,000 & 9,000 feet	Winter Storm	0	0	0	0
10/25/2011	Larimer County below 6,000 feet	Winter Storm	0	0	0	0
11/1/2011	Larimer County below 6,000 feet	Winter Storm	0	0	0	0
11/1/2011	Larimer County between 6,000 & 9,000 feet	Winter Storm	0	0	0	0
11/1/2011	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
11/2/2011	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
12/3/2011	Larimer County between 6,000 & 9,000 feet	Winter Storm	0	0	0	0
12/21/2011	Larimer County below 6,000 feet	Winter Weather	0	0	0	0
1/11/2012	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
1/15/2012	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
1/18/2012	Larimer County above 9,000 feet	Blizzard	0	0	0	0
1/20/2012	Larimer County above 9,000 feet	Winter Weather	0	0	0	0

Date	Location	Event Type	Injuries	Deaths	Damage to Property	Damage to Crops
2/2/2012	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
2/2/2012	Larimer County below 6,000 feet	Winter Storm	0	0	0	0
2/2/2012	Larimer County between 6,000 & 9,000 feet	Winter Storm	0	0	0	0
2/21/2012	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
2/28/2012	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
11/10/2012	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
12/19/2012	Larimer County below 6,000 feet, between 6,000 & 9,000 feet, and above 9,000 feet	Winter Weather	0	0	0	0
12/24/2012	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
1/29/2013	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
2/24/2013	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
2/26/2013	Larimer County between 6,000 & 9,000 feet	Winter Weather	0	0	0	0
3/3/2013	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
3/8/2013	Larimer County between 6,000 & 9,000 feet, above 9,000 feet	Winter Storm	0	0	0	0
4/8/2013	Larimer County between 6,000 & 9,000 feet	Winter Storm	0	0	0	0
4/13/2013	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
4/15/2013	Larimer County below 6,000 feet, between 6,000 & 9,000 feet, and above 9,000 feet	Winter Storm	0	0	0	0
4/22/2013	Larimer County below 6,000 feet, between 6,000 & 9,000 feet, and above 9,000 feet	Winter Storm	0	0	0	0
10/13/2013	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
11/16/2013	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
12/3/2013	Larimer County below 6,000 feet, between 6,000 & 9,000 feet, and above 9,000 feet	Heavy Snow	0	0	0	0
1/3/2014	Larimer County between 6,000 & 9,000 feet, and above 9,000 feet	Winter Weather	0	0	0	0

Date	Location	Event Type	Injuries	Deaths	Damage to Property	Damage to Crops
1/27/2014	Larimer County between 6,000 & 9,000 feet	Winter Weather	0	0	0	0
1/29/2014	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
1/30/2014	Larimer County below 6,000 feet, between 6,000 & 9,000 feet	Winter Storm	0	0	0	0
2/7/2014	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
4/2/2014	Larimer County between 6,000 & 9,000 feet	Winter Storm	0	0	0	0
4/12/2014	Larimer County between 6,000 & 9,000 feet, above 9,000 feet	Heavy Snow	0	0	0	0
5/11/2014	Larimer County below 6,000 feet, between 6,000 & 9,000 feet, and above 9,000 feet	Winter Storm	0	0	0	0
10/13/2014	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
11/11/2014	Larimer County below 6,000 feet, between 6,000 & 9,000 feet, and above 9,000 feet	Winter Weather	0	0	0	0
11/22/2014	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
12/13/2014	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
12/21/2014	Larimer County above 9,000 feet	Winter Storm	0	0	0	0
12/25/2014	Larimer County below 6,000 feet, between 6,000 & 9,000 feet, and above 9,000 feet	Winter Weather	0	0	0	0
2/1/2015	Larimer County between 6,000 & 9,000 feet	Winter Weather	0	0	0	0
2/15/2015	Larimer County between 6,000 & 9,000 feet, above 9,000 feet	Winter Weather	0	0	0	0
2/25/2015	Larimer County between 6,000 & 9,000 feet, above 9,000 feet	Heavy Snow	0	0	0	0
3/2/2015	Larimer County above 9,000 feet	Winter Weather	0	0	0	0
3/3/2015	Larimer County between 6,000 & 9,000 feet	Winter Weather	0	0	0	0
4/2/2015	Larimer County between 6,000 & 9,000 feet	Winter Weather	0	0	0	0
4/16/2015	Larimer County between 6,000 & 9,000 feet, above 9,000 feet	Winter Storm	0	0	0	0

Date	Location	Event Type	Injuries	Deaths	Damage to Property	Damage to Crops
		Total:	0	0	$31 million	0

CLIMATE CHANGE IMPACTS

As a result of global climate change, the United States is already experiencing more intense rain and snowstorms. The amount of snow falling in the heaviest one percent of storms has risen nearly 74%, averaged nationally, between 1958 and 2011.[54] As Larimer County prepares for regional changes in climate, it will be important to consider scenarios in which larger amounts of snow will fall over shorter periods of time. The impacts have the potential to affect infrastructure, public safety, and the local economy in a diversity of (potentially) negative ways.

Inventory Exposed

All assets located in Larimer County can be considered at risk from winter storms. This includes 324,122 people, or 100% of the County's population, and all buildings and infrastructure within the County. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the County's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Potential Losses

Winter storms affect the entire planning area of Larimer County and its jurisdictions including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Winter storms will remain a highly likely occurrence for Larimer County.

Probability of Future Occurrences

Severe winter storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past severe winter events provide benchmarks for projecting similar conditions into the future. The probability that Larimer County will experience a severe winter storm event can be difficult

[54] T*hird U.S. National Climate Assessment*, 2014. U.S. Global Change Research Program.

to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in Larimer County at least once every year.

Land Use and Development

All future structures built in Larimer County will likely be exposed to severe weather extremes and damage. Since the previous statement is assumed to be uniform countywide, the location of development does not increase or reduce the risk necessarily. Larimer County and its jurisdictions must adhere to building codes, and therefore, new development can be built to current standards to account for adverse weather. Additionally, as homes go up in more remote parts of the county, accessing those rural residents may become impossible should sheltering or emergency services be needed in an extreme event.

6 Mitigation Strategy

This section of the Plan provides the blueprint for Larimer County and its participating jurisdictions to become less vulnerable to natural hazards. The goals, objectives, and strategies are based on the general consensus of the Larimer County Planning Team and local stakeholder feedback, along with the findings of the Hazard Identification and Risk Assessment. This section consists of the following subsections:

- INTRODUCTION
- GOALS AND OBJECTIVES SUMMARY
- 2009 HAZARD MITIGATION PLAN ACTION REPORT
- 2016 HAZARD MITIGATION PLAN ACTION REPORT

6.1 Introduction

The intent of the Mitigation Strategy is to provide the County and its participating jurisdictions with the goals that will guide future mitigation policy and project administration. The Mitigation Strategy includes a list of proposed actions deemed necessary to meet those goals and reduce the impact of natural hazards. The development of the strategy included a thorough review of natural hazards and identified policies and projects intended to not only reduce the future impacts of hazards, but also to help Larimer County and participating jurisdictions balance and achieve their economic, environmental, and social goals. The development of the Mitigation Strategy was strategic, in that all policies and projects have been linked to establish priorities. Moreover, projects have been assigned to specific departments or individuals responsible for their implementation. Potential funding sources are identified when possible and identified projects were assumed to be realistically achievable over the next five years.

- *Mitigation Goals* are general guidelines that explain what the county wants to achieve. Goals are usually expressed as broad policy statements representing desired long-term results.
- *Mitigation Objectives* describe strategies or implementation steps to attain the identified goals. Objectives are more specific statements than goals; the described steps are usually measurable and can have a defined completion date.
- *Mitigation Actions* provide more detailed descriptions of specific work tasks to help the county and its municipalities achieve prescribed goals and objectives.

Based on participation from the Larimer County Hazard Mitigation Large Planning Team, the mitigation strategy from the 2010 Northern Colorado Regional Hazard Mitigation Plan has been modified and updated. Objectives were clarified to better document roles and responsibilities. Previously identified actions were updated and new actions have been added to address particular hazards facing Larimer County and its local jurisdictions.

In order to prioritize the mitigation actions in this plan, the County and each participating jurisdiction referred to FEMA's STAPLEE methodology as a guide. The STAPLEE approach allows for a careful review of the feasibility of mitigation actions by using seven criteria. The criteria are described below:

- *S - Social*
- *T - Technical*
- *A - Administrative*

- *P - Political*
- *L - Legal*
- *E - Economic*
- *E - Environmental*

FEMA mitigation planning requirements indicate that any prioritization system used shall include a special emphasis on the extent to which benefits are maximized according to a cost-benefit review of the proposed projects. To do this in an efficient manner that is consistent with FEMA's guidance on using cost-benefit review in mitigation planning, the STAPLEE method was adapted to include a higher weighting (x1.5) for the economic feasibility factor – Cost Effective. This method incorporates concepts similar to those described in Method C of FEMA 386-5: Using Benefit Cost Review in Mitigation Planning (FEMA, 2007).

In order to ensure that a broad range of mitigation actions were considered for the Mitigation Strategy, the Larimer County Hazard Mitigation Large Planning Team analyzed a comprehensive range of specific mitigation actions for each hazard after the risk assessment was complete. This helped to ensure that there was sufficient span and creativity in the mitigation actions considered.

There are six categories of mitigation actions which Larimer County considered in developing its Mitigation Strategy. Those categories include:

- **Prevention**: Government administrative or regulatory actions or processes that influence the way land and buildings are developed and built. These actions also include public activities to reduce hazard losses. Examples include planning, zoning, building codes, subdivision regulations, hazard specific regulations (such as floodplain regulations), capital improvement programs, and open-space preservation and stormwater regulations.
- **Property Protection**: Actions that involve modifying or removing existing buildings or infrastructure to protect them from a hazard. Examples include the acquisition, elevation and relocation of structures, structural retrofits, flood-proofing, storm shutters, and shatter resistant glass. This category also includes insurance.
- **Public Education and Awareness:** Actions to inform and educate citizens, elected officials, and property owners about potential risks from hazards and potential ways to mitigate them. Such actions include hazard mapping, outreach projects, library materials dissemination, real estate disclosures, the creation of hazard information centers, and school age / adult education programs.
- **Natural Resource Protection**: Actions that in addition to minimizing hazard losses also preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, forest and vegetation management, wetlands restoration or preservation, slope stabilization, and historic property and archeological site preservation.
- **Structural Project Implementation**: Mitigation projects intended to lessen the impact of a hazard by using structures to modify the environment. Structures include stormwater controls (culverts); dams, dikes, and levees; and safe rooms.
- **Emergency Services**: Actions that typically are not considered mitigation techniques but reduce the impacts of a hazard event on people and property. These actions are often taken prior to,

during, or in response to an emergency or disaster. Examples include warning systems, evacuation planning and management, emergency response training and exercises, and emergency flood protection procedures.

6.2 Goals and Objectives Summary

The following table provides an update summary of the goals identified within the 2010 Northern Colorado Regional Hazard Mitigation Plan and of how they were incorporated into the 2016 Larimer County Multi-Jurisdictional Hazard Mitigation Plan.

Table 50. Goals – 2010 Northern Colorado Regional Hazard Mitigation Plan

Goal	Goal	Continue	Change	Delete
1	Protect Life and Property		**X**	
2	Improve Public Awareness		**X**	
3	Strengthen Partnerships and Promote Plan Implementation			**X**
4	Improve Emergency Services Response Plans		**X**	

Mitigation Goals are general guidelines that explain what a community wants to achieve with their local hazard mitigation plan. Goals are overarching targets and describe the ideal long-term outcomes envisioned by the community. For the 2016 Plan, Larimer County and the local jurisdictions participating in the hazard mitigation plan update identified the following five mitigation goals as the foundation of their local mitigation strategies:

- **GOAL 1:** Protect people, property, and natural resources
- **GOAL 2:** Improve capability to reduce disaster losses
- **GOAL 3:** Strengthen communication and coordination among public agencies, non-governmental organizations, businesses, and citizens
- **GOAL 4:** Increase public awareness of natural hazards and mitigation options
- **GOAL 5:** Integrate hazard mitigation into other planning mechanisms

More specific than Goals, Mitigation Objectives are the fundamental strategies prescribed by the Plan to achieve the identified Goals. In other words, Objectives describe the "how" of the mitigation strategy. In the 2016 Plan, Larimer County and the local jurisdictions participating in the hazard mitigation plan update identified the following five mitigation objectives:

- **OBJECTIVE 1:** Continue to develop and expand public awareness and information programs
- **OBJECTIVE 2:** Enhance training for hazard prevention and mitigation options

- **OBJECTIVE 3:** Incorporate risk reduction principles into policy documents and initiatives, as well as other institutional plans
- **OBJECTIVE 4:** Continue to collaborate with area partners through mutual aid agreements and long-term planning efforts
- **OBJECTIVE 5:** Reduce the vulnerability of local assets to the impacts of hazards.

In order to maintain continuity within the local mitigation strategy, each mitigation objective is associated with one or more mitigation goals (as is shown in the following table). This helps communities stay on track during the development of the mitigation strategy and focus their planning efforts around clear priorities. Together, the goals and objectives identified during the Larimer County mitigation strategy meeting, and refined over the course of the planning process, established the scope and focus of the proposed mitigation actions outlined in this Plan.

The following table provides a summary of the updated and/or revised mitigation goals for the 2016 Plan. It also outlines the planning objectives identified by the HM LPT for each goal and identifies whether the Goal is new to Larimer County or was previously identified in the 2010 Northern Colorado Regional Hazard Mitigation Plan.

Table 51. 2016 Larimer County Mitigation Strategy – Updated Goals and Objectives

Goal	Objective	New
GOAL 1: Protect people, property, and natural resources	1. Continue to develop and expand community preparedness education and resilience programs.	
	2. Enhance training for hazard prevention and mitigation options.	
	3. Incorporate risk reduction principles into policy documents and initiatives, as well as other institutional plans.	
	4. Continue to collaborate with area partners through mutual aid agreements and long-term planning efforts.	
	5. Reduce the vulnerability of local assets to the impacts of hazards.	
GOAL 2: Improve capability to reduce disaster losses	1. Continue to develop and expand community preparedness education and resilience programs.	X
	2. Enhance training for hazard prevention and mitigation options.	
	3. Incorporate risk reduction principles into policy documents and initiatives, as well as other institutional plans.	
	4. Continue to collaborate with area partners through mutual aid agreements and long-term planning efforts.	

Goal	Objective	New
	5. Reduce the vulnerability of local assets to the impacts of hazards.	
GOAL 3: Strengthen communication and coordination among public agencies, non-governmental organizations, businesses, and citizens	1. Continue to develop and expand community preparedness education and resilience programs.	X
	2. Enhance training for hazard prevention and mitigation options.	
GOAL 4: Increase public awareness of natural hazards and mitigation options	1. Continue to develop and expand community preparedness education and resilience programs.	
	2. Enhance training for hazard prevention and mitigation options.	
	3. Incorporate risk reduction principles into policy documents and initiatives, as well as other institutional plans.	
	4. Continue to collaborate with area partners through mutual aid agreements and long-term planning efforts.	
	5. Reduce the vulnerability of local assets to the impacts of hazards.	
GOAL 5: Integrate hazard mitigation into other planning mechanisms	3. Incorporate risk reduction principles into policy documents and initiatives, as well as other institutional plans.	X
	4. Continue to collaborate with area partners through mutual aid agreements and long-term planning efforts.	
	5. Reduce the vulnerability of local assets to the impacts of hazards.	

6.3 2010 Hazard Mitigation Plan Action Report

The Larimer County HM LPT reviewed the mitigation actions included in the 2010 Northern Colorado Regional Hazard Mitigation Plan that were specific to Larimer County and its participating jurisdictions. Based on a thorough action review and feedback process with the six 2010 participating communities – Larimer County, Loveland, Fort Collins, Estes Park, Wellington, and Berthoud – the project team developed a tracking matrix of action progress since the 2010 Northern Colorado Regional Hazard Mitigation Plan. Each of the six "legacy" communities reviewed the matrix before they began developing new and updated mitigation actions for the 2016 plan. The matrix is included in Appendix E.

6.4 2016 Hazard Mitigation Plan Action Report

The final, and arguably the most important step in updating the Mitigation Strategy was the creation of new Mitigation Actions. In preparing their Mitigation Actions, the County and each participating jurisdiction considered the 2016 planning goals and their individual hazard risks, priorities, and capabilities to mitigate identified hazards. The mitigation actions below represent the key outcome of the mitigation planning process.

As detailed above, members of the HM LPT referred to STAPLEE to assist with the prioritization of their actions. All actions are tied to specific goals and objectives to ensure alignment with the Plan's overall mitigation strategy. The following Mitigation Action Guides describe the newly identified mitigation actions for Larimer County. The 2016 actions for each of the participating jurisdictions are included in the community profiles.

<table>
<tr><td colspan="2">Larimer County: Larimer Connects Project (Larimer – 1)</td></tr>
<tr><td>PRIORITY: 1</td><td>HAZARDS ADDRESSED: Drought, Earthquake, Land Subsidence, Extreme Temperatures, Flood, Severe Storm, Wind & Tornado, Fire, Public Health, Hazmat</td></tr>
<tr><td>LOCATION: All of Larimer County</td><td>GOALS ADDRESSED: Goals 1-5</td></tr>
<tr><td>RECOMMENDATION DATE: 10/18/2015</td><td>OBJECTIVES ADDRESSED: Objectives A, B, D and E</td></tr>
<tr><td>TARGET COMPLETION DATE: 12/31/2017</td><td></td></tr>
<tr><td colspan="2">ISSUE: Community Outreach regarding mitigation measures is currently lacking.</td></tr>
<tr><td colspan="2">RECOMMENDATION: The purpose of this project is to build community connections – within communities, between communities and the connections that reach past communities into formal structures (municipalities, special districts, counties, region, and state).</td></tr>
<tr><td colspan="2">ACTION: Larimer Connects Community Outreach includes the development of community connections through coursework, education and outreach throughout all of Larimer County to increase overall community knowledge, education, and readiness leading to a culture of community resilience at the lost local level. The project components involve three phases: 1) community assessment and identification of resources, 2) synthesis of available data, and 3) implementation of the program.</td></tr>
<tr><td>LEAD AGENCY: Larimer County, Office of Emergency Management</td><td>EXPECTED COST: $400,000</td></tr>
<tr><td>SUPPORT AGENCIES: All municipal and other emergency management partners in the county, Fire Chiefs, EMS Chiefs, Law Enforcement personnel, and community members</td><td>POTENTIAL FUNDING SOURCES: The Board of Commissioners has approved $100,000 for the initial study.</td></tr>
<tr><td colspan="2">PROGRESS MILESTONES: The objectives of this project include:
– Bringing greater awareness to community members about the hazards in their area
– Building community from the ground up by strengthening connections and partnerships
– Creating custom programs for each individual community to enhance knowledge, skills and abilities to solve problems and effectively move through the disaster environment
– Changing the culture of Larimer County to ensure future generations are more equipped to respond and recover from disasters
Efforts Underway</td></tr>
</table>

- Unmet Needs and Community Fragility Study to determine the current state of each individual community

Future Milestones

- Assessment and Identification of Resources – Completion of the Unmet Needs and Community Fragility Study
- Analysis and Synthesis of Data – accumulate all available date, along with available reports and studies, and analyze the information to determine the best outreach approach for individual communities
- Bullseye Approach – Larimer seeks to first reach the individual, then the family, neighborhood, community and finally the networks of communities to build a culture of resilience in the county
- Implementation – Consists of four parts
  - Identify of pilot communities to formalize the program
  - Develop expanded educational modules – multi-sector, resilience, fragility
  - Create online learning modules and tools
  - Conduct a community competition

Larimer County: Emergency Preparedness Public Education/Outreach (Larimer – 2)	
PRIORITY: 2	HAZARDS ADDRESSED: Public Health
LOCATION: County-wide	GOALS ADDRESSED: 1
RECOMMENDATION DATE: 10/21/2015	OBJECTIVES ADDRESSED: A
TARGET COMPLETION DATE: Ongoing	
ISSUE: During the recent wildfire and flood events, many residents, especially in mountain areas, were not prepared to evacuate or to shelter-in-place. Many ran out of water, medicines, diapers, etc., in two or three days and expected government to provide resources for them. Some refused to leave their homes because they had no plans for dealing with pets or livestock.	
RECOMMENDATION: Continue public education/outreach, especially in mountainous areas, encouraging residents to develop Family Disaster Plans and assemble an Emergency Kit.	
ACTION: Continue to post information on Health Department website. Attend safety and health fairs. Develop displays/educational materials and create opportunities to present information to mountain locations.	
LEAD AGENCY: Larimer County Department of Health and Environment	EXPECTED COST: $50,000 + .20 FTE
SUPPORT AGENCIES: Larimer County Office of Emergency Management, CDPHE, CDC	POTENTIAL FUNDING SOURCES: Emergency Preparedness and Response grant

PROGRESS MILESTONES:

- Developing new emergency preparedness display
- Developing new educational materials and continuing to update website
- Engaging in outreach opportunities

Larimer County: Wildfire Education and Outreach (Larimer – 3)	
PRIORITY: 3	HAZARDS ADDRESSED: Extreme Temperatures and Fire
LOCATION: Larimer County WUI	GOALS ADDRESSED: Goals 1, 2, 3 and 4
RECOMMENDATION DATE:10/18/2015	OBJECTIVES ADDRESSED: Objectives A, B, D and E
TARGET COMPLETION DATE:12/31/2018	
ISSUE: Climate change, increased population and hazard complexity is all leading to increased risk to community members from wildfire	
RECOMMENDATION: Coordinate wildfire education and outreach programs amongst all partners in the county	
ACTION: Development of a coordinated wildfire education and outreach program with multiple wildfire and natural lands partners	
LEAD AGENCY: Larimer County Office of Emergency Management	EXPECTED COST: $100,000
SUPPORT AGENCIES: Larimer County Sheriff's Office, Larimer County Building Department, municipal emergency management agencies, CSFS, USFS, Rocky Mountain National Park, VOAD Agencies	POTENTIAL FUNDING SOURCES: county resources
PROGRESS MILESTONES: – Engage with key partners who provide outreach to Larimer County residents regarding wildfire risk and mitigation – Determine common goals and coordinate actions – Develop an education and outreach program specific to wildfire risk in Larimer County	

Coalition for the Poudre River Watershed: Forest Resilience and fuels reduction (Larimer – 4)	
PRIORITY: 4	HAZARDS ADDRESSED: Flood, Fire
LOCATION: High Park Fire Burn Area	GOALS ADDRESSED: 1, 3
RECOMMENDATION DATE: 10/27/2015	OBJECTIVES ADDRESSED: D, E
TARGET COMPLETION DATE: 06/2017	
ISSUE: Reducing high fuel loads in critical forested catchments in the Cache La Poudre by integrating volunteers with professional sawyers.	
RECOMMENDATION: Collaborative planning and implementation of forest resilience/fuels reductions projects to reduce the negative impacts of wildfires. .	
ACTION: This project involves training Youth Corps and volunteers to be certified sawyers to work alongside professional sawyers to thin forests and reduce fuel loads in high priority areas of the watershed. We began our project in the North Fork of the Poudre at the Boy Scout Ranch near Red Feather Lakes.	
LEAD AGENCY: CPRW	EXPECTED COST: ~$100,000.
SUPPORT AGENCIES: The Nature Conservancy, Wildlands Restoration Volunteers, CSFS, NRCS, Larimer County Conservation Corps, and Boy Scout Ranch	POTENTIAL FUNDING SOURCES: City of Fort Collins, CSFS, Patagonia, New Belgium Brewing, and Dept Natural Resources.

PROGRESS MILESTONES: In 2015, our partners treated ~30 acres of land at the Boy Scout Ranch and will continue to treat an additional 30 – 50 acres by 2017. Thinned forest materials will be re-used at a different habitat restoration site or used by a local timber company.

Larimer County: Flood Risk Velocity and Depth Criteria Project (Larimer – 5)	
PRIORITY: 5	HAZARDS ADDRESSED: Land Subsidence, Flood, Severe Storm and Fire
LOCATION: Big Thompson, Little Thompson and Cache la Poudre Watersheds	GOALS ADDRESSED: Goals 1, 2, 3, 4, and 5
RECOMMENDATION DATE:10/18/2015	OBJECTIVES ADDRESSED: Objectives A, B, C, D, and E
TARGET COMPLETION DATE: 12/31/2017	
ISSUE: The topography of Larimer County leads to varying degrees of risk depending upon the floodplain location	
RECOMMENDATION: Analyze waterflow depth and velocity to determine if floodplain regulations should be changed to account for varying conditions	
ACTION: Develop velocity and depth criteria for all floodplains in Larimer County and incorporate criteria into floodplain regulations	
LEAD AGENCY: Larimer County Engineering Department	EXPECTED COST: $75,000 for initial pilot project, $250,000 for extensive study
SUPPORT AGENCIES: Larimer County Community Development Division and Office of Emergency Management	POTENTIAL FUNDING SOURCES: county resources for pilot project.
PROGRESS MILESTONES: – Determine specific areas to conduct a pilot for the velocity and depth criteria and its relevance to current floodplain regulations – Develop a Request for Proposal with a clear scope of work for the development of the criteria – Award a vendor – Analyze the results of the pilot project and make changes as needed for criteria accuracy – Implement the criteria countywide – Update floodplain regulations with new criteria	

Larimer County: Flood and Fire Recovery Mitigation Activities (Larimer – 6)	
PRIORITY: 6	HAZARDS ADDRESSED: Flood, Severe Storm, and Fire
LOCATION: 2013 Flood Impacted Areas	GOALS ADDRESSED: Goals 1, 2, and 5
RECOMMENDATION DATE: 10/18/2015	OBJECTIVES ADDRESSED: Objectives B, C, and E
TARGET COMPLETION DATE: 12/31/2018	

ISSUE: Larimer County continues to move through the recovery from the 2012 High Park Wildfire and the 2013 Flood. Many projects remain unfinished, allowing the county to look at mitigation opportunities for the future.	
RECOMMENDATION: Assess all unfinished recovery projects for possible mitigation opportunities and implement alternatives when appropriate	
ACTION: Include mitigation alternatives in flood and fire recovery efforts whenever possible	
LEAD AGENCY: Larimer County Engineering Department and Community Development	EXPECTED COST: Cost will depend upon each specific recovery project
SUPPORT AGENCIES: Larimer County Public Works Division, Community Development Division and Office of Emergency Management	POTENTIAL FUNDING SOURCES: FEMA Public Assistance funding, HMGP funding, county resources
PROGRESS MILESTONES: – Assess all unfinished flood and fire recovery projects for mitigation alternatives – Incorporate mitigation actions into FEMA Public Assistance recovery projects when possible and allowable – Continue county home acquisition program for homes destroyed in the floodway – Work with CDOT and FHWA on joint projects where mitigation opportunities are warranted – Incorporate mitigation actions into future county efforts and infrastructure upgrades	

Larimer County: Rainfall and Stream Gauge Monitoring System (Larimer – 7)	
PRIORITY: 7	HAZARDS ADDRESSED: Land Subsidence, Flood, Severe Storm, Wildfire
LOCATION: Larimer County Watersheds	GOALS ADDRESSED: Goals 1-4
RECOMMENDATION DATE: 10/15/2015	OBJECTIVES ADDRESSED: Objective E
TARGET COMPLETION DATE: 12/31/2017	
ISSUE: Rainfall and stream gauges exist on a small section of the county's watersheds and many of these gauges were damaged or destroyed during the 2013 Flood.	
RECOMMENDATION: Install rainfall and stream gauges throughout Larimer County's major watersheds, including the Big Thompson River, Little Thompson River and the Cache la Poudre River and connect all with a monitoring system that can provide real-time data and early warning to citizens and emergency responders.	
ACTION: Install rainfall and stream gauge monitoring hardware and software in major watersheds throughout Larimer County.	
LEAD AGENCY: Larimer County Engineering Department	EXPECTED COST: $300,000
SUPPORT AGENCIES: Larimer County Community Development Division and Office of Emergency Management	POTENTIAL FUNDING SOURCES: 2015 HMGP grant funding for partial implementation, county funding
PROGRESS MILESTONES: – Determine the number and location of each rainfall / stream gauge necessary to provide full and accurate coverage of waterways – Develop a Request for Proposal with a clear scope of work for the installation of the gauges and the implementation of the project – Award a vendor – Implement the system and test it to ensure functionality – Train and educate county staff on the system at least annually	

Larimer County: High Water Mark Initiative Project (Larimer – 8)	
PRIORITY: 8	HAZARDS ADDRESSED: Flooding
LOCATION: 2013 Flood Locations	GOALS ADDRESSED: Goals 1, 2, and 4
RECOMMENDATION DATE: 10/18/2015	OBJECTIVES ADDRESSED: Objectives A, C, and E
TARGET COMPLETION DATE:12/31/2016	
ISSUE: The 2013 Flood brought to light the dangers of flash flooding from heavy rainfall events in the county. Over time, the lessons learned will be forgotten leading to ongoing danger from future events.	
RECOMMENDATION: Join FEMA's High Water Mark Initiative and Install high water placards along the Big and Little Thompson Rivers in flood-impacted areas to educate and inform community members about the risk from flooding.	
ACTION: Purchase and install 2013 Flood High Water Mark placards	
LEAD AGENCY: Larimer County, Office of Emergency Management	EXPECTED COST: $10,000
SUPPORT AGENCIES: City of Fort Collins, City of Loveland, Town of Berthoud, Town of Estes Park, Fire Districts, Water Districts	POTENTIAL FUNDING SOURCES: Community organizations, county funding
PROGRESS MILESTONES: – Join the High Water Mark Initiative through FEMA – Coordinate the HWM Launch Event and HWM Sign Design, production and placement – Post HWM signs in high profile locations throughout flood impacted areas	

Coalition for the Poudre River Watershed: Post Fire Restoration (Larimer – 9)	
PRIORITY: 9	HAZARDS ADDRESSED: Fire and Flood
LOCATION: High Park Fire Burn Area	GOALS ADDRESSED: 1 and 3
RECOMMENDATION DATE: 10/27/2015	OBJECTIVES ADDRESSED: D and E
TARGET COMPLETION DATE: 06/2017	
ISSUE: Post-fire erosion, debris flows, and flooding that affects water quality and increases risk to life and safety	
RECOMMENDATION: Collaborative planning and implementation of post-fire restoration projects to control hillslope and channel erosion.	
ACTION: Identifying which areas of the burn area are still at risk of degrading water quality and threatening life and property and then designing on the ground restoration treatments that help reduce erosion and stabilize channels, and reduce runoff volumes.	
LEAD AGENCY: CPRW	EXPECTED COST: $300-$500k (difficult to estimate as we are mid-stream for both planning and implementation)
SUPPORT AGENCIES: USFS, Wildlands Restoration Volunteers, CSFS, NRCS, local cities, Larimer County, Trout Unlimited and several other stakeholders	POTENTIAL FUNDING SOURCES: Local water utilities, EPA, HUD, CWCB

PROGRESS MILESTONES: Major project milestones and reporting of current project status

In addition to adding ~300 acres of post fire restoration from 2012 – 2013, we have begun implementation on a significant channel restoration project in Skin Gulch in 2015 and are planning other post-fire restoration efforts in Seaman Reservoir (Helwett Gulch Fire) and planning for other post fire restoration needs that are remaining in the burn area. We aim to finish that planning by January with an aim to begin implementation of any identified projects in mid-2016.

Larimer County: Full Adoption of **Updated** FEMA Floodplains (Larimer – 10)	
PRIORITY: 10	HAZARDS ADDRESSED: Flood
LOCATION: All of Larimer County	GOALS ADDRESSED: Goals 1, 2, 3, 4, and 5
RECOMMENDATION DATE: 10/18/2015	OBJECTIVES ADDRESSED: Objectives A, B, C, D and E
TARGET COMPLETION DATE: 12/31/2020	
ISSUE: Floodplain mapping is out of date and the 2013 Flood caused extensive changes to current floodplains	
RECOMMENDATION: Work with FEMA on updating current floodplain mapping throughout Larimer County	
ACTION: By 2020, all Larimer County watersheds will be mapped and adopted by FEMA	
LEAD AGENCY: Larimer County Engineering Department	EXPECTED COST: $300,000
SUPPORT AGENCIES: Larimer County Community Development and Office of Emergency Management	POTENTIAL FUNDING SOURCES: Colorado State Flood Hazard Mapping Project
PROGRESS MILESTONES: – **Identification of floodplain reaches that need to be updated.** – **Preliminary Floodplain Studies Completed** – **Flood Review Board Review and Recommendation** – **Community Outreach** – **Formal adoption process through FEMA**	

Larimer County: Bridge Improvement Project (Larimer – 11)	
PRIORITY: 11	HAZARDS ADDRESSED: Earthquake, Flood, Severe Storm, and Fire
LOCATION: All of Larimer County	GOALS ADDRESSED: Goals 1, 2 and 5
RECOMMENDATION DATE: 10/18/2015	OBJECTIVES ADDRESSED: Objectives C and E
TARGET COMPLETION DATE: 12/31/2020	

ISSUE: The 2012 High Park Wildfire and the 2013 Flood caused the Public Works Division to delay necessary bridge improvements due to the wide scale destruction of roads and bridges throughout Larimer County, therefore structurally deficient bridges exist that must be replaced.	
RECOMMENDATION: Assess and replace all structurally deficient bridges in Larimer County	
ACTION: In accordance with the Larimer Strategic Plan, replace all structurally deficient bridges in Larimer County by 2020	
LEAD AGENCY: Larimer County Engineering Department	EXPECTED COST: Dependent upon the project location and structure
SUPPORT AGENCIES: Larimer County Public Works Division	POTENTIAL FUNDING SOURCES: county resources
PROGRESS MILESTONES: – Complete the assessment of all bridges in Larimer County to determine status – Prioritize bridge projects based upon need and condition – Implement bridge improvements as funding allows	

Larimer County: Hydrology Analysis and Infrastructure Upgrades (Larimer – 12)	
PRIORITY: 12	PRIORITY: 12
LOCATION: Project location	LOCATION: Project location
RECOMMENDATION DATE: 10/18/2015	RECOMMENDATION DATE: 10/18/2015
TARGET COMPLETION DATE: 12/31/2020	TARGET COMPLETION DATE: 12/31/2020
ISSUE: New hydrology is available since the 2013 Flood, illustrating undersized bridges and crossings leading to inadequate flow capacity	
RECOMMENDATION: Analyze new hydrology and determine areas where improvements to structures are needed	
ACTION: Analyze need for bridge and crossing improvements and pursue funding for replacement structures.	
LEAD AGENCY: Larimer County Engineering Department	LEAD AGENCY: Larimer County Engineering Department
SUPPORT AGENCIES: Larimer County Public Works Division	SUPPORT AGENCIES: Larimer County Public Works Division
PROGRESS MILESTONES: – Collect all new hydrology from the 2013 Flood – Analyze data to determine undersized crossings and bridges leading to low capacity – Develop long-term planning to replace or improve each site to improve capacity – Seek funding opportunities for specific projects	

Larimer County: Long-Range Community Planning (Larimer – 13)	
PRIORITY: 13	HAZARDS ADDRESSED: Drought, Earthquake, Land Subsidence, Extreme Temperatures, Flood, Severe Storm, Wind & Tornado, Fire, Public Health, Hazmat
LOCATION: Western Larimer County (Unincorporated area from the eastern extent of the Front Range west to the Larimer County line)	GOALS ADDRESSED: Goals 1,2,3 and 5

RECOMMENDATION DATE: 10/18/2015	OBJECTIVES ADDRESSED: Objectives C and E
TARGET COMPLETION DATE: 12/31/2017	
ISSUE: A multitude of planning and recovery planning efforts are underway, and while each individual effort is needed, there is no unified plan for the area.	
RECOMMENDATION: The recommendation is to bring together all watershed coalition, governmental and non-governmental plans into one unified planning effort.	
ACTION: The purpose of this mitigation action is to develop a long range plan for the area affected by the 2012 High Park Wildfire and 2013 Flood, plus other areas susceptible to natural hazards.	
LEAD AGENCY: Larimer County, Community Development Division	EXPECTED COST: $350,000
SUPPORT AGENCIES: Watershed Coalitions, Big Thompson Conservation District, Long-Term Recovery Group, Fire Districts, USFS, CSFS, Rocky Mountain National Park	POTENTIAL FUNDING SOURCES: CDBG-DR Funding through the Department of Local Affairs
PROGRESS MILESTONES: – Coordinate with all stakeholders to incorporate the coalition master plans into the future planning process – Coordinate with incorporated cities and towns – Coordinate with all districts, state landholders, and federal landholders – Identify all other plans (transportation, open lands, trails, hazards, river coalitions, etc.) for inclusion in the final long-range plan – Develop needed planning – Utilize community outreach for citizen input to the plan	

Larimer County: Mitigation Code Changes (Larimer – 14)	
PRIORITY: 14	HAZARDS ADDRESSED: Drought, Earthquake, Land Subsidence, Extreme Temperatures, Flood, Severe Storm, Wind & Tornado, Fire, Public Health, Hazmat
LOCATION: All of Larimer County	GOALS ADDRESSED: Goals 1, 2, 4, and 5
RECOMMENDATION DATE: 6/1/2015	OBJECTIVES ADDRESSED: Objectives B, C, and E
TARGET COMPLETION DATE:12/31/2016	
ISSUE: Recent large-scale disasters have caused Larimer County to re-evaluate all Land Use, Wildfire and Building codes for possible mitigation actions	
RECOMMENDATION: Provide recommendations for code changes to the Land Use, Wildfire and Building Codes for reducing losses and mitigating risk	
ACTION: Update Larimer County Land Use, Wildfire and Building Codes with recommendations approved by the Board of Commissioners, Planning Commission and Flood Review Board to decrease future risk and disaster losses.	
LEAD AGENCY: Larimer County, Building Department	EXPECTED COST: $0
SUPPORT AGENCIES: Office of Emergency Management, Community Development Division	POTENTIAL FUNDING SOURCES: County staff time

PROGRESS MILESTONES:

- Develop a review team to go over all codes and provide suggested changes
- Participate in the Colorado State DOLA Mitigation Advisory Group
- Compile all recommended changes and present to the Board of Commissioners for consideration
- Make changes as appropriate and finalize recommended actions
- Participate in the code revision process, including public meetings and review by the Planning Commission and Flood Review Board

Larimer County: Maintain adequate public health monitoring, surveillance, response capabilities (Larimer – 15)	
PRIORITY: 15	HAZARDS ADDRESSED: Public Health
LOCATION: County-wide	GOALS ADDRESSED: 1
RECOMMENDATION DATE: 10/21/2015	OBJECTIVES ADDRESSED: E
TARGET COMPLETION DATE: Ongoing	
ISSUE: Larimer County is vulnerable to a wide variety of public health threats, including disease epidemics and exposure to chemical, biological or radiological agents.	
RECOMMENDATION: Continue to ensure that adequate resources are in place to monitor public health threats and take the necessary steps to prevent or limit the scope and magnitude of threats that could escalate into public health emergencies.	
ACTION: Continue to monitor disease outbreaks and remain prepared to provide safe and rapid prophylaxis of residents during large-scale events through the SNS program. Maintain capability to identify and respond to chemical, biological or radiological incidents. Maintain systems for education, notification, and communication with partners.	
LEAD AGENCY: Larimer County Department of Health and Environment	EXPECTED COST: Unknown
SUPPORT AGENCIES: Larimer County Department of Emergency Management, CDPHE, CDC, local hospitals and other healthcare providers, Larimer County Emergency Healthcare Coalition.	POTENTIAL FUNDING SOURCES: Emergency Preparedness and Response grant, other grant and general fund monies.
PROGRESS MILESTONES: - Identifying and responding to community disease outbreaks, as needed. - Continuing to provide routine vaccinations and immunizations. - Issuing Health Alerts and other notifications, as needed	

Larimer County: Box Elder Stormwater and Drainage Master Plan Implementation (Larimer – 16)	
PRIORITY: 16	HAZARDS ADDRESSED: Land Subsidence, Flood and Severe Storm

LOCATION: Larimer County	GOALS ADDRESSED: Goals 1, 2, and 3
RECOMMENDATION DATE: 10/18/2015	OBJECTIVES ADDRESSED: Objectives C, D and E
TARGET COMPLETION DATE: 12/31/2020	
ISSUE: The Box Elder Stormwater and Drainage Master Plan has been established and needs to be implemented. The Box Elder Basin Regional Stormwater Authority has begun the regional portions of the project. The Larimer County portion of the master plan will follow.	
RECOMMENDATION: Implement the Larimer County portions of the master plan	
ACTION: Larimer County will need to upgrade infrastructure to fully implement the master plan, including increasing flow capacity at county crossings.	
LEAD AGENCY: Larimer County Engineering Department	EXPECTED COST: $5.3 million in county resources and another $14 million from the authority
SUPPORT AGENCIES: Larimer County Community Development Division	POTENTIAL FUNDING SOURCES: Larimer County and authority resources
PROGRESS MILESTONES: – Complete the Regional part of the master plan – Establish funding for county projects – Determine the engineering and design for each phase – Construction of new infrastructure to support the master plan	

Larimer County: Transportation Master Plan Update (Larimer – 17)	
PRIORITY: 17	HAZARDS ADDRESSED: Earthquake, Land Subsidence, Flood, Severe Storm, Fire
LOCATION: All of Larimer County	GOALS ADDRESSED: Goals 1, 2, 3, and 5
RECOMMENDATION DATE: 10/18/2015	OBJECTIVES ADDRESSED: Objectives C, D and E
TARGET COMPLETION DATE: 9/1/2016	
ISSUE: The current Transportation Master Plan is out of date	
RECOMMENDATION: Update the master plan to ensure existing conditions are addressed	
ACTION: Review and update the Transportation Master Plan	
LEAD AGENCY: Larimer County Public Works Division	EXPECTED COST: $85,000 for capital expansion fee
SUPPORT AGENCIES: Larimer County Engineering Department	POTENTIAL FUNDING SOURCES: county resources
PROGRESS MILESTONES: – Update the Capital Expansion Fee Program – Update the Transportation Master Plan (County staff) – Follow the county public input process for plan approval – Adoption of the plan – Implementation projects	

Larimer County: Risk Assessment Program (Larimer – 18)	
PRIORITY: 18	HAZARDS ADDRESSED: Civil Disturbance and Hazmat
LOCATION: All of Larimer County	GOALS ADDRESSED: Goals 1, 2, 3 and 5
RECOMMENDATION DATE: 10/18/2015	OBJECTIVES ADDRESSED: Objectives B, C, D and E
TARGET COMPLETION DATE: 12/31/2017	
ISSUE: Increasing population throughout Larimer County has led to more industry and larger employers, increasing the potential for a large-scale human-caused incident in the county.	

RECOMMENDATION: Develop a risk assessment program for large businesses, hazardous materials fixed facilities, schools, and industry to develop awareness, decrease risk and improve response protocols	
ACTION: Develop a risk assessment program for large businesses, hazardous materials fixed facilities, schools, and industry to develop awareness, decrease risk and improve response protocols	
LEAD AGENCY: Larimer County Office of Emergency Management	EXPECTED COST: $0
SUPPORT AGENCIES: All Larimer County Emergency Management partners	POTENTIAL FUNDING SOURCES: staff time only
PROGRESS MILESTONES: – Seek support from emergency management partners for the development of a risk assessment program – Determine team members for risk assessment team – Train personnel on the Statewide IP Gateway risk assessment software program – Determine roles and responsibilities of risk assessment team members – Create risk assessment forms and reports – Seek out pilot locations to test the program – Conduct pilot assessments and refine and finalize process	

Big Thompson Watershed Coalition: River Restoration Projects (Larimer – 19)	
PRIORITY: 19	HAZARDS ADDRESSED: Flood
LOCATION: Big Thompson River Corridor	GOALS ADDRESSED: 1) Protect people, property and natural resources; 2) Improve capability to reduce disaster losses; 3) Strengthen Communication & coordination among public agencies, non-governmental organizations, etc.
RECOMMENDATION DATE:	OBJECTIVES ADDRESSED: 1) Incorporate risk reduction principles into policy documents & initiatives & plans; 2) Continue to collaborate with area partners through long-term planning efforts; 3) Reduce vulnerability of local assets to impact of hazards
TARGET COMPLETION DATE:	6/1/2020
ISSUE: The floods of 2013 caused significant loss of property within the Big Thompson River Corridor. The Big Thompson Watershed Coalition seeks to implement resilient river restoration throughout the watershed to mitigate the extent of severe damage in the next high water event. Using the Master Plan developed in 2015 as a guiding document, the Coalition seeks to plan and implement restoration projects in strong collaboration with other corridor projects planned by other agencies and organizations in an effort to minimize duplication of efforts and leverage funding; updating the master plan throughout the process; Approximately 50% of the guidelines described in the Master Plan, and to keep the plan updated as projects are put in place.	
RECOMMENDATION: Build on the high level resilient restoration guidelines outlined in the Master Plan to design and implement river restoration projects.	
ACTION: Resilient restoration techniques which focus on holistic watershed health, including stabilizing river channel and banks, considering how infrastructure is located in the floodplain; creating and improving aquatic and riparian habitat.	
LEAD AGENCY: Big Thompson Watershed Coalition	EXPECTED COST: approximately $10 – 50 million

SUPPORT AGENCIES: CDOT, NRCS, Colorado Water Conservation Board, CDBG, Larimer County, Colorado Parks and Wildlife; Trout Unlimited, Wildland Restoration Volunteers;	POTENTIAL FUNDING SOURCES: CWCB, CDBG, NRCS , matching funds through non-profit and other foundation grant programs
PROGRESS MILESTONES: 1) Annual Master Plan Updates ; 2)Detailed resilient restoration design for approximately 20 river reaches in collaboration with supporting agencies; 3) Complete design and implement on the ground projects for approximately 20 river reaches in collaboration with supporting agencies; 4) Provide Larimer County and supporting agencies quarterly and annual updates on project progress.	

Larimer County: River Restoration and Mitigation Projects (Larimer – 20)	
PRIORITY: 20	HAZARDS ADDRESSED: Flood
LOCATION: Big Thompson River Corridor	GOALS ADDRESSED: 1, 2 and 3
RECOMMENDATION DATE: 10/30/2015	OBJECTIVES ADDRESSED: 1, 2 and 3
TARGET COMPLETION DATE: 6/1/2020	
ISSUE: After the High Park Wildfire in 2012 and the floods of 2013, there was significant loss of property within all three of our major watersheds in Larimer County. Several citizen-led coalitions were established after these events for planning and implementation of projects to restore these watersheds.	
RECOMMENDATION: The county seeks to partner with all of the coalitions in Larimer County to restore the watersheds and mitigate against future risk.	
ACTION: Resilient restoration techniques which focus on holistic watershed health, including stabilizing river channel and banks, considering how infrastructure is located in the floodplain; creating and improving aquatic and riparian habitat.	
LEAD AGENCY: Larimer County	EXPECTED COST: Project specific. Total restoration and mitigation would be over $20 million
SUPPORT AGENCIES: Big Thompson Watershed Coalition, Coalition for the Poudre River Watershed, Estes Valley Watershed Coalition, Little Thompson Watershed Coalition, CDOT, NRCS, Colorado Water Conservation Board, CDBG, Colorado Parks and Wildlife; Trout Unlimited, Wildland Restoration Volunteers; USFS, CSFS	POTENTIAL FUNDING SOURCES: CWCB, CDBG, NRCS, Larimer County, and matching funds through non-profit and other foundation grant programs
PROGRESS MILESTONES: 1) Annual Master Plan Updates ; 2)Detailed resilient restoration design for approximately 20 river reaches in collaboration with supporting agencies; 3) Complete design and implement on the ground projects for approximately 20 river reaches in collaboration with supporting agencies; 4) Provide Larimer County and supporting agencies quarterly and annual updates on project progress	

Larimer County: Cotton Willows Subdivision Engineering Study (Larimer – 21)	
PRIORITY: 21	HAZARDS ADDRESSED: Flood
LOCATION: Cotton Willows Subdivision, LaPorte, Larimer County	GOALS ADDRESSED: Goals 1, 2 and 5
RECOMMENDATION DATE: 10/18/2015	OBJECTIVES ADDRESSED: Objectives C, D and E
TARGET COMPLETION DATE: 12/31/2018	
ISSUE: The Cotton Willows Subdivision is a residential subdivision located in the vicinity of LaPorte, Colorado, along the Cache la Poudre River. The subdivision has experienced both drainage and flood issues for many years. Shallow ground water conditions exist and frequently result in either pumping of water from the subdivision or water damage to existing structures. The area is also susceptible to flooding and drainage issues due to spring runoff from the Cache la Poudre each spring. Following the High Park Wildfire, the area's flood issues increased dramatically, leading to extensive sandbag efforts and pumping of water throughout the spring and during the rainy season.	
RECOMMENDATION: Conduct an extensive engineering study in the area in an attempt to identify viable solutions for the subdivision.	
ACTION: Conduct 1) a Groundwater and Drainage Study and 2) a Floodplain Mitigation Study	
LEAD AGENCY: Larimer County Engineering Department	EXPECTED COST: $90,000
SUPPORT AGENCIES: Larimer County Public Works Division, Engineering Department	POTENTIAL FUNDING SOURCES: county resources, grant funding for infrastructure and community development projects
PROGRESS MILESTONES: – Obtain funding for the project – Create a Request for Proposals and Send out to vendors – Choose a consultant to conduct the studies – Finalize the study and analyze the results – Provide recommendations to the Cotton Willows Subdivision on future action	

Larimer County: Vehicle for Severe Storm and Fire Events (Larimer – 22)	
PRIORITY: 22	HAZARDS ADDRESSED: Storm, Fire
LOCATION: Project location	GOALS ADDRESSED: 1, 2, 3.
RECOMMENDATION DATE: 11/01/2015	OBJECTIVES ADDRESSED: E, D
TARGET COMPLETION DATE: 01/01/2019	
ISSUE: In severe weather, particularly snowstorms, there are many miles of public and private roads which will not be cleared. Any emergency response (Law, Fire, EMS) may be delayed for hours or days until roads can be cleared. Many residential roads are not maintained and can be impassable until a contractor can remove snow. Some of these roads are miles long.	
RECOMMENDATION: Obtain a vehicle which is capable of transporting responders and supplies/equipment into a scene, and be capable of removing citizens trapped or in distress when over the road vehicles are not able to make access.	
ACTION: Determine vehicle configurations are adaptable to fire and EMS situations that can travel off-road or over snow-closed road. Obtain trailer for such vehicle, if needed, obtain storage location which will be accessible to Red Feather Lakes Fire Protection Members when roads are impassable. Train members on the use operation, use, and driving. Red Feather Lakes Fire would maintain and repair this vehicle. They would also make other agencies aware of this capability and of its availability for situations in their district. We would also make this available for organizations providing essential services for our area. (REA, Verizon, etc.)	

LEAD AGENCY: Red Feather Lakes Volunteer Fire Department	EXPECTED COST: Enclosed, heated for multiple personnel and supine patients: $110,000.
SUPPORT AGENCIES: Crystal Lakes Fire Protection District, Larimer County SO	POTENTIAL FUNDING SOURCES: Red Feather Lakes Volunteer Fire Department, fund raising, grants.
PROGRESS MILESTONES: 1. Determine design/capacity parameters to include dimensions, weight, ability to be used over a variety or terrain and narrow roads. Ability to respond to multiple types of missions; i.e. EMS, Fire, Rescue. 2. Obtain storage facility meeting objectives above. 3. Select vendor of vehicle and determine cost. 4. Match cost with available funding and apply for grants. 5. Obtain grant and purchase equipment. Install equipment. 6. Extensive training on maintenance and operation of the vehicle for members.	

7 Plan Implementation and Maintenance

Having a solid plan for monitoring, evaluating, and updating the County's mitigation strategy is critical to maintaining its value and success. Ensuring effective implementation of mitigation activities paves the way for continued momentum in the planning process and gives direction for the future. This section explains who will be responsible for maintenance activities and what those responsibilities entail. It also provides a methodology and schedule of maintenance activities including a description of how the public will be involved on a continual basis.

This Chapter discusses how the Larimer County Multi-Jurisdictional Hazard Mitigation Strategy will be implemented and how the overall Hazard Mitigation Plan will be evaluated and enhanced over time. This section also discusses how the public and participating stakeholders will continue to be involved in the hazard mitigation planning process. This chapter consists of the following subsections:

- IMPLEMENTATION ACTION PLAN
- PLAN INTEGRATION, EXISTING CAPABILITIES AND RESOURCES
- FUTURE PLAN EVALUATION, MONITORING, UPDATING

7.1 Implementation Action Plan

The 2016 planning process was overseen by the Larimer County Office of Emergency Management, in coordination with other County departments.

The Larimer County Board of Commissioners has authorized the submission of this Plan to both the Colorado Division of Homeland Security and Emergency Management (DHSEM) and the Federal Emergency Management Agency (FEMA) for their respective reviews and subsequent approvals. Upon state and federal approval, the Larimer County Board of Commissioners will act to formally adopt this Plan.

7.1.1 Plan Integration, Existing Capabilities and Resources

The capability assessment examines the ability of Larimer County to implement and manage the comprehensive mitigation strategy laid out in this Plan. The strengths, weaknesses, and resources of the County are identified here as a means for evaluating and maintaining effective and appropriate management of the town's hazard mitigation program.

Local Personnel

The ability of a community to implement a comprehensive mitigation strategy depends, in part, on available resources, including people and staff. The table below outlines Larimer County's capabilities as they relate to key personnel.

	Full Time	Part Time	None or Not-Identified
Emergency Manager	X		
Floodplain Administrator	X		
Community Planner	X		
GIS Specialist	X		
Grant Writer	X		

Land Use Planning and Codes

Local land use plans and building codes are tremendous tools for evaluating local policies related to hazard mitigation and risk reduction. Additionally, comprehensive master plans, capital improvement plans, stormwater plans and zoning ordinances all present opportunities for enhanced local capabilities. The table below outlines the County's current capabilities as they relate to land use planning and codes.

	Yes (Y); No (N)
A Zoning Ordinance	Y
A hazard-specific ordinance	Y
Local building codes	Y
A Comprehensive Plan / Master Plan	Y
A Capital Improvements Plan	Y
A Stormwater Plan	N
A Continuity of Operations Plan (COOP)	Y
An Emergency Operations Plan (EOP)	Y
A Long-Term Recovery Plan	Y
Participates in the NFIP	Y

7.1.2 Plan Maintenance and Implementation

Larimer County has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping this plan current. The Implementation Strategy below also includes a discussion of how the County will continue to encourage meaningful public participation in the plan maintenance process.

Jurisdiction	Plan Maintenance and Implementation Strategy
Larimer County	*"The Larimer County Office of Emergency Management will be the lead agency for the plan and the follow up. Meetings will occur at least once every six months to check in on mitigation actions and determine next steps."* *"The Larimer County Office of Emergency Management has standing public meetings with the Board of Commissioners on key projects and will ensure the HMP is reviewed and updated during these meetings."*

Larimer County will actively maintain the hazard mitigation plan by coordinating a bi-annual review with participating jurisdictions of all mitigation actions included in the 2016 Mitigation Strategy. The County will facilitate the mitigation action check-in process with each participating community and staff will meet with participating jurisdictions that are not able to attend the meeting either in person or by phone to facilitate an effective maintenance and implementation process.

Each participating jurisdiction has identified a process through which it will evaluate, maintain, and update their local mitigation action. Details about their processes are included in the Community Profiles section of the plan.

The 2016 Plan will be updated by the FEMA approved five year anniversary date, as required by the Disaster Mitigation Act of 2000, or following a disaster event. Future plan updates will account for any new hazard vulnerabilities, special circumstances, or new information that becomes available. During the five-year review process, the following questions will be considered as criteria for assessing the effectiveness of the Larimer County Multi-Jurisdictional Hazard Mitigation Plan.

- Has the nature or magnitude of hazards affecting the County changed?
- Are there new hazards that have the potential to impact the County?
- Do the identified goals and actions address current and expected conditions
- Have mitigation actions been implemented or completed?
- Has the implementation of identified mitigation actions resulted in expected outcomes?
- Are current resources adequate to implement the plan?
- Should additional local resources be committed to address identified hazards?

Issues that arise during monitoring and evaluation which require changes to the local hazard, risk and vulnerability summary, mitigation strategy, and other components of the plan will be incorporated during future updates.

7.1.3 Integrating Hazard Mitigation into Local Planning

Through discussions at planning meetings and the use of an online survey, individual outreach, and phone calls, each participating jurisdiction brainstormed with the planning team to identify processes for integrating hazard mitigation into their local planning mechanisms and policies. The table below lists the specific integration strategies identified by Larimer County based on the mitigation actions listed in this plan.

Table 52. Processes for Integrating Hazard Mitigation into Other Planning Mechanisms

Jurisdiction	Strategy
Larimer County	*"We will update our hazard mitigation codes in the Land Use, Wildfire and Building Code documents"*

Appendix A – Meeting Minutes & Sign-In Sheets

Michael Baker INTERNATIONAL

We Make a Difference

LARIMER COUNTY COMMITTED TO EXCELLENCE

Larimer County 2016 Multi-Jurisdictional Hazard Mitigation Plan Update
Large Team Kickoff Meeting

When and Where
Larimer County Courthouse on June 29th, 2015, 1:00 – 3:00 PM

Attendees
See Sign-In Sheets Attached

Agenda and Minutes:

1. Welcome and Introductions

Lori Hodges, Larimer County Director of Emergency Management, welcomed the large planning team attendees and then introduced Mike Garner, Michael Baker International (Baker), who is serving as the contracted project manager for the countywide hazard mitigation plan update. Due to the large number of attendees and time constraints, individual introductions of the large team were bypassed. Mike then stepped through the meeting's agenda.

2. Hazard Mitigation Planning Overview

Mike then briefly discussed hazard mitigation and an overview of the hazard mitigation planning process. He explained that the current Northern Colorado Regional Hazard Mitigation Plan was set to expire in July 2015, but that due to recent disasters FEMA has extended the expiration date until early 2016.

3. Jurisdictional Participation Requirements

Mike then walked through the following participation requirements for any jurisdictions planning to formally adopt the plan: submit a participation letter; help to identify hazards unique to that jurisdiction; identify how vulnerabilities and risks may differ from the county as a whole; formulate mitigation actions specific that that jurisdiction; offer community stakeholders an opportunity to be involved in the planning process; document a process for plan integration and maintenance; and formally adopt the plan by the jurisdiction's governing body. Lori confirmed receipt thus far of roughly 20 letters of intent to participate.

4. Planning Process / Project Schedule

Mike then presented the following project schedule.

- 6/29 Large Team Kick-Off Meeting
- August: Risk Assessment / Mitigation Strategy Meeting
- September: Mitigation Actions / Plan Maintenance Meetings
- Late Summer / Fall: Public Outreach
- October: Final Draft Posted for Comment

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165 South Union Blvd., Suite 200 | Lakewood, CO 80228
Office: 720.514.1100 | Fax: 720.479.3157

- November 26: Submit to State/FEMA
- TBD: FEMA Approval Pending Adoption
- TBD: Presentation to County Commissioners

5. 5-Year Plan Review

Mike then gave an overview of the first of the large planning team surveys that will be disseminated to the large planning team shortly after this kick-off meeting. The intent is to solicit comments of the existing plan: strengths and weaknesses, has it been implemented and what were implementation challenges, have hazard risks changed, etc. He asked the audience to raise hands if they were involved in the current plan's development. Less than 10 people did so in the group. Mike mentioned that the current plan is posted to the project website (www.LarimerHMP2016.com) for those interested in reviewing.

6. Hazards to Profile.

Mike then presented the list of hazards that the small team agreed to profile fully. This 'top 10' list ended up including the following 12 hazards:

- Biological Hazards / Contagion
- Civil Disturbance
- Earthquake
- Erosion / Deposition
- Fire - Wildland
- Flood – Flash and Riverine
- Hazmat – Fixed and Transport
- Landslide / Rockslide
- Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)
- Tornado
- Utility Disruption
- Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)

Mike explained that other hazards not on this list will still be mentioned in the plan, but that a full hazard profile & risk/vulnerability assessment would not be conducted at the county level for those. It was pointed out that this plan update should focus on those hazards that can be mitigated against.

One large planning team participant, Katie Bigner (Fort Collins Utilities and Sustainability Services) spoke up about possibly including extreme temperatures or extreme heat as an additional hazard to profile fully. Katie mentioned that the city had recently commissioned an extreme heat report and felt that information would be applicable to this planning effort. She agreed to share that report to Lori and Mike for small team review and discussions. Katie mentioned that she did believe the hazard of extreme heat did present opportunities for mitigation projects to consider incorporating into this plan. Lori asked for time to review the report and that Katie's suggestion would be considered.

7. Current Mitigation Strategy Goals

Mike then reviewed the following current plan's goals and mentioned that these would be revisited in the next meeting for changes/edits. He then explained how a mitigation strategy can include goals, objectives for achieving those goals, and then mitigation actions/projects to accomplish those goals.

1. Protect life and property
2. Improve public awareness
3. Strengthen partnerships and promote plan implementation
4. Improve emergency services response plans

8. Mitigation Action Overview

Mike then spent some time talking to the group about mitigation actions. He walked through the 4 main categories of actions, which include: Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, and Education and Awareness Programs. The next few slides provided some examples of these types of projects.

9. Planning Exercise

The next portion of the meeting involved a planning exercise. Attendees were divided into small groups (3-6 people) and each were provided a hazard scenario. Four different scenarios existing included hazard situations specific to: flooding, wildfire, tornado, and winter storm. Each group was then asked to spend some time brainstorming potential mitigation actions to help reduce or eliminate the hazard, preferably one from each of the four mitigation action categories. Throughout the meeting, Baker circulated copies of FEMA's Mitigation Ideas booklet, which contains ideas for specific mitigation ideas focused on individual hazards.

After ~10 minutes, Mike then asked the groups to present their ideas. Each scenario was read and then groups took turns explaining their mitigation ideas. This lead to some beneficial dialog. Ideas presented by the groups were solid and well thought out.

10. Wrap-Up

Lori then asked a few of the jurisdictions on the small planning team to individually address their jurisdictional participants.

Mike Gavin (Fort Collins) gave some good background on past iterations of the hazard mitigation plan. He mentioned that the large number of city departments were invited to participate in this process to ensure that the mitigation strategy that results from this planning process is as robust and all-encompassing as possible. He also mentioned that this planning process would benefit the city's participation in FEMA's Community Rating System (CRS) program, which provides for reduced flood insurance rates for citizens and businesses.

Pat Mialy (Loveland) then spoke about how this process will align with another hazard mitigation master planning project that the city is kicking off in the coming months. She wants this project to help serve as a springboard for the other and is also looking to involve as large of a cross section of city personnel as possible. Her hope is to ultimately develop a mitigation strategy and plan for the city that covers all current and future project and which aligns with both the city's short and long term (50+ years) visions.

Karen Thompson (Estes Park) then spoke of how they are in the beginning stages of entering into the CRS program. She said that the town works closely with many federal agencies and looks for this project to help the town develop a list of mitigation actions that can assist with grants and project implementation.

Lori then wrapped up discussions by stating that we want to include as many interested agencies and organizations in this hazard mitigation planning process. She spoke to how the results of this plan can then be implemented into other planning mechanisms to continue to work towards a more resilient county.

Questions were then fielded relating to plan participation for Title 32 Special Districts. Lori mentioned that those entities are allowed to formally adopt this plan if they would like, but that would mean that those districts would fully participate in this planning process. A question was raised about private utility participation. Lori stated that they were welcome to participate in this planning process and offer up mitigation actions.

Mike Garner then concluded the meeting by showing the project website (www.LarimerHMP2016.com) and welcoming any questions throughout the process. He stated that all presentations, minutes, etc will be accessible via the project website.

A post-meeting CRS discussion was then held with those interested participants.

Post-Meeting Action Items:

1. Large team members were asked to begin compiling and sending existing data and plans to Mike Garner or Lori that may be applicable to this hazard mitigation plan. A hard deadline will be communicated in the near future.
2. Large team members were asked to begin sharing news of this project with their communities.
3. Large team members were asked to begin thinking about mitigation actions that they want to document in this plan.

LARIMER HMP KICK-OFF MEETING
June 29, 2015

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LARIMER HMP KICK-OFF MEETING

June 29, 2015

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Michael Baker INTERNATIONAL

We Make a Difference

LARIMER COUNTY COMMITTED TO EXCELLENCE

Larimer County 2016 Multi-Jurisdictional Hazard Mitigation Plan Update
Large Planning Team Meeting #2

Where and When
The Ranch Complex, McKee Building, Loveland on August 24th, 2015, 1:00 – 4:00 PM

Attendees
See separate sign-in sheets

Agenda and Minutes:

1. Welcome and Introductions

Lori Hodges welcomed the large planning team attendees and then introduced the county's consultants for this project, Mike Garner and Enessa Janes, from Michael Baker International (Baker). Attendees then individually introduced themselves and identified the jurisdiction/district/organization that they represent.

2. Project Overview Update: Schedule, Status, Small Team Role

Baker then reviewed the project schedule (detailed in presentation). The current status is that the risk and vulnerability assessment is roughly 75% complete. Data sets requested during past meetings have for the most part now been delivered and Baker is working through these. The Baker Team then reviewed the role of the hazard mitigation small planning team, which to date has involved: 2010 mitigation action reporting, data collection, outreach strategizing, meeting and plan document content, and identification of hazards to profile and critical facilities across the county.

3. Jurisdictional Participation Requirements / Expectations

Baker then walked through the following participation requirements for any jurisdictions planning to formally adopt the plan: submit a participation letter; help to identify hazards unique to that jurisdiction; identify how vulnerabilities and risks may differ from the county as a whole; formulate mitigation actions specific that that jurisdiction; offer community stakeholders an opportunity to be involved in the planning process; document a process for plan integration and maintenance; and formally adopt the plan by the jurisdiction's governing body.

4. Review of 5-Year Plan Review & Risk Factor survey results

Baker then presented some of the high-level results of the 5-Year Plan Review & Risk Factor survey. This survey was conducted through the large planning team and will be used for the jurisdictional and district appendixes to the plan document. The Baker Team then also presented some results from the 1st public survey, which will be shared with the large planning team for their use in compiling mitigation actions.

5. Overview of Risk Assessment Results

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Baker then presented the risk assessment results webmap that is linked from the project website. Additional risk and vulnerability data layers will be added as they are available. The large planning team was urged to utilize this information when compiling mitigation actions.

6. Review the updated Mitigation Strategy Goals & Objectives

The updated mitigation strategy goals and objectives, updated and reviewed by the small planning team were then presented by Baker. Baker explained how the goals and objectives define the high-level mitigation strategy for this plan update and how proposed actions will align with these.

7. Reporting of status updates for 2009 Mitigation Actions

Baker then informed the large planning team that the small planning team had recently completed the status reporting for over 200 mitigation actions that were documented in the 2010 plan. This information will be included in the 2016 updated plan document.

8. 2016 Mitigation Actions (Mitigation Action Guide)

Baker then presented the Mitigation Action Guide template that will be used to collect and document 2016 mitigation actions. The template is posted on the project website and should be used by all plan participants to document those actions to be incorporated into the updated plan.

9. Jurisdictional/Special District Break-out Session

Large planning team participants were then broken out into jurisdictional groups for an opportunity for each jurisdiction to discuss strategy, questions, and next steps forward. Both Ms. Hodges and the Baker staff floated amongst the groups helping to answer questions and provide guidance. These jurisdictional groups then reported back to the larger group what they discussed. Some jurisdictions agreed that they would be holding internal planning meetings in preparation for the 3rd and final large planning team meeting to be held on September 30th.

10. Q&A Session

Baker and Ms. Hodges concluded the meeting with a Q&A session. Final meeting points were to ensure that all large planning team members understood what is expected from their jurisdictions/districts and what the post-meeting actions items were for all.

Post-Meeting Action Items:

1. Adopting jurisdictions to submit Participation Letter (if not already done)
2. Adopting jurisdictions to complete pending surveys
3. Adopting jurisdictions (and other interested Large Team organizations) to begin brainstorming / compiling mitigation actions/projects for review during the final large planning team meeting

HAZARD MITIGATION PLANNING MEETING
August 24, 2015

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HAZARD MITIGATION PLANNING MEETING
August 24, 2015

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HAZARD MITIGATION PLANNING MEETING
August 24, 2015

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Wolf	Chris	cwolf@poudre-fire.org	
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LARIMER COUNTY
COMMITTED TO EXCELLENCE

Michael Baker
INTERNATIONAL

HAZARD MITIGATION PLANNING MEETING
August 24, 2015

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HAZARD MITIGATION PLANNING MEETING

August 24, 2015

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Ward	Greg	Greg.Ward@cityofloveland.org	
Wensing	Rod	Rod.Wensing@cityofloveland.org	
Worthington	Brent	Brent.Worthington@cityofloveland.org	

lessman Jodi Jodi.lessman@cityofloveland.org Jodi Lessman

HAZARD MITIGATION PLANNING MEETING

August 24, 2015

Last Name	First Name	Email	Signature
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Wensing	Rod	Rod.Wensing@cityofloveland.org	
Worthington	Brent	Brent.Worthington@cityofloveland.org	

Michael Baker INTERNATIONAL

We Make a Difference

LARIMER COUNTY COMMITTED TO EXCELLENCE

Larimer County 2016 Multi-Jurisdictional Hazard Mitigation Plan Update
Large Team Meeting #3

Where and When
East Training Room at the Larimer County Sheriff's Office, 2501 Midpoint, Fort Collins on October 20th, 2015, 9:00 AM – 12:00 PM

Attendees
See separate sign-in sheets

Agenda:

1. Welcome and Introductions

Lori Hodges and her consultants from Michael Baker International (Baker) welcomed attendees to this final large planning team meeting and workshop. Attendees were asked to introduce themselves.

2. Project Overview Update: Schedule, Status

As part of their brief slideshow presentation, Baker updated participants on the current status of the planning project, past milestones, and that a draft document was anticipated to be ready by the end of November. Baker then discussed next steps after that: jurisdictional/district/public review & comment, DHSEM/FEMA review, and adoption.

3. Jurisdictional Participation Requirements / Expectations

Baker then reviewed with attendees what the participation requirements were for those jurisdictions and districts that planned to formally adopt the hazard mitigation plan. These have been detailed in all presentations delivered throughout the planning process and include: providing required data, completing project surveys, internal education and outreach, meeting attendance, formulation of new mitigation actions, review and comment on the draft plan, and formal adoption.

4. 2016 Mitigation Actions (Mitigation Action Guide [MAG]) Working Session

Baker then concluded their presentation by walking through the Mitigation Action Guide templates that are being used to document and track new mitigation actions. They then talked through the various types of mitigation actions and provided some examples of each. Following the presentation, attendees were divided up into jurisdictional/district groups to work through finalizing their new 2016 actions. During this working session, the Baker team completed and final necessary project data collection from participants. Baker and Lori then spent the rest of the meeting time bouncing between attendees and providing assistance as needed. Final digital versions of the new MAGs were requested by 10/23.

5. Q&A Session

Post-Meeting Action Items:

1. Adopting jurisdictions to complete any remaining surveys
2. Adopting jurisdictions to provide digital versions of final MAGs

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LARIMER COUNTY COMMITTED TO EXCELLENCE

Michael Baker INTERNATIONAL

Larimer County Hazard Mitigation Plan
Planning Team Meeting Sign In Sheet - 10/20/2015

First Name	Last Name	Representing	Signature
Jim	Anderson	Town of Berthoud	
Dick	Wilcox	Pinewood Springs Fire	
April	Getchius	Timnath	
John	Michaels	Town of Windsor	
Mike	Cowin	Poudre Fire - City of Fort Collins	
Steve	Charles	Berthoud Fire PD	
Mike	Hergenrieder	City of FC Light & Power	
Diane	Green	City of Fort Collins ERA	
Jerry	Gibbens	Northern Water	
Michelle	Stalker	City of Loveland	
Matt	Allen	Upper Thompson Sanitation District	
Eric	Lessard	City of Loveland	
Justin	Whitesell	Larimer County Sheriff's Office	
Erik	Rose	Town of Estes Park	

LOVELAND

Larimer County Hazard Mitigation Plan
Planning Team Meeting Sign In Sheet - 10/20/2015

First Name	Last Name	Representing	Signature
Steve	Adams	Power	
Shane	Adamson	IT	
Carmen	Bloom	911	
Leah	Browder	Public Works	
John	Burns	IT	
Deb	Callies	City of Loveland	
Michael	Ceronski	City of Loveland	
Ken	Cooper	Facilities	
Christina	Cornelison-Spight	Loveland Risk Management	Christina Cornelison Spight
Gary	Dahlgren	Streets	
Carie	Dann	Fire	
Kimberly	Frick	City of Loveland	
Mark	Gaisford	911	
Greg	George	Building & Planning	
Kevin	Gingery	Stormwater	
Bettie	Greenberg	HR	
Kathy	Gross	City of Loveland	
Alison	Hade	Building & Planning	
Betsey	Hale	Economic Development	
Marilyn	Hilgenberg	Parks & Rec	
Julia	Holland	HR	
Larry	Howard	Water	
Becky	Kamoske	911	
Bob	Klinger	Police	

LOVELAND

Larimer County Hazard Mitigation Plan
Planning Team Meeting Sign In Sheet - 10/20/2015

First Name	Last Name	Representing	Signature
Eric	Lessard	Stormwater	
Jodi	Lessman	City of Loveland	
Jason	Licon	Airport	
Bill	Lundquist	Fire	
Chris	Matkins	City of Loveland	
Mike	McCrary	Waste Water	
Ingrid	McMillan-Ernst	Fire	
Janet	Meisel-Burns	Parks & Rec	
Mick	Mercer	Stormwater & Solid Waste	
Bob	Miller	Water	
Brent	Newbanks	Police	
Brieana	Reed-Harmel	City of Loveland	
Heidi	Ryan	911	
Greg	Ward	Fire	
Rod	Wensing	City Administration	
Brent	Worthington	Finance	

Larimer County Hazard Mitigation Plan
Planning Team Meeting Sign In Sheet - 10/20/2015

First Name	Last Name	Representing	Signature
Braden	Applegate	Poudre Valley EMS	
Matt	Allen	Upper Thompson Sanitation District	
Kelly	Bernish	Fort Collins	
Chris	Bieker	Sanitation	
Mike	Bielmaier	Chief Medical	
Katy	Bigner	City of Fort Collins	
Will	Birchfield	Chief Building Official and Floodplain Manager	
Mike	Blackwill	Windsor Severance Fire Rescue	
Jim	Boizot	Platte River Power Authority	
Nate	Boschman	Wildland Restoration Volunteers	
Herb	Brady	Windsor Severance Fire Rescue	
Jack	Brinkhoff	Town of Wellington	
Steve	Charles	Berthoud Fire Protection District	
Alison	Chilcott	Community Development	
Cory	Christensen	PD Division Chief	
Hugh	Collins	Poudre Canyon Fire Protection District	
Susanne	Cordery-Cotter	Colorado State University Facilities Dept.	
Kimberly	Culp	911 Director	
Alisa	Darrow	Town Clerk / Asst Town Administrator	
Mary	Davis	Estes Valley Recreation and Parks District	
Dan	Defibaugh	Crystal Lakes Fire Protection District	
Scott	Dorman	Fire Chief	
Sean	Dougherty	Relator (Public)	

Larimer County Hazard Mitigation Plan
Planning Team Meeting Sign In Sheet - 10/20/2015

First Name	Last Name	Representing	Signature
Jan	Dowker	Town of Berthoud	
Jim	Duell	Sanitation	
Mike	Ellerby	Front Range College - Safety	
Corey	Engen	Colorado Riparian Association	
Lindsay	Ex	Environmental Planner	
Alan	Fraundorf	IT Manager	
Rick	Frei	Schools	
Eric	Fried	Larimer Building Dept	
Mike	Gavin	EM	
Kevin	Gertig	Utility Director	
April	Getchius	Town of Timnath	
Terry	Gilbert	Larimer CountyCommunity Development Director	
Jason	Godinez	ARC	
Ron	Gonzales	Poudre Fire Prevention	
Gary	Green	Wellington FPD	
Dave	Groves	City of Fort Collins	
Fred	Haberecht	Colorado State University Facilities Dept.	
Pete	Hall	Poudre School District Operations Director	
Chris	Harris	Water Treatment Facility	
Mike	Hart	Berthoud Town Administrator	
Jon	Haukaas	Stormwater	
Tom	Hellen	Johnstown Public Works	
Janelle	Henderson	Larimer Health and Environ.	
Errin	Henggeller	City of Fort Collins	

Larimer County Hazard Mitigation Plan
Planning Team Meeting Sign In Sheet - 10/20/2015

First Name	Last Name	Representing	Signature
Marsha	Hilmes-Robinson	CRS Coordinator	
Matt	Hines	Estes Valley Recreation and Parks District	
Lori	Hodges	OEM	
Scott	Hummer	North Poudre Irrigation	
Robert	Isaacson	Glacier View Fire Protection District	
Mark	Jackson	Transportation	
Gina	Janett	Save the Poudre	
Shayna	Jones	Big Thompson R. Restoration Coalition	
Lauri	Kadrich	Planning, Development, Transportation Director	
Marian	Kelly	Crystal Lakes Fire Protection District	
Mark	Kempton	City of Fort Collins	
Tim	Klippert	UC Health Emergency Manager	
Jaqueline	Kozak Thiel	Chief Sustainability Officer	
Jim	Kubichek	Crystal Lakes Fire Protection District	
Wes	Kufeld	Police Chief	
Tina	Kurtz	Estes Park	
Frank	Lancaster	Town Administrator	
Jon	Landkamer	Estes Park Police	
Mike	Larson	Thompson Valley EMS	
Randy	Lesher	Thompson Valley EMS	
Chris	Lochra	Stormwater	
Jenne	Loffer	United Way 211 Larimer County	
Larry	Lorentzen	Town of Wellington	
Travis	Machalek	Assistant TA	

Larimer County Hazard Mitigation Plan
Planning Team Meeting Sign In Sheet - 10/20/2015

First Name	Last Name	Representing	Signature
Marian	Kelly	Crystal Lakes Fire Protection District	
Jennifer	Kovecses	Coalition for the Poudre River Watershed	
Donn	Maynard	Livermore Fire Protection Dist.	
Steve	McFarland	Finance Officer	
Shawn	McGaffin	Poudre Fire Prevention	
Pat	Mialy	Loveland OEM	
John	Michaels	Town of Windsor	
Jim	Montague	Poudre Fire GIS	
Brian	Moore	Platte River Power Authority	
Megan	Nies	Larimer County OEM	
Corey	Pass	Commander	
Milissa	Peters	Timnath	
Mark	Peterson	Engineering	
Bob	Poncelow	Poudre Fire Marshall	
Ken	Quintana	Colorado State University	
Louis	Rellergert	Environmental Quality	
Karen	Reynolds	Boxelder Sanitation District	
Mary	Davis	Parks and Recreation District	
Eric	Rose	PD	Eric Rose
Lisa	Rosintoski	PIO	
Kate	Rusch	Town of Estes Park	
Ken	Sampley	Stormwater	
Larry	Schneider	Streets Superintendent	
Clint	Skutchan	Fort Collins Board of Realtors	

Larimer County Hazard Mitigation Plan
Planning Team Meeting Sign In Sheet - 10/20/2015

First Name	Last Name	Representing	Signature
Nicholas	Sporer	Fort Collins Streets	
Melody	Storgaard	Red Cross	
Susan	Strong	Environmental Quality	
Jim	Struble	Nothern Colorado Water Conservancy District	
Karen	Thompson	Estes Park	
Shawn	Tierney	Sustainable Living Association	
Joel	Tower	PD Traffic Division Supervisor	
Mark	Turner	Thompson Valley EMS	
Kelly	Unger	Town of Windsor	
John	Vazquez	Town of Windsor	
Gerry	Wagner	Red Feather Fire Department	
Sherry	Wagner	PD	
Angela	Walsh	Platte River Power Authority	
Carol	Webb	Water Utility Director	
Justin	Whitesell	Sheriff's Office EM/ES	
Richard	Wilcox	Pinewood Springs Fire Protection District	
Gary	Wockner	Save the Poudre	
Chris	Wolf	OEM Specialist	
Pete	Wray	Planner	

Appendix B – Community Profiles

The following Community Profiles were produced to provide additional, specific information that is unique to each participating jurisdiction included in this Hazard Mitigation Plan.

Town of Berthoud

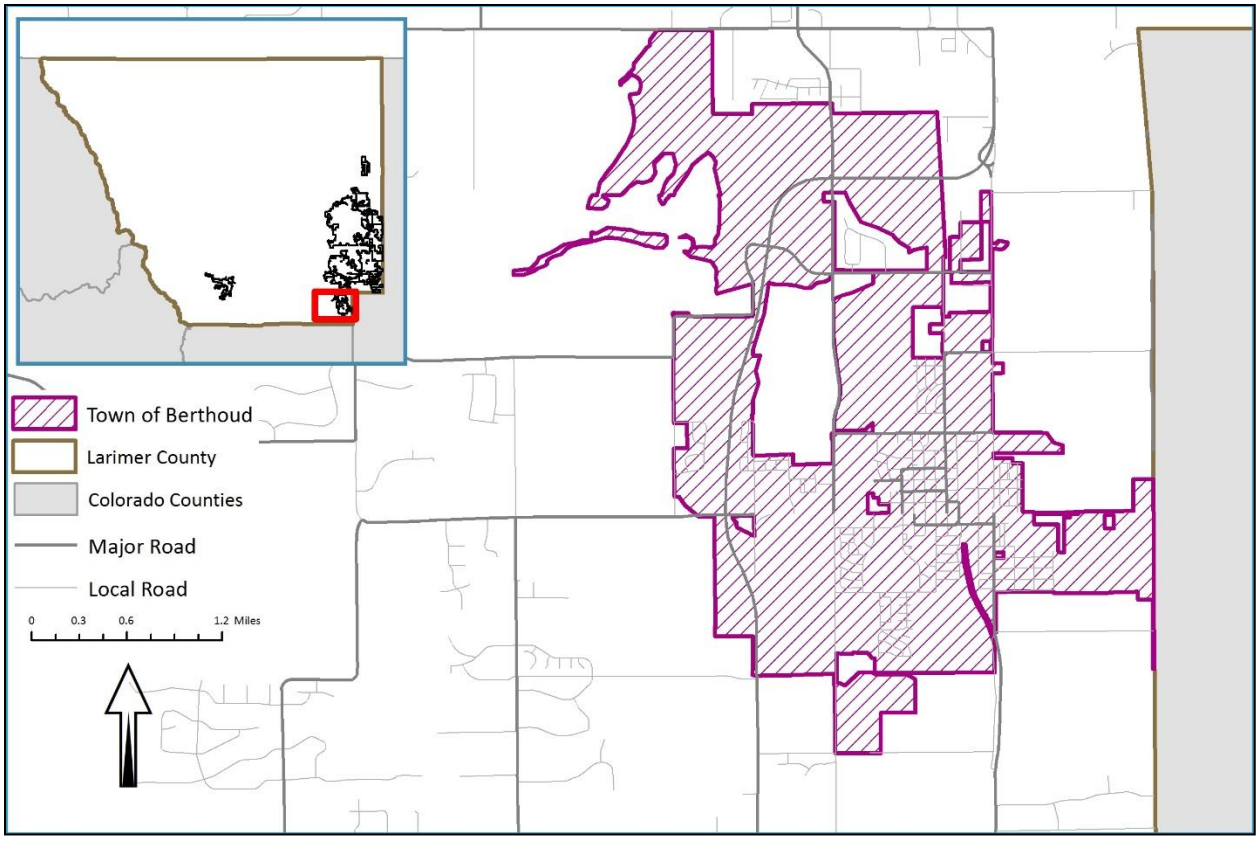
"Garden Spot of Colorado, where good things grow. A small progressive community which endeavors to provide the quality of life enjoyed by past and present generations while ensuring its position for the future within the dynamic Front Range economic corridor. A town that works together to control its own destiny by being proactive in planning for future growth while preserving and enhancing its rural character."

-- 2014 Berthoud Comprehensive Plan

Berthoud's Comprehensive Plan states that in the face of future population growth and development, the town will remain a small to medium-sized community featuring a "vibrant mixed use commercial and residential core as well as a state-of-the-art mixed use residential, educational, employment and commercial presence at I-25. Downtown will be surrounded by vibrant strong neighborhoods, and regional business and commercial facilities will be featured along U.S. 287, I-25 and Larimer County Road 17. Outside of Berthoud neighborhoods, the rural pattern of development will be a mix of agricultural, open space and large lot residential property. Parks, open spaces, neighborhoods and outlying areas will be connected by community and regional trails." This vision will guide planning and development decisions as well as future hazard mitigation and risk reduction activities in and around the town.

Community Profile

The Town of Berthoud is located north of the Little Thompson River and west of Interstate 25 between Longmont and Loveland. The town is located in both Larimer and Weld counties. Berthoud is a small community surrounded by mostly farmland. Rich in agricultural history (wheat was the first crop to be gown, followed by alfalfa and beets), Berthoud quickly became an agricultural center of Larimer County.



The following table summarizes key demographic and development related characteristics of the Town of Berthoud.

Town of Berthoud Statistics		
	Town of Berthoud	Colorado
Population, 2010	5,105	5,029,196
2000-2010 Population Change, %	5%	14.5%
% Population under 5 years, 2010	5.2%	6.8%
% Population under 19 years, 2010	29.1%	20.3%
% Population 65 years and over, 2010	12.4%	10.9%
Language other than English spoken at home, % age 5+, 2009-2013	5.6%	15.9%
Homeownership Rate 2010	75.1%	65.5%
Persons Per Household 2010	2.5	2.57
Persons below poverty level, %, 2013	9.3%	13.2%
Median Household Income, 2013	$64,025	$58,433

US Census 2010

Hazard Identification and Risk Assessment

The Town of Berthoud is situated in both Larimer and Weld Counties. For the purpose of this plan, spatially analyzed hazard risks have been assessed for the areas of the town that lie specifically within Larimer County.

The following Hazard Identification and Risk Assessment Summary table is based on jurisdiction-specific responses to the risk factor exercise and differs from the risk factor results that were determined at the county scale.

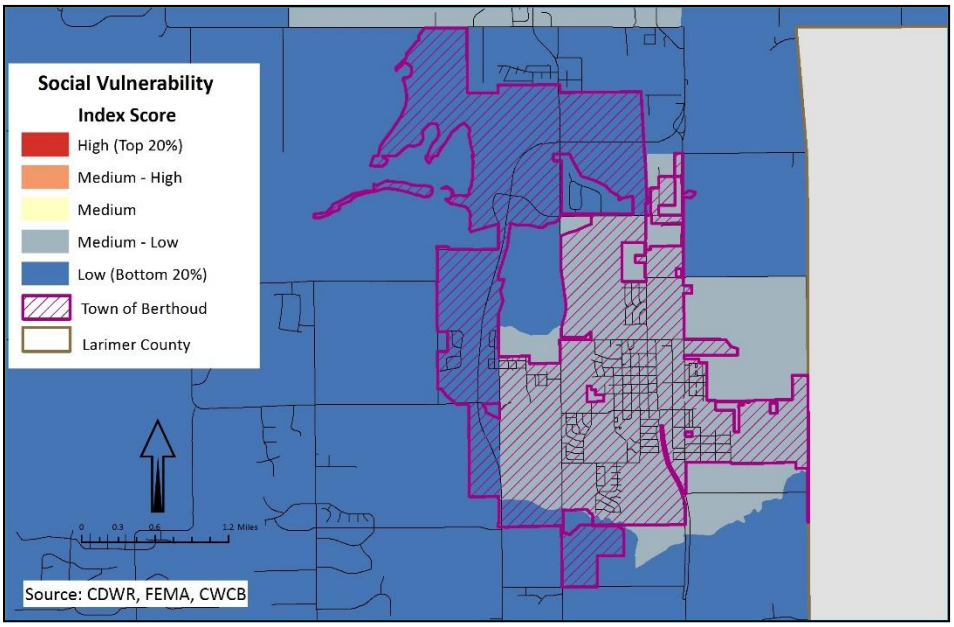
NATURAL HAZARD	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)	0.9	0.6	0.8	0.3	0.4	3.00
Hazmat – Fixed and Transport	0.9	0.6	0.4	0.4	0.4	2.70
Tornado	0.9	0.6	0.4	0.4	0.1	2.40
Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)	0.9	0.6	0.4	0.3	0.1	2.30
Civil Disturbance	0.9	0.3	0.4	0.4	0.2	2.20
Biological Hazards / Contagion	0.6	0.3	0.4	0.4	0.4	2.10
Utility Disruption	0.6	0.6	0.2	0.4	0.1	1.90
Fire – Wildland	0.6	0.3	0.2	0.2	0.4	1.70
Flood – Flash and Riverine	0.3	0.3	0.4	0.2	0.3	1.50
Earthquake	0.3	0.3	0.2	0.1	0.1	1.00
Erosion / Deposition	0.3	0.3	0.2	0.1	0.1	1.00
Landslide / Rockslide	0.3	0.3	0.2	0.1	0.1	1.00
HIGH RISK (2.5 or higher): Winter Storm (Blizzard Conditions, Heavy Snow Accumulation); Hazmat – Fixed and Transport						
MODERATE RISK HAZARD (2.0 - 2.4): Tornado; Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning); Civil Disturbance; Biological Hazards / Contagion						
Low Risk (1.9 and lower): Utility Disruption; Fire – Wildland; Flood – Flash and Riverine; Earthquake; Erosion / Deposition; Landslide / Rockslide						

Vulnerability Assessment

This section provides a refined vulnerability assessment, specific for the Town of Berthoud, for those hazards that were identified as being rated HIGH in the preceding section. This analysis was conducted separately from that of the county-wide vulnerability assessment to specifically focus on the population, structures, infrastructure, and other assets unique to the Town of Berthoud.

The results of the social vulnerability assessment are displayed on the map below. On the map, social vulnerability is represented at the census tract level by 5 classes of vulnerability: Low (bottom 20% of the county), Medium-Low, Medium, Medium-High, and High (top 20% of the county). The Town of Berthoud's social vulnerability map shows social vulnerability within the community.

Social Vulnerability Map – Town of Berthoud[55]



Social vulnerability is represented as the social, economic, demographic, and housing characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to hazard events. The pre-existing social conditions that contribute to disaster losses can be identified using social vulnerability indicators. Using methods identified in the Social Vulnerability Index (SoVI) developed by Cutter et. al. (2003) this layer shows the social vulnerability index scores for the State of Colorado at the census tract level. Social vulnerability is represented at the Census tract level by five classes of vulnerability: Low, Medium-Low, Medium, Medium-High, and High.

The Town of Berthoud is characterized by a mix of medium-low to low levels of social vulnerability. A closer look at the individual social vulnerability indicators within the town will give local emergency

[55] Source: Colorado Division of Water Resources Dam Safety Branch, FEMA, Colorado Water Conservation Board (CWCB)

managers, planners, and stakeholders an even clearer picture of which social vulnerability factors have the largest negative effect on the community and its resiliency. It is important that the town continue to monitor social vulnerability levels over time as demographics and economics change in the area. To do so, local census data can be tracked for each of the social vulnerability indicators outlined in Chapter 4 of the 2016 Larimer County Multi-Jurisdictional Multi-Hazard Mitigation Plan.

Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)

Previous Occurrences

According to NOAA's Storm Events Database, the Town of Berthoud has experienced 74 Winter Storms since 1996. On March 17, 2003 there was report of a winter storm causing $15,500,000 in property damage in areas of Larimer County below 6,000 feet and eastern Larimer County. There were no deaths, injuries or damage to crops reported for any of these storms. The Town of Berthoud is at high risk of experiencing Winter Storms during the winter months.

Inventory Exposed

All assets located in the Town of Berthoud can be considered at risk from winter storms. This includes 5,105 people, or 100% of the Town's population, and all buildings and infrastructure within the town. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the Town's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Potential Losses

Winter storms affect the entire planning area of the Town of Berthoud including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Winter storms will remain a highly likely occurrence for the Town of Berthoud.

Probability of Future Occurrences

Severe winter storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past severe winter events provide benchmarks for projecting similar conditions into the future. The probability that the Town of Berthoud will experience a severe winter storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in town at least once every year.

Hazmat – Fixed and Transport

Previous Occurrences

Based on data supplied by the Pipeline and Hazardous Materials Safety Administration's (PHMSA) Incident Reports Database there has been 1 reported HAZMAT incidents within the Town of Berthoud between 1971 and 2015. There were no injuries or fatalities resulting from the incident.

Inventory Exposed

We can't accurately predict when or where a HAZMAT incident may occur. Therefore, for the purpose of this plan, all existing and future buildings, facilities, and populations in the Town of Berthoud are considered to be equally exposed and couple potentially be impacted. This includes 299,630 people, or 100% of the Town's population, and all buildings and infrastructure within the Town.

When hazardous materials are being transported they are particularly vulnerability to transportation related accidents, misuse, or terrorist threats. Most hazardous materials are transported in large quantities in order to reduce costs and security is difficult to maintain around moving vehicles that cross jurisdictional boundaries. When transported close to populated areas or critical infrastructure, HAZMAT releases can have serious consequences. The inventory that is most often exposed to HAZMAT risks are railways, roadways, and fixed facilities that contain hazardous materials, and all assets that lie within a mile of the potential release areas.

Potential Losses

HAZMAT related events occur throughout the Town of Berthoud every year. The intensity and magnitude of these incidents depend on weather conditions, the location of the event, the time of day, and the process by which the materials are released. *Was is raining when the event happened? Were the hazardous materials being transported by rail when they were released or were they at a fixed facility? Did the spill happen during rush hour traffic or in the middle of the night?* All of these considerations matter when determining the risk and potential damages associated with a HAZMAT incident.

HAZMAT events have the potential to threaten lives and disrupt business activity. Moreover, HAZMAT incidents can cause serious environmental contamination to non-renewable resources such as air, ground, and water sources.

Probability of Future Occurrences

As with most hazards that have limited spatial predictability or warning time, the probability of future occurrences of HAZMAT events is difficult to predict. However, as development continues to encroach into existing industrial areas and becomes more dense along high-risk designated hazardous materials transportation routes, the risk of future occurrences becomes greater. Even if the frequency of HAZMAT spills remains the same over time, population growth will increase the probability of a disaster event.

Capabilities Assessment

The capability assessment examines the ability of the Town of Berthoud to implement and manage the comprehensive mitigation strategy laid out in this Plan. The strengths, weaknesses, and resources of the community are identified here as a means for evaluating and maintaining effective and appropriate management of the Town's hazard mitigation program.

Local Personnel

The ability of a community to implement a comprehensive mitigation strategy depends, in part, on available resources, including people and staff. The following table outlines the town's capabilities as they relate to key personnel.

	Full Time	Part Time	None or Not-Identified
Emergency Manager			X
Floodplain Administrator			X
Community Planner	X		
GIS Specialist			X
Grant Writer			X

Land Use Planning and Codes

Local land use plans and building codes are tremendous tools for evaluating local policies related to hazard mitigation and risk reduction. Additionally, comprehensive master plans, capital improvement plans, stormwater plans and zoning ordinances all present opportunities for enhanced local capabilities. The following table outlines the town's current capabilities as they relate to land use planning and codes.

	Yes (Y); No (N)
A zoning ordinance	Y
A hazard-specific ordinance	-
Local building codes	Y
A Comprehensive Plan / Master Plan	Y
A Capital Improvements Plan	-
A Stormwater Plan	N
A Continuity of Operations Plan (COOP)	N
An Emergency Operations Plan (EOP)	N
A Long-Term Recovery Plan	-
Participates in the NFIP	Y

Building codes are one tool that communities use to enhance public safety. For example, they can increase structural integrity, mitigate structure fires, and provide benefits in relation to natural hazard avoidance. In Colorado, land use regulations and building codes are typically implemented at the local level. Even without a statewide mandate, most counties and many municipalities have enacted regulations and codes. The Town of Berthoud has adopted a local building code requirement, demonstrating their understanding of the benefits codes provide, including reduced exposure to hazards.

Plan Maintenance and Implementation

The Town of Berthoud has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the town will continue public participation in the plan maintenance process.

Jurisdiction	Plan Maintenance and Implementation Strategy
Town of Berthoud	*"The Town, Fire District and Sheriff's Department will meet at a minimum annually to discuss items that need to be updated and look at progress of action items. All items with budgetary requirements would need to be approved by the Town Board of Trustees."* "*The Town will post information on the website and utilize the marketing and communications firm to get information to citizens and businesses."*

Integrating Hazard Mitigation into Local Planning

Through discussions at planning meetings and the use of an online survey, individual outreach, and phone calls, each participating jurisdiction brainstormed with the planning team to identify processes for integrating hazard mitigation into their local planning mechanisms and policies. The following table lists the specific integration strategy identified by the Town of Berthoud based on the mitigation actions listed in this plan.

Jurisdiction	Strategy
Town of Berthoud	"The Town has a Comprehensive Master Plan that is continually updated. All actions will be documented or planned in advance. Budgeted items will be reviewed annually."

Mitigation Action Guides

The following Mitigation Action Guides present Berthoud's mitigation actions that were developed for the 2016 Plan.

Town of Berthoud: Full Adoption of Updated FEMA Floodplains	
PRIORITY: Priority 1	HAZARDS ADDRESSED: Flood
LOCATION: Town of Berthoud	GOALS ADDRESSED: Goals 1, 2, 3, 4, and 5
RECOMMENDATION DATE: 10/18/2015	OBJECTIVES ADDRESSED: Objectives A, B, C, D and E
TARGET COMPLETION DATE: 12/31/2020	
ISSUE: Floodplain mapping is out of date and the 2013 Flood caused extensive changes to current floodplains. The Little Thompson River has never been mapped.	
RECOMMENDATION: Work with FEMA on updating current floodplain mapping in coordination with Larimer County.	
ACTION: By 2020, the Little Thompson River through the Town of Berthoud will be mapped and adopted by FEMA.	
LEAD AGENCY: Town of Berthoud	EXPECTED COST: $300,000
SUPPORT AGENCIES: Larimer County Community Development and Office of Emergency Management	POTENTIAL FUNDING SOURCES: Colorado State Flood Hazard Mapping Project

PROGRESS MILESTONES:

- Little Thompson Floodplain Mapped
- Review and Comment Period / Public Review Process
- Community Outreach
- Follow the County process for zoning changes per county policy (Flood Review Board, Planning Commission, BCC, etc.)

Town of Berthoud: Flood Recovery Mitigation Activities	
PRIORITY: 2	HAZARDS ADDRESSED: Flood, Severe Storm
LOCATION: 2013 Flood Impacted Areas	GOALS ADDRESSED: Goals 1, 2, and 5
RECOMMENDATION DATE: 10/18/2015	OBJECTIVES ADDRESSED: Objectives B, C, and E
TARGET COMPLETION DATE: 12/31/2018	
ISSUE: The Town of Berthoud and surrounding areas continue to move through the recovery from the 2013 Flood. Many projects remain unfinished, allowing the Town of Berthoud to look at mitigation opportunities for the future.	
RECOMMENDATION: Assess all unfinished recovery projects for possible mitigation opportunities and implement alternatives when appropriate	
ACTION: Include mitigation alternatives in flood recovery efforts whenever possible	
LEAD AGENCY: Town of Berthoud	EXPECTED COST: Cost will depend upon each specific recovery project
SUPPORT AGENCIES: Larimer County Public Works Division, Community Development Division and Office of Emergency Management	POTENTIAL FUNDING SOURCES: FEMA Public Assistance funding, HMGP funding, county resources
PROGRESS MILESTONES: – Assess all unfinished flood recovery projects for mitigation alternatives – Work with CDOT and FHWA on joint projects where mitigation opportunities are warranted – Incorporate mitigation actions into future town efforts and infrastructure upgrades	

Town of Berthoud / Emergency Operations Plan (Berthoud – 1)	
PRIORITY: Priority 3	HAZARDS ADDRESSED: Drought, Earthquake, Land Subsidence or large sinkholes, Extreme Temperatures, Flood, Severe Storm, Wind & Tornado, Structural and Wildland Fire, Public Health Emergencies, Hazardous Material Releases, Civil Unrest and Terrorist Attack
LOCATION: 328 Massachusetts Ave., Berthoud, CO 80513	GOALS ADDRESSED: The following goals are addressed; Goal 1, Goal 2, Goal 3, Goal 4 and Goal 5.

RECOMMENDATION DATE: 10/19/2015	OBJECTIVES ADDRESSED: The following objectives are addressed; Objective A, Objective B, Objective C, Objective D and Objective E.
TARGET COMPLETION DATE:	02/01/2016
ISSUE: The Town of Berthoud does not have an "Emergency Operations Plan."	
RECOMMENDATION: Review the Larimer County Comprehensive Emergency Management Plan, draft an emergency operations plan for the Town of Berthoud.	
ACTION: Adopt the Larimer County Comprehensive Emergency Management Plan, draft as an Annex an Emergency Operations Plan for the Town of Berthoud for adoption and implementation.	
LEAD AGENCY: Town of Berthoud	EXPECTED COST: Minimal, staff time
SUPPORT AGENCIES: Larimer County Sheriff's Office, Larimer County, CO Berthoud Fire Protection District, Berthoud, CO	POTENTIAL FUNDING SOURCES: Revenues from property and sales taxes / Grants
PROGRESS MILESTONES: Project Funding	

Town of Berthoud / Continuity of Operations Plan (Berthoud – 2)	
PRIORITY: Priority 4	HAZARDS ADDRESSED: Drought, Earthquake, Land Subsidence or large sinkholes, Extreme Temperatures, Flood, Severe Storm, Wind & Tornado, Structural and Wildland Fire, Public Health Emergencies, Hazardous Material Releases, Civil Unrest and Terrorist Attack
LOCATION: 328 Massachusetts Ave., Berthoud, Co 80513 (Town of Berthoud, Town Limits)	GOALS ADDRESSED: The following goals are addressed; Goal 1, Goal 2, Goal 3, Goal 4 and Goal 5.
RECOMMENDATION DATE: 10/19/2015	OBJECTIVES ADDRESSED: The following objectives are addressed; Objective A, Objective B, Objective C, Objective D and Objective E.
TARGET COMPLETION DATE:	06/30/2016
ISSUE: The Town of Berthoud does not have a Continuity of Operations Plan.	
RECOMMENDATION: Draft a Continuity of Operations Plan through committee involvement.	
ACTION: Draft and adopt a Continuity of Operations Plan for the Town of Berthoud.	
LEAD AGENCY: Town of Berthoud	EXPECTED COST: Staff time, minimal cost
SUPPORT AGENCIES: Larimer County Office of Emergency Management , Larimer County, CO Berthoud Fire Protection District, Berthoud, CO	POTENTIAL FUNDING SOURCES: Revenues from property and sales tax / Grants
PROGRESS MILESTONES: Project Funding	

Town of Berthoud / Severe Weather Warning System (Berthoud – 3)

PRIORITY: Priority 5	HAZARDS ADDRESSED: Severe Weather and Tornado
LOCATION: 328 Massachusetts Ave., Berthoud, CO	GOALS ADDRESSED: The following goals are addressed; Goal 1, Goal 2, Goal 3, Goal 4 and Goal 5.
RECOMMENDATION DATE: 10/19/2015	OBJECTIVES ADDRESSED: The following Objectives are addressed; Objective A, Objective B, Objective C, Objective D and Objective E.
TARGET COMPLETION DATE:	12/31/2020
ISSUE: The Town of Berthoud does not have a severe weather warning system. An F3 tornado strike an area south west of the Town of Berthoud in June, 2014.	
RECOMMENDATION: To secure funding to contract the design and installation of a severe weather warning system for the Town of Berthoud to include all annexed areas.	
ACTION: Contact vendors who design and install severe weather warning systems, obtain funding through a grant or donations and award a bid to complete the project.	
LEAD AGENCY: Town of Berthoud	EXPECTED COST: $219,273
SUPPORT AGENCIES: Larimer County Office of Emergency Management, Larimer County, CO Berthoud Fire Protection District, Berthoud, CO	POTENTIAL FUNDING SOURCES: Grants / Donations
PROGRESS MILESTONES: Grant Feasibility	

Jurisdiction or Organization: Town of Berthoud, Update Snow Removal Plan (Berthoud – 4)	
PRIORITY: Priority 6	HAZARDS ADDRESSED: Extreme Temperatures, Severe Storm, Public Health
LOCATION: Project location	GOALS ADDRESSED: 1, 2, 3, 4 and 5
RECOMMENDATION DATE: 10/15/2016	OBJECTIVES ADDRESSED: A, B, C, and E
TARGET COMPLETION DATE: 10/15/2017	
ISSUE: The Town needs to update the snow removal policy and coordinate with the County	
RECOMMENDATION: Written document explaining snow removal procedures based on accumulation and road conditions	
ACTION: A written plan adopted by the governing body and accessible by the public online and at Town facilities	
LEAD AGENCY: Town of Berthoud	EXPECTED COST: Staff time/minimal cost
SUPPORT AGENCIES: Sheriff's Department, Larimer County	POTENTIAL FUNDING SOURCES: None necessary
PROGRESS MILESTONES: Draft, final and adoption of the document are the major milestone	

Letter of Intent to Participate

Town of Berthoud
328 Massachusetts Ave.
P.O. Box 1229
Berthoud, CO 80513-2229
Ph. 970-532-2643 Fax 970-532-0640

LETTER OF INTENT TO PARTICIPATE

November 26, 2014

Lori R. Hodges
Larimer County Emergency Management
200 West Oak Street
Fort Collins, CO 80526

Re: "Statement of Intent to Participate" as a participating jurisdiction in the Larimer County Multi-Jurisdictional Hazard Mitigation Plan (JMP)

Dear Ms. Hodges,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the Town of Berthoud is submitting this letter of intent to confirm that Town of Berthoud has agreed to participate in the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, Town of Berthoud agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Larimer County OEM to complete the plan in conformance with FEMA requirements.

Town of Berthoud understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by an agreement between the Lead Jurisdiction and the Participating Jurisdiction, I Jan Dowker, Mayor Pro-Tem, hereby advise you that the Town of Berthoud intends to participate in the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 26th day of November, 2014

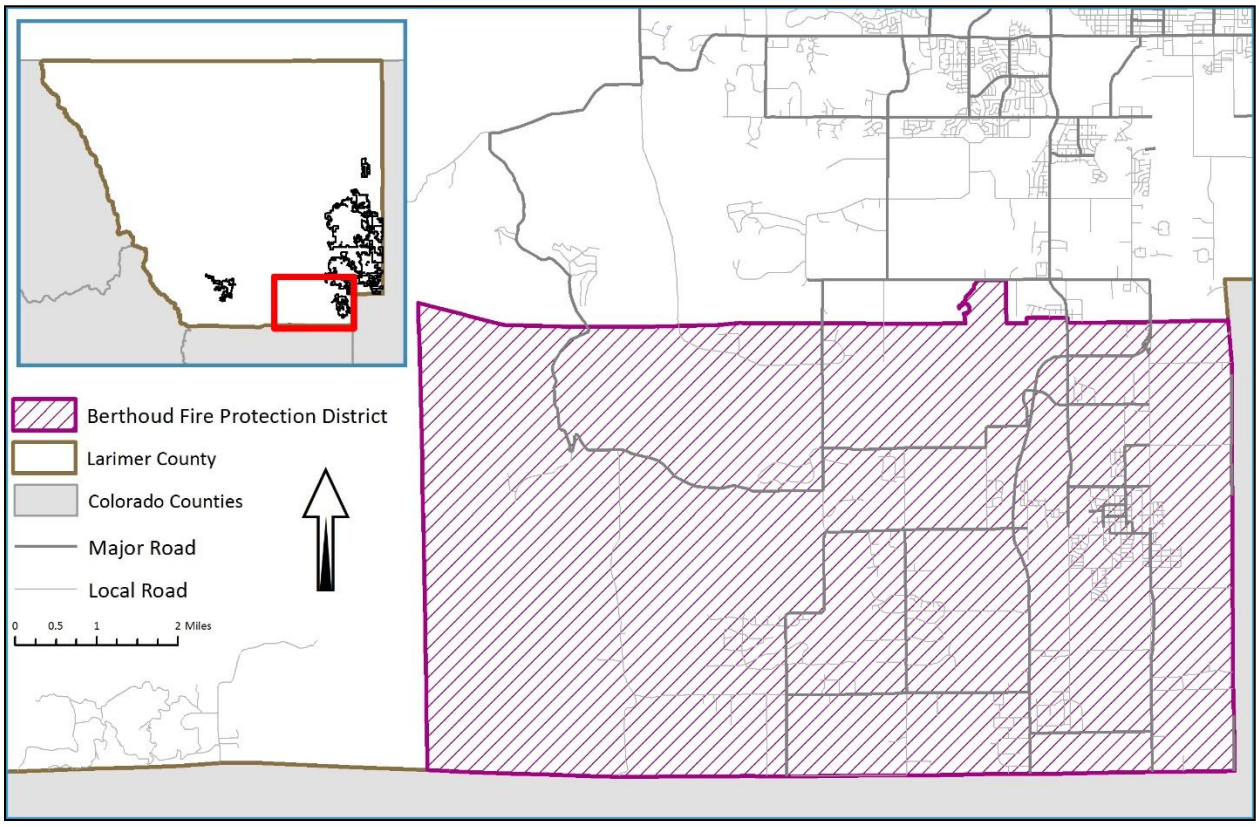
Jan Dowker, Mayor Pro-Tem

Berthoud Fire Protection District

"To Serve, To Care, To Support"
– Mission Statement, Berthoud Fire Protection District

Community Profile

The Berthoud Fire Protection District is a Special District under Title 32, Colorado Revised Statutes. The District celebrated 125 years of service to the Berthoud community in 2013. The District serves more than 17,500 residents within its 103 square mile area. Fire protection, emergency medical, rescue, hazardous material response and emergency management services are provided to portions of Larimer, Weld and Boulder Counties. The District has maintained a vision to provide the highest quality and cost effective service, community involvement, and excellence as a public service agency to the Town of Berthoud and surrounding area.



Hazard Identification and Risk Assessment

Berthoud Fire Protection District is situated in both Larimer and Weld Counties. For the purpose of this plan, spatially analyzed hazard risks have been assessed for the areas of the district that lie specifically within Larimer County.

The following Hazard Identification and Risk Assessment Summary table is based on jurisdiction-specific responses to the risk factor exercise and differs from the risk factor results that were determined at the county scale.

NATURAL HAZARD	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)	0.9	0.9	0.8	0.2	0.3	3.10
Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)	0.9	0.6	0.8	0.2	0.3	2.80
Fire – Wildland	0.9	0.3	0.6	0.4	0.3	2.50
Flood – Flash and Riverine	0.6	0.9	0.4	0.3	0.3	2.50
Utility Disruption	0.6	0.6	0.6	0.4	0.2	2.40
Hazmat – Fixed and Transport	0.6	0.6	0.4	0.4	0.3	2.30
Tornado	0.6	0.6	0.6	0.4	0.1	2.30
Biological Hazards / Contagion	0.6	0.3	0.2	0.4	0.3	1.80
Civil Disturbance	0.3	0.3	0.2	0.4	0.1	1.30
Earthquake	0.3	0.3	0.2	0.4	0.1	1.30
Erosion / Deposition	0.3	0.3	0.2	0.4	0.1	1.30
Landslide / Rockslide	0.3	0.3	0.2	0.4	0.1	1.30
HIGH RISK (2.5 or higher): Winter Storm (Blizzard Conditions, Heavy Snow Accumulation); Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning); Fire – Wildland; Flood – Flash and Riverine;						
MODERATE RISK HAZARD (2.0 - 2.4): Utility Disruption; Hazmat – Fixed and Transport; Tornado						
Low Risk (1.9 and lower): Biological Hazards / Contagion; Civil Disturbance; Earthquake; Erosion / Deposition; Landslide / Rockslide						

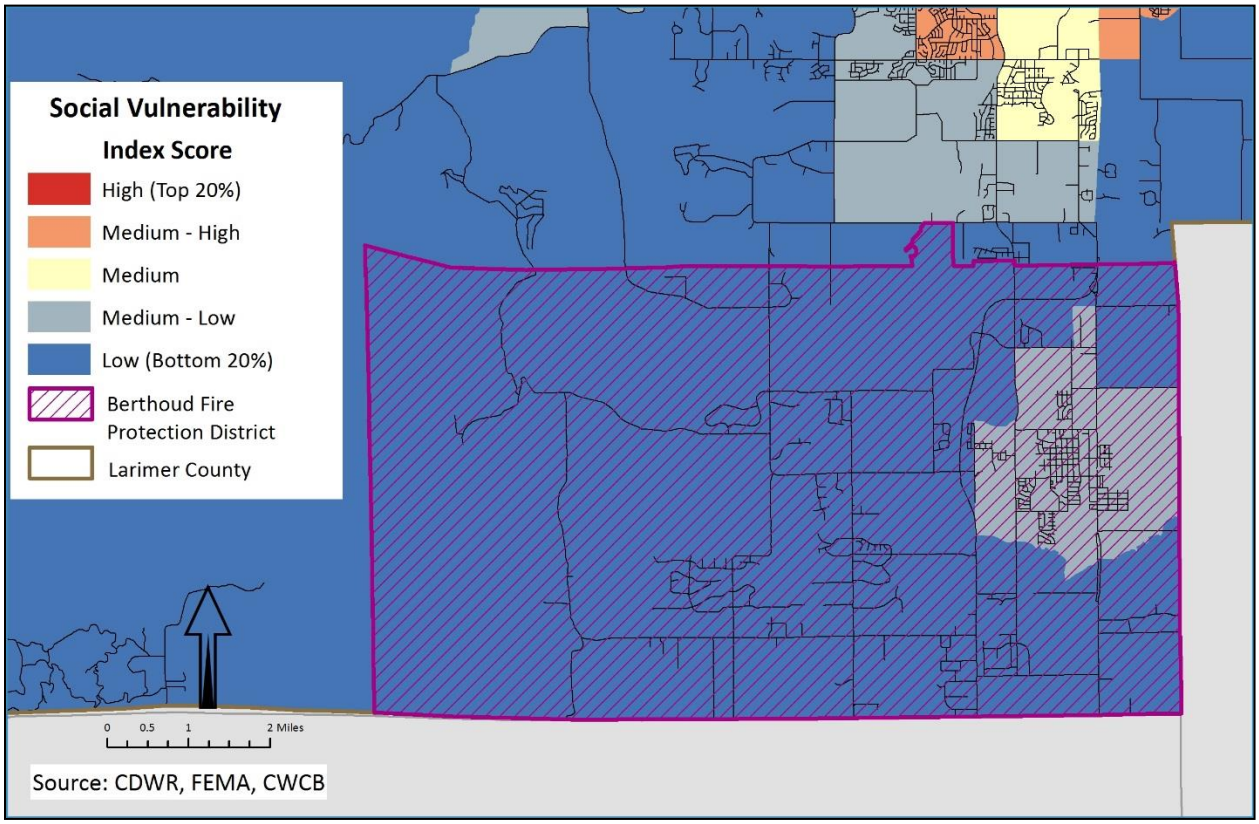
Vulnerability Assessment

This section provides a refined vulnerability assessment, specific for the Berthoud Fire Protection District, for those hazards that were identified as being rated HIGH in the preceding section. This analysis was conducted separately from that of the county-wide vulnerability assessment to specifically focus on the population, structures, infrastructure, and other assets unique to the Berthoud Fire Protection District.

The results of the social vulnerability assessment are displayed on the map below. On the map, social vulnerability is represented at the census tract level by 5 classes of vulnerability: Low (bottom 20% of the

county), Medium-Low, Medium, Medium-High, and High (top 20% of the county). The Berthoud Fire Protection District's social vulnerability map shows social vulnerability within the district.

Social Vulnerability Map – Berthoud Fire Protection District[56]



Social vulnerability is represented as the social, economic, demographic, and housing characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to hazard events. The pre-existing social conditions that contribute to disaster losses can be identified using social vulnerability indicators. Using methods identified in the Social Vulnerability Index (SoVI) developed by Cutter et. al. (2003) this layer shows the social vulnerability index scores for the State of Colorado at the census tract level. Social vulnerability is represented at the Census tract level by five classes of vulnerability: Low, Medium-Low, Medium, Medium-High, and High.

Berthoud Fire Protection District is characterized by a mix of medium-low to low levels of social vulnerability. A deeper-dive into the individual social vulnerability indicators within the district will give local emergency managers, planners, and stakeholders an even clearer picture of which social vulnerability factors have the largest negative effect on the community and its resiliency. It is important

[56] Source: Colorado Division of Water Resources Dam Safety Branch, FEMA, Colorado Water Conservation Board (CWCB)

that the District continue to monitor social vulnerability levels over time as demographics and economics change in the area.

Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)

Previous Occurrences

According to NOAA's Storm Events Database, the Berthoud Fire Protection District has experienced 74 Winter Storms since 1996. On March 17, 2003 there was report of a winter storm causing $15,500,000 in property damage in areas of Larimer County below 6,000 feet and eastern Larimer County. There were no deaths, injuries or damage to crops reported for any of these storms. The Berthoud Fire Protection District is at high risk of experiencing Winter Storms during the winter months.

Inventory Exposed

All assets located in the Berthoud Fire Protection District can be considered at risk from winter storms. This includes more than 17,500 people, or 100% of the District's population, and all buildings and infrastructure within the district. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the District's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Potential Losses

Winter storms affect the entire planning area of the Berthoud Fire Protection District including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Winter storms will remain a highly likely occurrence for the Berthoud Fire Protection District.

Probability of Future Occurrences

Severe winter storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past severe winter events provide benchmarks for projecting similar conditions into the future. The probability that the Berthoud Fire Protection District will experience a severe winter storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the district at least once every year.

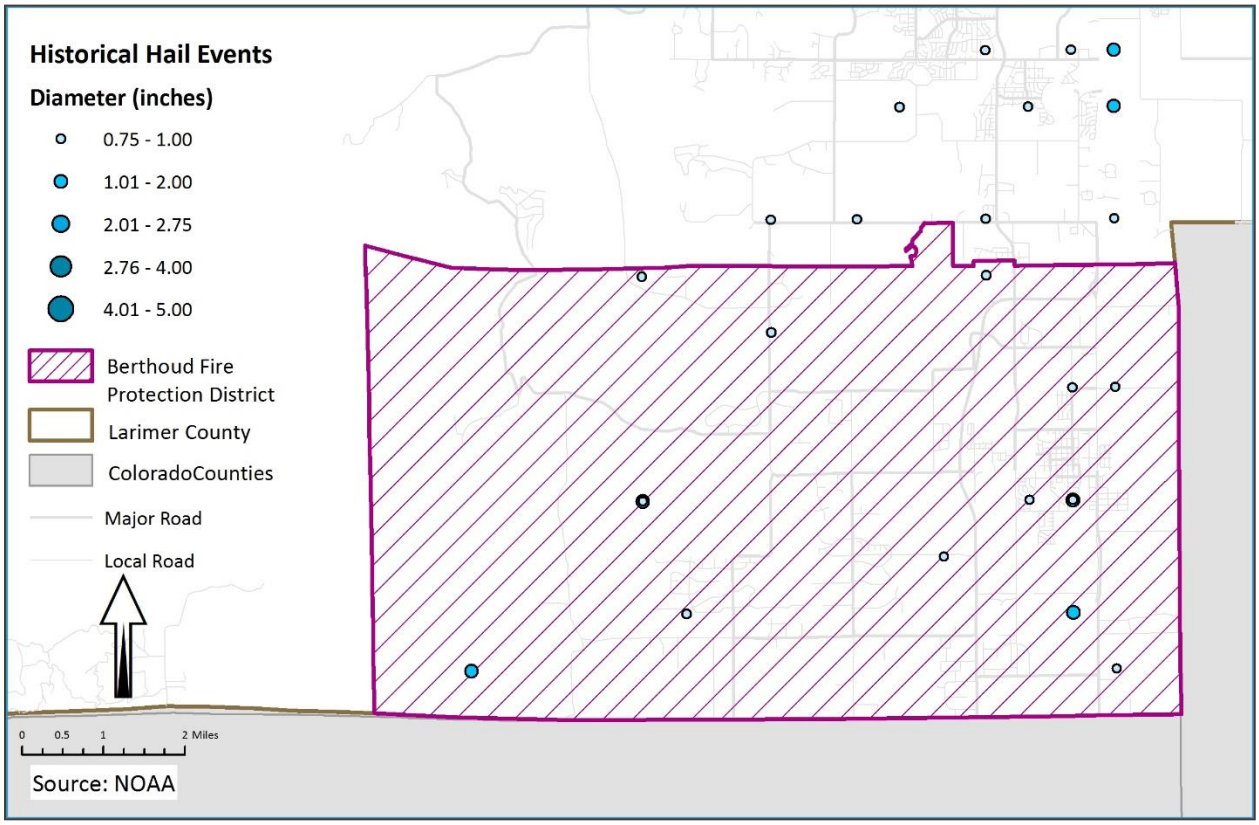
Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)

Previous Occurrences

According to NOAA's Storm Events Database there was 1 reported injury, and no reported deaths, property damage, or crop damage in the Berthoud Fire Protection District due to hail. There have been

18 hail events reported in the District between 1955 and 2014. Based on the historic data showing hazardous impacts on the district, there is a great potential for hail events to occur at any given time.

Historical Hail Events in Berthoud Fire Protection District[57]



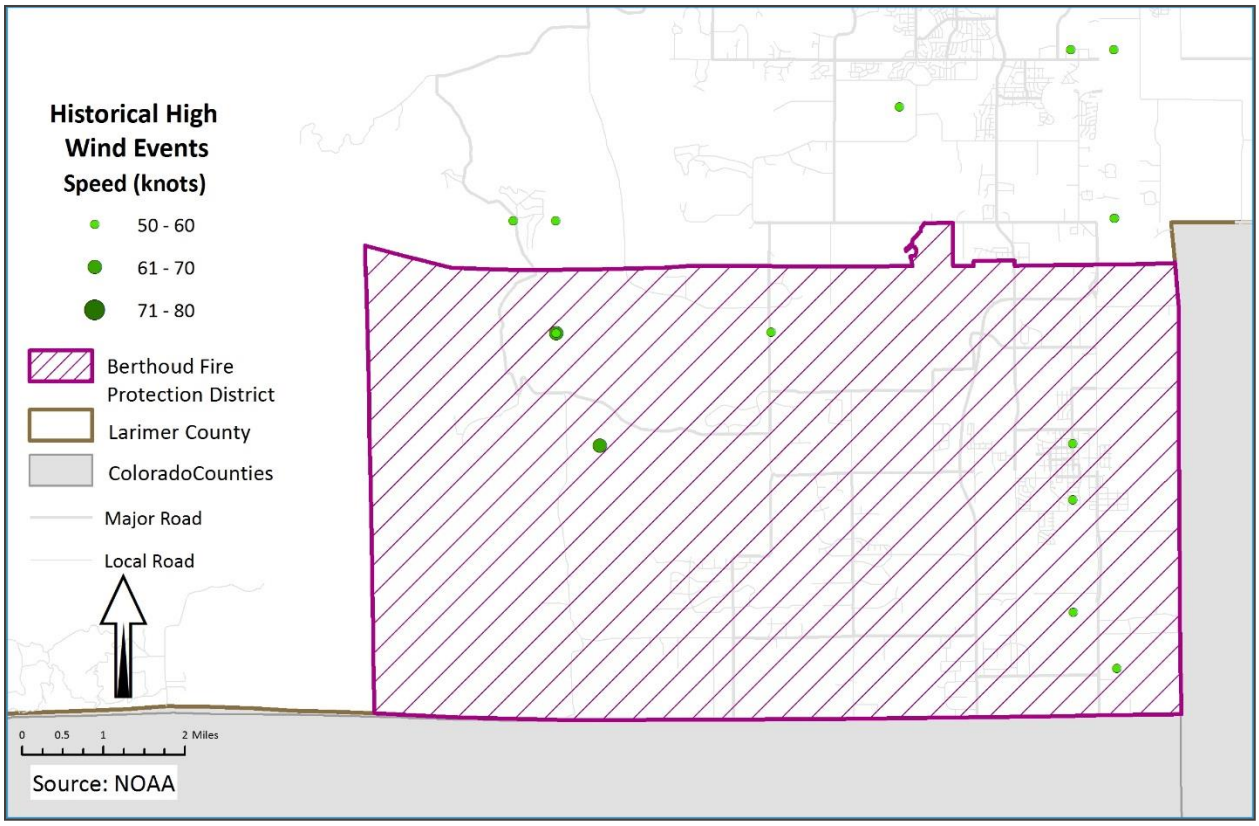
According to NOAA's Storm Events Database there have been no injuries, deaths, property loss or crop loss in the Berthoud Fire Protection District due to thunderstorm wind. Based on the historic data showing hazardous impacts on Larimer County, there is a great potential for hail events to occur at any given time in the District.

According to NOAA's Storm Events Database there has been 1 lightning event in the Berthoud Fire Protection District between 1996 and 2014. There have been no reported injuries, deaths, property damage, or crop damage resulting from lightning events within the district.

According to NOAA's Storm Events Database there have been 8 windstorm events in the Berthoud Fire Protection District between 1996 and 2014. There have been no reported injuries, deaths, property damage, or crop damage resulting from a windstorm event.

[57] Source: NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

Historical High Wind Events in Berthoud Fire Protection District[58]



Inventory Exposed

All assets located in the Berthoud Fire Protection District can be considered at risk from spring and summer storms. This includes more than 17,500 people, or 100% of the District's population, and all buildings and infrastructure within the district. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the District's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Inventory assets exposed to severe wind is dependent on the age of the building, type, construction material used, and condition of the structure. Possible losses to critical infrastructure include:

- Electric power disruption
- Communication disruption
- Water and fuel shortages
- Road closures

[58] Source: NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

- Damaged infrastructure components, such as sewer lift stations and treatment plants
- Damage to homes, structures, and shelters

Potential Losses

Spring and summer storms affect the entire planning area of the Berthoud Fire Protection District including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Severe storms will remain a highly likely occurrence for the Berthoud Fire Protection District. It is likely that lightning and hail will also be experienced in the area due to such storms.

Generally, straight-line wind events destroy private, commercial, and public property. Additional costs stem from debris removal, maintenance, repair, and response. Indirect costs include loss of industrial and commercial productivity as a result of damage to infrastructure, facilities, or interruption of services. Because no specific, countywide loss estimation exists for wind, potential losses are related to historical property damage and injuries/deaths.

Probability of Future Occurrences

Spring and summer storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past spring and summer events provide benchmarks for projecting similar conditions into the future. The probability that the Berthoud Fire Protection District will experience a spring or summer storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the Berthoud Fire Protection District at least once every year.

Reported straight-line wind events over the past nineteen years provide an acceptable framework for determining the future occurrence in terms of event. The probability of the Berthoud Fire Protection District experiencing a severe wind event associated with damages or injuries can be difficult to quantify, but based on historical record of 8 severe wind events since 1996, there is a high chance of this type of event occurring each year.

Fire – Wildland

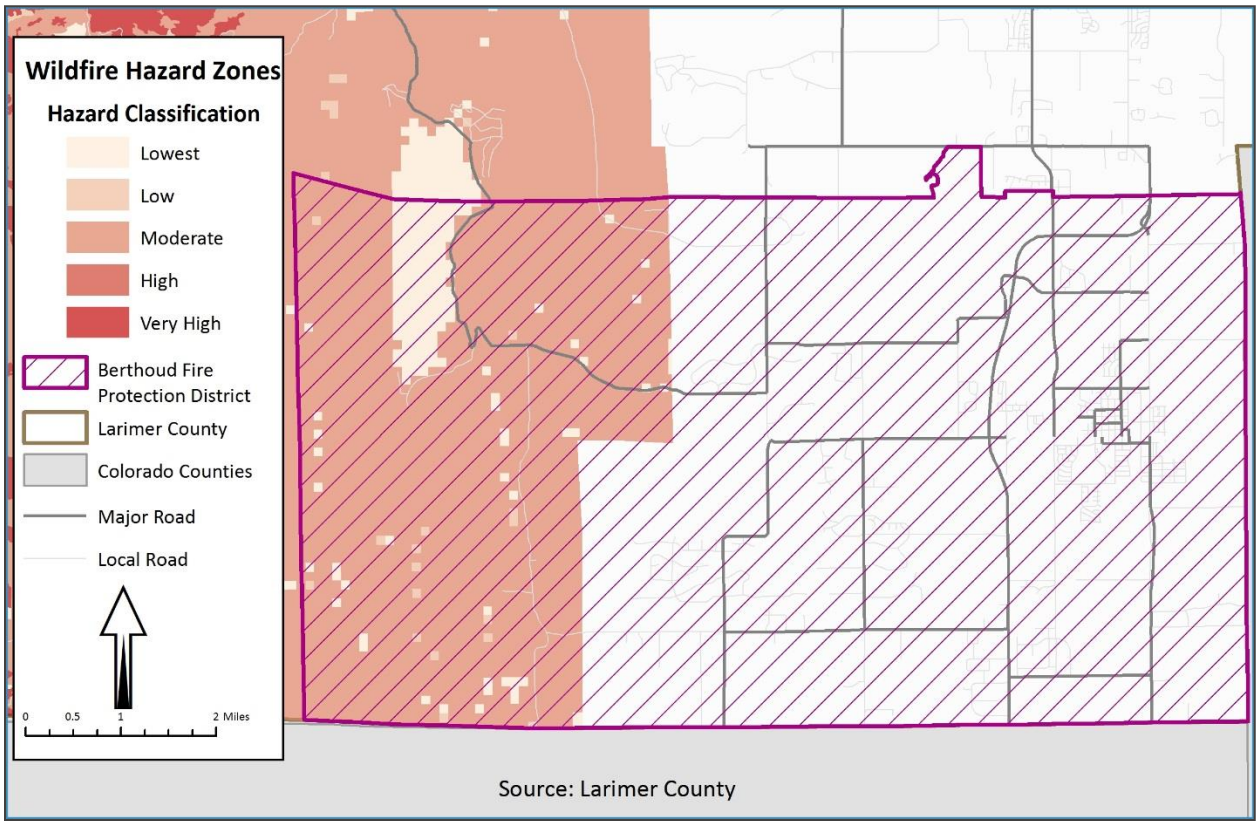
Previous Occurrences

According to NOAA's Storm Events Database there have been no reported wildfire events in the Berthoud Fire Protection District. Based on the historic data showing hazardous impacts on Larimer County, there is a great potential for wildfire events to occur at any given time in the Berthoud Fire Protection District.

Inventory Exposed

The following Wildfire Hazard Zone map identifies the expected wildfire behavior. The highest wildfire hazard zones in the district are located in the western region, in areas where there are lower population densities.

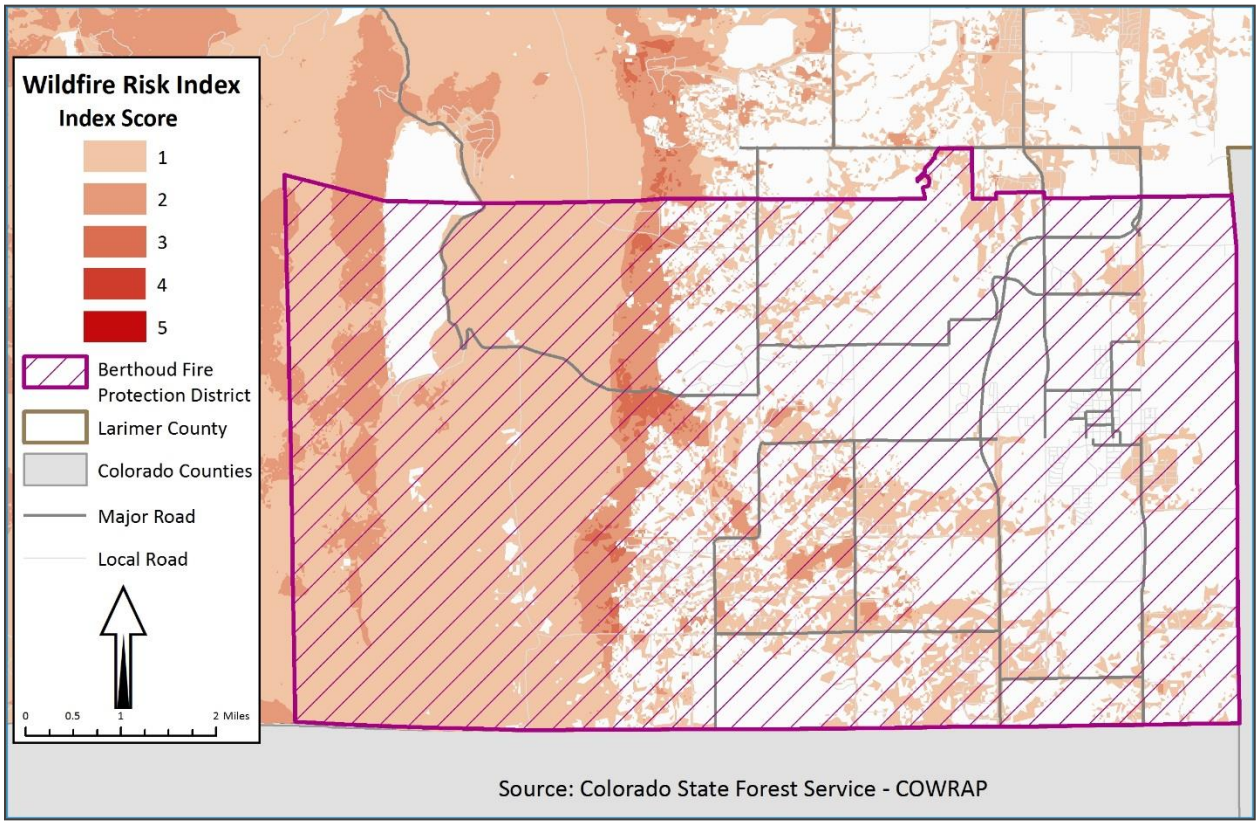
Berthoud Fire Protection District Wildfire Hazard Zone Map[59]



The following Wildfire Risk map identifies areas with the greatest potential impacts from a wildfire, in other words, those areas most at risk. The highest wildfire risk areas in the district are located in the western and central region, in areas where there are lower population densities.

[59] To be used to identify wildfire hazards within the Wildfire Mitigation Area. The hazards are determined according to the Wildfire Hazard Area Mapping (WHAM) guidelines.

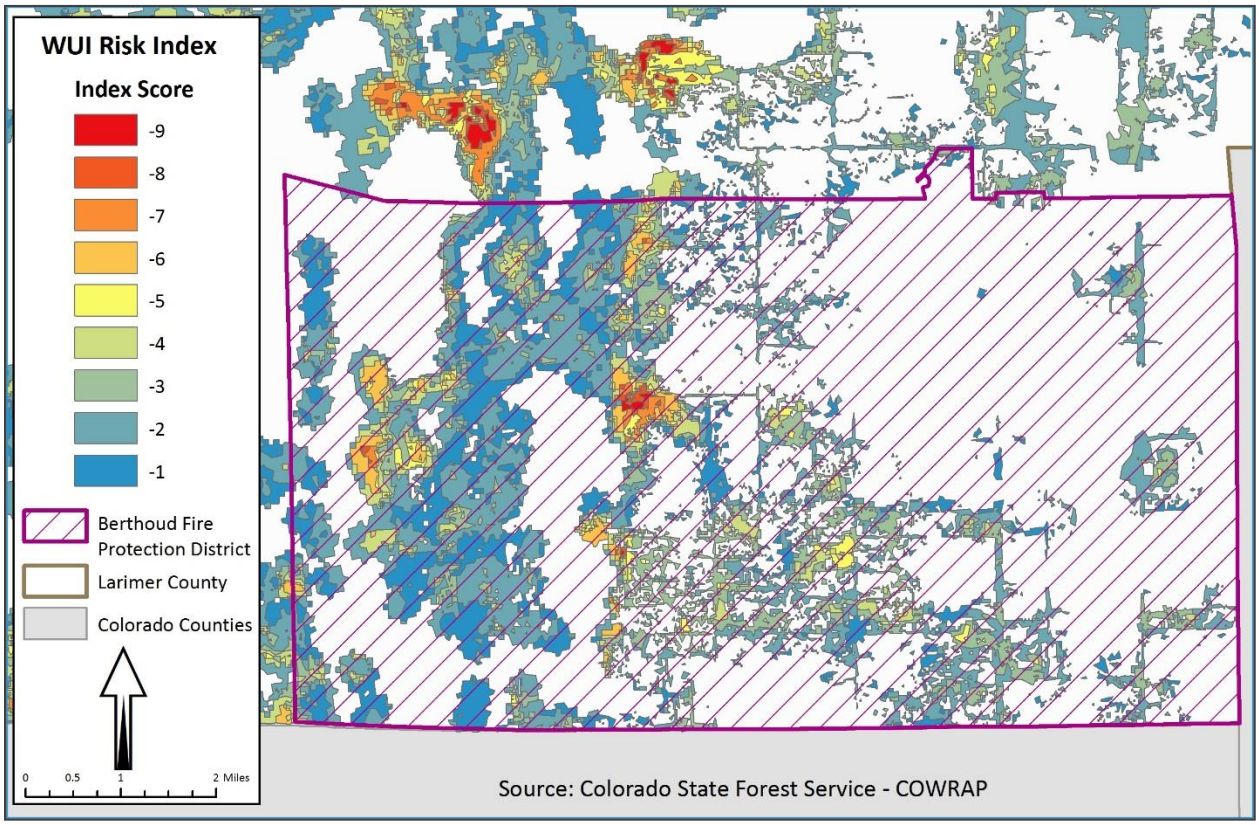
Berthoud Fire Protection District Wildfire Risk Index Map[60]



There are a number of areas in the central and western region of the district that are within the medium to highest level on the WUI Risk Index Scale. This means that the potential impact on people and homes from a wildfire in those areas is medium to high in relationship to the rest of Larimer County. This level of risk is derived by combining housing density with predicted flame length.

[60] Wildfire Risk represents the possibility of loss or harm occurring from a wildfire. Risk is derived by combining wildfire threat and fire effects. The COWRAP data set was produced statewide and ranks areas on a scale that includes: lowest risk to highest risk. All risk rankings are present in Larimer County.

Berthoud Fire Protection District WUI Map[61]



Fires can extensively impact the economy of an affected area, including the agricultural, recreation and tourism industries, water resources, and the critical facilities upon which the Berthoud Fire Protection District depends. There are no identified critical facilities located in areas with the *moderate-high* wildfire threat total.

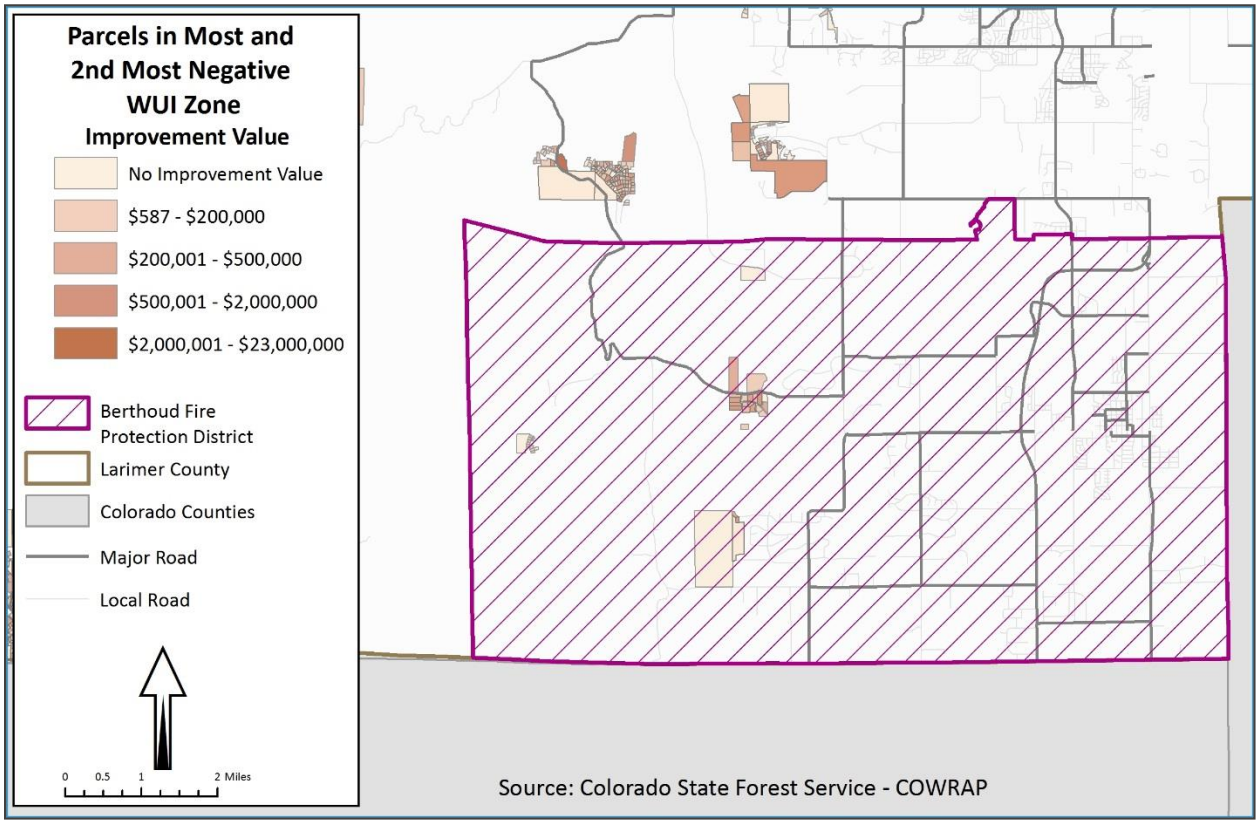
Potential Losses

The exposure data provided in the previous section (Inventory Assets Exposed) provides the clearest picture of potential losses to wildfire in the Berthoud Fire Protection District. The appraisal value of the structures within these *moderate-high* threat areas is approximately $8,986,171. The risk assessment uses

[61] Wildland Urban Interface (WUI) Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length. The COWRAP data set was produced statewide and ranks areas on a scale that includes: least negative to most negative impacts. This scale stretched from -1 (least) to -9 (most) statewide, within Berthoud Fire Protection District values present span this entire range.

worst case scenario loss estimates. For this reason it is important to plan for relative levels of loss rather than specific potential loss dollar amounts.

Berthoud Fire Protection District Parcels in the Most Negative and Second Most Negative WUI Zone



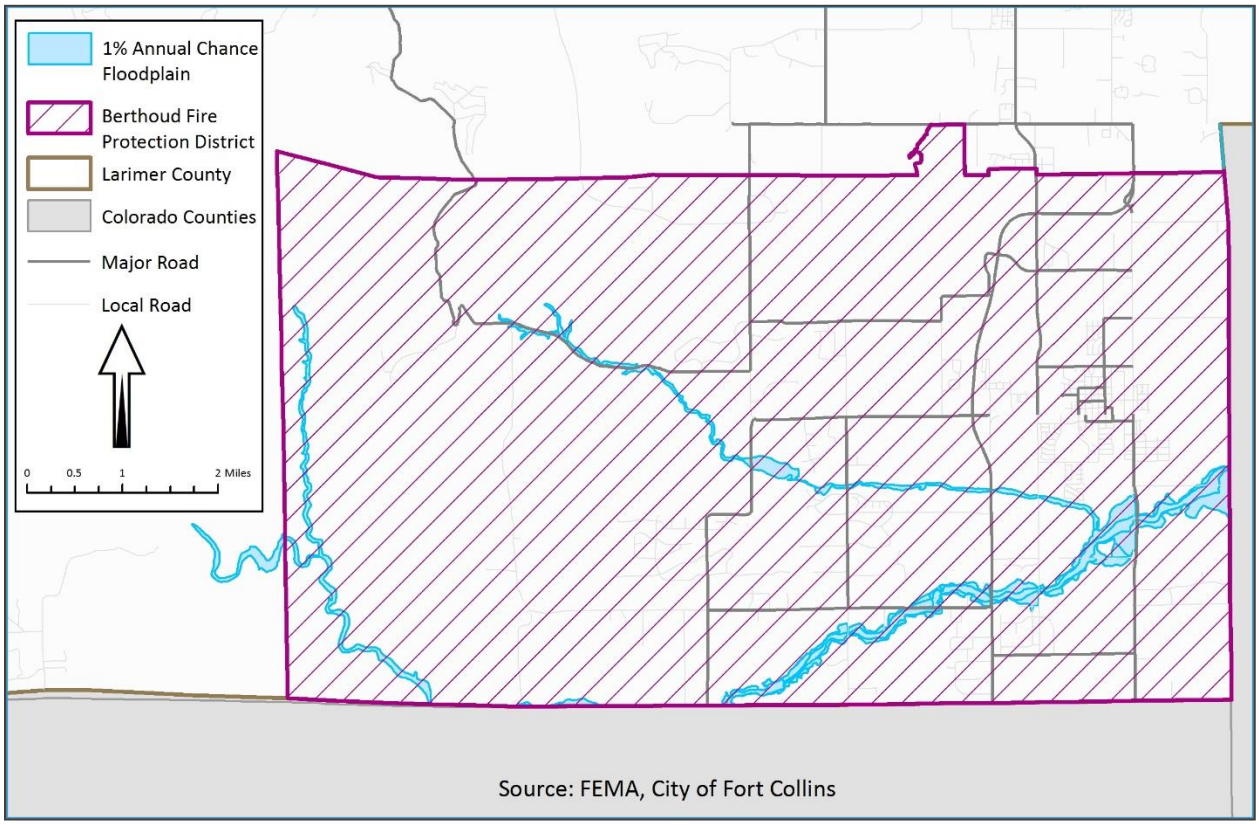
Probability of Future Occurrences

The likelihood of wildfires attaining significant size and intensity is unpredictable and highly dependent on environmental conditions and firefighting response. Weather conditions, particularly drought events, increase the likelihood of wildfires occurring. That said, it is important to note that 98% of wildfires are human-caused. Ultimately, the occurrence of future wildfire events will strongly depend on patterns of human activity and events are more likely to occur in wildfire-prone areas experiencing new or additional development.

Wildfires can occur at any time of day and during any month of the year. Moreover, the length of a wildfire season and/or peak months may vary appreciably from year to year. As evidenced by the wildfire risk assessment, areas within the Berthoud Fire Protection District that are characterized by dense development and single family homes along the wildland-urban interface are most vulnerable to wildfire.

Flood – Flash and Riverine

Berthoud Fire Protection District Special Flood Hazard Area[62]

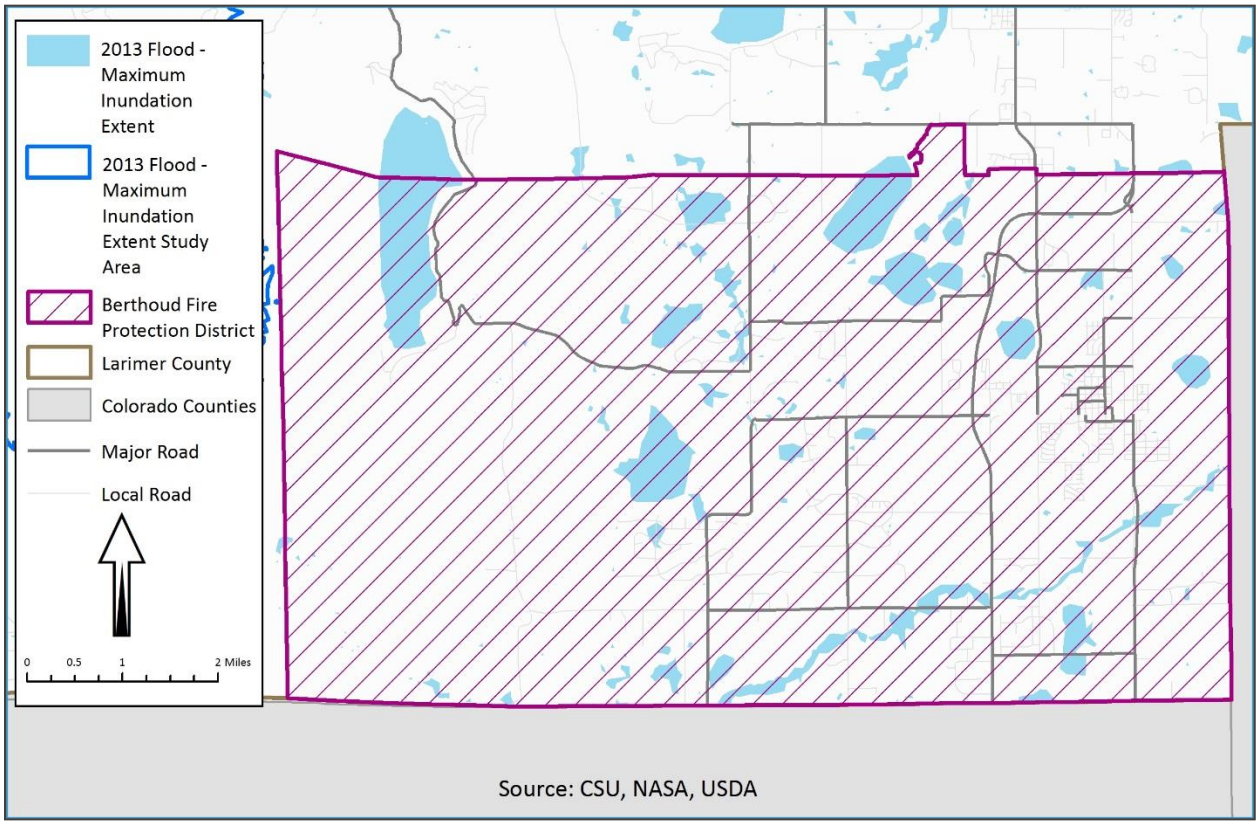


Previous Occurrences

According to NOAA's Storm Events Database there have been no reported injuries, property loss, or crop damage in the Berthoud Fire Protection District caused by flooding. On September 12, 2013 there were two reported deaths caused by flooding. From September 12-16, 2013 nearly 6-18 inches of rain fell across Colorado's front range and I-25 corridor. Based on the historic data showing hazardous impacts on the district, there is a great potential for flooding events to occur at any given time.

[62] This layer is compiled utilizing the most recent Special Flood Hazard Areas (SFHA) as defined by FEMA's National Flood Hazard Layer (NFHL) in combination with some recent flood studies performed by the City of Fort Collins. These areas are also referred to as the 1% Annual Chance Floodplain.

Berthoud Fire Protection District 2013 Flood Extent[63]



Maximum flood extent—a key data need for disaster response and mitigation—is rarely quantified due to storm-related cloud cover and the low temporal resolution of optical sensors. While change detection approaches can circumvent these issues through the identification of inundated land and soil from post-flood imagery, their accuracy can suffer in the narrow and complex channels of increasingly developed and heterogeneous floodplains. The data depicted above is from a study that explored the utility of the Operational Land Imager (OLI) and Independent Component Analysis (ICA) for addressing these challenges in the unprecedented 2013 Flood along the Colorado Front Range, USA. The approach was able to simultaneously distinguish flood-related water and soil moisture from pre-existing water bodies and other spectrally similar classes within the narrow and braided channels of the study site.

Inventory Exposed

Critical facilities are essential to the health and welfare of the whole population and are especially important both during and after hazard events. Critical structures or areas that overlap or touch the SFHA are considered "flood prone."

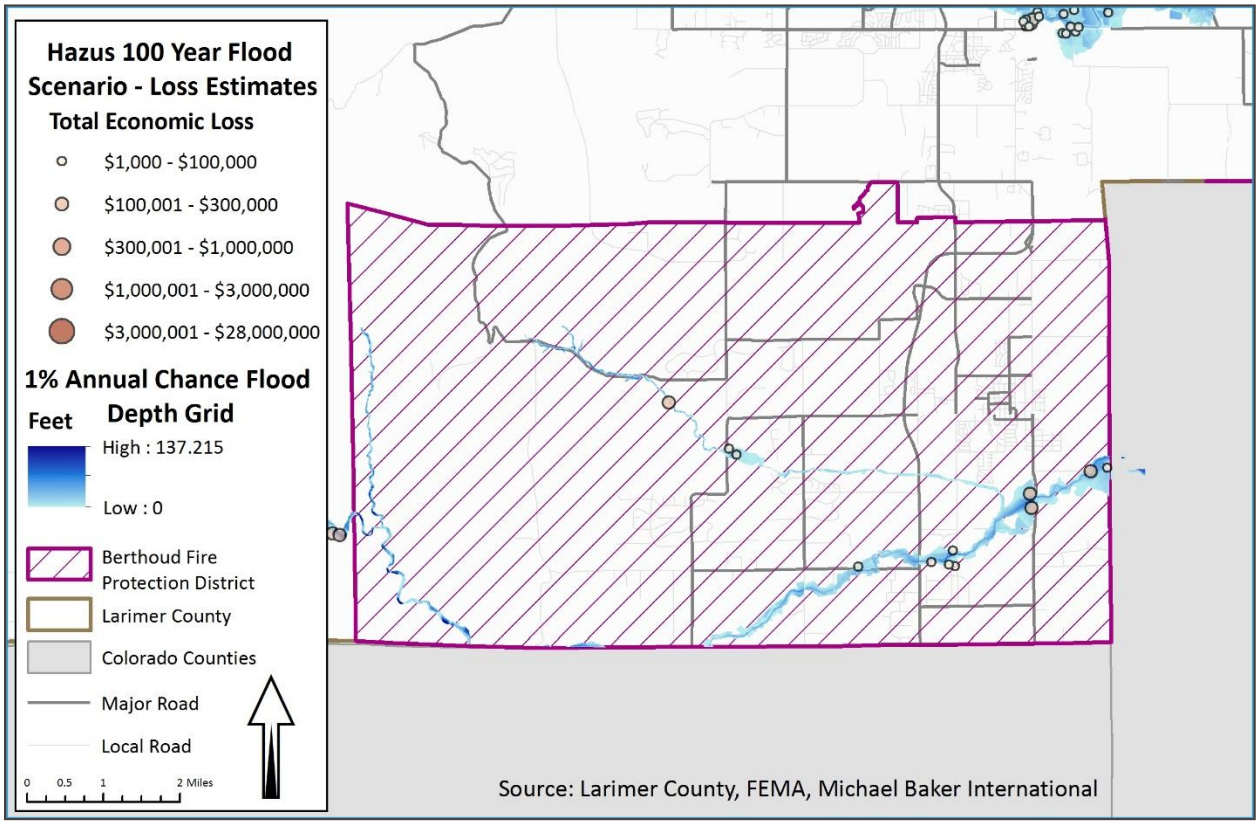
[63] Multi-Temporal Independent Component Analysis and Landsat 8 for Delineating Maximum Extent of the 2013 Colorado Front Range Flood

The critical facility and structure exposure analysis estimates that there are no critical facilities and 12 parcels/structures in the Berthoud Fire Protection District that are flood prone (not including the total miles of flood prone infrastructure). The appraised value of these exposed structures is over $2.8 million dollars.

Potential Losses

Hazus estimates for the Berthoud Fire Protection District that for a 100-year flood event, approximately 12 buildings will experience flood damage. The estimated building loss is over $343 thousand dollars, content loss over $313 thousand dollars, and inventory loss $189.5 thousand dollars.

Berthoud Fire Protection District 1% Annual Flood Loss Estimation and Flood Depth Grid Map[64]



[64] FEMA's loss estimation modeling software, Hazus, was utilized to produce this data set. A 100 year flood scenario was defined and losses were calculated for each point (structure) that intersected the depth grid based on the Hazus depth damage curves for specific structure attributes (such as foundation type, building type, and first flood height). Information derived from Hazus-MH 2.2 flood scenario. Total Losses equals a sum of building losses, content losses, and inventory losses. 1% Annual Chance Flood flooding depth grid, produced from the best available topographic and floodplain data.

Probability of Future Occurrences

Frequency of previously reported flood events in the Berthoud Fire Protection District provide an acceptable framework for determining the probability of future flood occurrence in the area. The probability that the District will experience a flood event can be difficult to predict or quantify.

Severe flooding has the potential to inflict significant damage to people and property in the district. Mitigating flood damage requires that communities remain diligent and notify local officials of potential flood (and flash flood) prone areas near infrastructure such as roads, bridges, and buildings.

Capabilities Assessment

The capability assessment examines the ability of the Berthoud Fire Protection District to implement and manage the comprehensive mitigation strategy laid out in this Plan. The strengths, weaknesses, and resources of the community are identified here as a means for evaluating and maintaining effective and appropriate management of the district's hazard mitigation program.

Local Personnel

The ability of a community to implement a comprehensive mitigation strategy depends, in part, on available resources, including people and staff. The following table outlines the district's capabilities as they relate to key personnel.

	Full Time	Part Time	None or Not-Identified
Emergency Manager			X
Floodplain Administrator			X
Community Planner			X
GIS Specialist			X
Grant Writer			X

Land Use Planning and Codes

Local land use plans and building codes are tremendous tools for evaluating local policies related to hazard mitigation and risk reduction. Additionally, comprehensive master plans, capital improvement plans, stormwater plans and zoning ordinances all present opportunities for enhanced local capabilities. The following table outlines the district's current capabilities as they relate to land use planning and codes.

	Yes (Y); No (N)
A zoning ordinance	N
A hazard-specific ordinance	N
Local building codes	Y
A Comprehensive Plan / Master Plan	N
A Capital Improvements Plan	Y
A Stormwater Plan	N
A Continuity of Operations Plan (COOP)	Y
An Emergency Operations Plan (EOP)	Y

A Long-Term Recovery Plan	N
Participates in the NFIP	Y

Building codes are one tool that communities use to enhance public safety. For example, they can increase structural integrity, mitigate structure fires, and provide benefits in relation to natural hazard avoidance. In Colorado, land use regulations and building codes are typically implemented at the local level. Even without a statewide mandate, most counties and many municipalities have enacted regulations and codes. The Berthoud Fire Protection District has adopted a local building code requirement, demonstrating their understanding of the benefits codes provide, including reduced exposure to hazards.

Plan Maintenance and Implementation

The Berthoud Fire Protection District has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the District will continue public participation in the plan maintenance process.

Jurisdiction	Plan Maintenance and Implementation Strategy
Berthoud Fire Protection District	*"Our mitigation actions will be reviewed by staff and the District's Board of Directors on annual basis."* *"Changes to our mitigation actions and priorities will be announced publically and posted on the District's website for public review and comment."*

Integrating Hazard Mitigation into Local Planning

Through discussions at planning meetings and the use of an online survey, individual outreach, and phone calls, each participating jurisdiction brainstormed with the planning team to identify processes for integrating hazard mitigation into their local planning mechanisms and policies. The following table lists the specific integration strategy identified by the Berthoud Fire Protection District based on the mitigation actions listed in this plan.

Jurisdiction	Strategy
Berthoud Fire Protection District	*"We will continue to identify specific hazards in our community and address them by completing a risk and vulnerability assessment, policy and/or codes will be adopted to address the issues."* *"We've completed a Community Wildfire Protection Plan and an R / A on the Burlington Northern Santa Fe Railroad which transverses our community."*

Mitigation Action Guides

The following Mitigation Action Guides present the District's mitigation actions that were developed for the 2016 Plan.

Berthoud Fire Protection District / Emergency Operations Plan (Berthoud FPD – 1)	
PRIORITY: Priority 1	HAZARDS ADDRESSED: Drought, Earthquake, Land Subsidence or large sinkholes, Extreme Temperatures, Flood, Severe Storm, Wind & Tornado, Structural and Wildland Fire, Public Health Emergencies, Hazardous Material Releases, Civil Unrest and Terrorist Attack
LOCATION: 275 Mountain Ave., Berthoud, CO 80513	GOALS ADDRESSED: The following goals are addressed; Goal 1, Goal 2, Goal 3, Goal 4 and Goal 5.
RECOMMENDATION DATE: 10/19/2015	OBJECTIVES ADDRESSED: The following objectives are addressed; Objective A, Objective B, Objective C, Objective D and Objective E.
TARGET COMPLETION DATE: 02/01/2016	
ISSUE: The Berthoud Fire Protection District does not have an "Emergency Operations Plan."	
RECOMMENDATION: Review the Larimer County Comprehensive Emergency Management Plan, draft an emergency operations plan for the Berthoud Fire Protection District.	
ACTION: Adopt the Larimer County Comprehensive Emergency Management Plan, draft as an Annex an Emergency Operations Plan for the Berthoud Fire Protection District for adoption and implementation.	
LEAD AGENCY: Berthoud Fire Protection District	EXPECTED COST: 58 staff hours / staff cost $3,322
SUPPORT AGENCIES: Larimer County Sheriff's Office, Larimer County, CO	POTENTIAL FUNDING SOURCES: District revenues from property taxes (gas/oil included) / specific ownership taxes / Grants
PROGRESS MILESTONES: Project Funding	

Berthoud Fire Protection District / Continuity of Operations Plan (Berthoud FPD – 2)	
PRIORITY: Priority 2	HAZARDS ADDRESSED: Drought, Earthquake, Land Subsidence or large sinkholes, Extreme Temperatures, Flood, Severe Storm, Wind & Tornado, Structural and Wildland Fire, Public Health Emergencies, Hazardous Material Releases, Civil Unrest and Terrorist Attack
LOCATION: 275 Mountain Ave., Berthoud, Co 80513	GOALS ADDRESSED: The following goals are addressed; Goal 1, Goal 2, Goal 3, Goal 4 and Goal 5.
RECOMMENDATION DATE: 10/19/2015	OBJECTIVES ADDRESSED: The following objectives are addressed; Objective A, Objective B, Objective C, Objective D and Objective E.
TARGET COMPLETION DATE: 06/30/2016	
ISSUE: The Berthoud Fire Protection District does not have a Continuity of Operations Plan.	
RECOMMENDATION: Draft a Continuity of Operations Plan through committee involvement.	
ACTION: Draft and adopt a Continuity of Operations Plan for the Berthoud Fire Protection District.	
LEAD AGENCY: Berthoud Fire Protection District	EXPECTED COST: 107 staff hours / staff cost $6,094
SUPPORT AGENCIES: Larimer County Office of Emergency Management , Larimer County, CO	POTENTIAL FUNDING SOURCES: District revenues from property taxes (gas/oil included) and specific ownership taxes / Grants
PROGRESS MILESTONES: Project Funding	

Berthoud Fire Protection District / Burlington Northern Santa Fe Railroad Threat and Risk Assessment and Mitigation Plan (Berthoud FPD – 3)	
PRIORITY: Priority 3	HAZARDS ADDRESSED: Chemical Fire, Public Health Emergencies and Hazardous Material Release
LOCATION: 275 Mountain Ave., Berthoud, CO 80513	GOALS ADDRESSED: The following goals are addresses; Goal 1, Goal 2, Goal 3, Goal 4 and Goal 5.
RECOMMENDATION DATE: 10/19/2015	OBJECTIVES ADDRESSED: The following objectives are addressed; Objective A, Objective B, Objective C, Objective D and Objective E.
TARGET COMPLETION DATE: 08/01/2016	
ISSUE: The Berthoud Fire Protection District has identified the need to update the 2011 Burlington Northern Santa Fe Railroad Threat and Risk Assessment and Mitigation Plan.	
RECOMMENDATION: Update the 2011 Burlington Northern Santa Fe Railroad Threat and Risk Assessment and Mitigation Plan.	
ACTION: Review current plan, complete risk identification and risk analysis, assess vulnerability and plan mitigation strategies.	

LEAD AGENCY: Berthoud Fire Protection District	EXPECTED COST: 40 staff hours / staff cost $2,278 The Blue Cell, LLC cost $3,500 / total cost $5,778
SUPPORT AGENCIES: The Blue Cell, LLC.	POTENTIAL FUNDING SOURCES: District revenues from property taxes (gas/oil revenue included) and specific ownership taxes / grants
PROGRESS MILESTONES: Project Funding.	

Berthoud Fire Protection District / Community Wildfire Protection Plan (Berthoud FPD – 4)	
PRIORITY: Priority 4	HAZARDS ADDRESSED: Wildfire / Urban Interface Wildfire
LOCATION: 275 Mountain Ave., Berthoud, CO 80513	GOALS ADDRESSED: The following goals are addressed; Goal 1, Goal 2, Goal 3, Goal 4 and Goal 5.
RECOMMENDATION DATE: 10/19/2015	OBJECTIVES ADDRESSED: The following objectives are addressed; Objective A, Objective B, Objective C, Objective D and Objective E.
TARGET COMPLETION DATE: 01/30/2016	
ISSUE: The Berthoud Fire Protection District has identified the need to update the District's 2007 Community Wildfire Plan.	
RECOMMENDATION: Contact Anchor Point Fire Management, Boulder, CO to contract the update of this plan with staff assistance.	
ACTION: Contact Chris White of Anchor Point Fire Management and request a bid to update the 2007 Community Wildfire Protection Plan. The purpose of the Community Wildfire Protection Plan is risk analysis, fire behavior analysis and community wildfire hazard rating (WHR). The results of the Community Wildfire Protection Plan is to provide a comprehensive, scientifically-based assessment of the wildfire hazards and risk within our jurisdiction.	
The LEAD AGENCY: Berthoud Fire Protection District	EXPECTED COST: staff hours 40 / staff cost $2,012 Anchor Point Fire Management $3,750 / total cost $5,752
SUPPORT AGENCIES: Larimer County Sheriff's Office, Emergency Services Anchor Point Fire Management, Boulder, CO	POTENTIAL FUNDING SOURCES: District revenues from property taxes (gas/oil revenue included) and specific ownership taxes
PROGRESS MILESTONES: Project Funding	

Berthoud Fire Protection District / Standard of Cover (Berthoud FPD – 5)	
PRIORITY: Priority 5	HAZARDS ADDRESSED: Drought, Earthquake, Land Subsidence, Extreme Temperatures, Flood, Severe Storm, Wind & Tornado, Structural and Wildland Fire, Public Health Emergencies, Hazardous Material Releases, Civil Unrest and Terrorist Attacks

LOCATION: 275 Mountain Ave., Berthoud, CO 80513	GOALS ADDRESSED: The following goals are addresses; Goal 1, Goal 2, Goal 3, Goal 4 and Goal 5.
RECOMMENDATION DATE: 10/19/2015	OBJECTIVES ADDRESSED: The following objectives are addressed; Objective A, Objective B, Objective C, Objective D and Objective E.
TARGET COMPLETION DATE: 10/31/2016	
ISSUE: The Berthoud Fire Protection District has identified the need to update the District's 2014 Standard of Cover.	
RECOMMENDATION: Update the 2014 Standard of Cover.	
ACTION: Review current plan, complete a deployment analysis that determines the distribution and concentration of fixed and mobile resources of the District. The Standard of Cover will include, through research, risk assessment, critical task analysis, agency service level objectives, and distribution and concentration measures. The Standard of Cover will also provide documentation of reliability studies and historical performance and conclude with policy recommendations.	
LEAD AGENCY: Berthoud Fire Protection District	EXPECTED COST: staff hours 80 / staff cost $4,556 National Fire Services Office cost $3,500 / total cost $8,056
SUPPORT AGENCIES: National Fire Services Office, Sylvania , Georgia	POTENTIAL FUNDING SOURCES: District revenues from property taxes (gas/oil revenue included) and specific ownership taxes / Grants
PROGRESS MILESTONES: Project Funding	

Berthoud Fire Protection District / Operational Response Guidelines & Policy (Berthoud FPD – 6)	
PRIORITY: Priority 6	HAZARDS ADDRESSED: Drought, Earthquake, Land Subsidence, Extreme Temperatures, Flood, Severe Storm, Wind & Tornado, Structural and Wildland Fire, Public Health Emergencies, Hazardous Materials Release, Civil Unrest and Terrorist Attacks
LOCATION: 275 Mountain Ave., Berthoud, CO 80513	GOALS ADDRESSED: [posted on website, use number]
RECOMMENDATION DATE: 10/19/2015	OBJECTIVES ADDRESSED: [posted on website, use letter]
TARGET COMPLETION DATE: 06/30/2016	
ISSUE: The Berthoud Fire Protection District has identified the need to update the District's Operational Response Guidelines.	
RECOMMENDATION: Update the District's Operational Response Guidelines.	
ACTION: Contract with Lexipol, LLC of Aliso Viejo, California to work with staff to develop new operating guidelines.	
LEAD AGENCY: Berthoud Fire Protection District	EXPECTED COST: staff hours 160 hours / staff cost $3,884 / Lexipol, LLC cost $3,836 / total cost $7,720
SUPPORT AGENCIES: Lexipol, LLC, Aliso Viejo, California	POTENTIAL FUNDING SOURCES: District revenues from property taxes (gas/oil revenue included) and specific ownership taxes / Grants
PROGRESS MILESTONES: Project Funding	

Letter of Intent to Participate

Berthoud Fire Protection District

LETTER OF INTENT TO PARATICIPATE

September 16, 2014

Larimer County Office of Emergency Management
Lori R. Hodges, Director
200 West Oak Street, 2nd Floor
Fort Collins, CO 80522-1190

Re: "Statement of Intent to Participate" as a participating jurisdiction in Larimer County Office of Emergency Management, Multi-Jurisdictional Hazard Mitigation Plan (JJMP)

Dear Director Hodges,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6 which specifically identify criteria that allow for multi-jurisdictional mitigation plan, the Berthoud Fire Protection District is submitting this letter of intent to confirm that Larimer County Office of Emergency Management has agreed to participate in the Larimer County's Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, Berthoud Fire Protection District agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to the Larimer County Office of Emergency Management, to complete the plan in conformance with FEMA requirements.

Berthoud Fire Protection District understands that it must engage in the following planning process, as more fully described in FEMA's Local Mitigation Planning Handbook dated March 2013 including but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc);
- Documentation of an effective process, to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

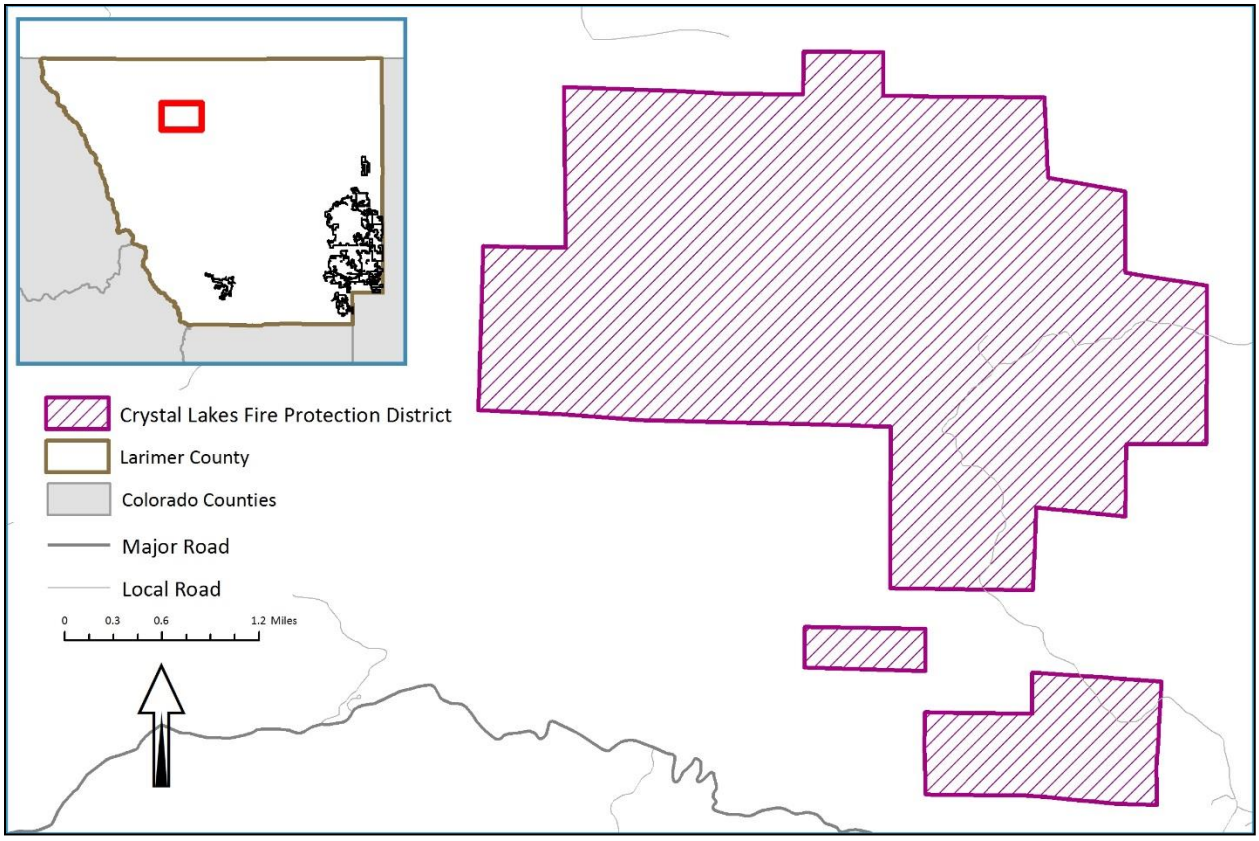
Box 570 • 275 Mountain Ave. • Berthoud, CO 80513
(970) 532-2264 Phone • (970) 532-4744 Fax • www.berthoudfire.org

Crystal Lakes Fire Protection District

Community Profile

The Crystal Lakes Fire Protection District (CLFPD) covers an area of approximately 4,800 acres and is surrounded by the Roosevelt National Forest fifty miles northwest of Fort Collins. The vegetation at this elevation (8,000 to 9,500 feet) ranges from grassy meadows to stands of aspen and pine and there are several lakes in the area. The District encompasses more than 600 cabins and residences on 1,700 lots, a community center, a small mountain resort (Beaver Meadows and associated land), and approximately 95 miles of unpaved roads. The only road in and out of the District is North County Road 73C, which is in good condition south of the district, but is often difficult to pass to the north-east (it becomes primarily single-lane, gets very rough, and has several hairpin turns). This results in the community having only one viable evacuation route (except for those driving high-clearance 4WD vehicles). There is a private dirt airstrip which is owned by Hank's Flying Service, Inc., north of Ottawa Way at Tami Road.

The fire district's community partners are Crystal Lakes Water & Sewer Association and Crystal Lakes Road & Recreation Association. Water & Sewer handles the Water Mitigation Plan for the area, maintaining several man-made lakes and reservoirs. Only a couple of dozen properties in the district have water and sewer-line service. All other properties are on wells/cisterns and septic systems/vaults. There is one hydrant (gravity-fed) near the community center. The primary source of water for firefighting activities is drafting out of the lakes. The large reservoir called Crystal Lakes (aka: Panhandle Reservoir) has an earthen dam, with approximately four dozen properties in the floodplain area below it. The Road & Recreation Association handles snowplowing and maintenance of the community roads, and has opened a slash-disposal depot for property owner use. They also maintain large tracts of community-owned greenbelts, mitigation of which is ongoing. There is a great deal of fire mitigation that needs to be done in this community, both on the publicly owned greenbelts and the privately owned lots. The pine beetle infestation of recent years has killed off a number of trees, and mitigation efforts are ongoing.



Hazard Identification and Risk Assessment

The following Hazard Identification and Risk Assessment Summary table is based on jurisdiction-specific responses to the risk factor exercise and differs from the risk factor results that were determined at the county scale.

NATURAL HAZARD	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Fire – Wildland	1.2	1.05	0.80	0.4	0.35	3.8
Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)	1.2	0.75	0.80	0.2	0.3	3.25
Utility Disruption	1.05	0.6	0.70	0.4	0.2	2.95
Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)	1.05	0.6	0.60	0.15	0.25	2.65
Flood – Flash and Riverine	0.9	0.6	0.50	0.3	0.25	2.55

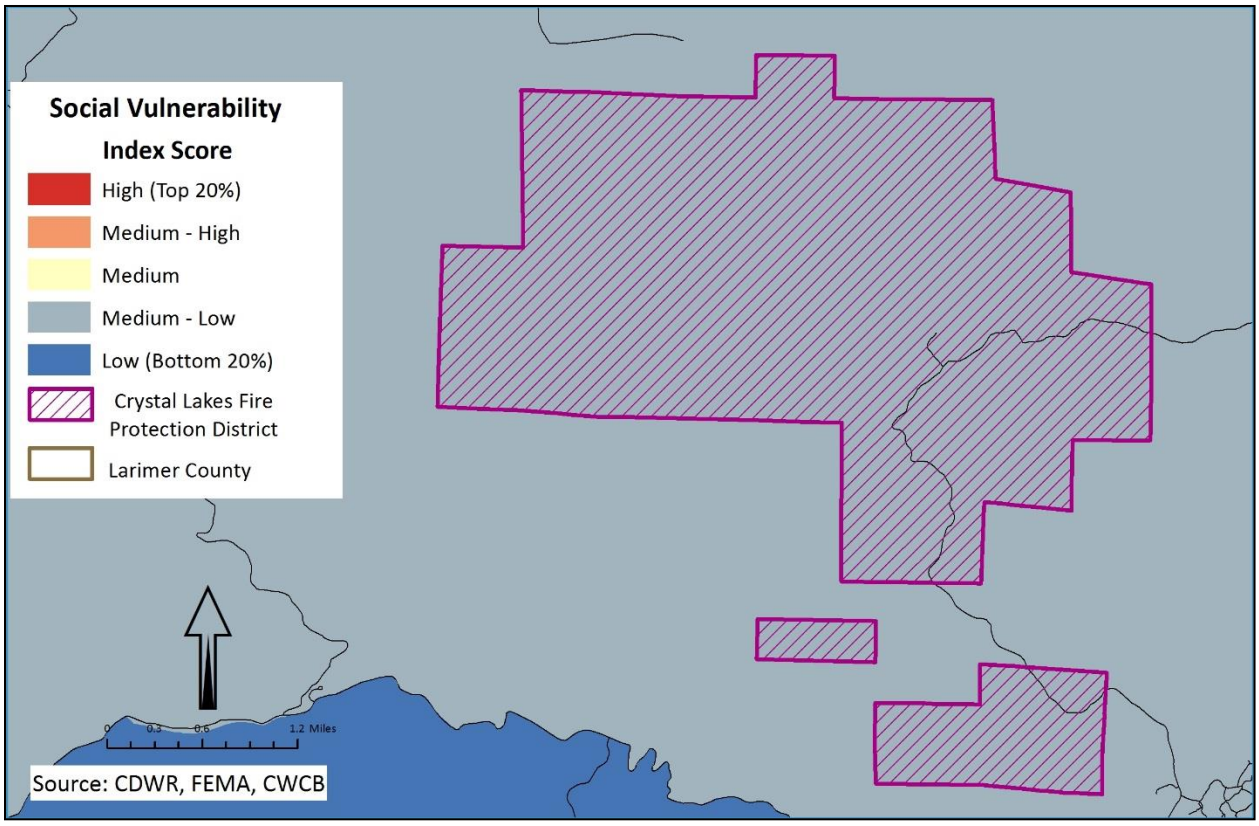
Biological Hazards / Contagion	0.75	0.6	0.30	0.2	0.4	2.25
Landslide / Rockslide	0.75	0.6	0.30	0.35	0.15	2.15
Erosion / Deposition	0.75	0.3	0.40	0.3	0.2	1.95
Hazmat – Fixed and Transport	0.6	0.45	0.30	0.35	0.15	1.85
Earthquake	0.45	0.3	0.30	0.4	0.25	1.7
Civil Disturbance	0.45	0.3	0.30	0.3	0.15	1.5
Tornado	0.3	0.3	0.20	0.4	0.1	1.3
HIGH RISK (2.5 or higher): Fire – Wildland; Winter Storm (Blizzard Conditions, Heavy Snow Accumulation); Utility Disruption; Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning); Flood – Flash and Riverine						
MODERATE RISK HAZARD (2.0 - 2.4): Biological Hazards / Contagion; Landslide / Rockslide; Erosion / Deposition						
Low Risk (1.9 and lower): Hazmat – Fixed and Transport; Earthquake; Civil Disturbance; Tornado						

Vulnerability Assessment

This section provides a refined vulnerability assessment, specific for the Crystal Lakes Fire Protection District, for those hazards that were identified as being rated HIGH in the preceding section. This analysis was conducted separately from that of the county-wide vulnerability assessment to specifically focus on the population, structures, infrastructure, and other assets unique to the Crystal Lakes Fire Protection District.

The results of the social vulnerability assessment are displayed on the map below. On the map, social vulnerability is represented at the census tract level by 5 classes of vulnerability: Low (bottom 20% of the county), Medium-Low, Medium, Medium-High, and High (top 20% of the county). The Crystal Lakes Fire Protection District's social vulnerability map shows social vulnerability within the community.

Social Vulnerability Map – Crystal Lakes Fire Protection District[65]



Social vulnerability is represented as the social, economic, demographic, and housing characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to hazard events. The pre-existing social conditions that contribute to disaster losses can be identified using social vulnerability indicators. Using methods identified in the Social Vulnerability Index (SoVI) developed by Cutter et. al. (2003) this layer shows the social vulnerability index scores for the State of Colorado at the census tract level. Social vulnerability is represented at the Census tract level by five classes of vulnerability: Low, Medium-Low, Medium, Medium-High, and High.

Crystal Lakes Fire Protection District is characterized by medium-low levels of social vulnerability. Continual monitoring of the individual social vulnerability indicators within the district will give local emergency managers, planners, and stakeholders an even clearer picture of which social vulnerability factors have the largest negative effect on the community and its resiliency. It is important that the district continue to monitor social vulnerability levels over time as demographics and economics change in the area.

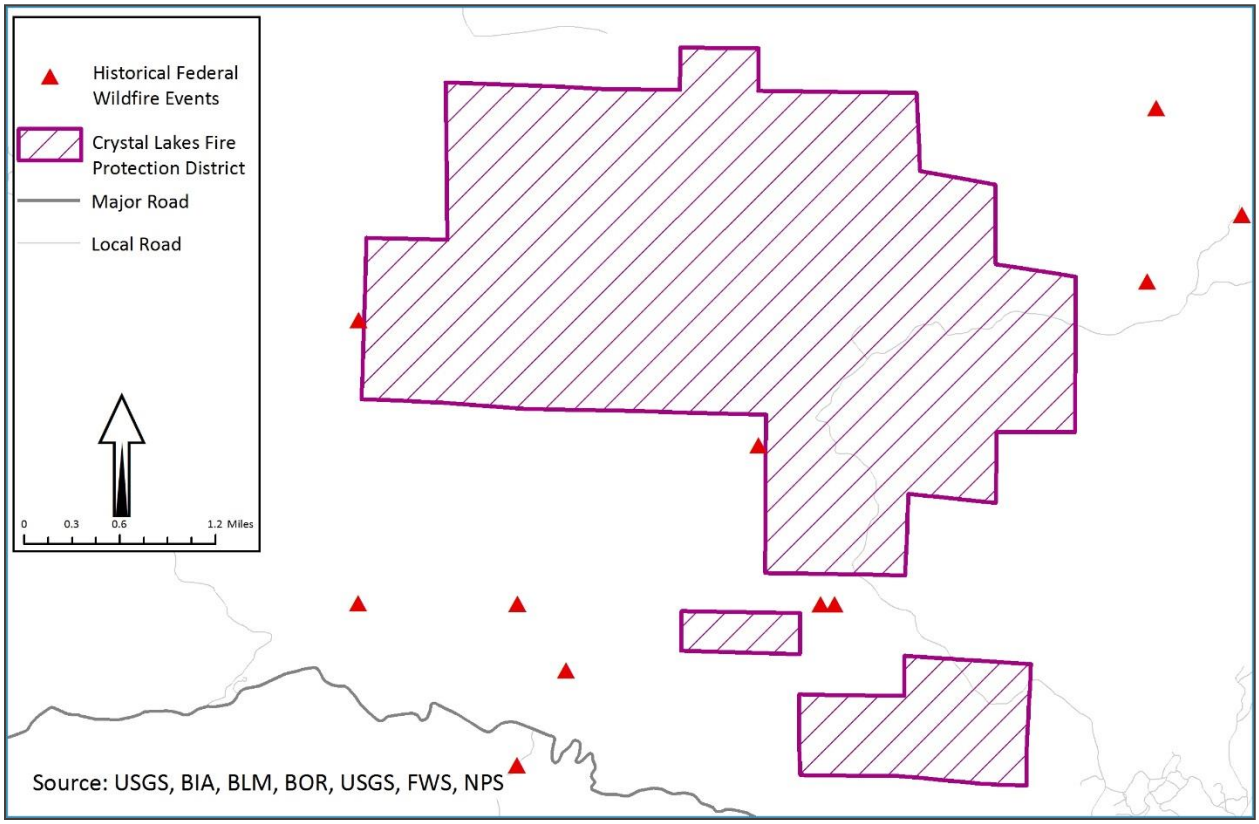
[65] Source: Colorado Division of Water Resources Dam Safety Branch, FEMA, Colorado Water Conservation Board (CWCB)

Fire – Wildland

Previous Occurrences

Crystal Lakes has experienced large wildfire events caused by small plane crashes, both of which took place several decades ago. The most recent substantial wildfire took place in September of 2015, burning approximately twenty acres and no structures. According to NOAA's Storm Events Database there have been no reported wildfire events within the Crystal Lakes Fire Protection District. Based on the historic data showing hazardous impacts near the Crystal Lakes Fire Protection District, there is a great potential for wildfire events to occur at any given time within the District.

Crystal Lakes Fire Protection District Historical Wildfire Map[66]

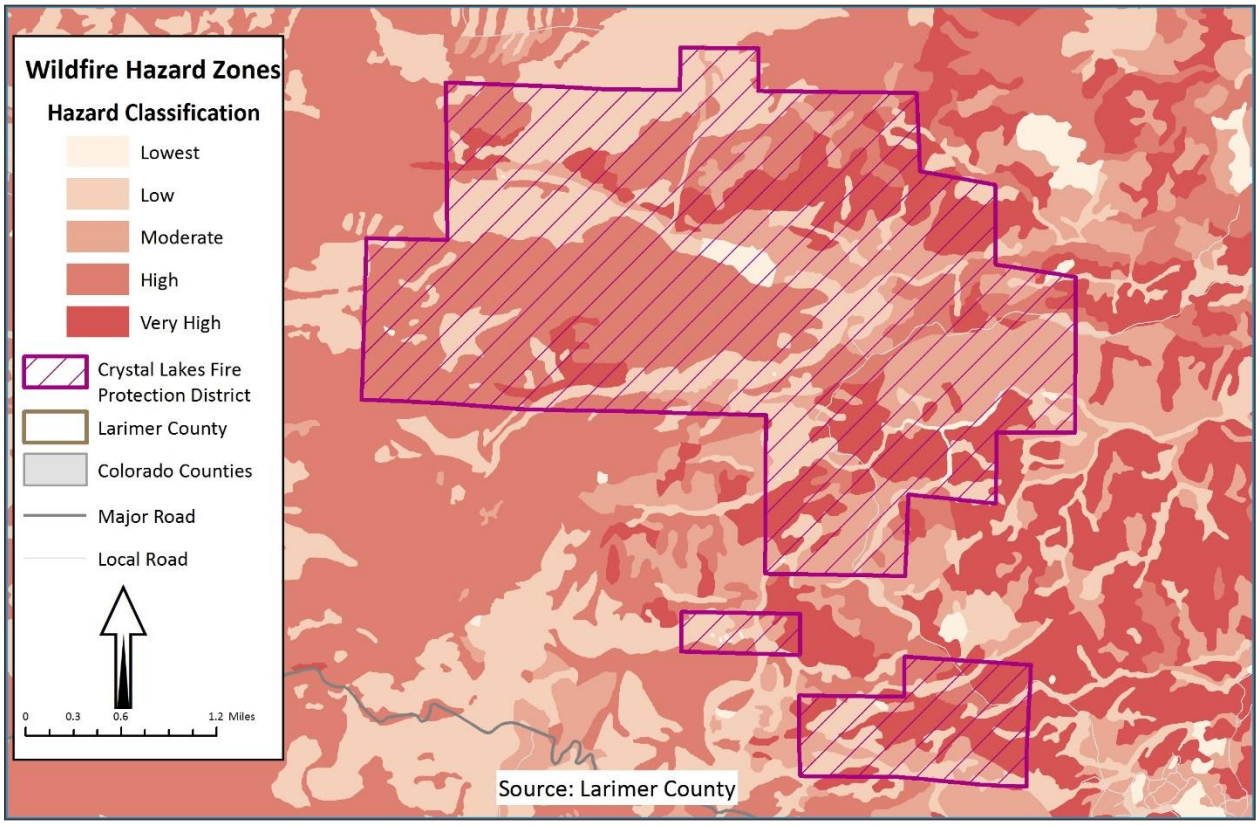


Inventory Exposed

The following Wildfire Hazard Zone map identifies the expected wildfire behavior. The highest wildfire hazard zones are located in areas across the district. These areas are where there are lower population densities.

[66] Historical wildland fire occurrence data compiled by USGS from 1980 - 2013, from BIA, BLM, BOR, USGS, FWS, and NPS.

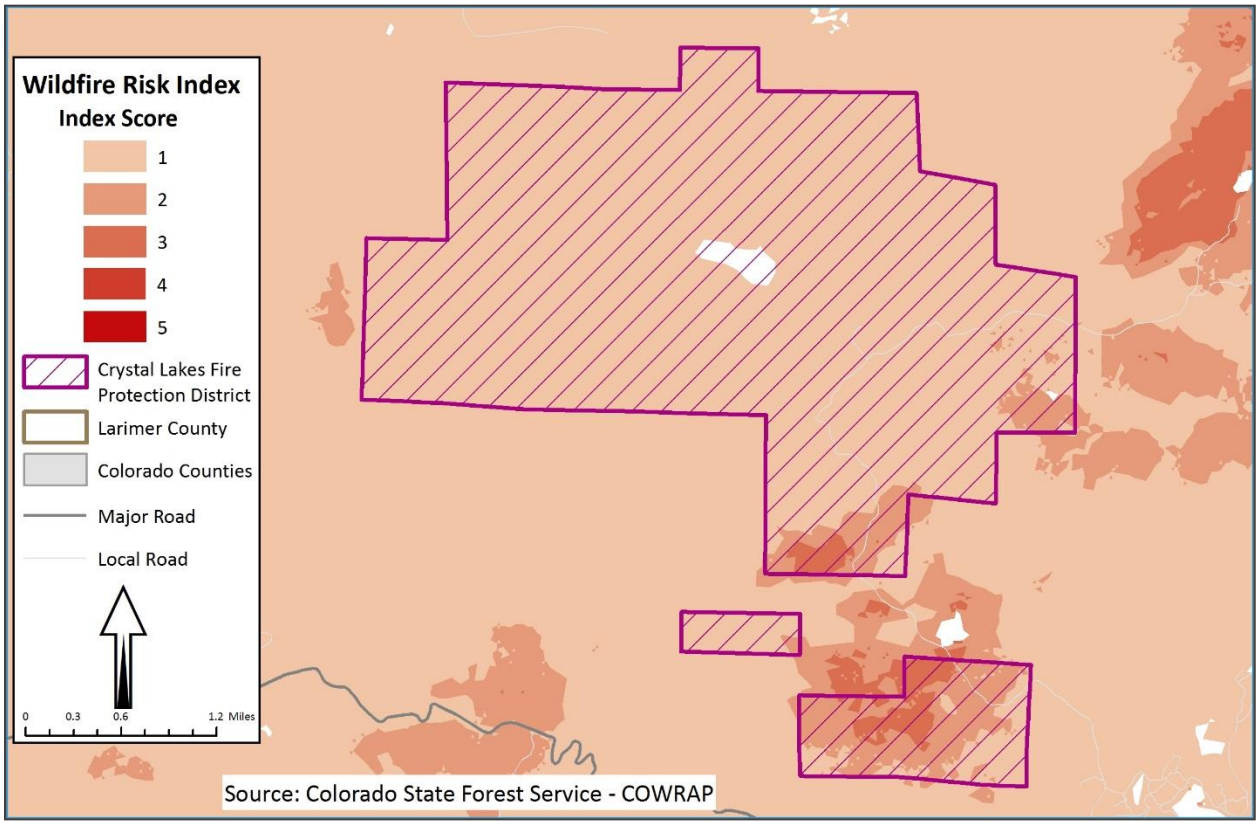
Crystal Lakes Fire Protection District Wildfire Hazard Zone Map[67]



The following Wildfire Risk map identifies areas with the greatest potential impacts from a wildfire, in other words, those areas most at risk. The highest wildfire risk areas in the district are located in the southern region, in areas where there are lower population densities.

[67] To be used to identify wildfire hazards within the Wildfire Mitigation Area. The hazards are determined based on vegetation cover type, habitat structure stage (cover type, tree size and crown cover percentage), southern facing aspects and 30% and greater slopes according to the Wildfire Hazard Area Mapping (WHAM) guidelines.

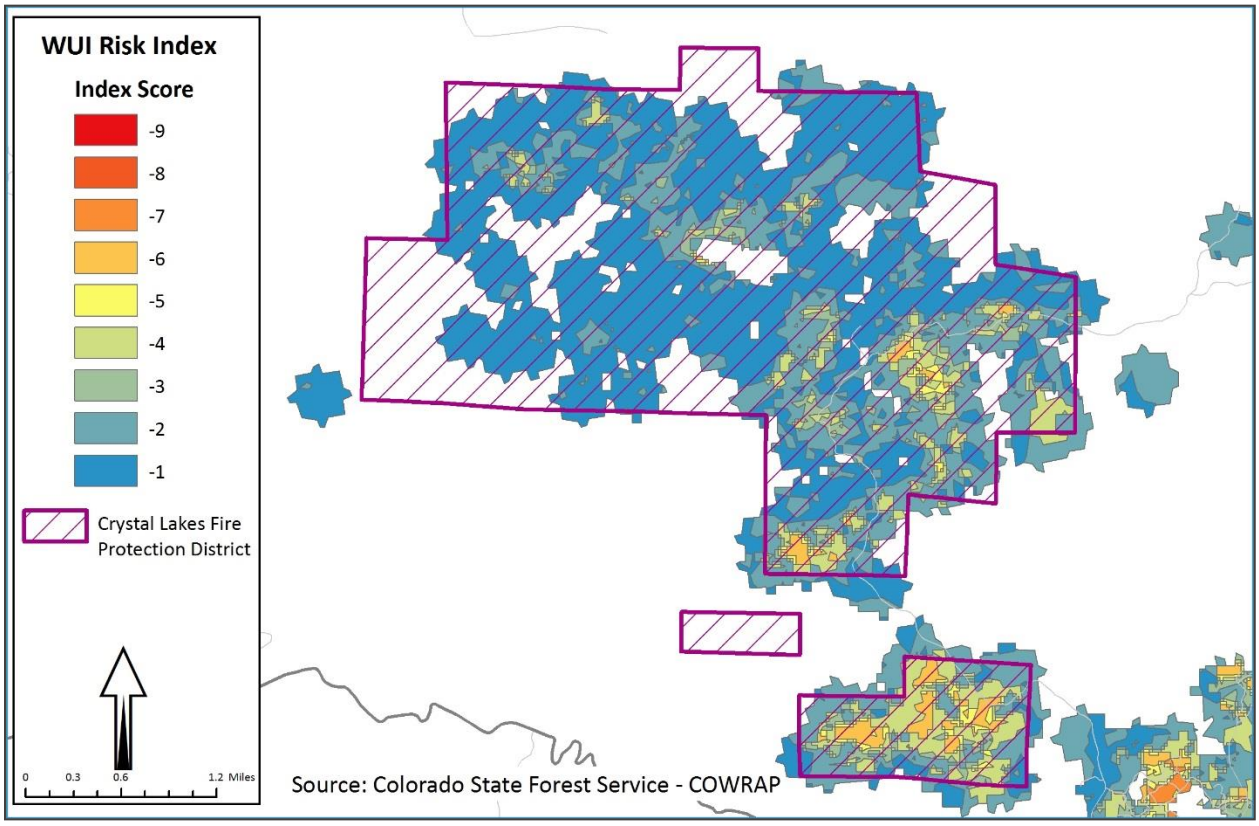
Crystal Lakes Fire Protection District Wildfire Risk Index Map[68]



There are a number of areas in the southeastern region of the district that are within the medium level on the WUI Risk Index Scale. This means that the potential impact on people and homes from a wildfire in those areas is medium to high in relationship to the rest of Larimer County. This level of risk is derived by combining housing density with predicted flame length.

[68] Wildfire Risk represents the possibility of loss or harm occurring from a wildfire. Risk is derived by combining wildfire threat and fire effects. The COWRAP data set was produced statewide and ranks areas on a scale that includes: lowest risk to highest risk. All risk rankings are present in Larimer County.

Crystal Lakes Fire Protection District WUI Map[69]



Fires can extensively impact the economy of an affected area, including the agricultural, recreation and tourism industries, water resources, and the critical facilities upon which the Crystal Lakes Fire Protection District depends. There are no areas of most negative wildfire threat according to the WUI Risk Index. There are areas of medium threat. There are no identified critical facilities or parcels located in areas with the *most negative and second most negative* wildfire threat total.

[69] Wildland Urban Interface (WUI) Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length. The COWRAP dataset was produced statewide and ranks areas on a scale that includes: least negative to most negative impacts. This scale stretched from -1 (least) to -9 (most) statewide, within the Crystal Lakes Fire Protection District values present span from 1 to 6.

Potential Losses

The exposure data provided in the previous section (Inventory Assets Exposed) provides the clearest picture of potential losses to wildfire in the Crystal Lakes Fire Protection District. The risk assessment uses worst case scenario loss estimates. For this reason it is important to plan for relative levels of loss rather than specific potential loss dollar amounts.

Probability of Future Occurrences

The likelihood of wildfires attaining significant size and intensity is unpredictable and highly dependent on environmental conditions and firefighting response. Weather conditions, particularly drought events, increase the likelihood of wildfires occurring. That said, it is important to note that 98% of wildfires are human-caused. Ultimately, the occurrence of future wildfire events will strongly depend on patterns of human activity and events are more likely to occur in wildfire-prone areas experiencing new or additional development.

Wildfires can occur at any time of day and during any month of the year. Moreover, the length of a wildfire season and/or peak months may vary appreciably from year to year. As evidenced by the wildfire risk assessment, areas within the CLFPD that are characterized by dense development and single family homes along the wildland-urban interface are most vulnerable to wildfire.

Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)

Previous Occurrences

According to NOAA's Storm Events Database, the Crystal Lakes Fire Protection District has experienced 264 Winter Storms since 1996. On March 17, 2003 there was report of a winter storm causing $15,500,000 in property damage in areas of Larimer County above 6,000 feet. There were no deaths, injuries or damage to crops reported for any of these storms. The Crystal Lakes Fire Protection District is at high risk of experiencing Winter Storms during the winter months.

Inventory Exposed

All assets located in the Crystal Lakes Fire Protection District can be considered at risk from winter storms. This includes all people, or 100% of the District's population, and all buildings and infrastructure within the district. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the District's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Potential Losses

Winter storms affect the entire planning area of the Crystal Lakes Fire Protection District including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Winter storms will remain a highly likely occurrence for the Crystal Lakes Fire Protection District.

Probability of Future Occurrences

Severe winter storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past severe winter events provide benchmarks for projecting similar conditions into the future. The probability that the Crystal Lakes Fire Protection District will experience a severe winter storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the district at least once every year.

Utility Disruption

Previous Occurrences

The Crystal Lakes Fire Protection District does not currently track incidences of utility disruption.

Inventory Exposed

All assets located in Crystal Lakes Fire Protection District are considered at risk from the impacts of utility disruption events. This includes all people, or 100% of the District's population, and all buildings and infrastructure within the District.

Potential Losses

Utility disruption events have the potential to threaten lives and disrupt business activity. However, monetary losses and casualty estimates are largely unknown.

Probability of Future Occurrences

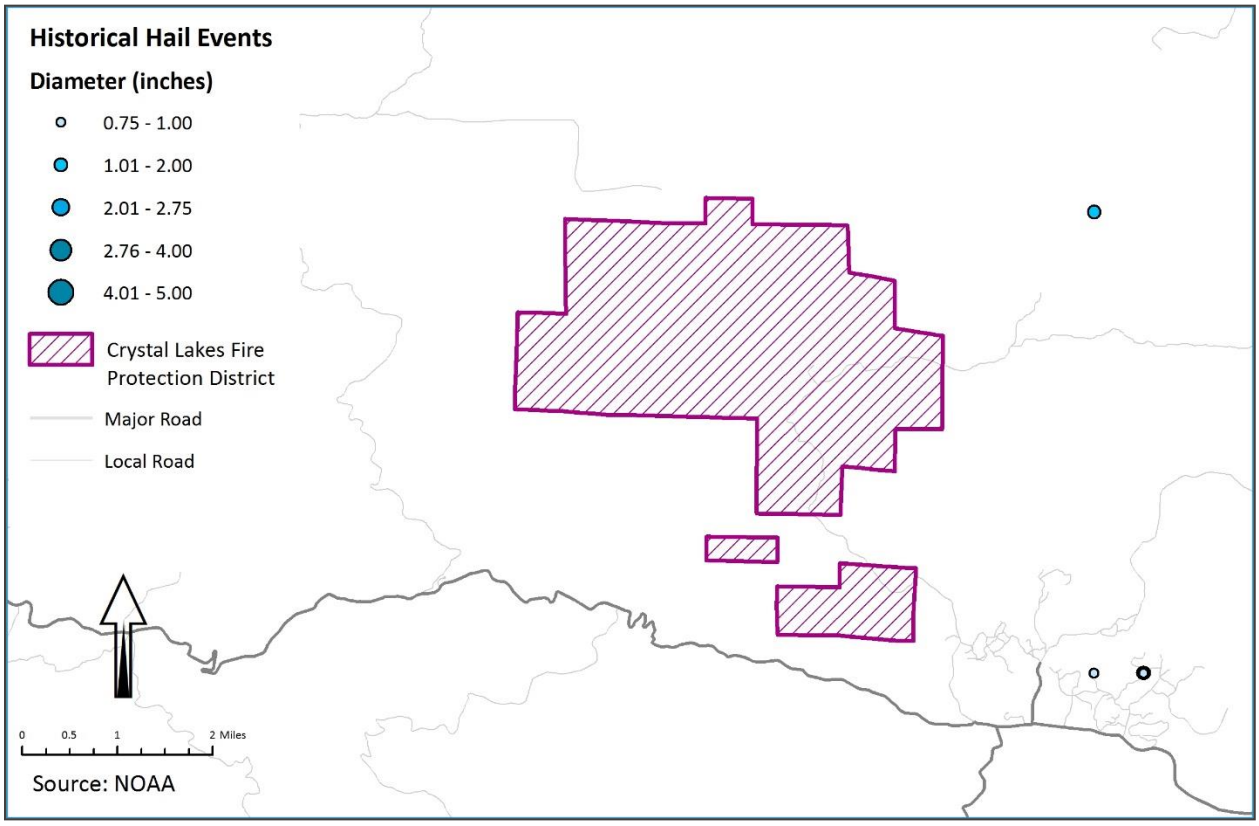
In general, utility outages result from failures in the distribution system as opposed to shortages of supply. Distribution systems are most susceptible to failure during extreme hot and cold temperatures as well as during violent weather conditions. Regional utility failures can threaten human life, particularly when outages affect hospitals, nursing homes, or other healthcare facilities. As both population and climate variability increase across the State of Colorado, and put more pressure on aging distribution systems, it is likely that utility disturbance events will become more frequent in and around the Crystal Lake Fire Protection District.

Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)

Previous Occurrences

According to NOAA's Storm Events Database there are no reported injuries, deaths, property loss or crop loss in Crystal Lakes Fire Protection District due to hail. There have been historic hail events less than 5 miles from the Crystal Lakes Fire Protection District. Based on the historic data showing hazardous impacts near the District, there is a great potential for hail events to occur at any given time.

Historical Hail Events near Crystal Lakes Fire Protection District[70]



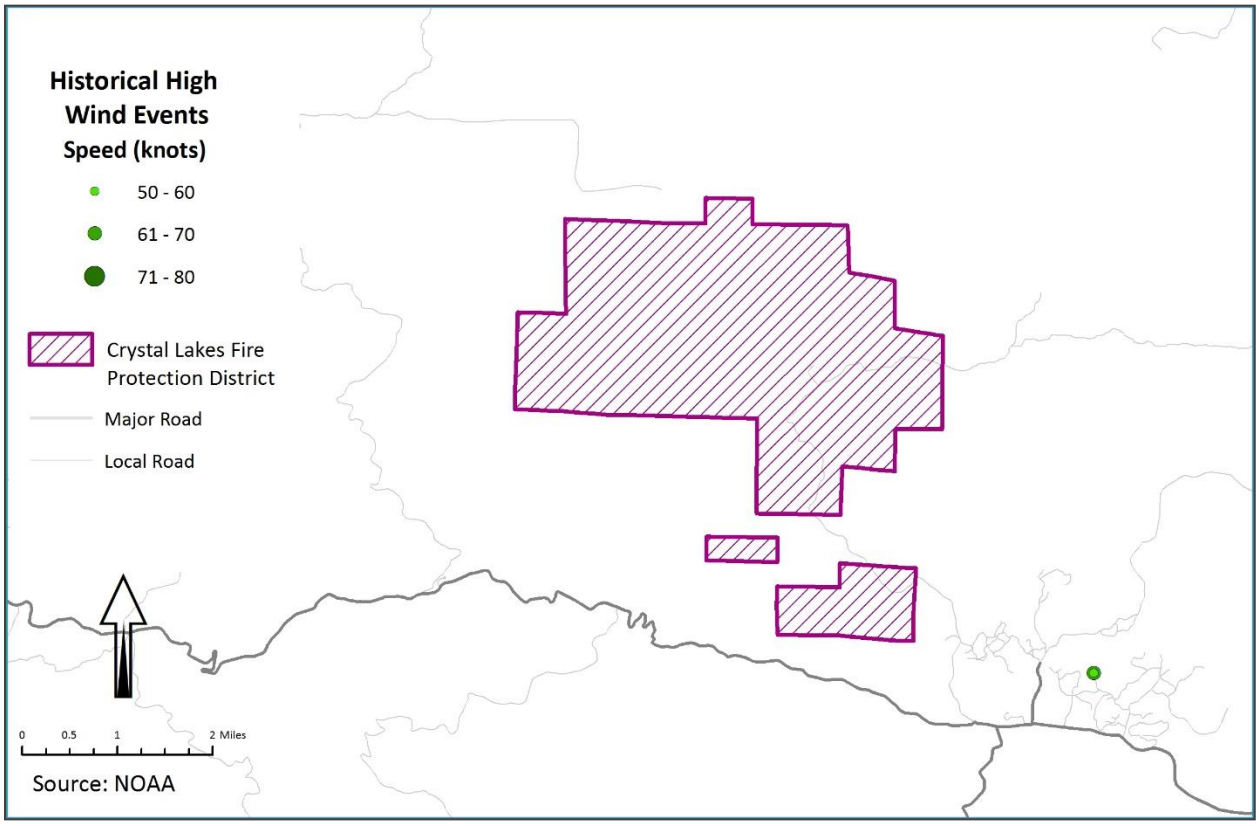
According to NOAA's Storm Events Database there have been no injuries, deaths, or reported losses in Crystal Lakes Fire Protection District due to thunderstorm wind between 1955 and 2014. Based on the historic data showing hazardous impacts near the district, there is a great potential for hail events to occur at any given time.

According to NOAA's Storm Events Database there have been no lightning events in Crystal Lakes Fire Protection District between 1996 and 2014.

According to NOAA's Storm Events Database there are no reported injuries, deaths, property loss or crop loss in Crystal Lakes Fire Protection District due to high wind. There have been historic high wind events less than 5 miles from the Crystal Lakes Fire Protection District. Based on the historic data showing hazardous impacts near the District, there is a great potential for high wind events to occur at any given time.

[70] Source: NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

Historical High Wind Events in Crystal Lakes Fire Protection District[71]



Inventory Exposed

All assets located in the Crystal Lakes Fire Protection District can be considered at risk from spring and summer storms. This includes all people, or 100% of the District's population, and all buildings and infrastructure within the district. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the District's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Inventory assets exposed to severe wind is dependent on the age of the building, type, construction material used, and condition of the structure. Possible losses to critical infrastructure include:

- Electric power disruption
- Communication disruption
- Water and fuel shortages
- Road closures
- Damaged infrastructure components, such as sewer lift stations and treatment plants

[71] Source: NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

- Damage to homes, structures, and shelters

Potential Losses

Spring and summer storms affect the entire planning area of the Crystal Lakes Fire Protection District including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Severe storms will remain a highly likely occurrence for the Crystal Lakes Fire Protection District. It is likely that lightning and hail will also be experienced in the area due to such storms.

Generally, straight-line wind events destroy private, commercial, and public property. Additional costs stem from debris removal, maintenance, repair, and response. Indirect costs include loss of industrial and commercial productivity as a result of damage to infrastructure, facilities, or interruption of services. Because no specific, countywide loss estimation exists for wind, potential losses are related to historical property damage and injuries/deaths.

Probability of Future Occurrences

Spring and summer storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past spring and summer events provide benchmarks for projecting similar conditions into the future. The probability that the Crystal Lakes Fire Protection District will experience a spring or summer storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the Crystal Lakes Fire Protection District at least once every year.

Reported straight-line wind events over the past nineteen years provide an acceptable framework for determining the future occurrence in terms of event. The probability of the Crystal Lakes Fire Protection District experiencing a severe wind event associated with damages or injuries can be difficult to quantify, but based on historical record of severe wind events in Larimer County, there is a high chance of this type of event occurring each year.

Flood – Flash and Riverine

Previous Occurrences

According to NOAA's Storm Events Database there have been no reported injuries or deaths in the Crystal Lakes Fire Protection District caused by flooding. There are no identified special flood hazard areas within the district.

Inventory Exposed

The critical facility and structure exposure analysis estimates that there are no critical facility or parcels/structures in the Crystal Lakes Fire Protection District that are flood prone (not including the total miles of flood prone infrastructure).

Potential Losses

Hazus estimates for the Crystal Lakes Fire Protection District that for a 100-year flood event, no buildings will experience flood damage.

Probability of Future Occurrences

Frequency of previously reported flood events in the Crystal Lake Fire Protection District provide an acceptable framework for determining the probability of future flood occurrence in the area. The probability that the District will experience a flood event can be difficult to predict or quantify.

Severe flooding near the district has the potential to inflict significant damage to people and property. Mitigating flood damage requires that communities remain diligent and notify local officials of potential flood (and flash flood) prone areas near infrastructure such as roads, bridges, and buildings.

Capabilities Assessment

The capability assessment examines the ability of the Crystal Lakes Fire Protection District to implement and manage the comprehensive mitigation strategy laid out in this Plan. The strengths, weaknesses, and resources of the community are identified here as a means for evaluating and maintaining effective and appropriate management of the District's hazard mitigation program.

Local Personnel

The ability of a community to implement a comprehensive mitigation strategy depends, in part, on available resources, including people and staff. The following table outlines the District's capabilities as they relate to key personnel.

	Full Time	Part Time	None or Not-Identified
Emergency Manager			X
Floodplain Administrator			X
Community Planner			X
GIS Specialist			X
Grant Writer			X

Land Use Planning and Codes

Local land use plans and building codes are tremendous tools for evaluating local policies related to hazard mitigation and risk reduction. Additionally, comprehensive master plans, capital improvement plans, stormwater plans and zoning ordinances all present opportunities for enhanced local capabilities. The following table outlines the district's current capabilities as they relate to land use planning and codes.

	Yes (Y); No (N)
A zoning ordinance	N
A hazard-specific ordinance	N
Local building codes	Y
A Comprehensive Plan / Master Plan	Y
A Capital Improvements Plan	-
A Stormwater Plan	-
A Continuity of Operations Plan (COOP)	-
An Emergency Operations Plan (EOP)	-
A Long-Term Recovery Plan	-
Participates in the NFIP	Y

Building codes are one tool that communities use to enhance public safety. For example, they can increase structural integrity, mitigate structure fires, and provide benefits in relation to natural hazard avoidance. In Colorado, land use regulations and building codes are typically implemented at the local level. Even without a statewide mandate, most counties and many municipalities have enacted regulations and codes. The Crystal Lakes Fire Protection District has adopted a local building code requirement, demonstrating their understanding of the benefits codes provide, including reduced exposure to hazards.

Plan Maintenance and Implementation

The Crystal Lakes Fire Protection District has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the district will continue public participation in the plan maintenance process.

Jurisdiction	Plan Maintenance and Implementation Strategy
Crystal Lakes Fire Protection District	*"As an all-volunteer fire district, we are limited in our ability to work on these kinds of projects. Community education efforts will continue to be undertaken by the fire department officers and monitored by the district board."* *"The district has an email list for contacting community members and will work with them and the local homeowners' associations in the planning process."*

Integrating Hazard Mitigation into Local Planning

Through discussions at planning meetings and the use of an online survey, individual outreach, and phone calls, each participating jurisdiction brainstormed with the planning team to identify processes for integrating hazard mitigation into their local planning mechanisms and policies. The following table lists the specific integration strategy identified by the Crystal Lakes Fire Protection District based on the mitigation actions listed in this plan.

Jurisdiction	Strategy
Crystal Lakes Fire Protection District	"*We can incorporate hazard mitigation into community education efforts and encourage community participation in mitigation. We have no authority over local ordinances, community association rules, how community money is spent, etc, so we're limited in our planning options*."

Mitigation Action Guides

The following Mitigation Action Guides present the District's mitigation actions that were developed for the 2016 Plan.

Crystal Lakes Fire Protection District: Community Outreach (Crystal Lakes FPD – 1)	
PRIORITY: High	HAZARDS ADDRESSED: Flood, Fire
LOCATION: Crystal Lakes	GOALS ADDRESSED: 2, 4
RECOMMENDATION DATE: ongoing	OBJECTIVES ADDRESSED: A, B
TARGET COMPLETION DATE: ongoing	
ISSUE: Property owners in the Crystal Lakes district need education in the most effective fire mitigation steps to take, when and how to safely evacuate in case of flood or fire, how to sign up for LETA, and how to ensure that their insurance is sufficient to allow them to recover from a disaster.	
RECOMMENDATION: Community outreach and education efforts.	
ACTION: Hold regular educational meetings covering the subjects of fire mitigation, evacuation, and property insurance. These meetings to take place on multiple occasions during the summer (when more property owners are in the area).	
LEAD AGENCY: Crystal Lakes Volunteer Fire Department	EXPECTED COST: Staffing for each meeting (all volunteer): one presenter, 2-3 people to set up/tear down meeting area. Having a LETA rep on hand for at least some of the presentations is helpful. Cost: funding for copying and purchase of educational handouts and refreshments. $1500
SUPPORT AGENCIES: LETA, possibly LCES	POTENTIAL FUNDING SOURCES: Crystal Lakes Fire Protection District; possible grants for materials costs.
PROGRESS MILESTONES: Continue to hold 4-5 presentations each summer, covering the subjects of fire mitigation, evacuation, and property insurance.	

Crystal Lakes Fire Protection District: Fire Mitigation Assessments (Crystal Lakes FPD – 2)	
PRIORITY: High	HAZARDS ADDRESSED: Fire
LOCATION: Crystal Lakes	GOALS ADDRESSED: 2, 4
RECOMMENDATION DATE: ongoing	OBJECTIVES ADDRESSED: A, B, E
TARGET COMPLETION DATE: ongoing	
ISSUE: Property owners in the Crystal Lakes district need education in the most effective fire mitigation steps to take and assistance in determining if they've done all they can to mitigate their property.	
RECOMMENDATION: One-on-one mitigation assessments.	
ACTION: Provide fire mitigation assessments to district property owners. At the request of local property owners, teams of two or more members of the fire department will meet with them to tour their property and provide mitigation advice and assessment.	
LEAD AGENCY: Crystal Lakes Volunteer Fire Department	EXPECTED COST: Staffing (all volunteer) of two-member teams for assessments throughout the year

	(with the majority in the summer). Funding for copying and purchasing educational handouts . $750
SUPPORT AGENCIES:	POTENTIAL FUNDING SOURCES: Crystal Lakes Fire Protection District; grants for materials costs.
PROGRESS MILESTONES: Continue to provide assessments to property owners upon request, performing each assessment within two weeks of request as often as possible.	

Crystal Lakes Fire Protection District: Fire Mitigation of Privately Owned Land (Crystal Lakes FPD – 3)	
PRIORITY: High	HAZARDS ADDRESSED: Fire
LOCATION: Crystal Lakes	GOALS ADDRESSED: 1, 2, 4
RECOMMENDATION DATE: 2016	OBJECTIVES ADDRESSED: A, B, E
TARGET COMPLETION DATE: ongoing	
ISSUE: Many privately owned areas in the Crystal Lakes community are in serious need of fire mitigation, and funding and resources for mitigation are lacking. The population is older, with half or more of all properties owned by retirees, and many people either lack the ability to mitigate or the money to pay for mitigation work.	
RECOMMENDATION: Property owners need grants and other assistance in their efforts to mitigate their properties. To assist with this effort, the Crystal Lakes Vol. Fire Dept. is in need of resources to identify unmitigated properties vital to the defense of the community and to contact these property owners with the offer of grants or other mitigation assistance needed to encourage them to do necessary mitigation work.	
ACTION: Assist property owners in mitigating their properties. The fire district can, if necessary, administer these grants, work to identify the properties most in need of mitigation, and make contact with the property owners to determine (and where possible offer) the resources would encourage mitigation work.	
LEAD AGENCY: Crystal Lakes Fire Protection District	EXPECTED COST: Staffing for the administration of grants – 1 or 2 volunteers, preferably with some of their time/effort reimbursed Cost: Grants on the order of $4-5,000 each would be excellent (though less would still have an impact).
SUPPORT AGENCIES: Larimer County	POTENTIAL FUNDING SOURCES: Grants for homeowners mitigation
PROGRESS MILESTONES: Best case scenario would be to administer one to two dozen mitigation grants to Crystal Lakes property owners each year for as many years as possible. Identification of 'high hazard' zones. Gain homeowner support. Obtain funding support to finance mitigation action.	

Crystal Lakes Fire Protection District: Evacuation Routes (Crystal Lakes FPD – 4)	
PRIORITY: High	HAZARDS ADDRESSED: Fire
LOCATION: Crystal Lakes	GOALS ADDRESSED: 1, 2, 4, 5
RECOMMENDATION DATE: immediately	OBJECTIVES ADDRESSED: C, D, E
TARGET COMPLETION DATE: asap	

ISSUE: Crystal Lakes, a community of more than 1600 properties, has only one evacuation route out of the area (County Road 73C to the south of the community). While 73C continues to the northeast of the community, the section of that road between Crystal Lakes subdivision and CR 67J on the way to 80C (approximately 73C mile marker 6 to 16) is extremely poor, with hairpin turns and deep potholes. Conditions on this road make it an unsuitable evacuation route for large or long vehicles (like trailers and motor homes, which are in frequent usage in the community during fire season) and any vehicle that is not high-clearance. This lack of a suitable secondary evacuation route means that a fire south of Crystal Lakes could cut off all viable evacuation routes for the community. During the summer fire season, this would trap upwards of 5,000 residents in the area who would them be at risk of being burned over by a wildfire. In addition, the lack of a secondary evacuation route impacts the neighboring community of Red Feather Lakes, through which all Crystal Lakes residents must evacuate in the current circumstances.	
RECOMMENDATION: Due to the potential life-threat presented by this lack of a secondary evacuation route, we recommend that the county plan roadwork on 73C from the borders of the Crystal Lakes subdivision to 67J (approximately 73C mm 6 to 16), removing the worst of the hairpin turns and grading it periodically to ensure that it is and remains at least minimally passable to all vehicles.	
ACTION: In partnership with Larimer County, work to improve access and evacuation from Crystal Lakes.	
LEAD AGENCY: Crystal Lakes &Larimer County .	EXPECTED COST: unknown
SUPPORT AGENCIES: Larimer County	POTENTIAL FUNDING SOURCES: Larimer County, Grants
PROGRESS MILESTONES: In spring of 2016, begin grading 73C from Crystal Lakes to 80C at least twice and preferably more often per year. Begin work as soon after that as possible to ensure that road is passable for all vehicles, including non-high-clearance and long or wide vehicles.	

Crystal Lakes Fire Protection District: Water Storage Cisterns (Crystal Lakes FPD – 5)	
PRIORITY: High	HAZARDS ADDRESSED: Fire
LOCATION: Crystal Lakes	GOALS ADDRESSED: 1, 2,
RECOMMENDATION DATE: 2016	OBJECTIVES ADDRESSED: E
TARGET COMPLETION DATE: 2018	
ISSUE: Crystal Lakes is a community with no community-wide water system and no system of hydrants. Fire services must draft water from ponds and lakes, and many areas in the district are more than two miles from the nearest water source.	
RECOMMENDATION: Buy and install water tanks and cisterns on greenbelt (publicly owned) areas or on private properties (with permanent easement agreed to by the property owner) in areas of the district which are significantly remote from water sources.	
ACTION: Install cisterns capable of containing 2500+ gallons underground where possible, and in areas where burial is not possible due to rock substrata, install IBC Tanks capable of containing 330 gallons above ground (these would have to be drained for winter to avoid freezing). The Crystal Lakes Volunteer Fire Department would be responsible for maintaining these cisterns and keeping them filled and accessible (year-round for the underground cisterns, during the fire season for the above-ground tanks).	
LEAD AGENCY: Crystal Lakes Fire Protection District	EXPECTED COST: We need at least three 2500-gallon cisterns ($1500+ each) and six to twelve 330-gallon IBC tanks ($550+ each), plus the cost of fittings and installation of the underground cisterns
SUPPORT AGENCIES: none	POTENTIAL FUNDING SOURCES: Grants, Crystal Lakes
PROGRESS MILESTONES: In the spring of 2016, begin installation of aboveground IBC tanks in locations throughout the district which are remote from natural water sources. Begin community outreach efforts to determine potential locations for underground cisterns and make legal arrangements for those locations during 2016. At any time after the ground has thawed in 2017, begin excavation and installation of underground cisterns in the areas with the least access to water sources.	

Letter of Intent to Participate

Crystal Lakes Fire Protection District

237 Blackfoot Rd, Red Feather Lakes, CO 80545
(970) 881-3501

December 18, 2014

Lori R. Hodges
Larimer County Emergency Management
200 West Oak Street
Fort Collins, CO 80526

Re: "Statement of Intent to Participate" as a participating jurisdiction in the Larimer County Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Dear Ms. Hodges,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the Crystal Lakes Fire Protection District is submitting this letter of intent to confirm that the Crystal Lakes Fire Protection District has agreed to participate in the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, the Crystal Lakes Fire Protection District agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Larimer County OEM to complete the plan in conformance with FEMA requirements.

The Crystal Lakes Fire Protection District understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

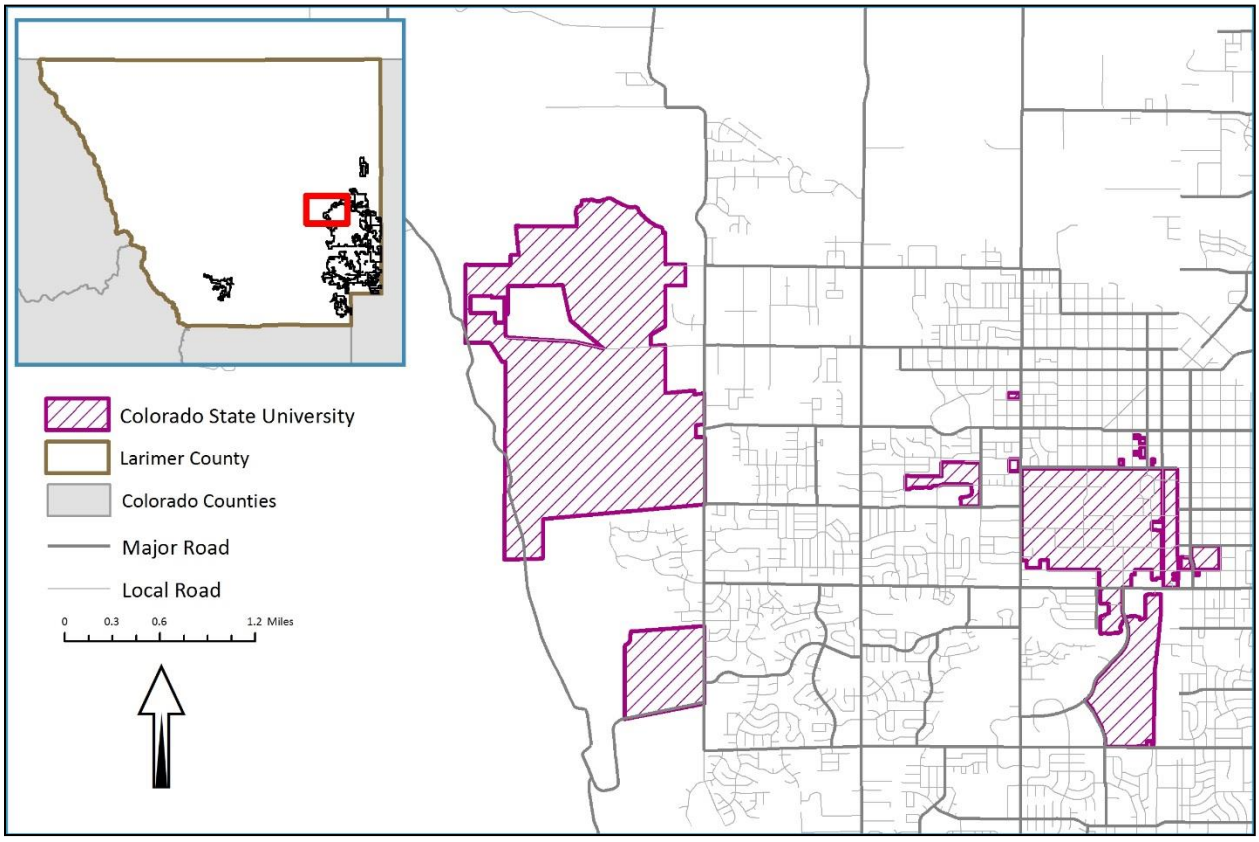
Therefore, with a full understanding of the obligations incurred by an agreement between the Lead Jurisdiction and the Participating Jurisdiction, I Raymond Williams, commit the Crystal Lakes Fire Protection District to the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 15th day of December

Colorado State University (CSU)

Community Profile

Founded in 1870 as the Colorado Agricultural College, Colorado State University (CSU) is among the nation's leading research universities. CSU is a public research university located in Fort Collins. The university is Colorado's largest land grant university, and the flagship University of the Colorado State University System. Current enrollment is over 32,000 students, including resident and non-resident instructions students. CSU plans to increase their enrollment to 35,000 students by 2020. The University also has a Moutain Campus located 53 miles west of Fort Collins. This area is not included in the analysis within this appendix and is covered under the unincorporated County portion of this plan.



Hazard Identification and Risk Assessment

The following Hazard Identification and Risk Assessment Summary table is based on jurisdiction-specific responses to the risk factor exercise and differs from the risk factor results that were determined at the county scale.

NATURAL HAZARD	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Flood – Flash and Riverine	0.9	0.6	0.6	0.4	0.2	2.70
Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)	1.2	0.3	0.6	0.2	0.3	2.60
Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)	1.2	0.3	0.6	0.3	0.1	2.50
Civil Disturbance	0.6	0.3	0.4	0.4	0.2	1.90
Utility Disruption	0.9	0.3	0.2	0.4	0.1	1.90
Tornado	0.6	0.3	0.4	0.4	0.1	1.80
Fire – Wildland	0.6	0.3	0.4	0.1	0.4	1.80
Hazmat – Fixed and Transport	0.6	0.3	0.2	0.4	0.1	1.60
Biological Hazards / Contagion	0.6	0.3	0.2	0.2	0.2	1.50
Earthquake	0.3	0.3	0.2	0.4	0.1	1.30
Landslide / Rockslide	0.3	0.3	0.2	0.2	0.1	1.10
Erosion / Deposition	0.3	0.3	0.2	0.1	0.1	1.00
HIGH RISK (2.5 or higher): Flood – Flash and Riverine; Winter Storm (Blizzard Conditions, Heavy Snow Accumulation); Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)						
MODERATE RISK HAZARD (2.0 - 2.4): None						
Low Risk (1.9 and lower): Civil Disturbance; Utility Disruption; Tornado; Fire – Wildland; Hazmat – Fixed and Transport; Biological Hazards / Contagion; Earthquake; Landslide / Rockslide; Erosion / Deposition						

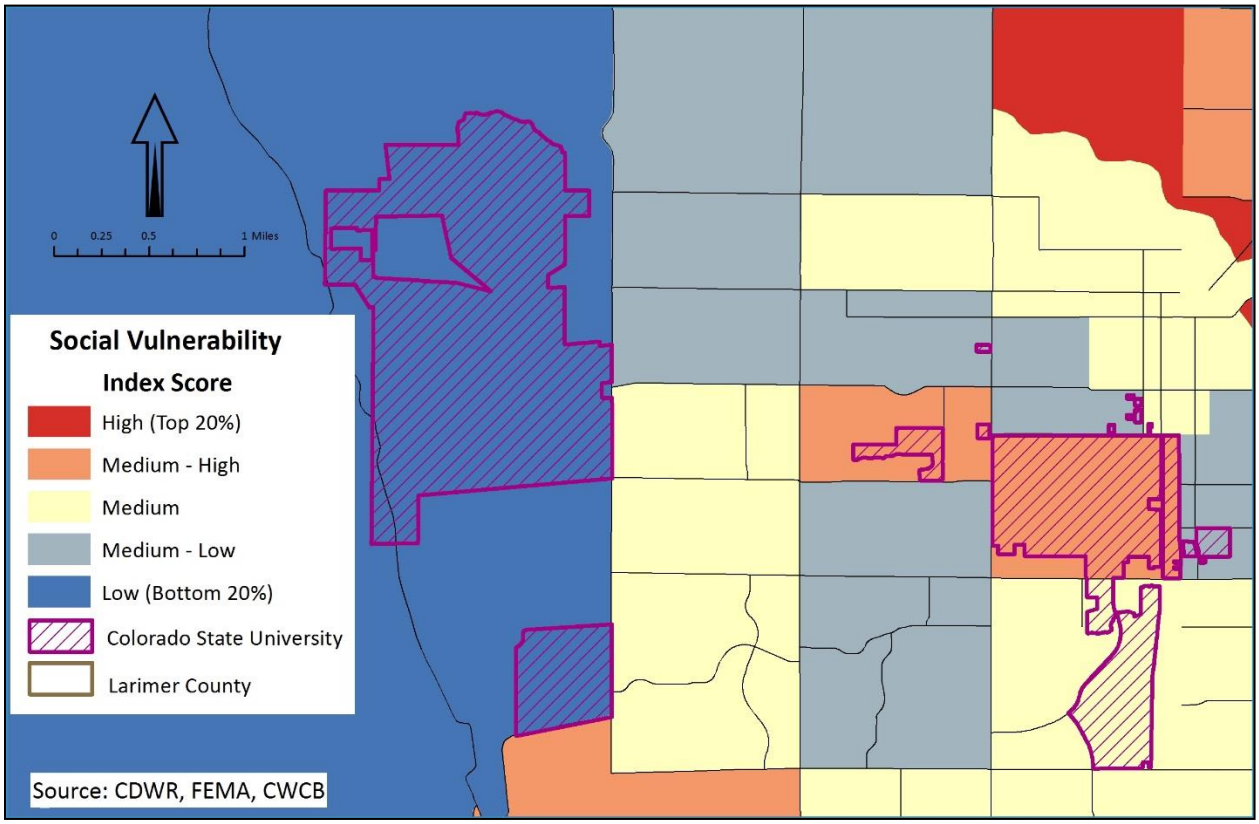
Vulnerability Assessment

This section provides a refined vulnerability assessment, specific for CSU, for those hazards that were identified as being rated HIGH in the preceding section. This analysis was conducted separately from that of the county-wide vulnerability assessment to specifically focus on the population, structures, infrastructure, and other assets unique to CSU.

The results of the social vulnerability assessment are displayed on the map below. On the map, social vulnerability is represented at the census tract level by 5 classes of vulnerability: Low (bottom 20% of the

county), Medium-Low, Medium, Medium-High, and High (top 20% of the county). CSU's social vulnerability map shows social vulnerability within the area.

Social Vulnerability Map – Colorado State University[72]



Social vulnerability is represented as the social, economic, demographic, and housing characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to hazard events. The pre-existing social conditions that contribute to disaster losses can be identified using social vulnerability indicators. Using methods identified in the Social Vulnerability Index (SoVI) developed by Cutter et. al. (2003) this layer shows the social vulnerability index scores for the State of Colorado at the census tract level. Social vulnerability is represented at the Census tract level by five classes of vulnerability: Low, Medium-Low, Medium, Medium-High, and High.

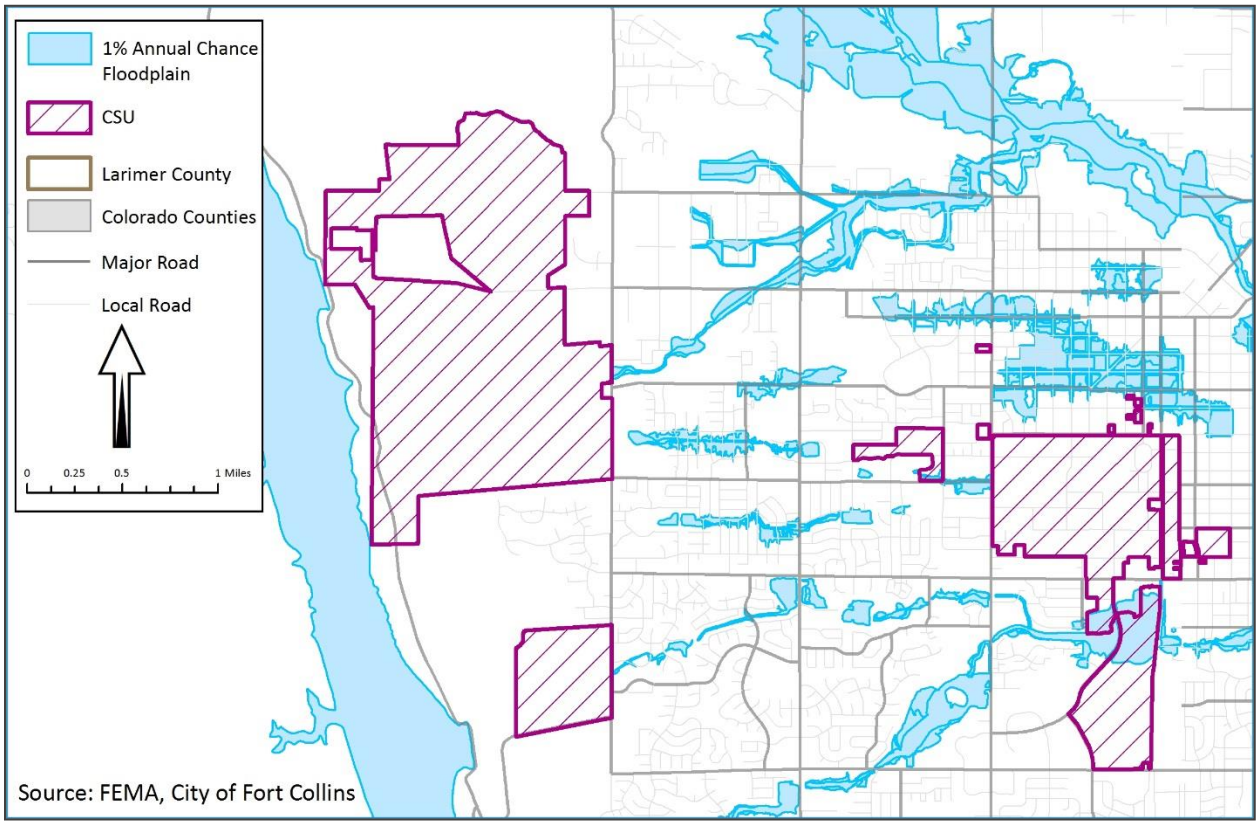
CSU is characterized by a mix of low to medium-high levels of social vulnerability. The eastern region of the campus has higher levels of social vulnerability to disasters that the rest of the area. A closer look at the individual social vulnerability indicators within the boundaries of the University (and within Fort Collins) will give local emergency managers, planners, and stakeholders a clearer picture of which social vulnerability factors have the largest negative effect on the university and its resiliency over time. It is

[72] Source: Colorado Division of Water Resources Dam Safety Branch, FEMA, Colorado Water Conservation Board (CWCB)

important that the university continues to monitor social vulnerability levels as demographics and economics change in the area.

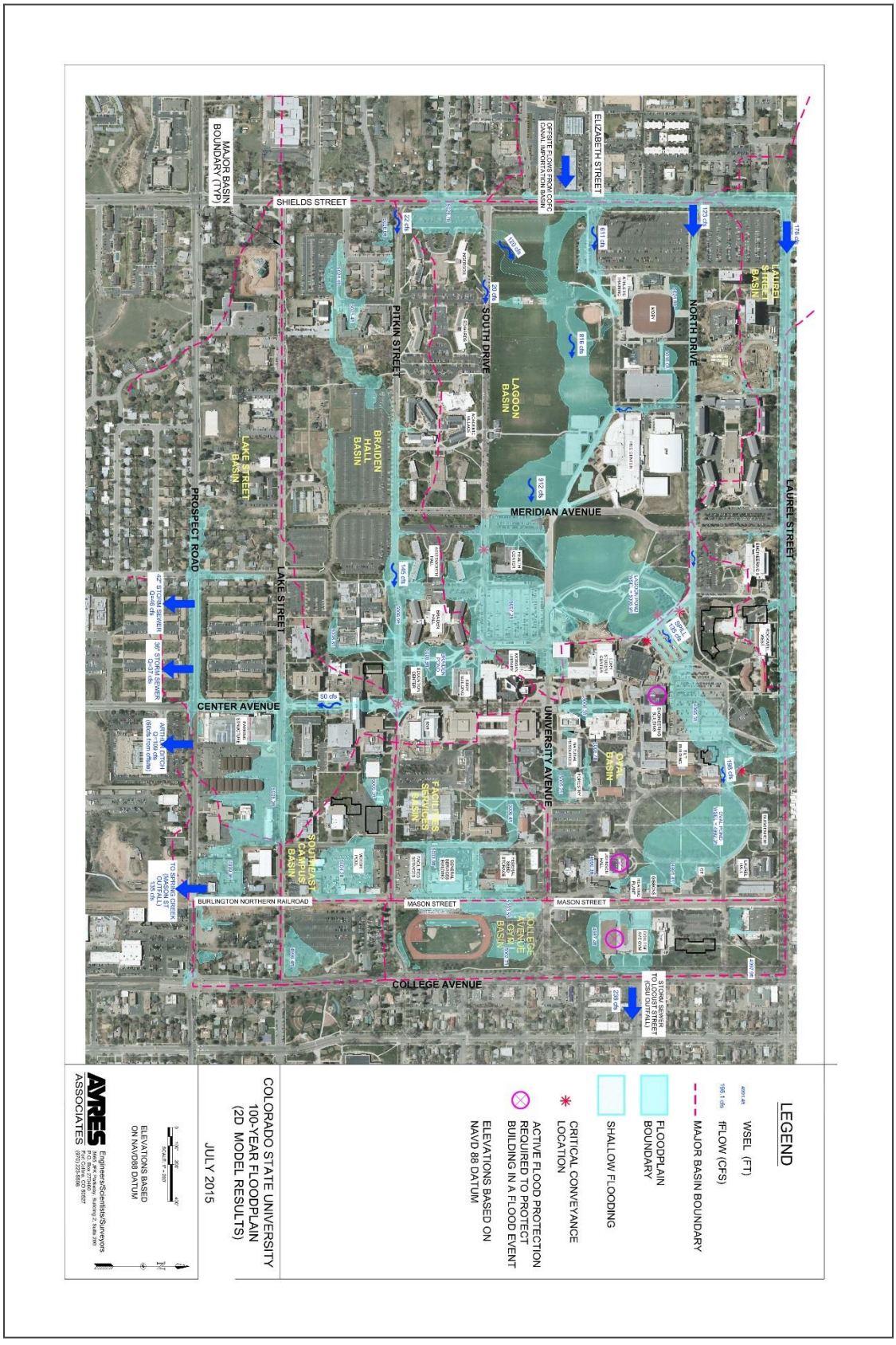
Flood – Flash and Riverine

CSU Special Flood Hazard Area[73]



[73] This layer is compiled utilizing the most recent Special Flood Hazard Areas (SFHA) as defined by FEMA's National Flood Hazard Layer (NFHL) in combination with some recent flood studies performed by the City of Fort Collins. These areas are also referred to as the 1% Annual Chance Floodplain.

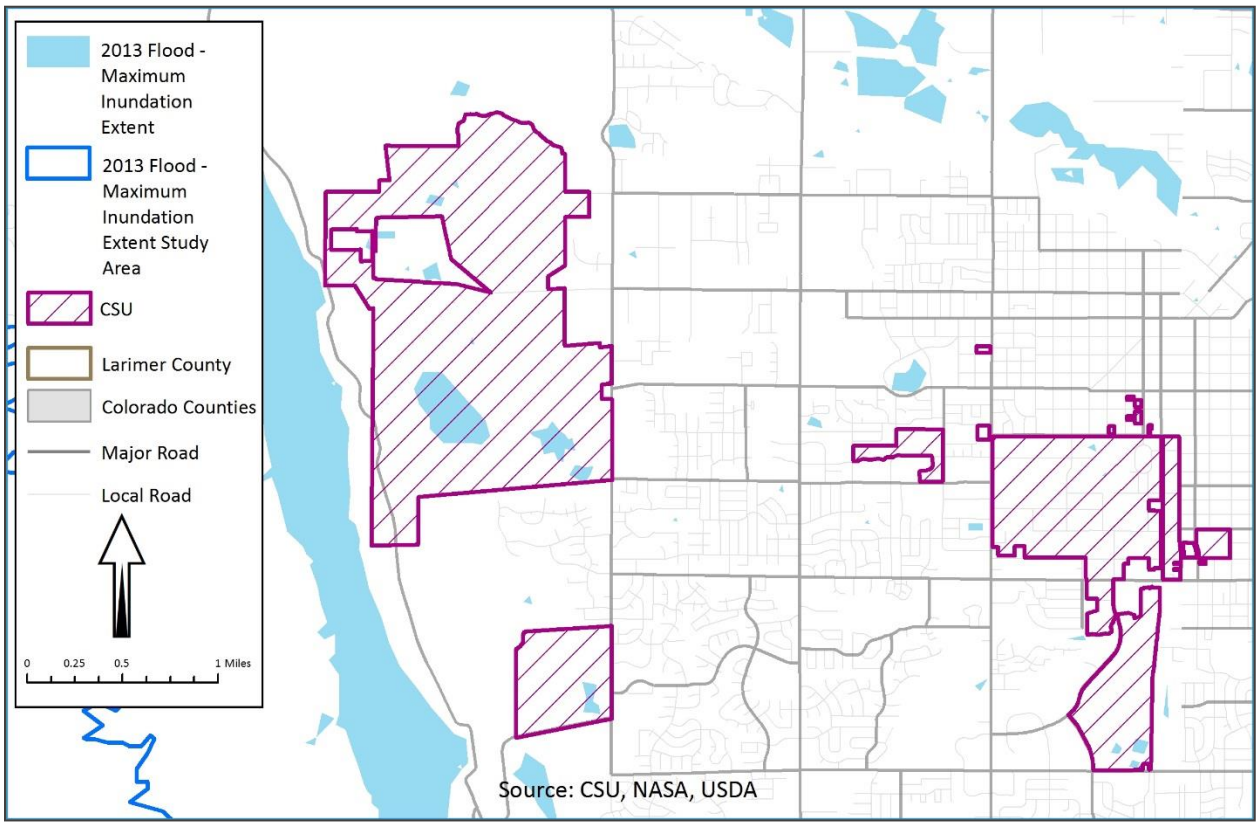
CSU Floodplain Map



Previous Occurrences

According to NOAA's Storm Events Database there have been 40 reported injuries and 5 deaths in the City of Fort Collins where CSU is located caused by flooding. On July 28, 1997 more than 8 inches of rain fell in southwest Fort Collins. Debris blocked a culvert along Spring Creek causing a 10-15 foot wall of water to surge through a mobile home park destroying some homes and damaging others. The CSU campus was flooded. High waters filled the CSU library basement with approximately 10 feet of water destroying many of the medical archives. There has been approximately $190.5 million dollars in property damage and $50,000 in crop damage from 1996 to 2014. Based on the historic occurrence of floods, CSU is extremely vulnerable to flood events at any given time.

CSU 2013 Flood Extent[74]



Maximum flood extent—a key data need for disaster response and mitigation—is rarely quantified due to storm-related cloud cover and the low temporal resolution of optical sensors. While change detection approaches can circumvent these issues through the identification of inundated land and soil from post-flood imagery, their accuracy can suffer in the narrow and complex channels of increasingly developed

[74] Multi-Temporal Independent Component Analysis and Landsat 8 for Delineating Maximum Extent of the 2013 Colorado Front Range Flood

and heterogeneous floodplains. The data depicted above is from a study that explored the utility of the Operational Land Imager (OLI) and Independent Component Analysis (ICA) for addressing these challenges in the unprecedented 2013 Flood along the Colorado Front Range, USA. The approach was able to simultaneously distinguish flood-related water and soil moisture from pre-existing water bodies and other spectrally similar classes within the narrow and braided channels of the study site.

Inventory Exposed

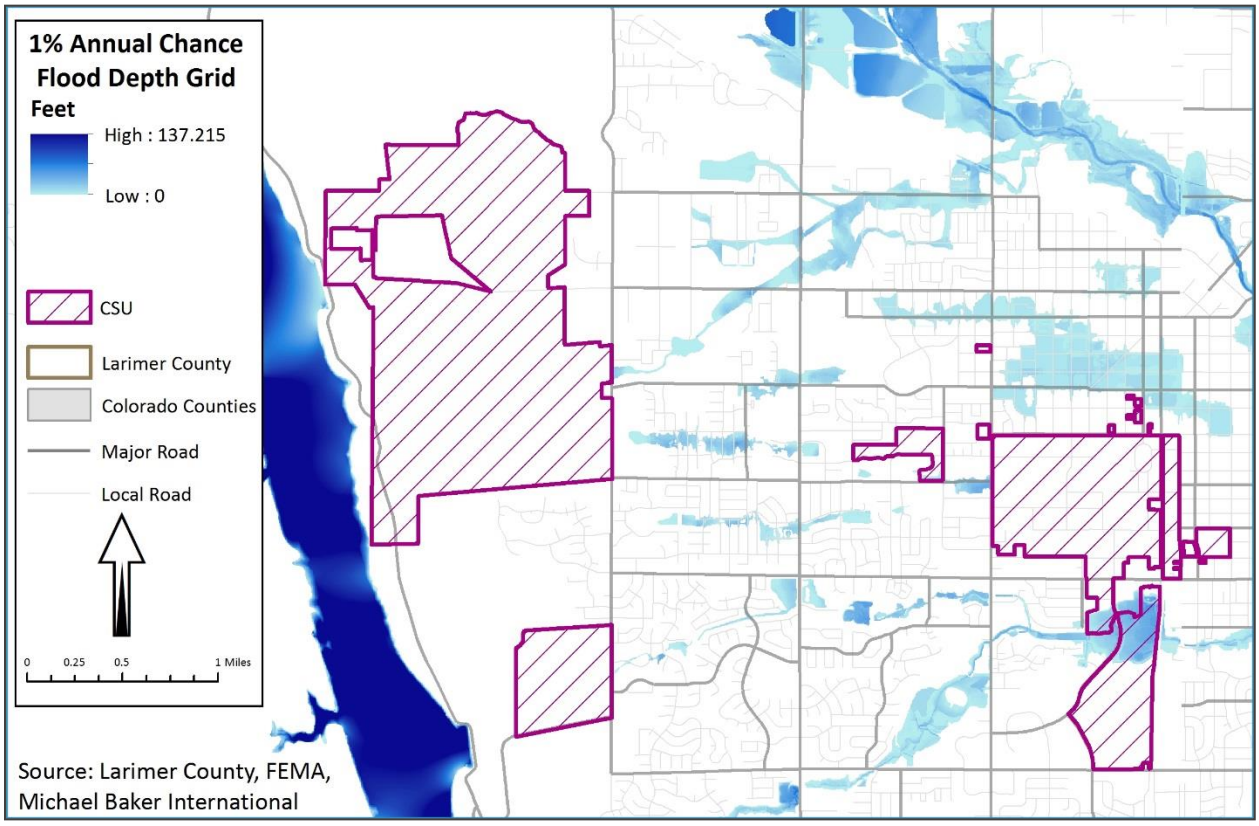
Critical facilities are essential to the health and welfare of the whole population and are especially important both during and after hazard events. Critical structures or areas that overlap or touch the SFHA are considered "flood prone."

The critical facility and structure exposure analysis estimates that there are no critical facilities or parcels/structures within the CSU boundary that are flood prone (not including the total miles of flood prone infrastructure). The University has stated that there are three buildings on Main Campus that will suffer flood damage during the 100-year flood event (Gibbons, Occupational Therapy, & Heating Plant). Plans are currently undersay to upgrade the heating plant door to provide 100-year protection. They also state that all buildings on Main Campus are considered by the University as being 'critical', per the state floodplain regulation.

Potential Losses

Hazus estimates for CSU that for a 100-year flood event, that no buildings will experience flood damage.

CSU 1% Annual Flood Loss Estimation and Flood Depth Grid Map[75]



Probability of Future Occurrences

Frequency of previously reported flood events in the CSU boundary provide an acceptable framework for determining the probability of future flood occurrence in the area. The probability that the University will experience a flood event can be difficult to predict or quantify.

Severe flooding has the potential to inflict significant damage to people and property in the University. Mitigating flood damage requires that communities remain diligent and notify local officials of potential flood (and flash flood) prone areas near infrastructure such as roads, bridges, and buildings.

Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)

Previous Occurrences

According to NOAA's Storm Events Database, CSU has experienced 74 Winter Storms since 1996. On March 17, 2003 there was report of a winter storm causing $15,500,000 in property damage in areas of Larimer County below 6,000 feet and eastern Larimer County. There were no deaths, injuries or damage to crops reported for any of these storms. CSU is at high risk of experiencing Winter Storms during the winter months.

[75] 1% Annual Chance Flood flooding depth grid, produced from the best available topographic and floodplain data.

Inventory Exposed

All assets located within CSU's boundary can be considered at risk from winter storms. This includes 37,220 people, or 100% of the university's population, and all buildings and infrastructure within the university. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the university's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Potential Losses

Winter storms affect the entire planning area of CSU including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Winter storms will remain a highly likely occurrence for CSU.

Probability of Future Occurrences

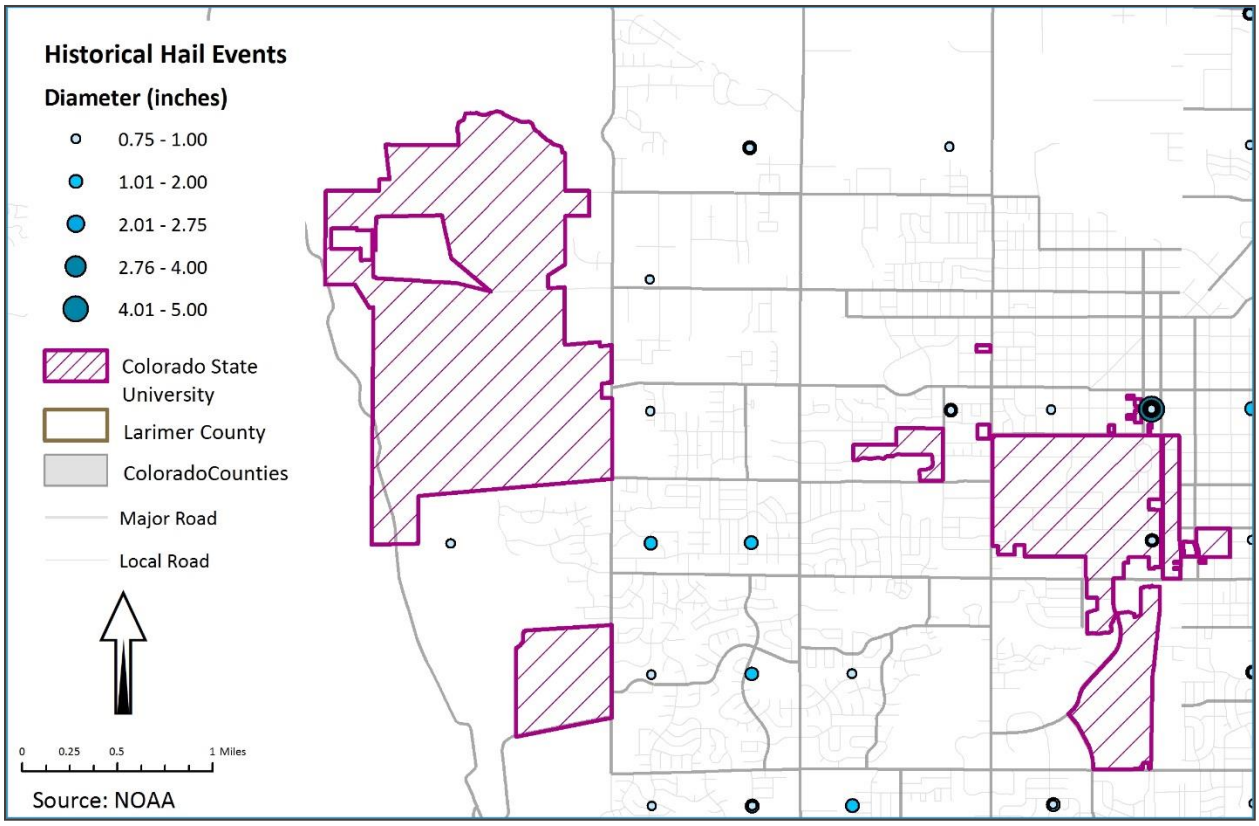
Severe winter storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past severe winter events provide benchmarks for projecting similar conditions into the future. The probability that CSU will experience a severe winter storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the university boundary at least once every year.

Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)

Previous Occurrences

According to NOAA's Storm Events Database there are no reported injuries, deaths, property loss or crop loss within CSU's boundary due to hail. There have been 2 reported damaging hail events within the university boundary between 1955 and 2014. Based on the historic data showing hazardous impacts on the university, there is a great potential for hail events to occur at any given time.

Historical Hail Events at CSU[76]



According to NOAA's Storm Events Database there have been 2 injuries and no deaths within CSU due to thunderstorm wind. There have been 14 thunderstorm wind events reported within the CSU boundary between 1955 and 2014. Of the 13 incidents, 1 reported property losses totaling $25,000 and no crop losses. Based on the historic data showing hazardous impacts in the area, there is a great potential for thunderstorm wind events to occur at any given time.

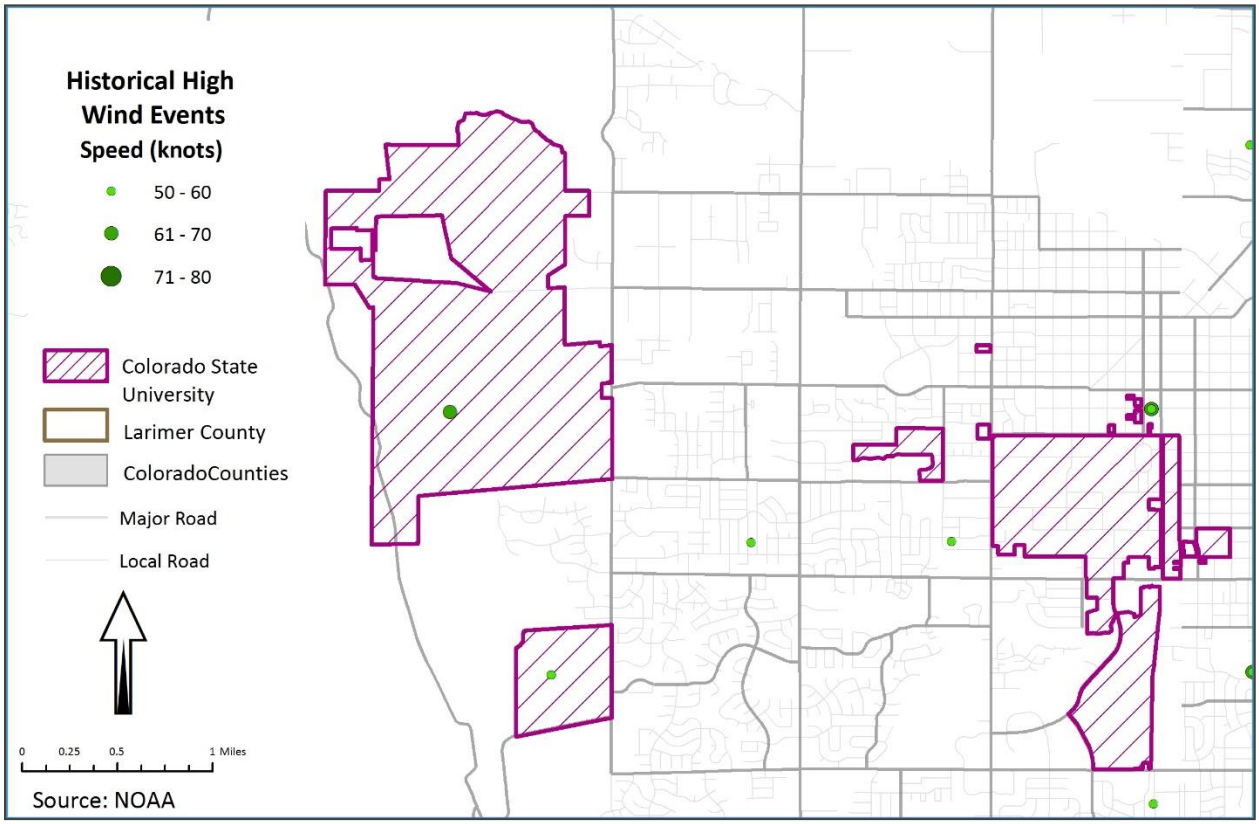
According to NOAA's Storm Events Database there have been 18 lightning events in the City of Fort Collins where CSU is located, between 1996 and 2014. There have been 4 reported injuries, 2 deaths, $108,000 worth of property damage, and $5,000 worth of crop damage.

According to NOAA's Storm Events Database there are no reported injuries, deaths, property loss or crop loss within CSU's boundary due to high wind. There have been 3 high wind event reported in the university

[76] Historical hail events. NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

boundary between 1955 and 2014. Based on the historic data showing hazardous impacts on the university, there is a great potential for high wind events to occur at any given time.

Historical High Wind Events at CSU[77]



Inventory Exposed

All assets located within the CSU boundary can be considered at risk from spring and summer storms. This includes 37,220 people, or 100% of the University's population, and all buildings and infrastructure within the university. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the University's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

[77] NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

Inventory assets exposed to severe wind is dependent on the age of the building, type, construction material used, and condition of the structure. Possible losses to critical infrastructure include:

- Electric power disruption
- Communication disruption
- Water and fuel shortages
- Road closures
- Damaged infrastructure components, such as sewer lift stations and treatment plants
- Damage to homes, structures, and shelters

Potential Losses

Spring and summer storms affect the entire planning area of CSU including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Severe storms will remain a highly likely occurrence for CSU. It is likely that lightning and hail will also be experienced in the area due to such storms.

Generally, straight-line wind events destroy private, commercial, and public property. Additional costs stem from debris removal, maintenance, repair, and response. Indirect costs include loss of industrial and commercial productivity as a result of damage to infrastructure, facilities, or interruption of services. Because no specific, countywide loss estimation exists for wind, potential losses are related to historical property damage and injuries/deaths.

Probability of Future Occurrences

Spring and summer storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past spring and summer events provide benchmarks for projecting similar conditions into the future. The probability that CSU will experience a spring or summer storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in CSU at least once every year.

Reported straight-line wind events over the past nineteen years provide an acceptable framework for determining the future occurrence in terms of event. The probability of CSU experiencing a severe wind event associated with damages or injuries can be difficult to quantify, but based on historical record of 3 severe wind events since 1954, there is a chance of this type of event occurring each year.

Capabilities Assessment

The capability assessment examines the ability of CSU to implement and manage the comprehensive mitigation strategy laid out in this Plan. The strengths, weaknesses, and resources of the community are

identified here as a means for evaluating and maintaining effective and appropriate management of the School's hazard mitigation program.

Local Personnel

The ability of a community to implement a comprehensive mitigation strategy depends, in part, on available resources, including people and staff. The following table outlines the University's capabilities as they relate to key personnel.

	Full Time	Part Time	None or Not-Identified
Emergency Manager	X		
Floodplain Administrator		X	
Community Planner	X		
GIS Specialist	X		
Grant Writer	X		

Land Use Planning and Codes

Local land use plans and building codes are tremendous tools for evaluating local policies related to hazard mitigation and risk reduction. Additionally, comprehensive master plans, capital improvement plans, stormwater plans and zoning ordinances all present opportunities for enhanced local capabilities. The following table outlines the University's current capabilities as they relate to land use planning and codes.

	Yes (Y); No (N)
A zoning ordinance	N
A hazard-specific ordinance	N
Local building codes	Y
A Comprehensive Plan / Master Plan	Y
A Capital Improvements Plan	Y
A Stormwater Plan	Y
A Continuity of Operations Plan (COOP)	N
An Emergency Operations Plan (EOP)	Y
A Long-Term Recovery Plan	N
Participates in the NFIP	Y

Building codes are one tool that communities use to enhance public safety. For example, they can increase structural integrity, mitigate structure fires, and provide benefits in relation to natural hazard avoidance.

In Colorado, land use regulations and building codes are typically implemented at the local level. Even without a statewide mandate, most counties and many municipalities have enacted regulations and codes. CSU has adopted a local building code requirement, demonstrating their understanding of the benefits codes provide, including reduced exposure to hazards.

Plan Maintenance and Implementation

CSU has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the university will continue public participation in the plan maintenance process.

Jurisdiction	Plan Maintenance and Implementation Strategy
CSU	*"CSU will continue our participation with the County Local Emergency Planning Committee; The CSU Public Safety Committee will review the Plan every two years."* *"Our policies promote "public" input through various committees across our campuses."*

Integrating Hazard Mitigation into Local Planning

Through discussions at planning meetings and the use of an online survey, individual outreach, and phone calls, each participating jurisdiction brainstormed with the planning team to identify processes for integrating hazard mitigation into their local planning mechanisms and policies. The following table lists the specific integration strategy identified by CSU based on the mitigation actions listed in this plan.

Jurisdiction	Strategy
CSU	*"Moving forward, we will integrate hazard mitigation actions into our master plans."*

Mitigation Action Guides

The following Mitigation Action Guides present CSU's mitigation actions that were developed for the 2016 Plan. It should be noted that since the major flooding event of 1997, the University has invested over $5 Million in flood mitigation measures and drainage improvements.

Colorado State University: Monthly meetings and trainings (CSU – 1)	
PRIORITY: Low	HAZARDS ADDRESSED: Public Health
LOCATION: Throughout Campuses	GOALS ADDRESSED: [posted on website, use number]
RECOMMENDATION DATE: Ongoing	OBJECTIVES ADDRESSED: Posted on Web
TARGET COMPLETION DATE: Ongoing	
ISSUE: Ongoing Education	
RECOMMENDATION: Monthly meetings and trainings	

ACTION: Ongoing training and education to University staff and students with Risk Management Week, Building Proctor Trainings and the Public Safety Team	
LEAD AGENCY: Colorado State University	EXPECTED COST: very minimal cost because it's built into the daily schedules
SUPPORT AGENCIES: Throughout Campus	POTENTIAL FUNDING SOURCES: Departmental Budgets
PROGRESS MILESTONES: Weekly/monthly/yearly meetings and presentations.	

Colorado State University: Ongoing emergency management exercises and drills (CSU – 2)	
PRIORITY: Low	HAZARDS ADDRESSED: Public Health
LOCATION: Throughout Campuses	GOALS ADDRESSED: [posted on website, use number]
RECOMMENDATION DATE: Ongoing	OBJECTIVES ADDRESSED: Reports and audits
TARGET COMPLETION DATE: Ongoing	
ISSUE: Ongoing emergency management exercises and drills	
RECOMMENDATION: Working with students and staff to execute the exercises and drills	
ACTION: Ongoing exercises and drill with University students and staff on a yearly basis.	
LEAD AGENCY: Colorado State University	EXPECTED COST: No true cost associated with exercises and drills
SUPPORT AGENCIES: Throughout Campus	POTENTIAL FUNDING SOURCES: Funding built into normal week schedules.
PROGRESS MILESTONES: Weekly/monthly/yearly meetings and presentations.	

Colorado State University: Ongoing upgrading of systems and infrastructure (CSU – 3)	
PRIORITY: Medium	HAZARDS ADDRESSED: Public Health
LOCATION: Throughout Campuses	GOALS ADDRESSED: [posted on website, use number]
RECOMMENDATION DATE: Ongoing	OBJECTIVES ADDRESSED: Code enforcement
TARGET COMPLETION DATE: Ongoing	
ISSUE: Ongoing upgrading of fire safety systems, road and drainage enhancements, new Stadium	
RECOMMENDATION: Through obtaining State funding for upgrading	
ACTION: Ongoing upgrading of systems and infrastructure as the University grows.	
LEAD AGENCY: Colorado State University	EXPECTED COST: $270 million
SUPPORT AGENCIES: Throughout Campus	POTENTIAL FUNDING SOURCES: State funding and private donations
PROGRESS MILESTONES: Weekly/monthly/yearly meetings and presentations along with various utilities/fire/building code inspections.	

Colorado State University: Protect and mitigate University utility (steam) tunnels from flooding. (CSU – 4)	
PRIORITY: High	HAZARDS ADDRESSED: Flood
LOCATION: Throughout Campuses	GOALS ADDRESSED: [posted on website, use number]

RECOMMENDATION DATE: Ongoing	OBJECTIVES ADDRESSED: Code enforcement
TARGET COMPLETION DATE: Ongoing	
ISSUE: Steam tunnel flood protection	
RECOMMENDATION: Through obtaining State funding	
ACTION: Protect and mitigate University utility (steam) tunnels from flooding.	
LEAD AGENCY: Colorado State University	EXPECTED COST: $317,460.00
SUPPORT AGENCIES: Private Consultant	POTENTIAL FUNDING SOURCES: State funding for Controlled Maintenance
PROGRESS MILESTONES: Meetings along with various utilities/fire/building code inspections.	

Letter of Intent to Participate

Colorado State University

Office of the Vice President for University Operations
518 Administration Building
6001 Campus Delivery
Fort Collins, Colorado 80523-6001
(970) 491-5257
FAX: (970) 491-2254
http://admin.colostate.edu/

LETTER OF INTENT TO PARTICIPATE

August 20, 2014

Lori R. Hodges
Larimer County
200 West Oak Street, 2nd Floor
PO Box 1190
Fort Collins, CO 80522-1190

Re: "Statement of Intent to Participate" as a participating jurisdiction in Larimer County Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Dear Lori Hodges,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, Colorado State University is submitting this letter of intent to confirm that Colorado State University has agreed to participate in the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, Colorado State University agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Larimer County to complete the plan in conformance with FEMA requirements.

Colorado State University understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by an agreement between Larimer County and Colorado State University, I, Amy Parsons, commit Ken Quintana to Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 21st day of August 2014

for: ROBERT SCHUR, EXEC. DIR.
Amy Parsons, Vice President for University Operations
Colorado State University

LARIMER COUNTY
COMMITTED TO EXCELLENCE

Michael Baker INTERNATIONAL

Town of Estes Park

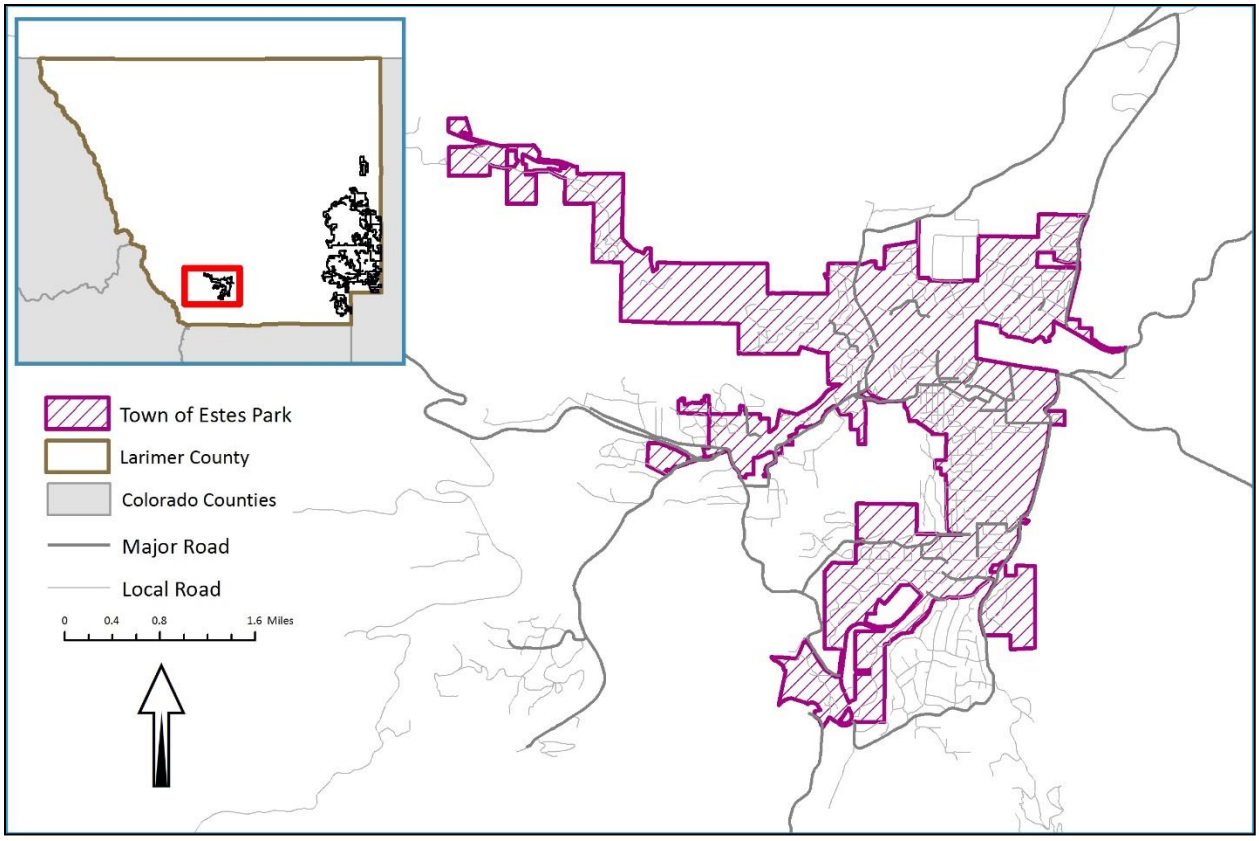
"The Mission of the Town of Estes Park is to provide high-quality, reliable services for the benefit of our citizens, guests and employees, while being good stewards of public resources and our natural setting."

– Estes Park 2015 Strategic Plan

Community Profile

The Town of Estes Park is located approximately 70 miles north west of Denver and is bordered to the west by Rocky Mountain National Park. Estes Park receives many visitors due to its close proximity to Rocky Mountain National Park. The town's elevation is 7,522 feet above sea level and it lies along the Big Thompson River. Based on the results of a recent Community Livability Survey, four in five residents of Estes Park rated their overall quality of life as excellent or good. Moreover, 77% of residents would be very or somewhat likely to recommend Estes Park as a place to live to someone who asks. Estes Park's overall appearance and overall image along with the Town as a place to live and retire received high ratings by at least four in five residents. Most of the aspects that contribute to community livability were rated positively and were at least similar to national benchmark comparisons. Additionally, in terms of Community Engagement, Estes Park scores high. This metric includes emergency preparedness efforts taken by local residents.

Since the mid-1980's, the Town of Estes Park and the surrounding Estes Valley have experienced rapid and complex change due to a shifting economic base, demographic shifts, growth characteristics, and increased use of their natural resources. According to the Estes Valley Comprehensive Plan, many of these changes have been caused by forces outside the community and are difficult to recognize and influence. In an effort to further understand these influences and develop a preferred future for the Valley, the Town of Estes Park and Larimer County cooperated in preparing a strategic future planning process called the Estes Park Directions.



The following table summarizes key demographic and development related characteristics of the Town of Estes Park.

Town of Estes Park Statistics		
	Town of Estes Park	Colorado
Population, 2010	5,858	5,029,196
2000-2010 Population Change, %	7.5%	14.5%
% Population under 5 years, 2010	4.8%	6.8%
% Population under 19 years, 2010	18.5%	20.3
% Population 65 years and over, 2010	25.2%	10.9%
Language other than English spoken at home, % age 5+, 2009-2013	20.7%	15.9%
Homeownership Rate 2010	63.1%	65.5%
Persons Per Household 2010	2.1	2.57
Persons below poverty level, %, 2013	4.2%	13.2%
Median Household Income, 2013	$59,826	$58,433

Hazard Identification and Risk Assessment

The following Hazard Identification and Risk Assessment Summary table is based on jurisdiction-specific responses to the risk factor exercise and differs from the risk factor results that were determined at the county scale.

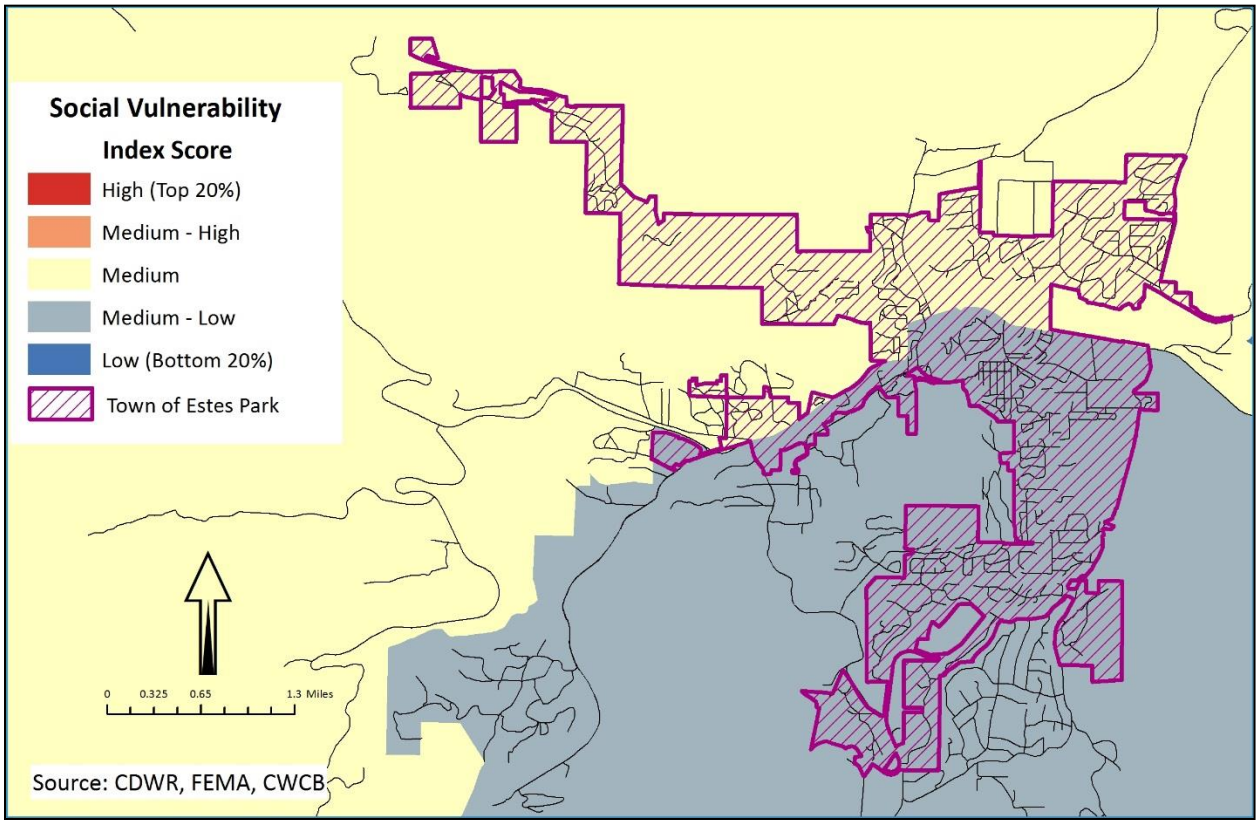
NATURAL HAZARD	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Fire – Wildland	1.0	0.9	0.7	0.3	0.4	3.3
Flood – Flash and Riverine	0.8	0.8	0.6	0.3	0.4	3.0
Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)	1.0	0.6	0.7	0.3	0.3	2.9
Utility Disruption	0.8	0.4	0.6	0.4	0.2	2.5
Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)	1.0	0.4	0.4	0.3	0.2	2.3
Landslide / Rockslide	0.5	0.3	0.4	0.4	0.2	1.8
Civil Disturbance	0.3	0.5	0.3	0.4	0.1	1.6
Erosion / Deposition	0.6	0.3	0.3	0.2	0.1	1.6
Hazmat – Fixed and Transport	0.3	0.3	0.2	0.4	0.1	1.4
Tornado	0.3	0.3	0.2	0.4	0.2	1.4
Biological Hazards / Contagion	0.3	0.3	0.2	0.3	0.1	1.3
Earthquake	0.3	0.3	0.2	0.4	0.1	1.3
HIGH RISK (2.5 or higher): Fire – Wildland; Flood – Flash and Riverine; Winter Storm (Blizzard Conditions, Heavy Snow Accumulation); Utility Disruption						
MODERATE RISK HAZARD (2.0 - 2.4): Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning);						
Low Risk (1.9 and lower): Landslide / Rockslide; Civil Disturbance; Erosion / Deposition; Hazmat – Fixed and Transport; Tornado; Biological Hazards / Contagion; Earthquake						

Vulnerability Assessment

This section provides a refined vulnerability assessment, specific for the Town of Estes Park, for those hazards that were identified as being rated HIGH in the preceding section. This analysis was conducted separately from that of the county-wide vulnerability assessment to specifically focus on the population, structures, infrastructure, and other assets unique to Estes Park.

The results of the social vulnerability assessment are displayed on the map below. On the map, social vulnerability is represented at the census tract level by 5 classes of vulnerability: Low (bottom 20% of the county), Medium-Low, Medium, Medium-High, and High (top 20% of the county). The Town of Estes Park's social vulnerability map shows social vulnerability within the community.

Social Vulnerability Map – Town of Estes Park[78]



Social vulnerability is represented as the social, economic, demographic, and housing characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to hazard events. The pre-existing social conditions that contribute to disaster losses can be identified using social vulnerability indicators. Using methods identified in the Social Vulnerability Index (SoVI) developed by Cutter et. al. (2003) this layer shows the social vulnerability index scores for the State of Colorado at the census tract level. Social vulnerability is represented at the Census tract level by five classes of vulnerability: Low, Medium-Low, Medium, Medium-High, and High.

Estes Park is characterized by a mix of medium-low to medium levels of social vulnerability. The northern half of the town have higher levels of social vulnerability to hazards than the southern region. Evaluating the individual social vulnerability indicators within the community over time will give local emergency managers, planners, and stakeholders an even clearer picture of why vulnerability to disasters may be higher in the northern region of the town as well as which social vulnerability factors have the largest negative effect on the town and its resiliency.

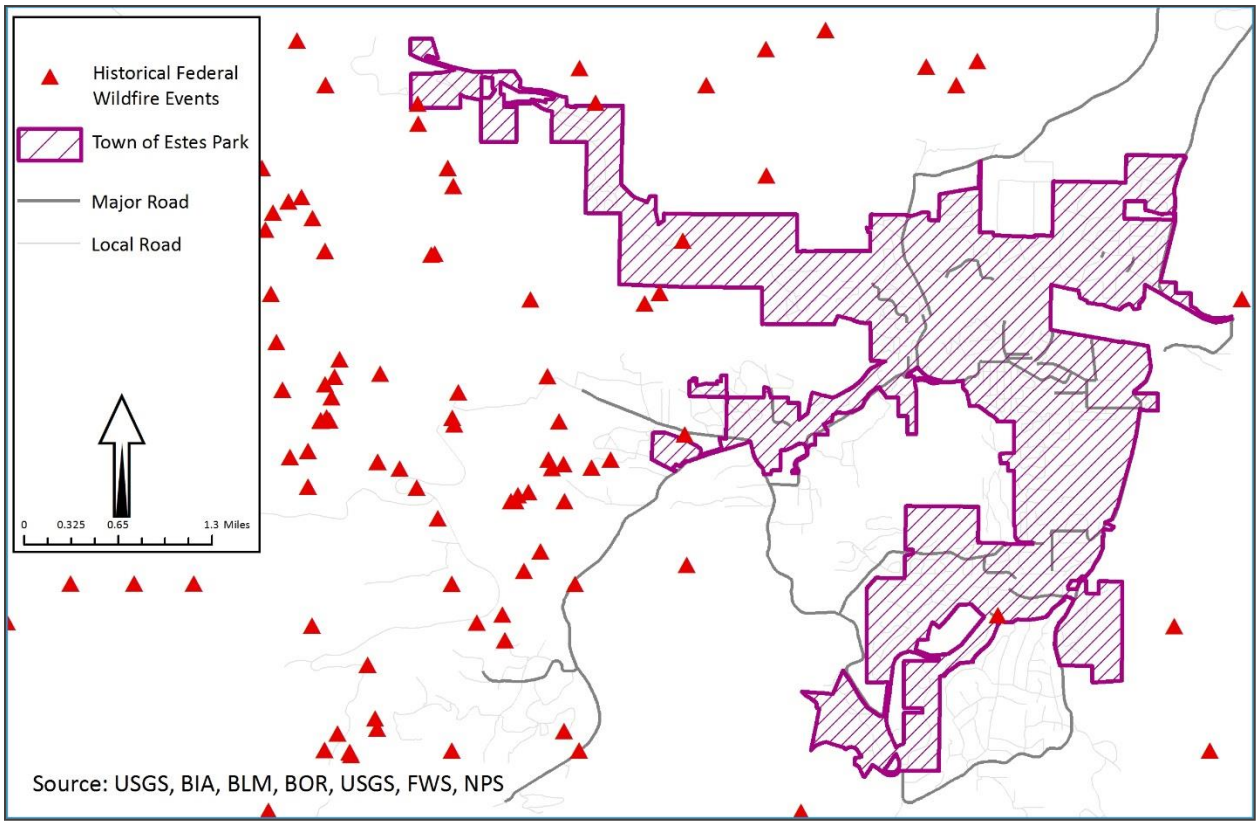
[78] Source: Colorado Division of Water Resources Dam Safety Branch, FEMA, Colorado Water Conservation Board (CWCB)

Fire – Wildland

Previous Occurrences

According to USGS there have been 3 reported wildfire events in the Town of Estes Park between 1980 and 2013. There is no data available regarding injuries, deaths, or damages. Based on the historic data showing hazardous impacts on Estes Park, there is a great potential for wildfire events to occur at any given time.

Town of Estes Park Historical Federal Wildfire Events[79]

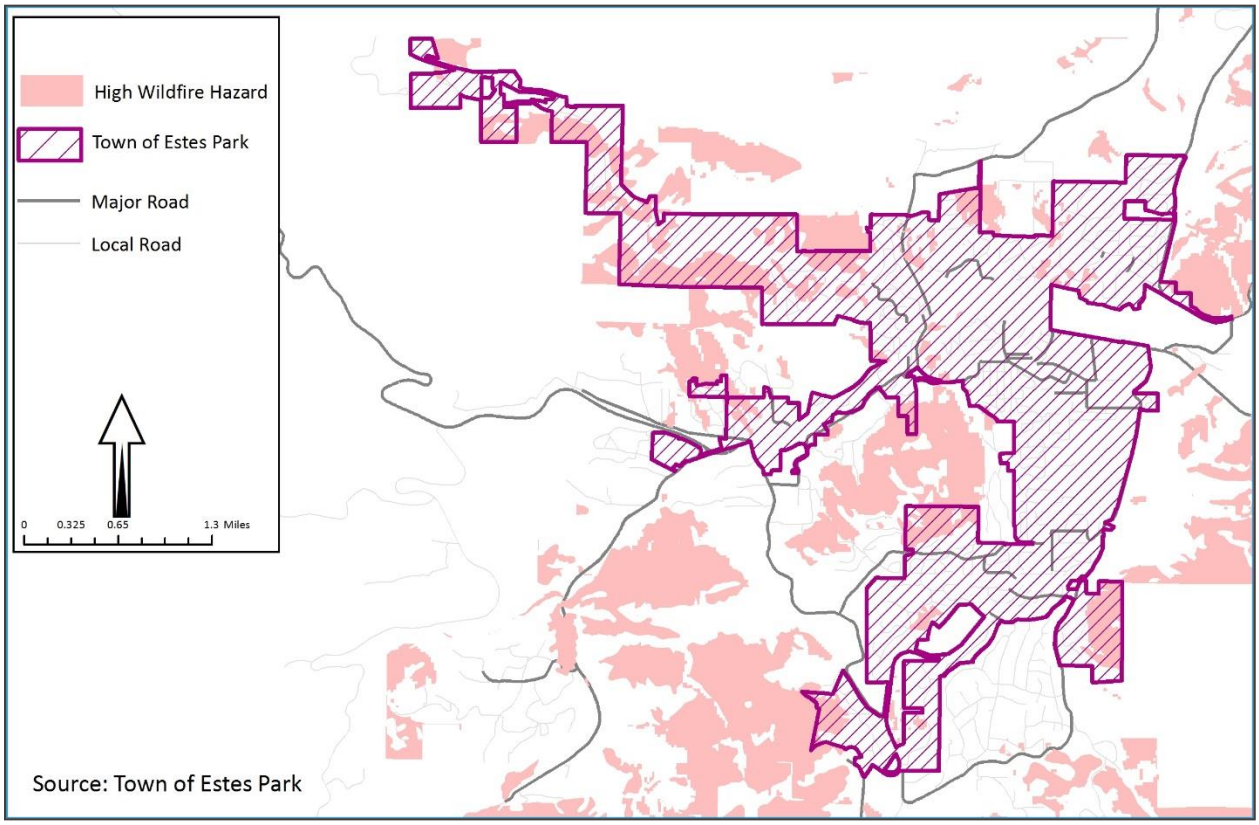


Inventory Exposed

The Town of Estes Park has established wildfire hazard zone designation to help hazard mitigation of wildfires in new developments and subdivisions. The mapped hazard areas include all areas "high-tree" fire hazard areas. Any new development or subdivision requires a mitigation plan prepared by a professional forester addressing how the development or subdivision will avoid or mitigate wildfire hazards. The following figure illustrates the high wildfire hazard zones determined by the Town of Estes Park, the Colorado State Forest Service, and Larimer County Wildfire Safety Specialist.

[79] Historical wildland fire occurrence data compiled by USGS from 1980 - 2013, from BIA, BLM, BOR, USGS, FWS, and NPS.

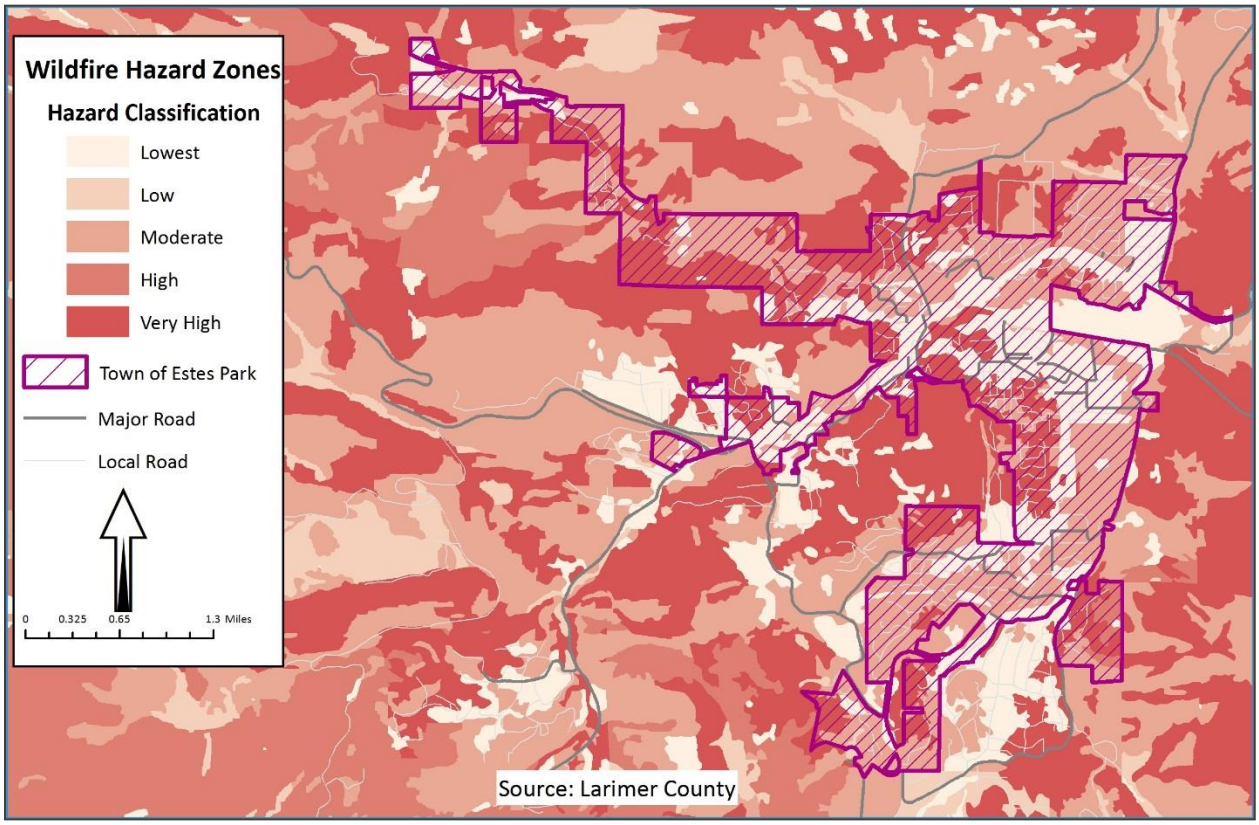
Town of Estes Park High Wildfire Hazard Zones[80]



The following Wildfire Hazard Zone map identifies the expected wildfire behavior. The highest wildfire hazard zones are located throughout the district.

[80] High Wildfire Hazard Zones, from Town of Estes Park

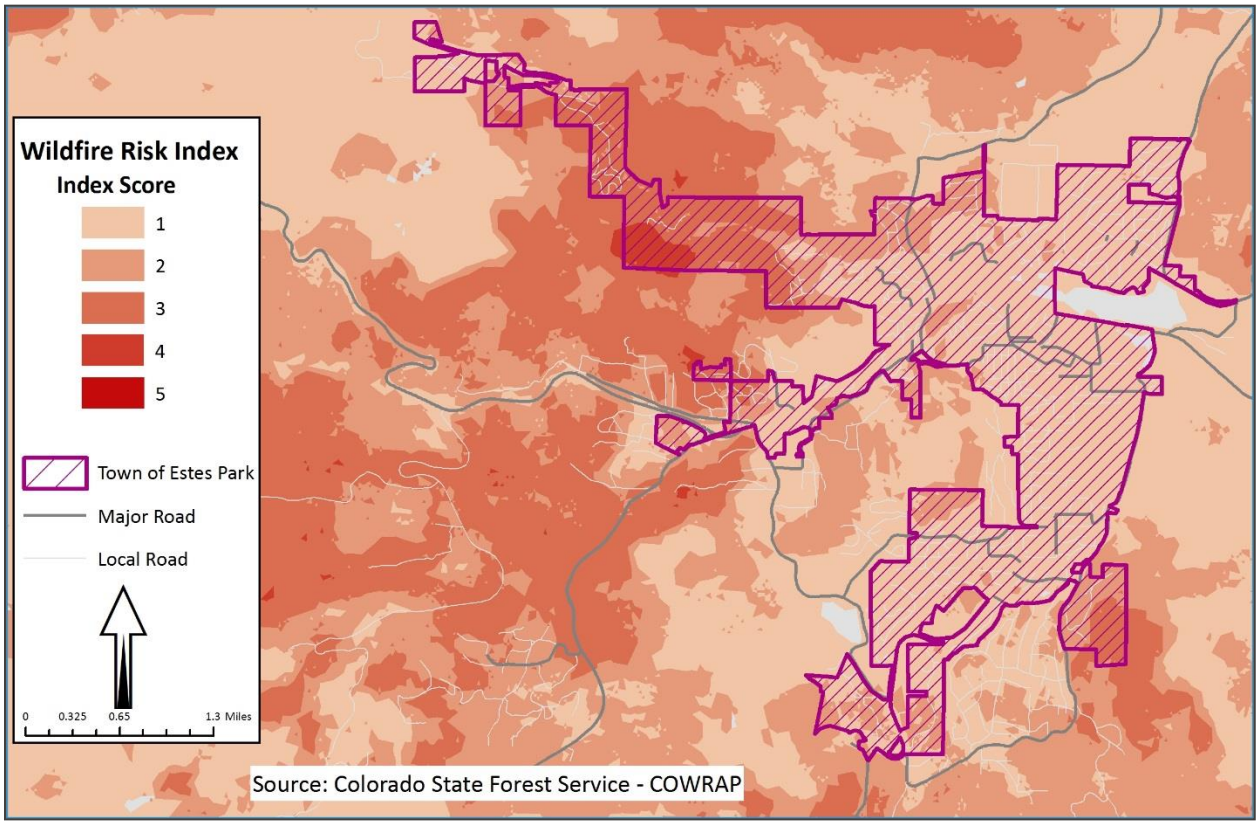
Town of Estes Park Wildfire Hazard Zone Map[81]



The following Wildfire Risk map identifies areas with the greatest potential impacts from a wildfire, in other words, those areas most at risk. The highest wildfire risk areas in the district are located in the northwestern region, in areas where there are lower population densities.

[81] To be used to identify wildfire hazards within the Wildfire Mitigation Area. The hazards are determined based on vegetation cover type, habitat structure stage (cover type, tree size and crown cover percentage), southern facing aspects and 30% and greater slopes according to the Wildfire Hazard Area Mapping (WHAM) guidelines.

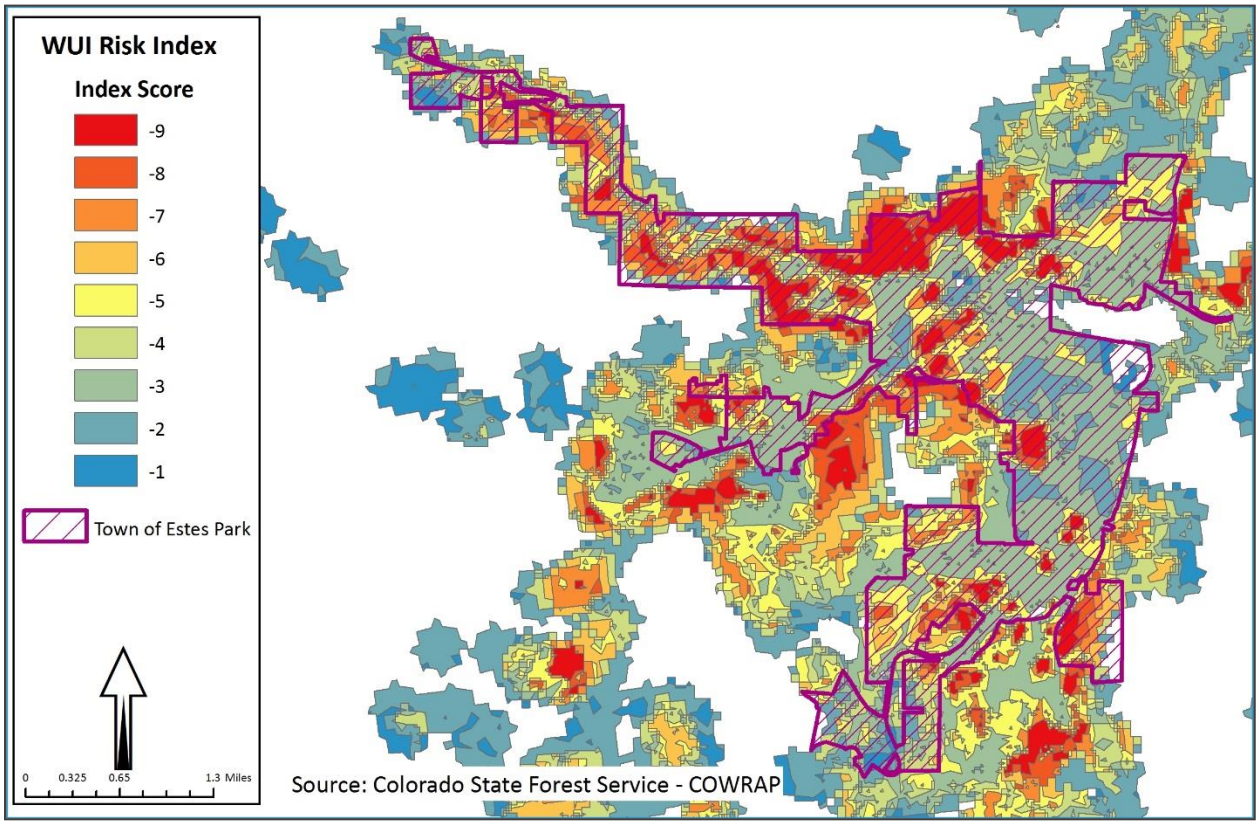
Town of Estes Park Wildfire Risk Index Map[82]



There are a number of areas in the town that are within the medium to highest level on the WUI Risk Index Scale. This means that the potential impact on people and homes from a wildfire in those areas is medium to high in relationship to the rest of Larimer County. This level of risk is derived by combining housing density with predicted flame length.

[82] Wildfire Risk represents the possibility of loss or harm occurring from a wildfire. Risk is derived by combining wildfire threat and fire effects. The COWRAP data set was produced statewide and ranks areas on a scale that includes: lowest risk to highest risk. All risk rankings are present in Larimer County.

Town of Estes Park WUI Map[83]



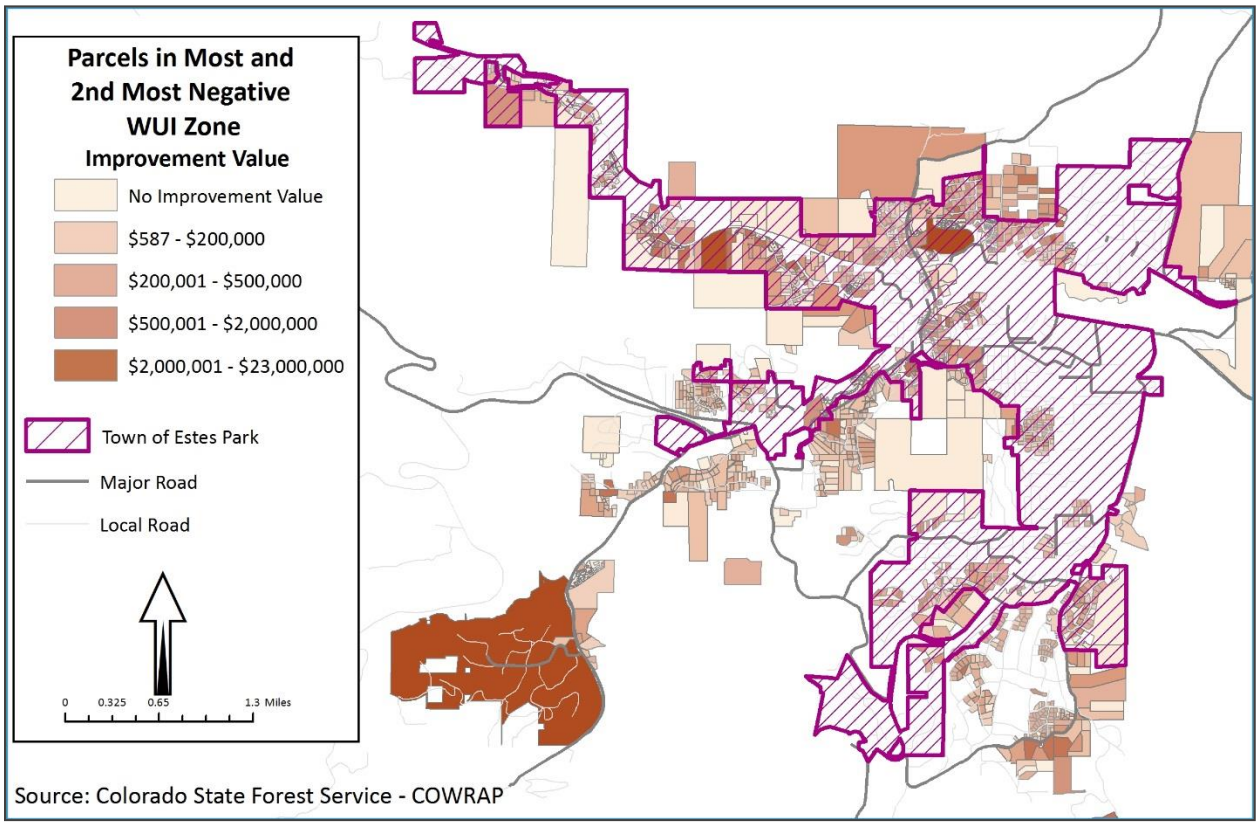
Fires can extensively impact the economy of an affected area, including the agricultural, recreation and tourism industries, water resources, and the critical facilities upon which the Town of Estes Park depends. There are many areas of high wildfire threat throughout the town according to the WUI Risk Index. There are also many areas of medium threat.

Potential Losses

[83] Wildland Urban Interface (WUI) Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length. The COWRAP data set was produced statewide and ranks areas on a scale that includes: least negative to most negative impacts. This scale stretched from -1 (least) to -9 (most) statewide, within the Town of Estes Park values present span this entire range.

The exposure data provided in the previous section (Inventory Assets Exposed) provides the clearest picture of potential losses to wildfire in the Town of Estes Park. There is 1 critical facility located in areas with the *most negative* and 6 critical facilities located in areas with the *2nd most negative* wildfire threat total. The appraisal value of the critical facilities within these *most and 2nd most negative* threat areas is approximately $10 million dollars. There are 942 parcels/structures located in areas with the *most negative* and 726 parcels/structures located in areas with the *2nd most negative* wildfire threat total. The appraisal value of the parcels/structures within these *most and 2nd most negative* threat areas is approximately $399.7 million dollars. The risk assessment uses worst case scenario loss estimates. For this reason it is important to plan for relative levels of loss rather than specific potential loss dollar amounts.

Town of Estes Park Parcels in the Most Negative and Second Most Negative WUI Zone



Probability of Future Occurrences

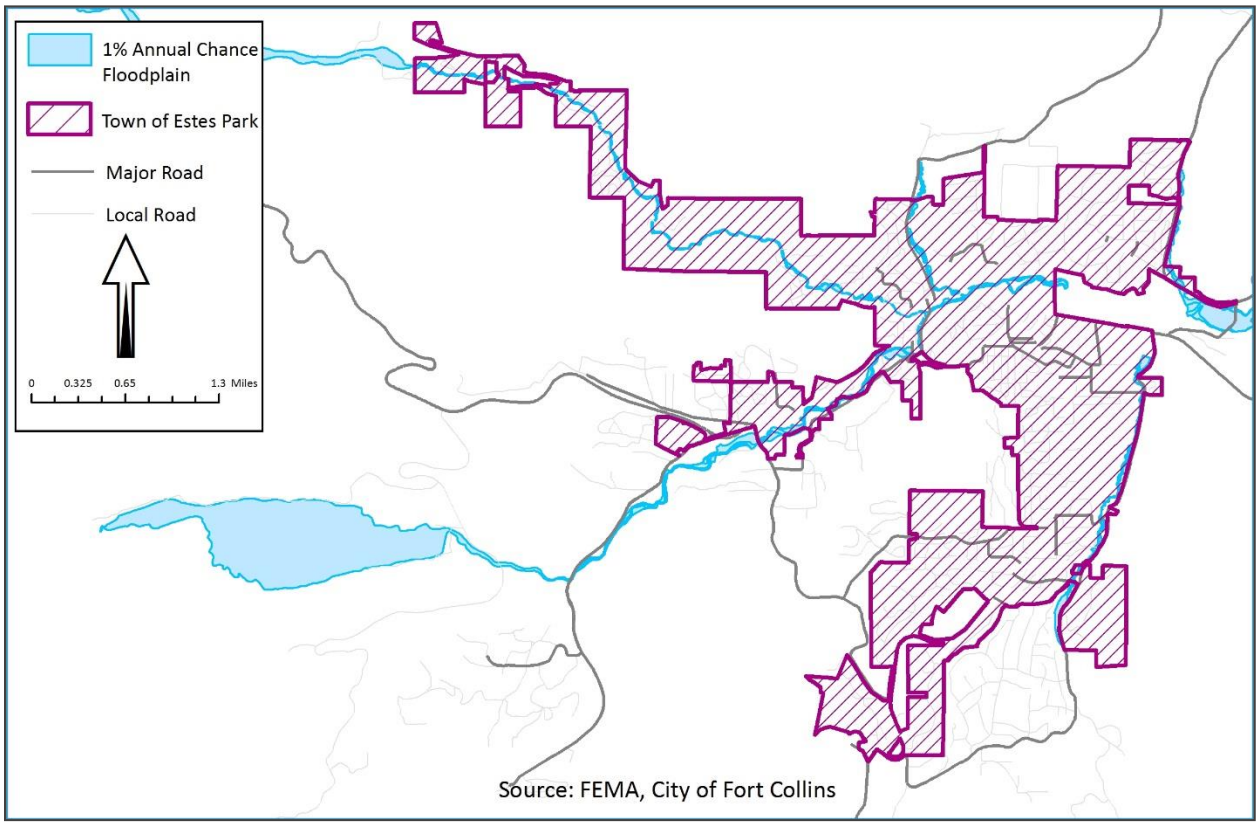
The likelihood of wildfires attaining significant size and intensity is unpredictable and highly dependent on environmental conditions and firefighting response. Weather conditions, particularly drought events, increase the likelihood of wildfires occurring. That said, it is important to note that 98% of wildfires are human-caused. Ultimately, the occurrence of future wildfire events will strongly depend on patterns of human activity and events are more likely to occur in wildfire-prone areas experiencing new or additional development.

Wildfires can occur at any time of day and during any month of the year. Moreover, the length of a wildfire season and/or peak months may vary appreciably from year to year. As evidenced by the

wildfire risk assessment, areas within Estes Park that are characterized by dense development and single family homes along the wildland-urban interface are most vulnerable to wildfire.

Flood – Flash and Riverine

Town of Estes Park Special Flood Hazard Area[84]



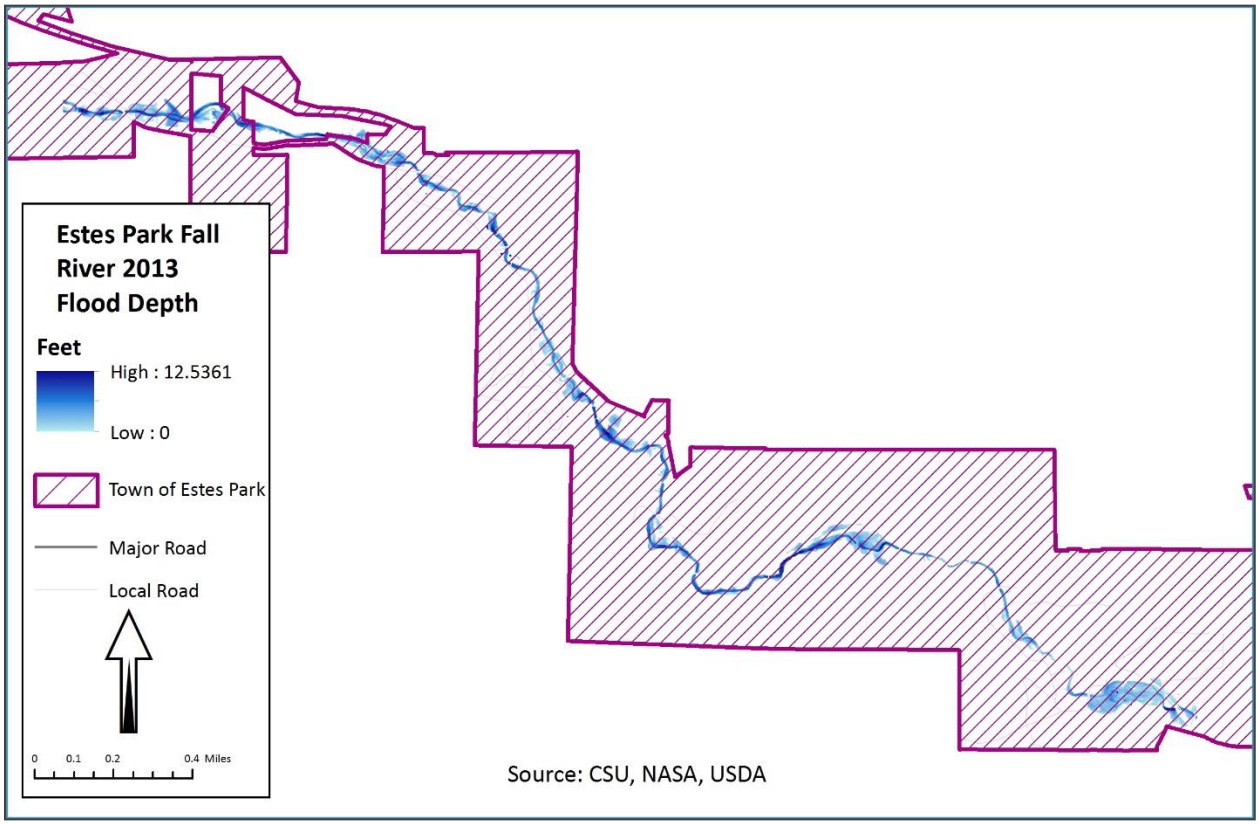
Previous Occurrences

Estes Park sustained severe damages during the September 2013 Colorado flood event. Evacuations began on September 12, 2013, at approximately 3:00AM and 2,428 contacts were made to warn and evacuate neighborhoods through the LETA911 emergency notification system. The information below was provided by the Town of Estes Park and provides a snapshot of just how many residents were impacted by the flood.

[84] This layer is compiled utilizing the most recent Special Flood Hazard Areas (SFHA) as defined by FEMA's National Flood Hazard Layer (NFHL) in combination with some recent flood studies performed by the City of Fort Collins. These areas are also referred to as the 1% Annual Chance Floodplain.

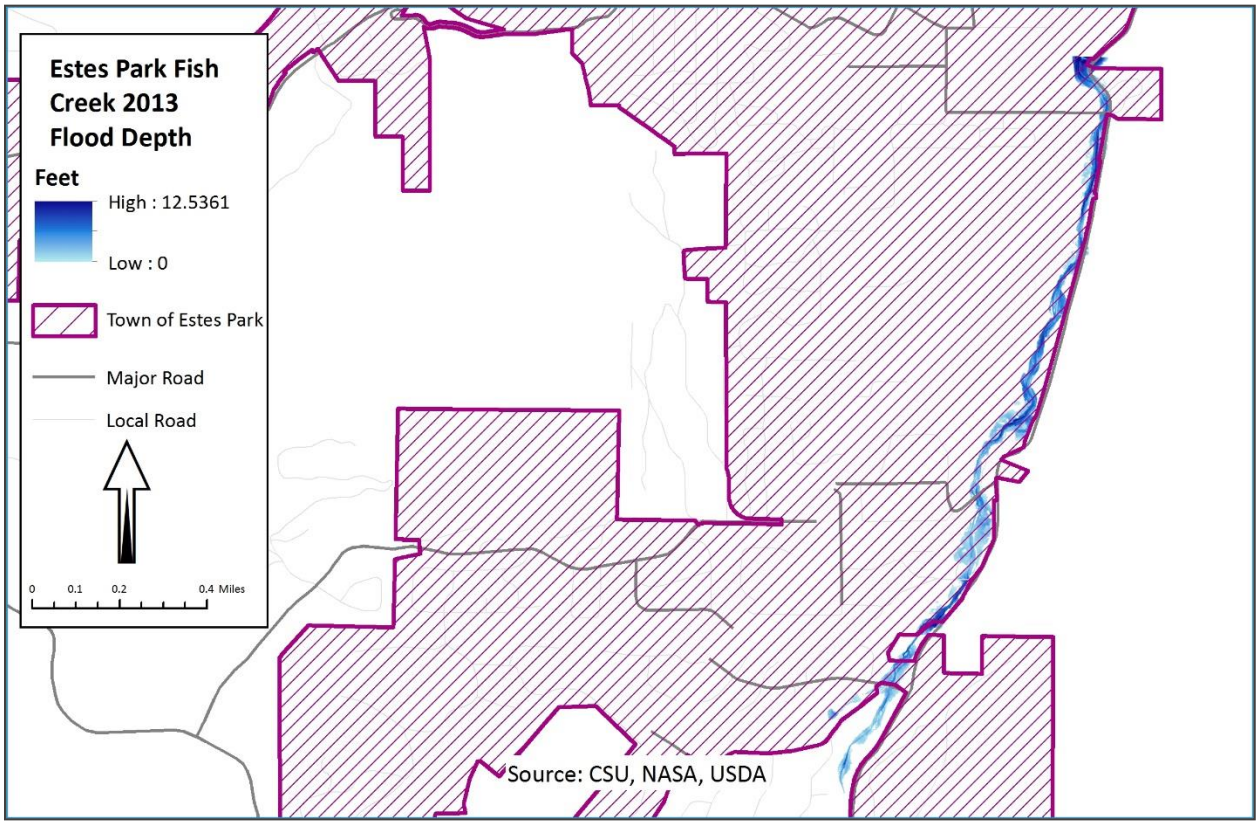
Red Cross Shelter Support:	606 people signed in
	167 people sheltered in the cents
	316 people outsourced to local hotels for varying amounts of time
Salvation Army Support:	3571 meals were served
	7000 snacks/drinks were served
	9000 gallons of water distributed
Utilities Outages and Restoration	Estimated $35-40 million in public infrastructure damage in the Estes Valley
	3.25 miles of Fish Creek Road are destroyed or damaged
	Caused outages for electric, water, gas, cable and phones
	Approximately 4,000 sewer taps were non-functional under “No Flush” orders within the Upper Thompson Sanitation District.
Structural Damage Assessments (incorporated Estes Park)	Rapid assessments completed for approximately 3,000 structures in the Estes Valley this week. Approximately 12 red tags were issued for properties that were determined to be unsafe for occupancy due to structural damage or electrical safety.
	2,383 estimated residences affected by water, mud, sewer access, road access
	183 estimated businesses affected by water, mud, sewer access, road access

Town of Estes Park Fall River 2013 Flood Extent[85]



[85] Based on high water marks collected by the Town of Estes Park.

Town of Estes Park Fish Creek 2013 Flood Extent[86]



Inventory Exposed

Critical facilities are essential to the health and welfare of the whole population and are especially important both during and after hazard events. Critical structures or areas that overlap or touch the SFHA are considered "flood prone."

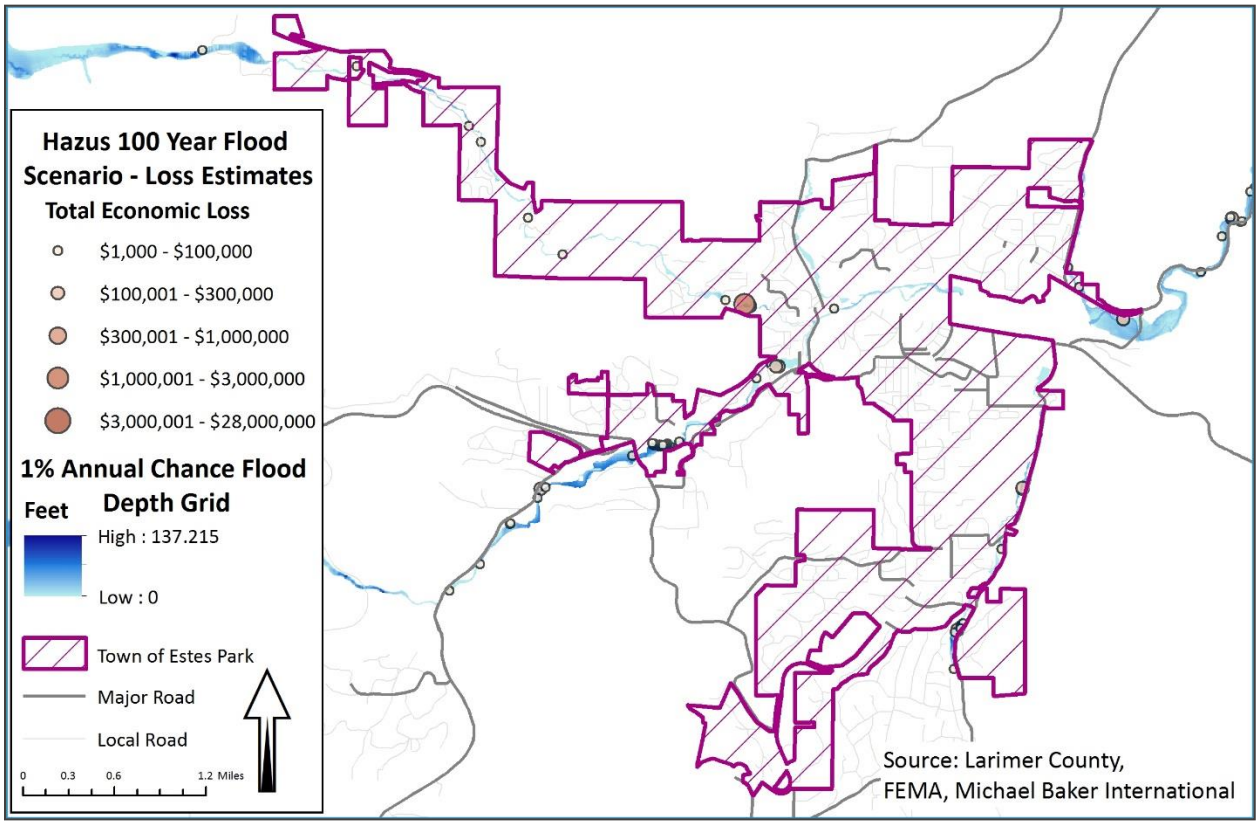
The critical facility and structure exposure analysis estimates that there are no critical facility and 42 structures in the Town of Estes Park that are flood prone (not including the total miles of flood prone infrastructure). The appraised value of the exposed structures is over $6 million dollars.

Potential Losses

Hazus estimates for the Town of Estes Park that for a 100-year flood event, approximately 42 buildings will experience flood damage. The total economic loss estimated for the 100-year flood is over $3.2 million dollars. The estimated building loss is $1.8 million dollars and $1.4 million dollars in content loss.

[86] Based on high water marks collected by the Town of Estes Park.

Town of Estes Park 1% Annual Flood Loss Estimation and Flood Depth Grid Map[87]



Probability of Future Occurrences

Frequency of previously reported flood events in the Town of Estes Park provide an acceptable framework for determining the probability of future flood occurrence in the area. The probability that the town will experience a flood event can be difficult to predict or quantify.

Severe flooding has the potential to inflict significant damage to people and property in the town. Mitigating flood damage requires that communities remain diligent and notify local officials of potential flood (and flash flood) prone areas near infrastructure such as roads, bridges, and buildings.

[87] FEMA's loss estimation modeling software, Hazus, was utilized to produce this data set. A 100 year flood scenario was defined and losses were calculated for each point (structure) that intersected the depth grid based on the Hazus depth damage curves for specific structure attributes (such as foundation type, building type, and first flood height). Information derived from Hazus-MH 2.2 flood scenario. Total Losses equals a sum of building losses, content losses, and inventory losses. 1% Annual Chance Flood flooding depth grid, produced from the best available topographic and floodplain data.

Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)

Previous Occurrences

According to NOAA's Storm Events Database, the Town of Estes Park has experienced 175 Winter Storms since 1996. On March 17, 2003 there was report of a winter storm causing $15,500,000 in property damage in areas within western Larimer County above 6,000 feet. There were no deaths, injuries or damage to crops reported for any of these storms. The Town of Estes Park is at high risk of experiencing Winter Storms during the winter months.

Inventory Exposed

All assets located in the Town of Estes Park can be considered at risk from winter storms. This includes 5,858people, or 100% of the Town's population, and all buildings and infrastructure within the town. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the Town's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Potential Losses

Winter storms affect the entire planning area of the Town of Estes Park including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Winter storms will remain a highly likely occurrence for the Town of Estes Park.

Probability of Future Occurrences

Severe winter storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past severe winter events provide benchmarks for projecting similar conditions into the future. The probability that the Town of Estes Park will experience a severe winter storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the town at least once every year.

Utility Disruption

Previous Occurrences

The Town of Estes Park does not currently track incidences of utility disruption.

Inventory Exposed

All assets located in the Town of Estes Park are considered at risk from the impacts of utility disruption events. This includes 5,858 people, or 100% of the Town's population, and all buildings and infrastructure within the Town.

Potential Losses

Utility disruption events have the potential to threaten lives and disrupt business activity. However, monetary losses and casualty estimates are largely unknown.

Probability of Future Occurrences

In general, utility outages result from failures in the distribution system as opposed to shortages of supply. Distribution systems are most susceptible to failure during extreme hot and cold temperatures as well as during violent weather conditions. Regional utility failures can threaten human life, particularly when outages affect hospitals, nursing homes, or other healthcare facilities. As both population and climate variability increase across the State of Colorado, and put more pressure on aging distribution systems, it is likely that utility disturbance events will become more frequent in and around the Town of Estes Park.

Capabilities Assessment

The capability assessment examines the ability of the Town of Estes Park to implement and manage the comprehensive mitigation strategy laid out in this Plan. The strengths, weaknesses, and resources of the community are identified here as a means for evaluating and maintaining effective and appropriate management of the Town's hazard mitigation program.

Local Personnel

The ability of a community to implement a comprehensive mitigation strategy depends, in part, on available resources, including people and staff. The following table outlines the town's capabilities as they relate to key personnel.

	Full Time	Part Time	None or Not-Identified
Emergency Manager		X	
Floodplain Administrator		X	
Community Planner	X		
GIS Specialist		X	
Grant Writer		X	

Land Use Planning and Codes

Local land use plans and building codes are tremendous tools for evaluating local policies related to hazard mitigation and risk reduction. Additionally, comprehensive master plans, capital improvement plans, stormwater plans and zoning ordinances all present opportunities for enhanced local capabilities. The following table outlines the town's current capabilities as they relate to land use planning and codes.

	Yes (Y); No (N)
A zoning ordinance	Y
A hazard-specific ordinance	Y
Local building codes	Y
A Comprehensive Plan / Master Plan	Y
A Capital Improvements Plan	Y
A Stormwater Plan	N

A Continuity of Operations Plan (COOP)	N
An Emergency Operations Plan (EOP)	Y
A Long-Term Recovery Plan	Y
Participates in the NFIP	Y

Building codes are one tool that communities use to enhance public safety. For example, they can increase structural integrity, mitigate structure fires, and provide benefits in relation to natural hazard avoidance. In Colorado, land use regulations and building codes are typically implemented at the local level. Even without a statewide mandate, most counties and many municipalities have enacted regulations and codes. The Town of Estes Park has adopted a local building code requirement, demonstrating their understanding of the benefits codes provide, including reduced exposure to hazards.

Plan Maintenance and Implementation

The Town of Estes Park has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the town will continue public participation in the plan maintenance process.

Jurisdiction	Plan Maintenance and Implementation Strategy
Town of Estes Park	*"Our Emergency Manager will manage the mitigation actions scheduling and progress by reviewing the plan annually"* *"Our PIO will manage and distribute informational releases to the public regarding mitigation actions, progress, and opportunities for public involvement."*

Integrating Hazard Mitigation into Local Planning

Through discussions at planning meetings and the use of an online survey, individual outreach, and phone calls, each participating jurisdiction brainstormed with the planning team to identify processes for integrating hazard mitigation into their local planning mechanisms and policies. The following table lists the specific integration strategy identified by the Town of Estes Park based on the mitigation actions listed in this plan.

Jurisdiction	Strategy
Town of Estes Park	*"Our mitigation actions will be incorporated in our capital improvement planning"* *"We have created a floodplain management team comprising of citizens, Town staff and consultants. Additional mitigation actions will form from this team and incorporate into future planning."*

Mitigation Action Guides

The following Mitigation Action Guides present the town's mitigation actions that were developed for the 2016 Plan.

<table>
<tr><td colspan="2">Jurisdiction or Organization: Storm Water Management (Estes Park – 1)</td></tr>
<tr><td>PRIORITY: High</td><td>HAZARDS ADDRESSED Flood, Severe Storm</td></tr>
<tr><td>LOCATION: Estes Park</td><td>GOALS ADDRESSED: Goals 1, 2, and 5</td></tr>
<tr><td>RECOMMENDATION DATE: January 2016</td><td>OBJECTIVES ADDRESSED: Objectives C and E</td></tr>
<tr><td colspan="2">TARGET COMPLETION DATE: November 2017</td></tr>
<tr><td colspan="2">ISSUE: The Estes Park Street Division has purchased a Jet Culvert Cleaner and Trailer. This equipment will be used for cleaning storm drain culverts and inlet storm drain pipes. The Street Division will be developing a storm water plan to clean culverts on a regular scheduled maintenance program. These culverts are along storm water ditch lines, mostly lines that cross under streets. The jet cleaner is also used in high water rain and spring runoff events. When soil and debris are washed down to ditches and block and fill culverts, this equipment will be used to help prevent flooding and open up storm drain culverts.</td></tr>
<tr><td colspan="2">RECOMMENDATION: Annual maintenance and inspection of equipment and mitigation planning</td></tr>
<tr><td colspan="2">ACTION: Inspection and mitigation planning for ground water management for flooding and run off season</td></tr>
<tr><td>LEAD AGENCY: Estes Park Street Division</td><td>EXPECTED COST: $47,260</td></tr>
<tr><td>SUPPORT AGENCIES: Town of Estes Park Public Works</td><td>POTENTIAL FUNDING SOURCES: Budgetary</td></tr>
<tr><td colspan="2">PROGRESS MILESTONES:
- Develop an annual maintenance and inspection plan for the Jet Culvert Cleaner
- Provide culvert clearing for the Estes Area as needed to minimize flood issues
- Conduct mitigation planning for ground water management
  </td></tr>
</table>

Estes Park – Town Hall – Basement Electrical Raising/Relocation (Estes Park – 2)	
PRIORITY: Medium	HAZARDS ADDRESSED: Flood-prone area containing high-priority electrical panels – Public Safety
LOCATION: Town Hall Basement	GOALS ADDRESSED: Raising or Relocation of most electrical components to an area not prone to flood; Help ensure continuity of service of Town Hall/PD/Emergency Services; Keep Town Hall operational
RECOMMENDATION DATE: 09/01/2015	OBJECTIVES ADDRESSED: Keep Town Hall operational in the case of another massive flood; Relocate PRPA Fiber gear; Relocate Level3 Fiber gear
TARGET COMPLETION DATE: 2/01/2016	
ISSUE: A sub-grade room contains important electrical panels, which power Town Hall. This building powers equipment which provides all telephone, cell phone, internet, and virtually all communications out of Estes Park. Building also houses the 911 emergency center. This room had one foot of water during the 2013 flood. Some equipment was destroyed.	
RECOMMENDATION: Raise/Relocate/Replace panels which are subject to flood – Potentially change out electrical panels 3+ feet, or move outside; Relocate a vast majority of the communications equipment to a conditioned, above-grade area.	
ACTION: Obtain several firm options and bids. Put into the Public Works budget; PRPA to relocate 98% of their gear. Once completed, ask Level3 to do the same. Provisions will be made to have an adequate space in the IT server room.	
LEAD AGENCY: Estes Park	EXPECTED COST: 4-5 days of EP IT staff time. Numerous days of PRPA staff time; $2000 in electrical improvements costs; $5000 in equipment costs (via PRPA)
SUPPORT AGENCIES: PRPA	POTENTIAL FUNDING SOURCES: PRPA will provide labor and materials at no direct charge to EP. Internal funds only for staff effort. Was not qualified for certain flood related grants.
PROGRESS MILESTONES: Sept 2015 – PRPA agreed to location, in progress. – Est. Oct 2015 completion Sept 2015 – Level3 was notified of intent. Seems amicable.	

Estes Park – MPEC EOC/Town Hall – Backup Site (Estes Park – 3)	
PRIORITY: Medium	HAZARDS ADDRESSED: Town Operations/Public Safety
LOCATION: Multi-Purpose Event Center	GOALS ADDRESSED: Provide infrastructure to setup an EOC or alternative location for Town Hall staff, in case o Town Hall becomes inoperable, for any reason; including PD/Emergency Services staff, as well as general EOC. Keep Town Hall staff operational in another location
RECOMMENDATION DATE: 09/01/2015	OBJECTIVES ADDRESSED: Keep Town Hall operations functioning in the case of severe outage of Town Hall. Provide secondary EOC location.
TARGET COMPLETION DATE: 6/01/2016	
ISSUE: Town Hall is older, without smoke/fire/water alarms, with some portions below grade, adjacent to flood prone areas. In the event of a building evacuation, provision MPEC to accept 40-60 staff, with electronic and communications facilities, to support all operations. Building also houses the 911 emergency center. The Town Hall basement room had one foot of water during the 2013 flood. Some equipment was destroyed.	
RECOMMENDATION: Provide contingency connections and gear at MPEC to support an EOC as well as a majority of staff from Town Hall.	
ACTION: Obtain several firm options and bids. Put into the Public Works budget.	
LEAD AGENCY: Estes Park	EXPECTED COST: $20-$75k
SUPPORT AGENCIES:	POTENTIAL FUNDING SOURCES: None obvious, other than internal funding.
PROGRESS MILESTONES: Nov 2014 – acquire backup FRII fiber switch; backup firewall; backup PD Verizon router; install private wireless access points To Do: Adequate Electrical to IT room Adequate HVAC to IT room Install backup gear, perform tests Onsite locate other IT needed gear Setup procedures at MPEC for seating/connections/ configurations	

Town of Estes Park: Watershed Protection Group (Estes Park – 4)	
PRIORITY: Medium	HAZARDS ADDRESSED: Flood, Severe Storm, Fire, Public Health, Hazmat
LOCATION: ESTES PARK TOWN HALL	GOALS ADDRESSED: 1, 2, 3, 4, 5
RECOMMENDATION DATE: 10/30/2015	OBJECTIVES ADDRESSED: A, B, C, D, E
TARGET COMPLETION DATE: ONGOING	
ISSUE: Avoid duplicating efforts and miscommunication; pool resources and ideas for wiser decision-making	

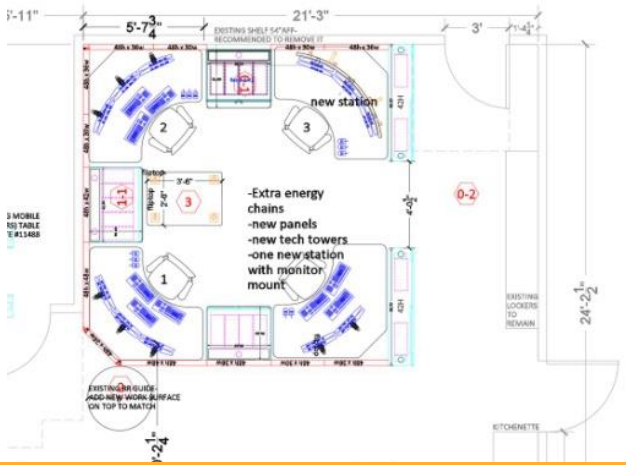
RECOMMENDATION: Assemble group, meet regularly, establish meeting parameters	
ACTION: Collaboration between Town departments and other outside agencies to determine best practices, planning, and implementation of projects. Provide a forum to discuss issues/projects involving watershed protection, including but not limited to stormwater management, flood mitigation, floodplain administration, emergency management, public outreach, financial aspects, watershed coalition, and utility providers	
LEAD AGENCY: Community Development Department	EXPECTED COST: 7-12 staff members; monthly meeting for approximately two hours, or more often as needed
SUPPORT AGENCIES: Community Development Department, Police Department, Public Works Department, Utilities Department, Town Administration, Finance, Estes Valley Watershed Coalition, Larimer County	POTENTIAL FUNDING SOURCES: Town of Estes Park
PROGRESS MILESTONES: Monthly (at a minimum) meetings to discuss current and future issues/projects. Town Board, Coalition Board updates as needed.	

Town of Estes Park: Replacement of Bridges and Widening of River Channels (Estes Park – 5)	
PRIORITY: High	HAZARDS ADDRESSED: Flood, Severe Storm, Fire, Public Health
LOCATION: Estes Park	GOALS ADDRESSED: Goals 1, 2, 4, 5
RECOMMENDATION DATE: 10/26/2015	OBJECTIVES ADDRESSED: Objectives C, D and E
TARGET COMPLETION DATE: 12/31/2030	
ISSUE: Most bridges and river channels within Town have inadequate capacity for flood flows	
RECOMMENDATION: Replacement of bridges and widening of river channels to accommodate flood flows.	
ACTION: The Town would have to acquire funding to replace and enlarge multiple undersized bridges and widen river channels to accommodate flood flows.	
LEAD AGENCY: Public Works	EXPECTED COST: Millions
SUPPORT AGENCIES: FHWA, FEMA, CDOT, other Town Departments	POTENTIAL FUNDING SOURCES: FEMA, FHWA, CDOT, other state and federal agencies

PROGRESS MILESTONES: Early/mid 2016 – begin replacement and enlargement of Moraine Ave. Bridge – completion in 2017.
Early 2017 submit grant applications for bridge replacement and channel widening
2017-2018 – begin construction on new bridges/widening channels
2018 – 2030? – complete bridge construction and channel widening

Estes Park: 4th Console for Communications Center (Estes Park – 6)	
PRIORITY: Medium	HAZARDS ADDRESSED: Drought, Earthquake, Land Subsidence, Extreme Temperatures, Flood, Severe Storm, Wind & Tornado, Fire, Public Health, Hazmat
LOCATION: Estes Park Communications Ctr	GOALS ADDRESSED: 1, 2, 3
RECOMMENDATION DATE: 01/01/2017	OBJECTIVES ADDRESSED: E
TARGET COMPLETION DATE: 12/31/2017	
ISSUE: Due to call volume in Hazard situations we have found that having only 3 dispatch consoles is too few.	
RECOMMENDATION: We want to add a full 4th console into the Communications Center	
ACTION: Purchasing new furniture, CAD computer, Radio Console	
LEAD AGENCY: Estes Park Police Department	EXPECTED COST: $120,000
SUPPORT AGENCIES: CRISP, LETA, WAC	POTENTIAL FUNDING SOURCES: Homeland Security Grant, Estes Park Police Department, Town of Estes Park, LETA.

PROGRESS MILESTONES: Initial plan will be to purchase the console furniture itself and an additional computer to run CAD. We already have a 4th phone station that will be moved to this location. Finally the purchase of the MCC7500 Console.



Town of Estes Park: Non-structural Flood proofing for Downtown Estes Park (Estes Park – 7)	
PRIORITY: Medium	HAZARDS ADDRESSED: Flood, Severe Storm, Fire, Public Health, Hazmat
LOCATION: Downtown Estes Park	GOALS ADDRESSED: Goals 1, 2, 4, 5
RECOMMENDATION DATE: 10/26/2015	OBJECTIVES ADDRESSED: Objectives C, D and E
TARGET COMPLETION DATE: 12/31/2020	
ISSUE: Flood proofing will help protect downtown properties from flood damage.	
RECOMMENDATION: Public dialog, applicability assessment and implementation of non-structural flood proofing measures to downtown buildings, as identified during the assessment process.	
ACTION: The Town would engage downtown property and business owners in a discussion of what non-structural flood proofing is and what benefits it can provide. The US Army Corps of Engineers Silver Jackets Program will be conducting a non-structural flood proofing assessment for downtown buildings and identifying potential funding sources. Flood proofing will be constructed following owner agreement and funding acquisition.	
LEAD AGENCY: Community Development	EXPECTED COST: Millions
SUPPORT AGENCIES: USACE, FEMA, CWCB, Downtown Business Groups, EP Public Works,	POTENTIAL FUNDING SOURCES: FEMA, USACE, State
PROGRESS MILESTONES: Summer 2016 – USACE Silver Jackets Study Complete Spring 2016-ongoing – public info/education/dialog about flood proofing 2017-2022 – implementation of flood proofing measures downtown	

Letter of Intent to Participate

TOWN OF ESTES PARK

November 25, 2014

Lori R. Hodges
Larimer County Emergency Management
200 West Oak Street
Fort Collins, CO 80526

Re: "Statement of Intent to Participate" as a participating jurisdiction in the Larimer County Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Dear Ms. Hodges:

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the Town of Estes Park is submitting this letter of intent to confirm that Town of Estes Park has agreed to participate in the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, Town of Estes Park agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Larimer County OEM to complete the plan in conformance with FEMA requirements.

Town of Estes Park understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

The Town of Estes Park will participate in the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Sincerely,

TOWN OF ESTES PARK

William C. Pinkham
Mayor

Administration
Town Administrator
Public Information

Administrative Services
Town Clerk
Human Resources

Community Development
Building Safety
Code Enforcement
Planning/Zoning

Community Services
Fairgrounds & Events
Museum
Senior Center
Visitor Services

Finance
P.O. Box 1747
Utility Billing

Police
P.O. Box 1287

Public Works
Fleet
Parks
Streets

Utilities
IT
Light and Power
Water

170 MACGREGOR AVE | P.O. BOX 1200 | ESTES PARK, CO 80517 | PH: 970-586-5331 www.estes.org

LARIMER COUNTY
COMMITTED TO EXCELLENCE

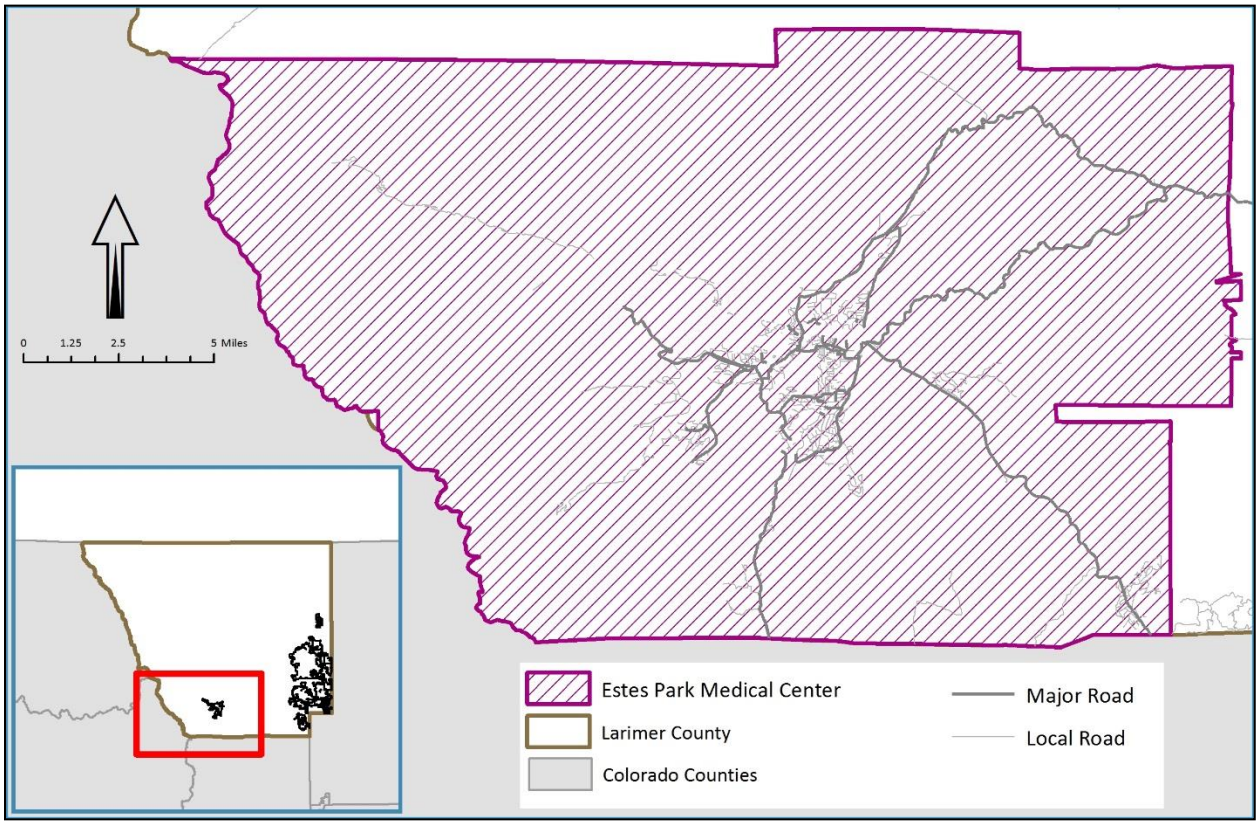
Michael Baker
INTERNATIONAL

Estes Park Medical Center

"To make a positive difference in the health and wellbeing of all we serve."
– Estes Park Medical Center Mission Statement

Community Profile

Estes Park Medical Center (EPMC) is a 25-bed critical access hospital with a 24-hour emergency department, 24-hour Advanced Life Support Ambulance Service, medical/surgical services, obstetrics, and home health and hospice services. Emergency air transport services are available from their healthcare associates in a number of Colorado Front Range communities. EPMC's physicians are board-certified in many different areas and specialties. EPMC has served the Estes Valley and surrounding areas since 1975, and is designated as a Level IV Trauma Center.



Hazard Identification and Risk Assessment

The following Hazard Identification and Risk Assessment Summary table is based on jurisdiction-specific responses to the risk factor exercise and differs from the risk factor results that were determined at the county scale.

NATURAL HAZARD	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Fire – Wildland	1.2	0.9	0.8	0.3	0.3	3.5
Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)	1.2	0.9	0.8	0.3	0.3	3.5
Flood – Flash and Riverine	1.2	0.9	0.8	0.3	0.2	3.4
Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)	1.2	0.9	0.6	0.3	0.3	3.3
Biological Hazards / Contagion	0.9	0.9	0.6	0.4	0.3	3.1
Utility Disruption	0.9	0.9	0.6	0.4	0.3	3.1
Landslide / Rockslide	1.2	0.6	0.4	0.4	0.1	2.7
Erosion / Deposition	0.9	0.6	0.6	0.2	0.2	2.5
Earthquake	0.6	0.6	0.4	0.4	0.1	2.1
Civil Disturbance	0.6	0.3	0.4	0.4	0.1	1.8
Tornado	0.6	0.3	0.4	0.4	0.1	1.8
Hazmat – Fixed and Transport	0.3	0.3	0.2	0.4	0.1	1.3
HIGH RISK (2.5 or higher): Fire – Wildland; Winter Storm (Blizzard Conditions, Heavy Snow Accumulation); Flood – Flash and Riverine; Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning); Biological Hazards / Contagion; Utility Disruption; Landslide / Rockslide; Erosion / Deposition						
MODERATE RISK HAZARD (2.0 - 2.4): Earthquake						
Low Risk (1.9 and lower): Civil Disturbance; Tornado; Hazmat – Fixed and Transport						

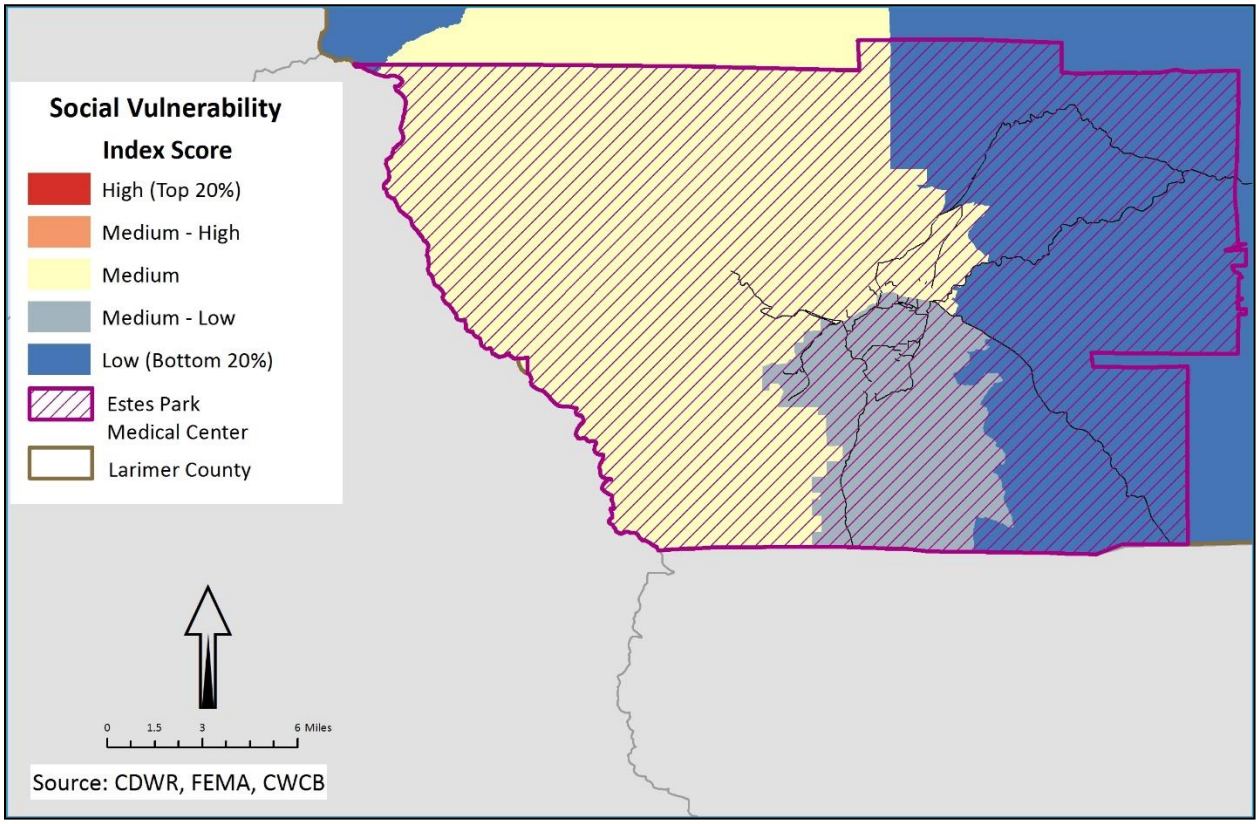
Vulnerability Assessment

This section provides a refined vulnerability assessment, specific for the Estes Park Medical Center service area, for those hazards that were identified as being rated HIGH in the preceding section. This analysis was conducted separately from that of the county-wide vulnerability assessment to specifically focus on the structures, infrastructure, and other assets unique to the Estes Park Medical Center service area.

The results of the social vulnerability assessment are displayed on the map below. On the map, social vulnerability is represented at the census tract level by 5 classes of vulnerability: Low (bottom 20% of the

county), Medium-Low, Medium, Medium-High, and High (top 20% of the county). The Estes Park Medical Center's social vulnerability map shows social vulnerability within the center.

Social Vulnerability Map – Estes Park Medical Center service area [88]



Social vulnerability is represented as the social, economic, demographic, and housing characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to hazard events. The pre-existing social conditions that contribute to disaster losses can be identified using social vulnerability indicators. Using methods identified in the Social Vulnerability Index (SoVI) developed by Cutter et. al. (2003) this layer shows the social vulnerability index scores for the State of Colorado at the census tract level. Social vulnerability is represented at the Census tract level by five classes of vulnerability: Low, Medium-Low, Medium, Medium-High, and High.

The Estes Park Medical Center service area is characterized by medium to low levels of social vulnerability. A deeper-dive into the individual social vulnerability indicators within the service area boundary will give medical center staff a clearer picture of which specific social vulnerability factors have the largest negative effect on resident within the area. It is important that the medical center continue to monitor social vulnerability levels over time as demographics and economics change in the area.

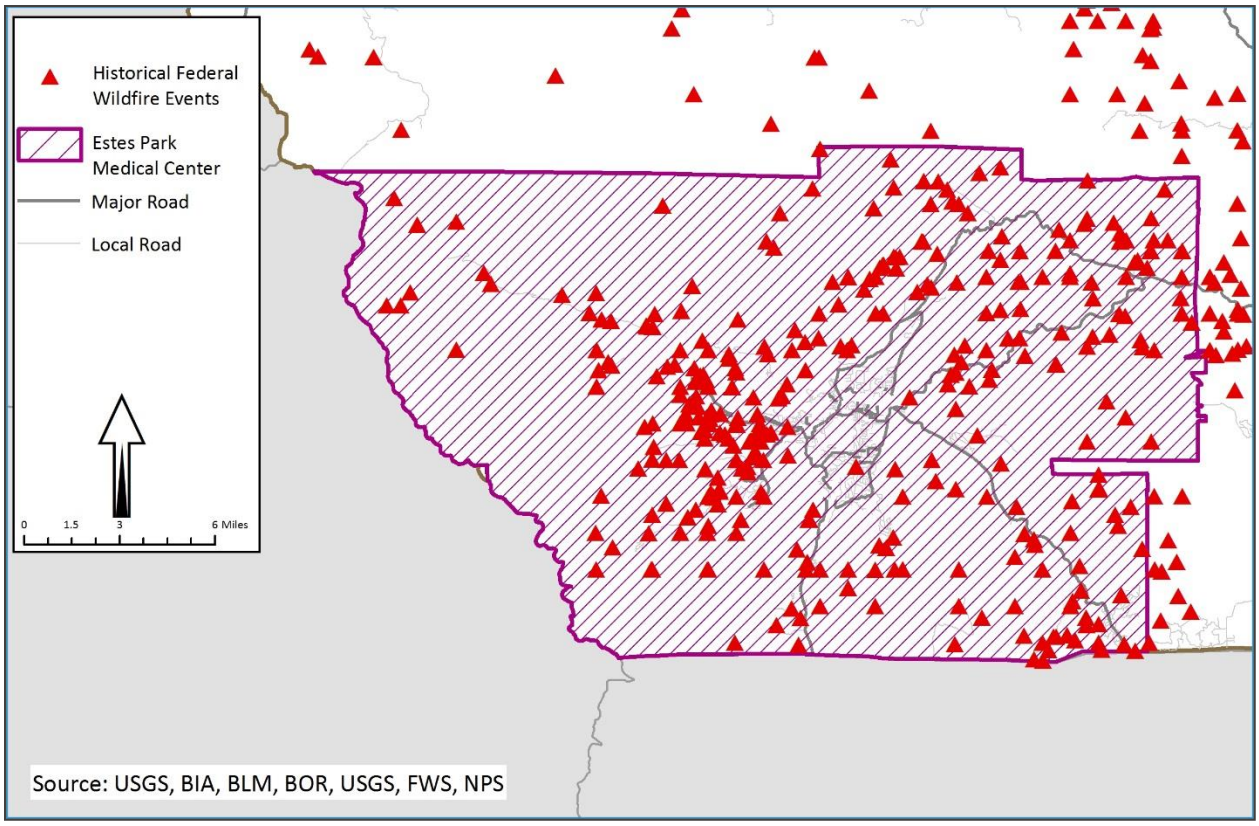
[88] Source: Colorado Division of Water Resources Dam Safety Branch, FEMA, Colorado Water Conservation Board (CWCB)

Fire – Wildland

Previous Occurrences

According to USGS there have been 362 reported wildfire events within the Estes Park Medical Center service area between 1980 and 2013. There is no data available regarding injuries, deaths, or damages. Based on the historic data showing hazardous impacts on the Estes Park Medical Center service area, there is a great potential for wildfire events to occur at any given time.

Estes Park Medical Center service area Historical Federal Wildfire Events[89]

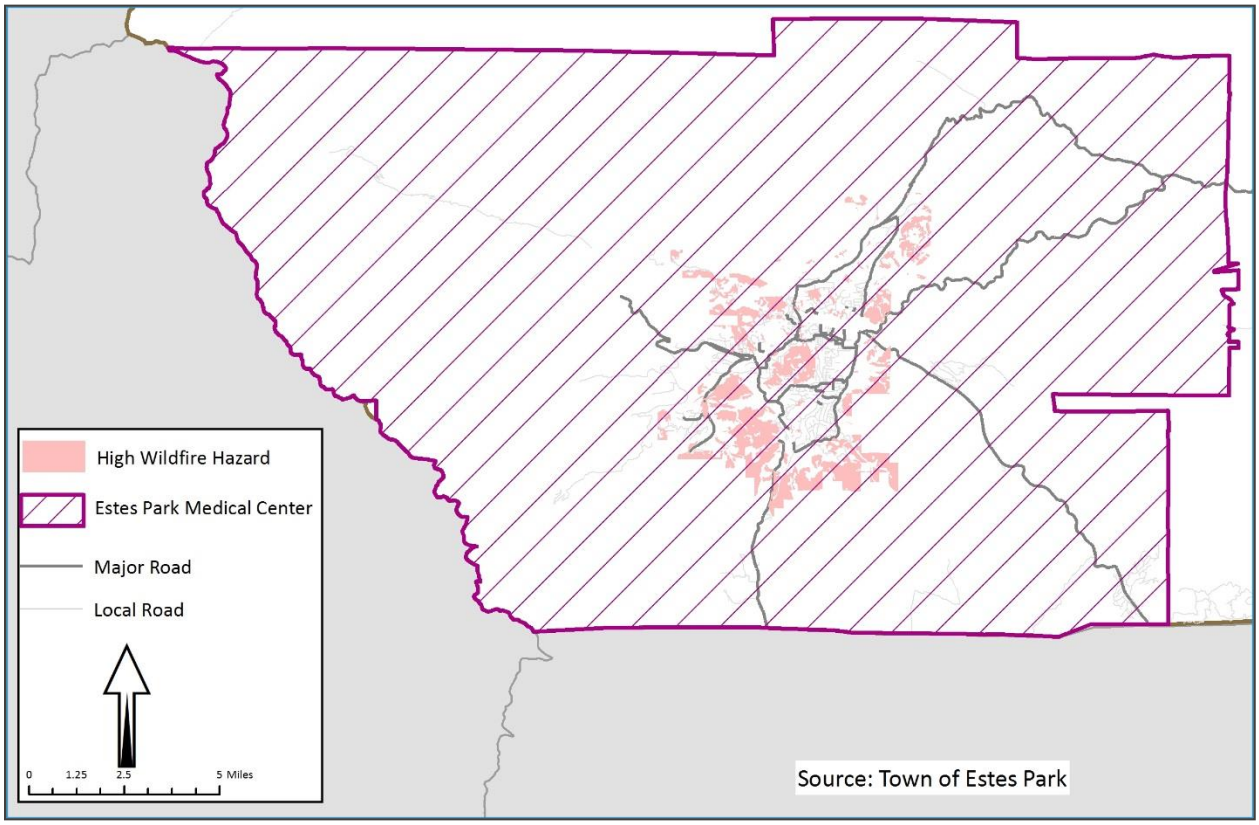


Inventory Exposed

The Town of Estes Park located within the Estes Park Medical Center service area, has established wildfire hazard zone designation to help hazard mitigation of wildfires in new developments and subdivisions. The mapped hazard areas include all areas "high-tree" fire hazard areas. Any new development or subdivision requires a mitigation plan prepared by a professional forester addressing how the development or subdivision will avoid or mitigate wildfire hazards. The following figure illustrates the high wildfire hazard zones determined by the Town of Estes Park, the Colorado State Forest Service, and Larimer County Wildfire Safety Specialist.

[89] Historical wildland fire occurrence data compiled by USGS from 1980 - 2013, from BIA, BLM, BOR, USGS, FWS, and NPS.

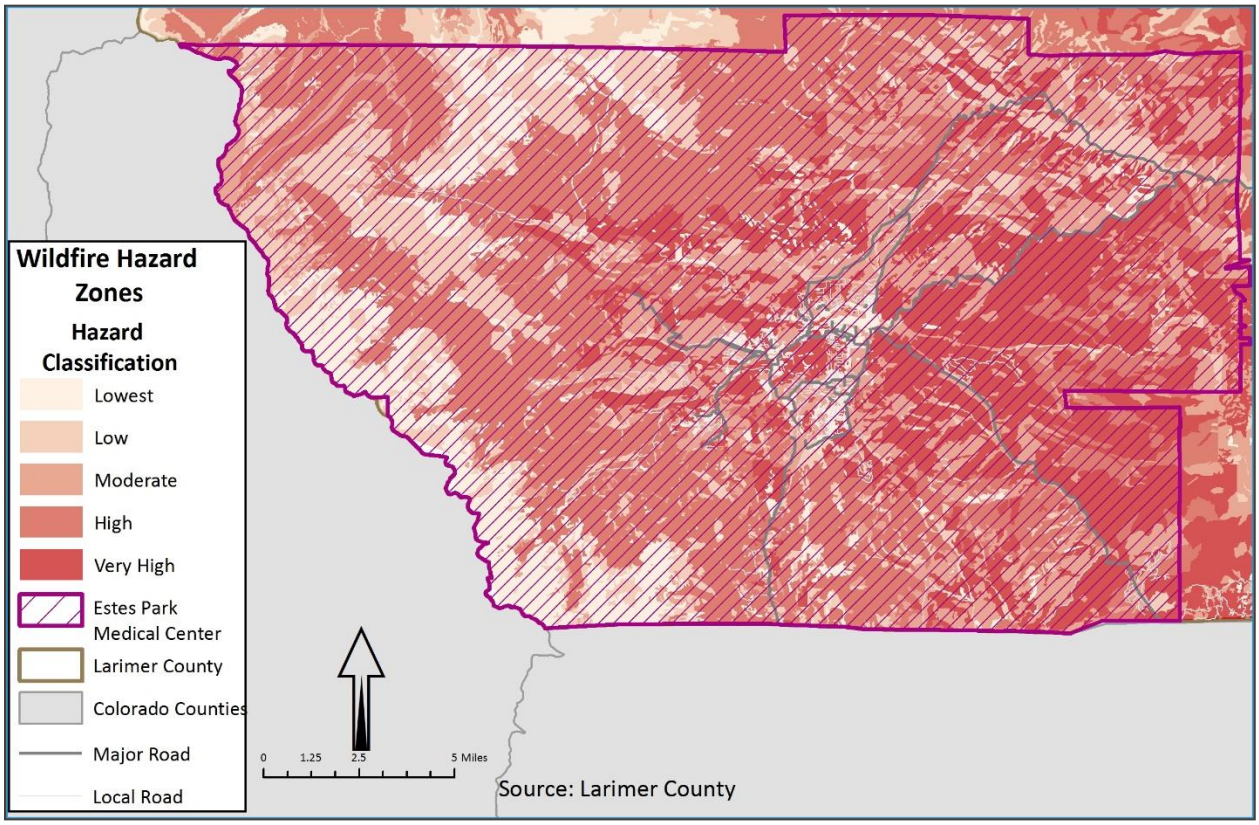
High Wildfire Hazard Zones- Estes Park Medical Center Service Area[90]



The following Wildfire Hazard Zone map identifies the expected wildfire behavior. The highest wildfire hazard zones in the district are located in the eastern region, in areas where there are lower population densities.

[90] High Wildfire Hazard Zones, from Town of Estes Park

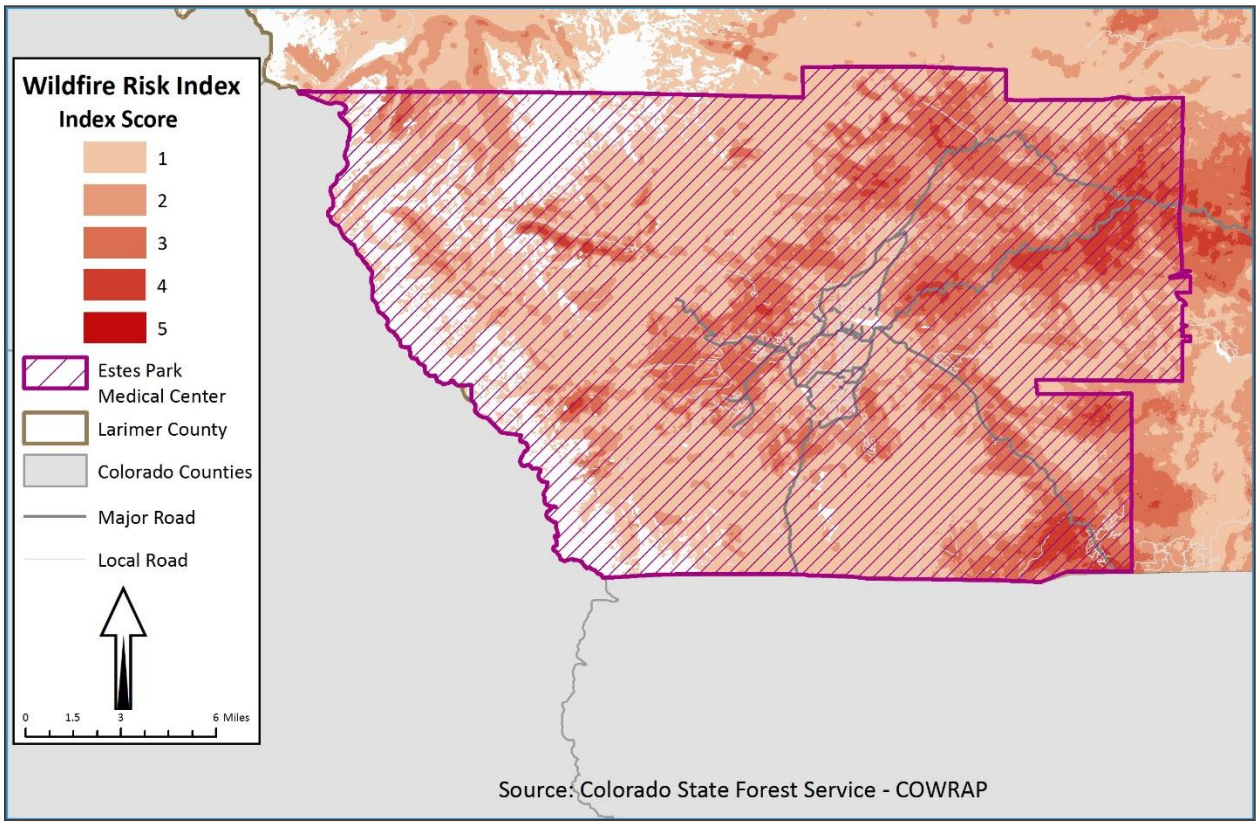
Estes Park Medical Center Service Area Wildfire Hazard Zone Map[91]



The following Wildfire Risk map identifies areas with the greatest potential impacts from a wildfire, in other words, those areas most at risk. The highest wildfire risk areas in the district are located in the eastern and southeastern region, in areas where there are lower population densities.

[91] To be used to identify wildfire hazards within the Wildfire Mitigation Area. The hazards are determined based on vegetation cover type, habitat structure stage (cover type, tree size and crown cover percentage), southern facing aspects and 30% and greater slopes according to the Wildfire Hazard Area Mapping (WHAM) guidelines.

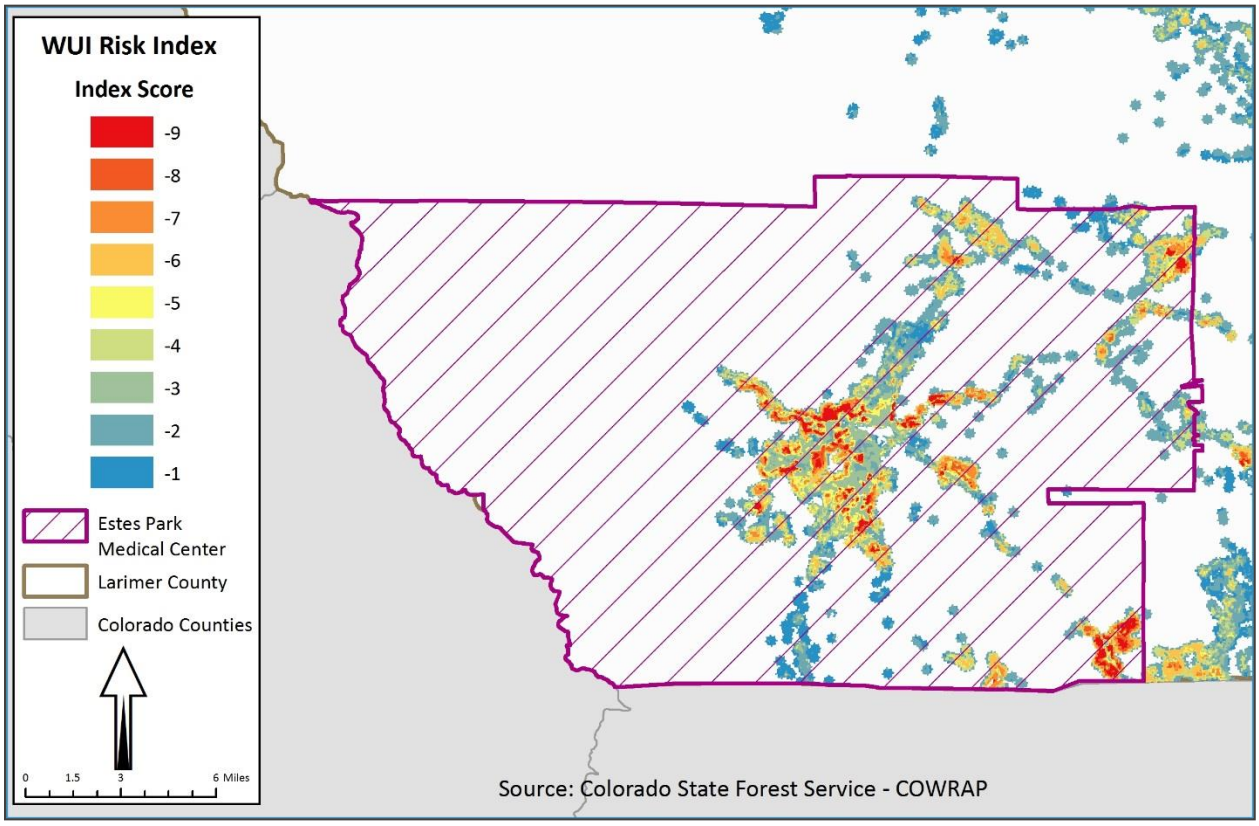
Estes Park Medical Center Service Area Wildfire Risk Index Map[92]



There are a number of areas in the central, south east and north east region of the medical center service area that are within the medium to highest level on the WUI Risk Index Scale. This means that the potential impact on people and homes from a wildfire in those areas is medium to high in relationship to the rest of Larimer County. This level of risk is derived by combining housing density with predicted flame length.

[92] Wildfire Risk represents the possibility of loss or harm occurring from a wildfire. Risk is derived by combining wildfire threat and fire effects. The COWRAP data set was produced statewide and ranks areas on a scale that includes: lowest risk to highest risk. All risk rankings are present in Larimer County.

Estes Park Medical Service Area Center WUI Map[93]



Fires can extensively impact the economy of an affected area, including the agricultural, recreation and tourism industries, water resources, and the critical facilities upon which the Estes Park Medical Center depends. There are many areas of high wildfire threat throughout the servicing area according to the WUI Risk Index. There are also many areas of medium threat.

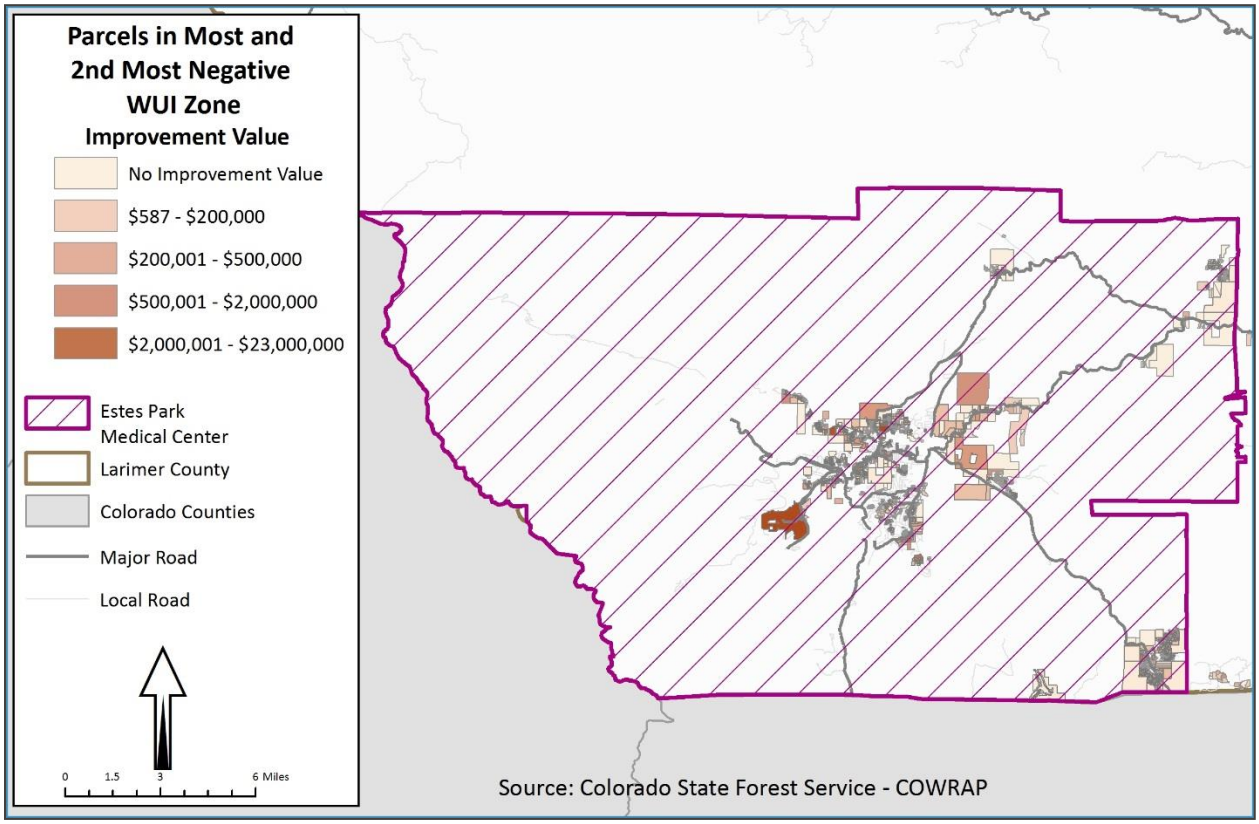
Potential Losses

The exposure data provided in the previous section (Inventory Assets Exposed) provides the clearest picture of potential losses to wildfire in the Estes Park Medical Center service area. There are 2 critical facilities located in areas with the *most negative* and 8 critical facilities located in areas with the *2nd most negative* wildfire threat total. The appraisal value of the critical facilities within these *most and 2nd most negative* threat areas is approximately $10.3 million dollars. There are 1,925 parcels/structures located

[93] Wildland Urban Interface Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length. The COWRAP data set was produced statewide and ranks areas on a scale that includes: least negative to most negative impacts.

in areas with the *most negative* and 1,787 parcels/structures located in areas with the *2nd most negative* wildfire threat total. The appraisal value of the parcels/structures within these *most and 2nd most negative* threat areas is over $788.7 million dollars. The risk assessment uses worst case scenario loss estimates. For this reason it is important to plan for relative levels of loss rather than specific potential loss dollar amounts.

Estes Park Medical Center Parcels in the Most Negative and Second Most Negative WUI Zone[94]



Probability of Future Occurrences

The likelihood of wildfires attaining significant size and intensity is unpredictable and highly dependent on environmental conditions and firefighting response. Weather conditions, particularly drought events, increase the likelihood of wildfires occurring. That said, it is important to note that 98% of wildfires are human-caused. Ultimately, the occurrence of future wildfire events will strongly depend on patterns of human activity and events are more likely to occur in wildfire-prone areas experiencing new or additional development.

[94] Wildland Urban Interface Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length.

Wildfires can occur at any time of day and during any month of the year. Moreover, the length of a wildfire season and/or peak months may vary appreciably from year to year. As evidenced by the wildfire risk assessment, areas within the Estes Park Medical Center service area that are characterized by dense development and single family homes along the wildland-urban interface are most vulnerable to wildfire.

Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)

Previous Occurrences

According to NOAA's Storm Events Database, the Estes Park Medical Center has experienced 175 Winter Storms since 1996. On March 17, 2003 there was report of a winter storm causing $15,500,000 in property damage in areas within western Larimer County above 6,000 feet. There were no deaths, injuries or damage to crops reported for any of these storms. The Estes Park Medical Center is at high risk of experiencing Winter Storms during the winter months.

Inventory Exposed

All assets located in the Estes Park Medical Center can be considered at risk from winter storms. This includes all people, or 100% of the Estes Park Medical Center's population, and all buildings and infrastructure within the Estes Park Medical Center. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the Medical Center's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Potential Losses

Winter storms affect the entire planning area of the Estes Park Medical Center including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

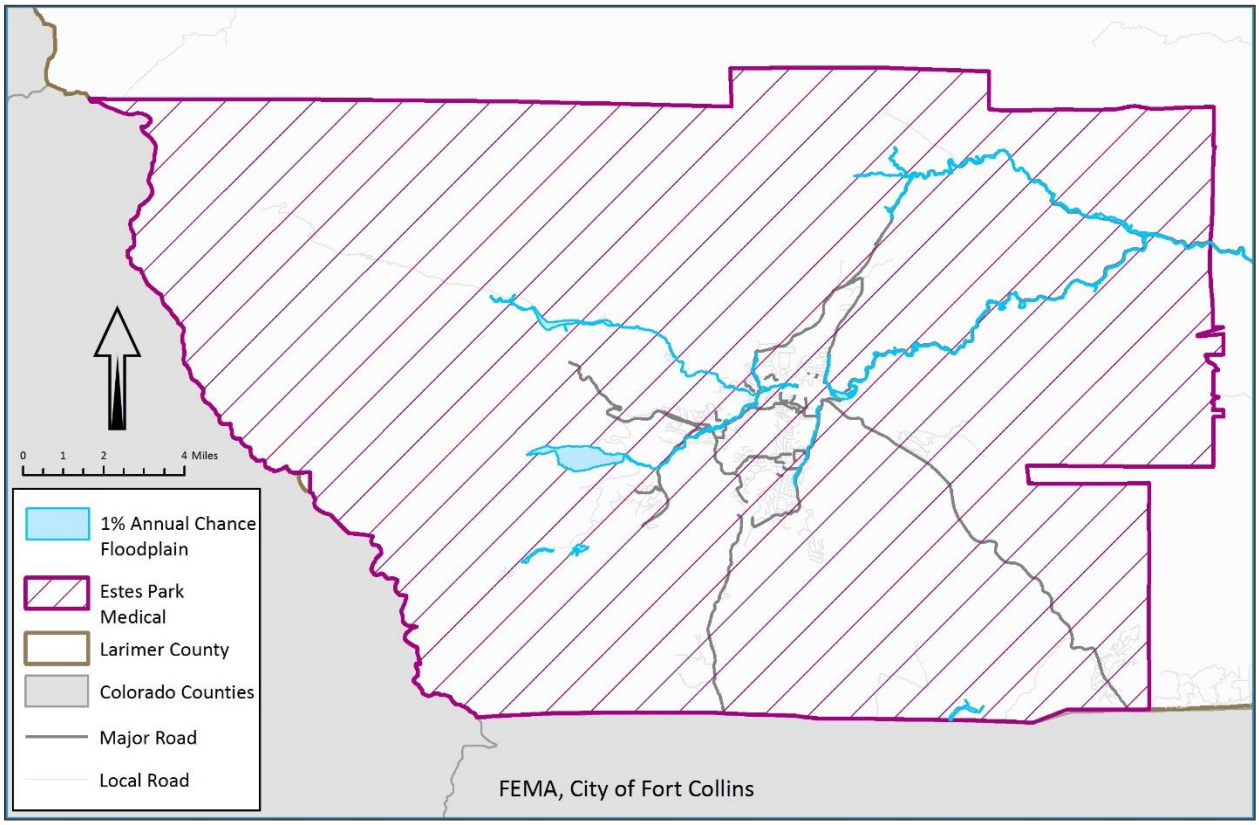
It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Winter storms will remain a highly likely occurrence for the Estes Park Medical Center.

Probability of Future Occurrences

Severe winter storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past severe winter events provide benchmarks for projecting similar conditions into the future. The probability that the Estes Park Medical Center service area will experience a severe winter storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the service area at least once every year.

Flood – Flash and Riverine

Estes Park Medical Center Special Flood Hazard Area[95]



Previous Occurrences

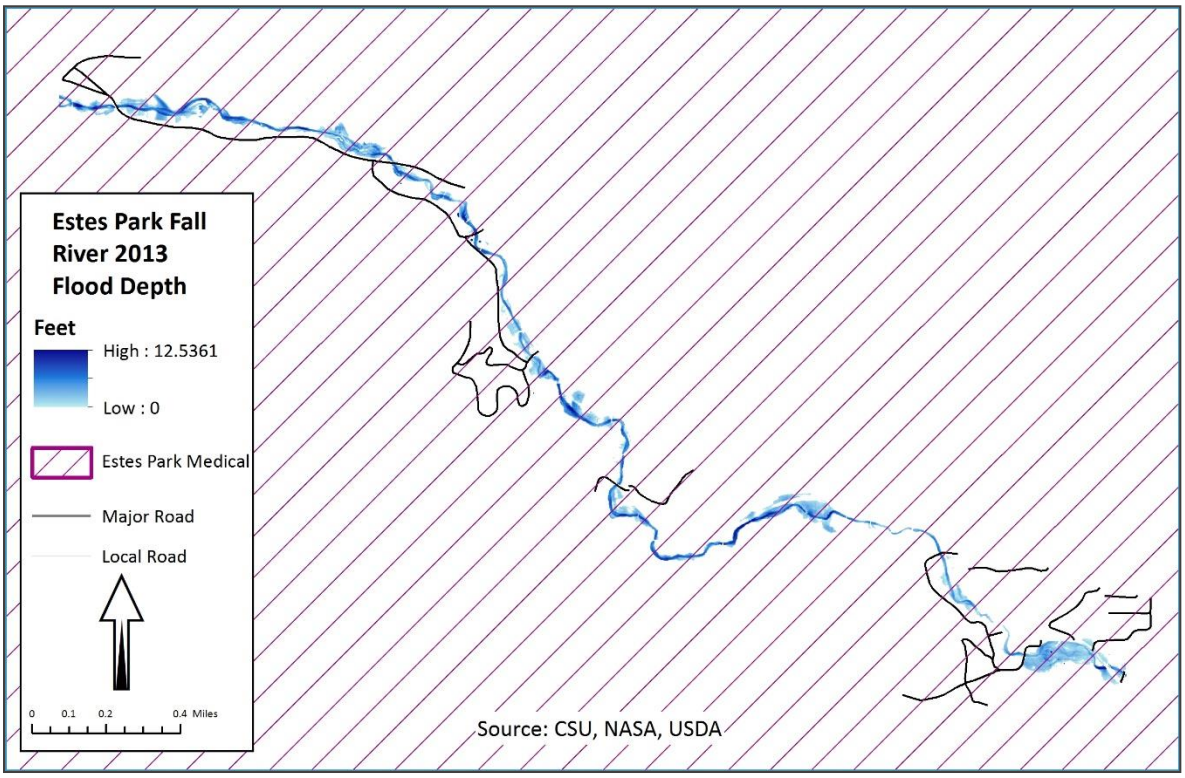
Estes Park sustained severe damages during the September 2013 Colorado flood event. Evacuations began on September 12, 2013, at approximately 3:00AM and 2,428 contacts were made to warn and evacuate neighborhoods through the LETA911 emergency notification system. The information below was provided by the Town of Estes Park and provides a snapshot of just home many residents were impacted by the flood.

Red Cross Shelter Support:	606 people signed in
	167 people sheltered in the cents
	316 people outsourced to local hotels for varying amounts of time
Salvation Army Support:	3571 meals were served
	7000 snacks/drinks were served

[95] This layer is compiled utilizing the most recent Special Flood Hazard Areas (SFHA) as defined by FEMA's National Flood Hazard Layer (NFHL) in combination with some recent flood studies performed by the City of Fort Collins. These areas are also referred to as the 1% Annual Chance Floodplain.

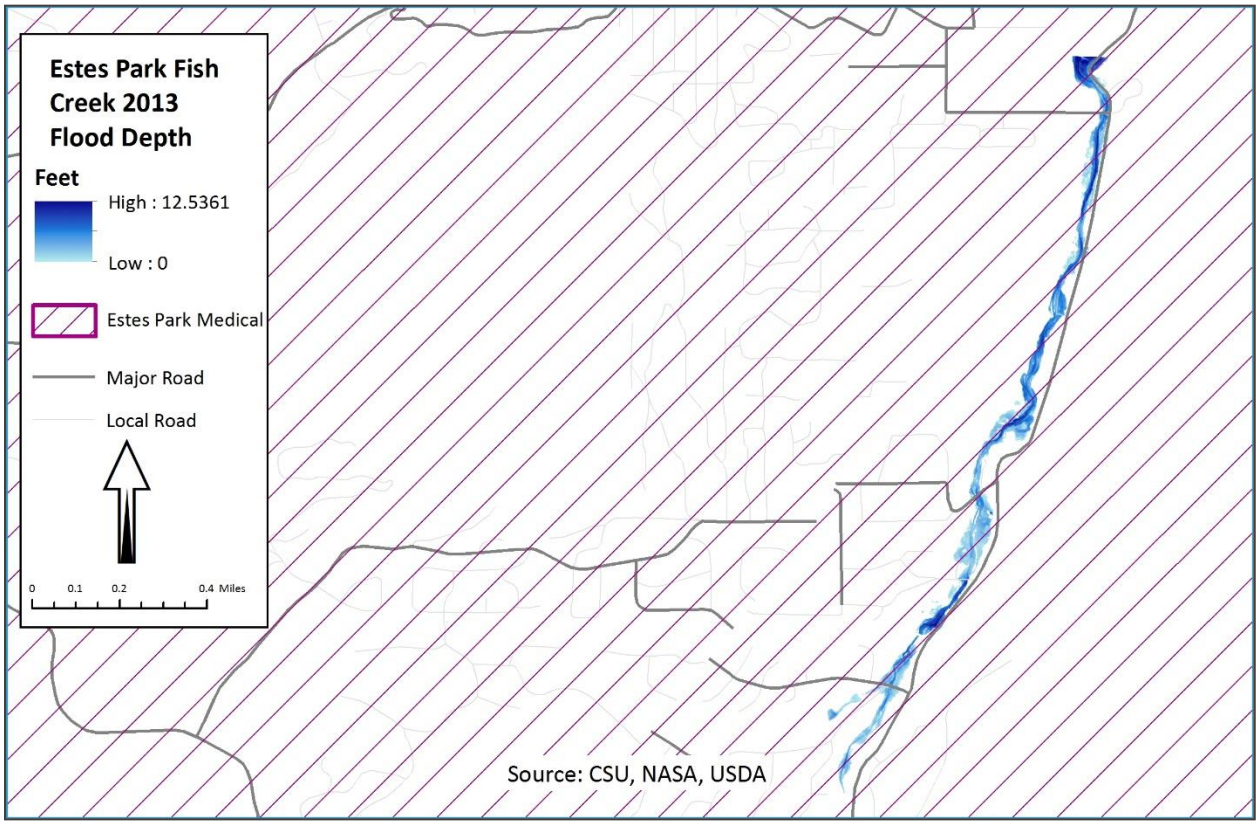
	9000 gallons of water distributed
Utilities Outages and Restoration	Estimated $35-40 million in public infrastructure damage in the Estes Valley
	3.25 miles of Fish Creek Road are destroyed or damaged
	Caused outages for electric, water, gas, cable and phones
	Approximately 4,000 sewer taps were non-functional under "No Flush" orders within the Upper Thompson Sanitation District.
Structural Damage Assessments (incorporated Estes Park)	Rapid assessments completed for approximately 3,000 structures in the Estes Valley this week. Approximately 12 red tags were issued for properties that were determined to be unsafe for occupancy due to structural damage or electrical safety.
	2,383 estimated residences affected by water, mud, sewer access, road access
	183 estimated businesses affected by water, mud, sewer access, road access

Estes Park Medical Fall River 2013 Flood Extent[96]



[96] Based on high water marks collected by the Town of Estes Park.

Estes Park Medical Center Fish Creek 2013 Flood Extent[97]



In addition to the September 2013 flood two additional floods were reported according to the NOAA's Storm Events Database. On August 2, 2007 a flash flood occurred resulting in $20,000 in property damage. Another flash flood occurred on July 18, 2013 resulting in $10,000 in property damage and $5,000 in crop damage. There were no reported injuries or deaths from these two floods.

Inventory Exposed

Critical facilities are essential to the health and welfare of the whole population and are especially important both during and after hazard events. Critical structures or areas that overlap or touch the SFHA are considered "flood prone."

The critical facility and structure exposure analysis estimates that there are 8 critical facility and 1,352 structures in the Estes Park Medical Center service area that are flood prone (not including the total miles of flood prone infrastructure). The appraised value of the exposed critical facilities is over $8 million dollars and the exposed structures is over $237.8 million dollars.

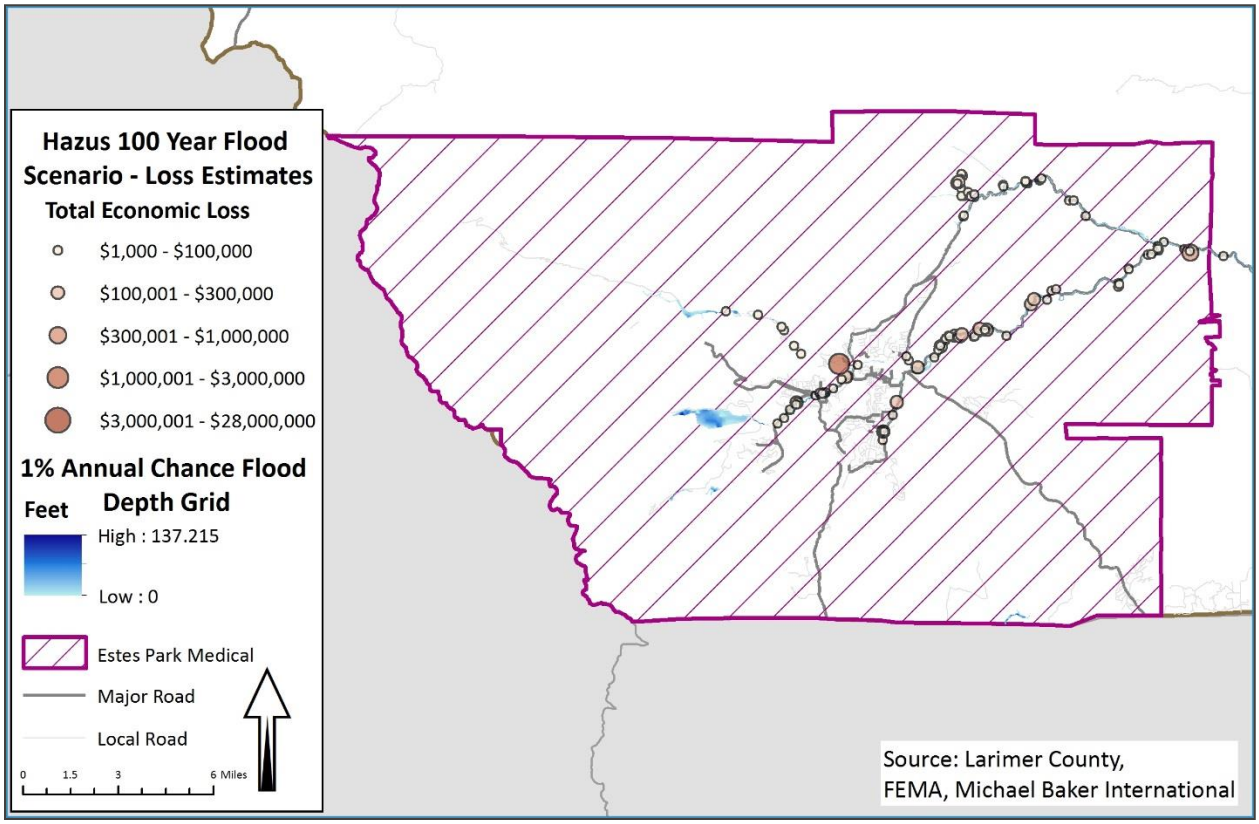
Potential Losses

Hazus estimates for the Estes Park Medical Center service area that for a 100-year flood event, no critical facilities and approximately 163 buildings will experience flood damage. The total economic loss

[97] Based on high water marks collected by the Town of Estes Park.

estimated for the 100-year flood is over $9.6 million dollars. The estimated building loss is over $5.3 million dollars, over $3.7 million dollars in content loss, and over $561 thousand dollars in inventory loss.

Estes Park Medical Center 1% Annual Flood Loss Estimation and Flood Depth Grid Map[98]



Probability of Future Occurrences

Frequency of previously reported flood events in the Estes Park Medical Service Area provide an acceptable framework for determining the probability of future flood occurrence in the area. The probability that the service area will experience a flood event can be difficult to predict or quantify.

[98] FEMA's loss estimation modeling software, Hazus, was utilized to produce this data set. A 100 year flood scenario was defined and losses were calculated for each point (structure) that intersected the depth grid based on the Hazus depth damage curves for specific structure attributes (such as foundation type, building type, and first flood height). Information derived from Hazus-MH 2.2 flood scenario. Total Losses equals a sum of building losses, content losses, and inventory losses. 1% Annual Chance Flood flooding depth grid, produced from the best available topographic and floodplain data.

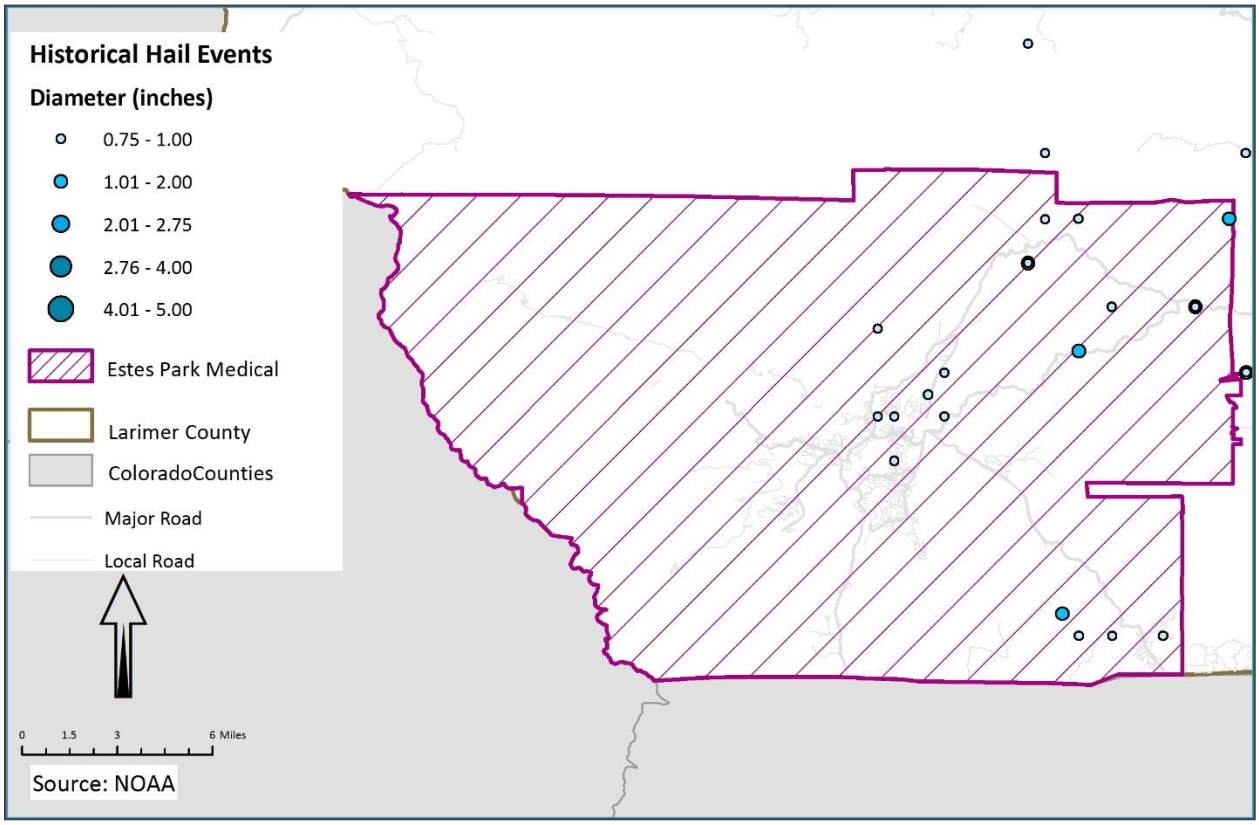
Severe flooding has the potential to inflict significant damage to people and property in the service area. Mitigating flood damage requires that communities remain diligent and notify local officials of potential flood (and flash flood) prone areas near infrastructure such as roads, bridges, and buildings.

Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)

Previous Occurrences

According to NOAA's Storm Events Database there are no reported injuries or deaths in Estes Park Medical Center service area due to hail. There have been 22 hail events reported in Estes Park Medical Center service area between 1955 and 2014. Of the 22 incidents, none reported losses. Based on the historic data showing hazardous impacts on the Estes Park Medical Center service area, there is a great potential for hail events to occur at any given time.

Estes Park Medical Historical Hail Events[99]



According to NOAA's Storm Events Database there is no historic data for thunderstorm wind events in Estes Park Medical Center service area. Based on the historic data showing hazardous impacts on the county, there is a great potential for hail events to occur at any given time.

[99] Source: NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

According to NOAA's Storm Events Database there have been 9 lightning events in the Estes Park Medical Center service area between 1996 and 2014. There have been 27 reported injuries, 4 deaths, $5,000 worth of property damage, and no reported crop damage. Based on the historic data showing hazardous impacts on the area, there is a great potential for lightning events to occur at any given time.

According to NOAA's Storm Events Database there have been 166 Windstorm events in and near the Estes Park Medical Center service area between 1996 and 2014. There have been 2 reported injuries, no deaths, $13.5 million dollars' worth of property damage, and no reported crop damage. There is no graphical data available showing the specific locations of these high wind events within the service area. Based on the historic data showing hazardous impacts on the area, there is a great potential for high wind events to occur at any given time.

Inventory Exposed

All assets located in the Estes Park Medical Center service area can be considered at risk from spring and summer storms. This includes all people, or 100% of the service area's population, and all buildings and infrastructure within the district. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the service area's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Inventory assets exposed to severe wind is dependent on the age of the building, type, construction material used, and condition of the structure. Possible losses to critical infrastructure include:

- Electric power disruption
- Communication disruption
- Water and fuel shortages
- Road closures
- Damaged infrastructure components, such as sewer lift stations and treatment plants
- Damage to homes, structures, and shelters

Potential Losses

Spring and summer storms affect the entire planning area of Estes Park Medical Center including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Severe storms will remain a highly likely occurrence for the Estes Park Medical Center service area. It is likely that lightning and hail will also be experienced in the area due to such storms.

Generally, straight-line wind events destroy private, commercial, and public property. Additional costs stem from debris removal, maintenance, repair, and response. Indirect costs include loss of industrial and commercial productivity as a result of damage to infrastructure, facilities, or interruption of services.

Because no specific, countywide loss estimation exists for wind, potential losses are related to historical property damage and injuries/deaths.

Probability of Future Occurrences

Spring and summer storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past spring and summer events provide benchmarks for projecting similar conditions into the future. The probability that Estes Park Medical Center service area will experience a spring or summer storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the Estes Park Medical Center service area at least once every year.

Reported straight-line wind events over the past nineteen years provide an acceptable framework for determining the future occurrence in terms of event. The probability of the Estes Park Medical Center service area experiencing a severe wind event associated with damages or injuries can be difficult to quantify, but based on historical record of 166 severe wind events since 1996, there is a high chance of this type of event occurring each year.

Biological Hazards / Contagion

Biological hazards, including epidemics and pandemics, have the potential to cause serious illness and death, especially among those who have compromised immune systems due to age or underlying medical conditions. During the 2015 planning process, pandemic flu was identified as the key public health hazard in the county.

Previous Occurrences

There is no available data for historic occurrences of biological hazards specifically within the Estes Park Medical Center service area.

Inventory Exposed

Due to the regional nature of public health hazards, jurisdictions with higher numbers of socially vulnerable residents are expected to experience magnified impacts of public health hazards. This includes places with high numbers of elderly residents, young children, low income families, and homeless individuals/outdoor laborers. Future mitigation efforts related to biological hazards should focus on reaching those residents who are elderly, young children, and live in poverty or are homeless.

Potential Losses

Because there is no defined geographic boundary for public health hazards, all of the people and infrastructure within the Estes Park Medical Center service area are exposed to public health hazards. Those with elevated risk and potential loss are the homeless, infirm, elderly, young and low income families. Placing a dollar amount on the cost of a human life are beyond the scope of the Plan, annualized economic losses for the Estes Park Medical Center due to public health hazards can be best quantified in terms of number of days of work lost due to sick medical center staff.

Probability of Future Occurrences

Based on the Colorado Department of Public Health and Environment annual reportable disease summary of 2,308 Reportable Diseases within Larimer County, there is great potential for biological hazards to occur at any given time in the Estes Park Medical Center service area.

Utility Disruption

Previous Occurrences

The Estes Park Medical Center does not currently track incidences of utility disruption within its service area.

Inventory Exposed

All assets located in Estes Park Medical Center service area are considered at risk from the impacts of utility disruption events. This includes all people, or 100% of the County's population, and all buildings and infrastructure within the County.

Potential Losses

Utility disruption events have the potential to threaten lives and disrupt business activity. However, monetary losses and casualty estimates are largely unknown.

Probability of Future Occurrences

In general, utility outages result from failures in the distribution system as opposed to shortages of supply. Distribution systems are most susceptible to failure during extreme hot and cold temperatures as well as during violent weather conditions. Regional utility failures can threaten human life, particularly when outages affect hospitals, nursing homes, or other healthcare facilities. As both population and climate variability increase across the State of Colorado, and put more pressure on aging distribution systems, it is likely that utility disturbance events will become more frequent in and around the Estes Park Medical Center service area.

Landslide / Rockslide

Previous Occurrences

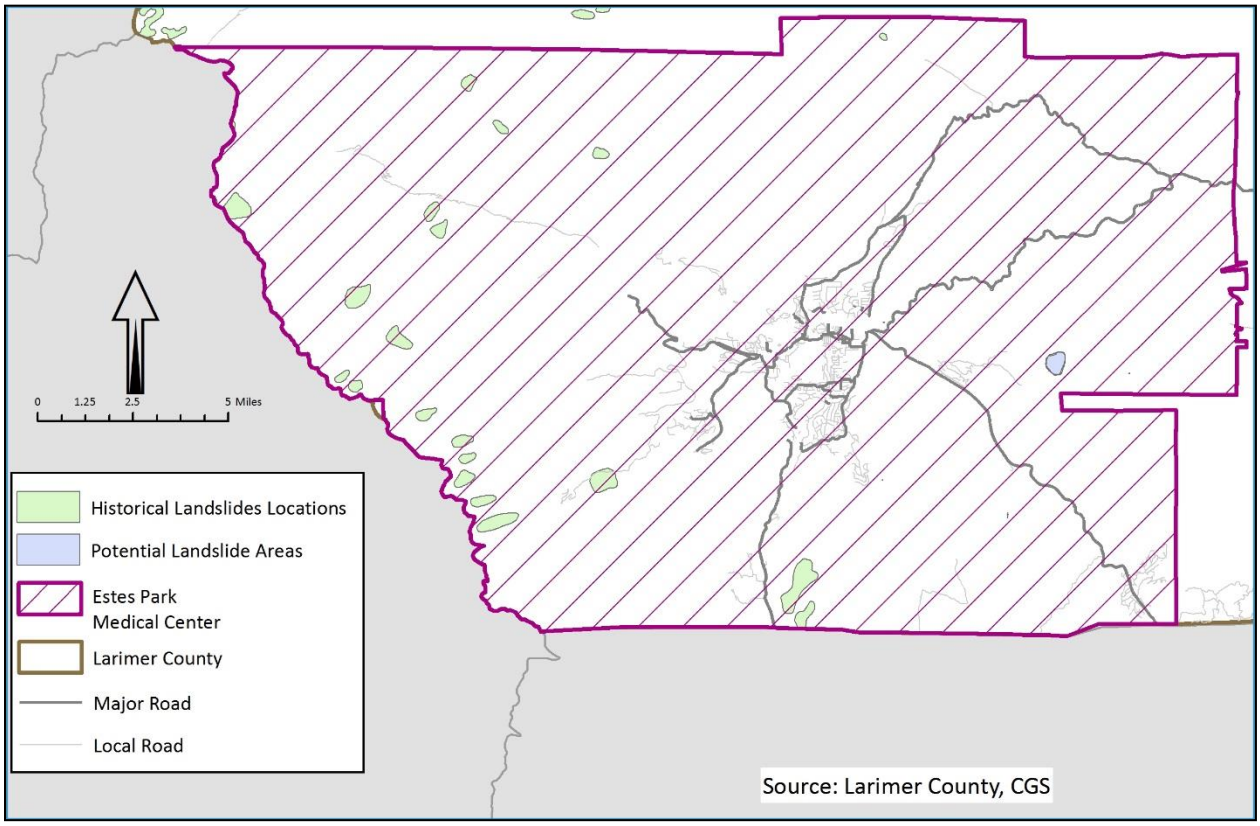
According to the Colorado Geological Survey there have been 23 historical landslide events within the Estes Park Medical Center service area. Recently, on September 27, 2013 a large landslide occurs behind the Aspen Lodge Resort and Spa near Estes Park.

September 2013 Landslide at Aspen Lodge Resort & Spa

Inventory Exposed

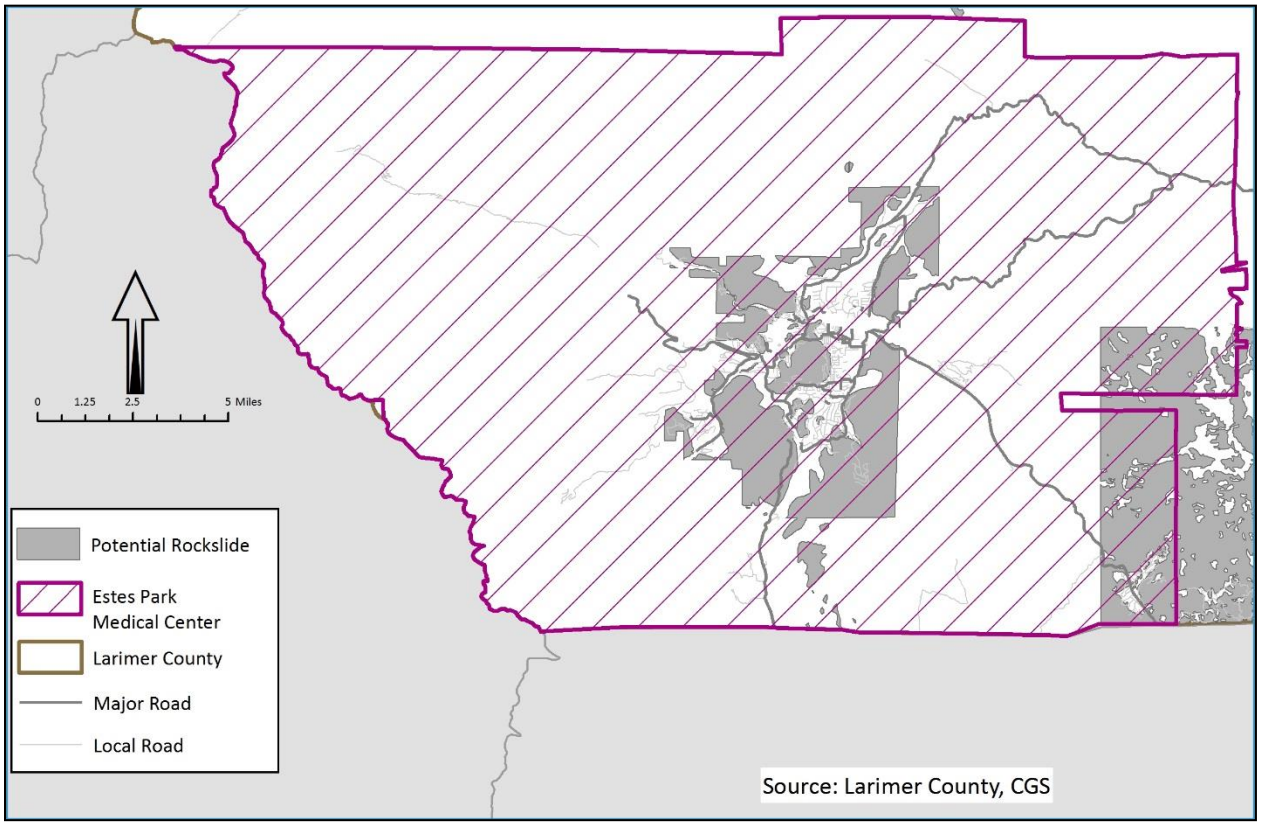
There are locations across all of the Estes Park Medical Center service Area that are vulnerable to landslides and rockslides. As population growth brings new development into available land in the area, more inventory assets may become exposed to landslides and rockslides hazards. The following figures show historical and potential landslide and rockslide areas in the Estes Park Medical Center service area. Due largely to topography, the western portion of the service area is more susceptible to landslides. Potential rockslide prone areas have been identified in the central and eastern regions of the service area.

Potential Landslide Areas – Estes Park Medical Center Service Area [100]



[100] Historical and potential landslide areas presently identified by the Colorado Geological Survey.

Potential Rockslide Areas – Estes Park Medical Center Service Area [101]

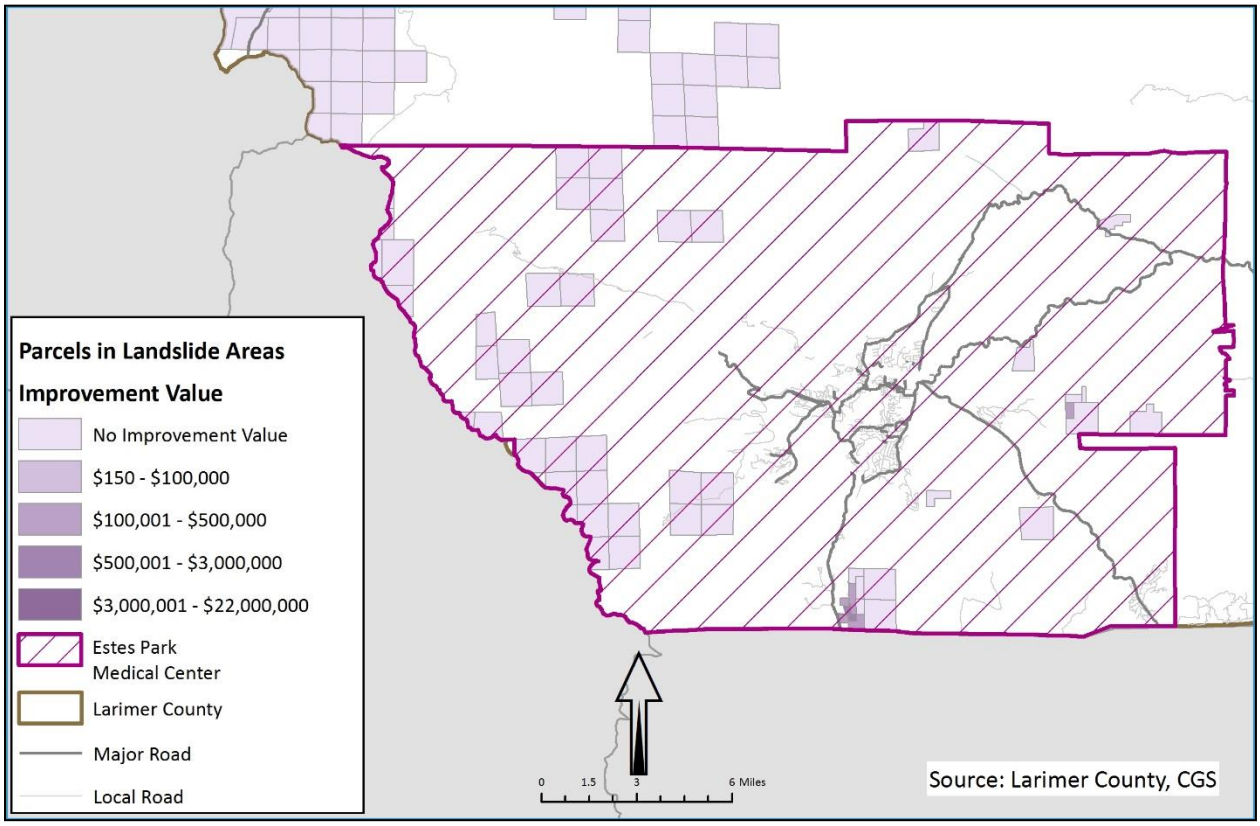


Potential Losses

The critical facility and structure exposure analysis estimates that there are no critical facility and 65 parcels/structures in the Estes Park Medical Center service area that are prone to landslides (not including the total miles of landslide prone infrastructure). The appraised value of the exposed structures is over $2.5 million dollars.

[101] Potential rock fall areas presently identified by the Colorado Geological Survey.

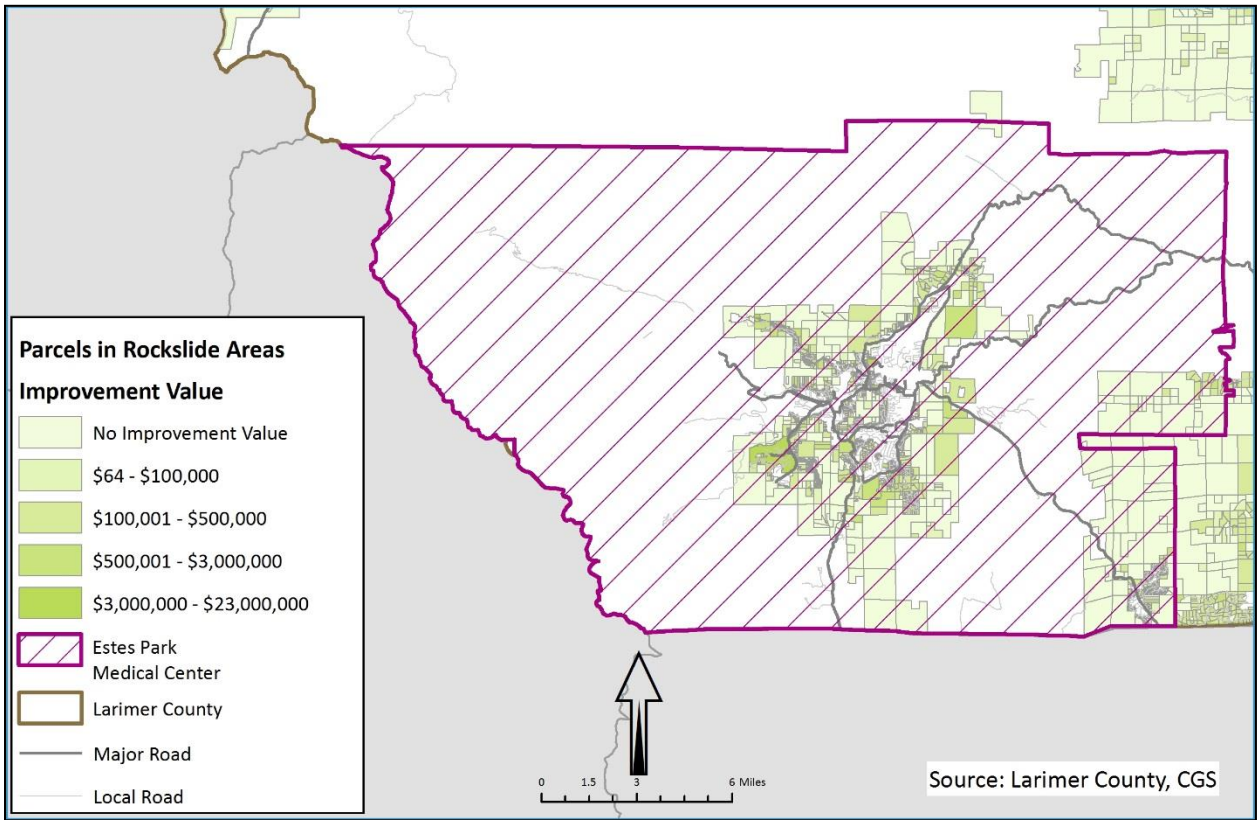
Parcels in Landslide Areas – Estes Park Medical Center Service Area [102]



The critical facility and structure exposure analysis estimates that there are 11 critical facility and 3,101 structures in the Estes Park Medical Center service area that are prone to rockslides (not including the total miles of rockslide prone infrastructure). The appraised value of the exposed critical facilities is over $11.2 million dollars and the exposed structures is over $690 million dollars.

[102] Parcels intersecting potential & historical landslide areas presently identified by the Colorado Geological Survey.

Parcels in Landslide Areas – Estes Park Medical Center Service Area [103]



Probability of Future Occurrences

Due to the uncertainty associated with existing data, it is challenging to accurately calculate probability for future events related to landslide and rockslide hazards. It can be assured however, that these hazards will continue to alter the landscape of the Estes Park Medical Center service area in the future.

Overall, the probability of future occurrences of rockslide and landslide events in the Estes Park Medical Center service area is high. Many areas of the district are prone to these types of hazard events due to their proximity to previous landslide events, their location at the base or top of steep slopes and drainage basins, or their location on infill or steep slope cuts. Individual assessments of landslide-prone areas are recommended in the future. Moreover, as development and population increase in the service area, increasing numbers of structures (and people) will be exposed to future landslide and rockslide events.

Erosion / Deposition

Previous Occurrences

Based on data provided by CGS, there are undermined areas within northeastern Larimer County that are indicative of higher subsidence, erosion, or deposition risk. Additionally, no undermined areas have been identified within the Estes Park Medical Centers service area. Currently, there is no historical data available for collapsible soil areas, expansive soil areas, or subsidence areas within the Estes Park Medical

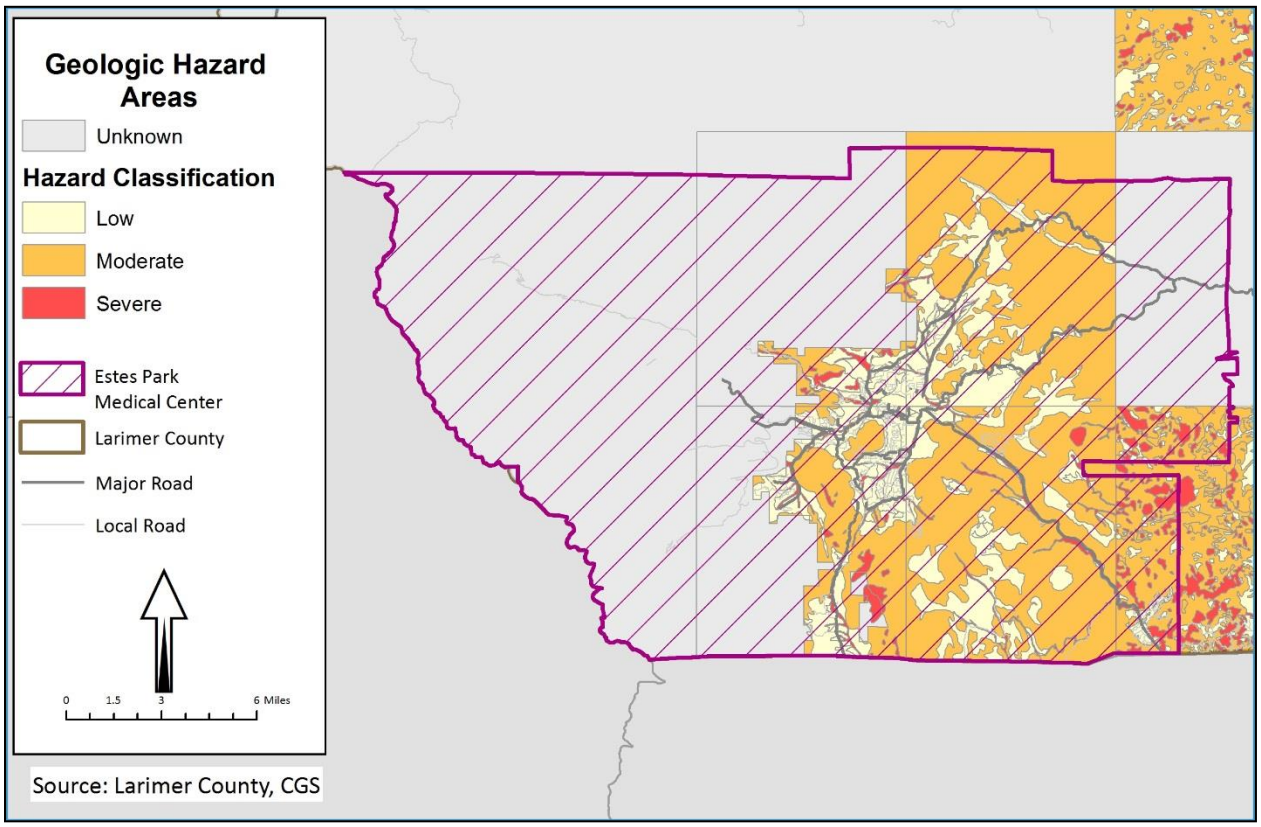
[103] Parcels that intersect potential rockfall areas presently identified by the Colorado Geological Survey.

Center service area. This indicates a relatively low risk of erosion and deposition risk within the Estes Park Medical Center service area.

Inventory Exposed

There are locations across all of Estes Park Medical Center's service area that are vulnerable to erosion and deposition. As population growth brings new development into available land in the county, more inventory assets may become exposed to erosion and deposition hazards. The following figure shows geological hazard areas in the Estes Park Medical Center Service Area.

Geological Hazard Areas – Estes Park Medical Center Service Area [104]

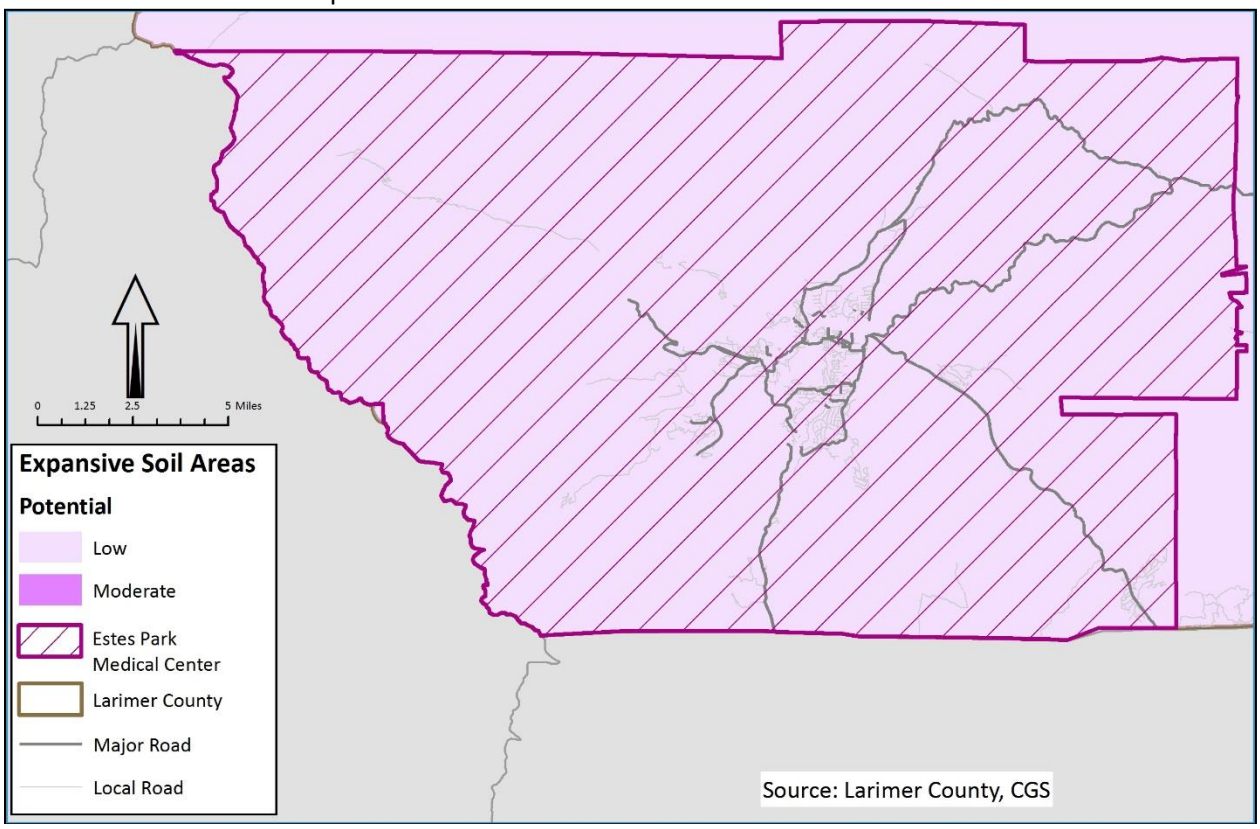


There are no land subsidence areas identified within the Estes Park Medical Center service area. Additionally, there are no collapsible soil areas identified within the Estes Park Medical Center service area.

The following figure presents a map identifying the locations within the Estes Park Medical Center service area that have potential for expansive soil. The Estes Park Medical Center service area consists entirely of low expansive soil potential.

[104] Used for identifying geologic hazard areas for land use. Source: Larimer County, CGS

Potential Expansive Soil Areas – Estes Park Medical Center Service Area[105]

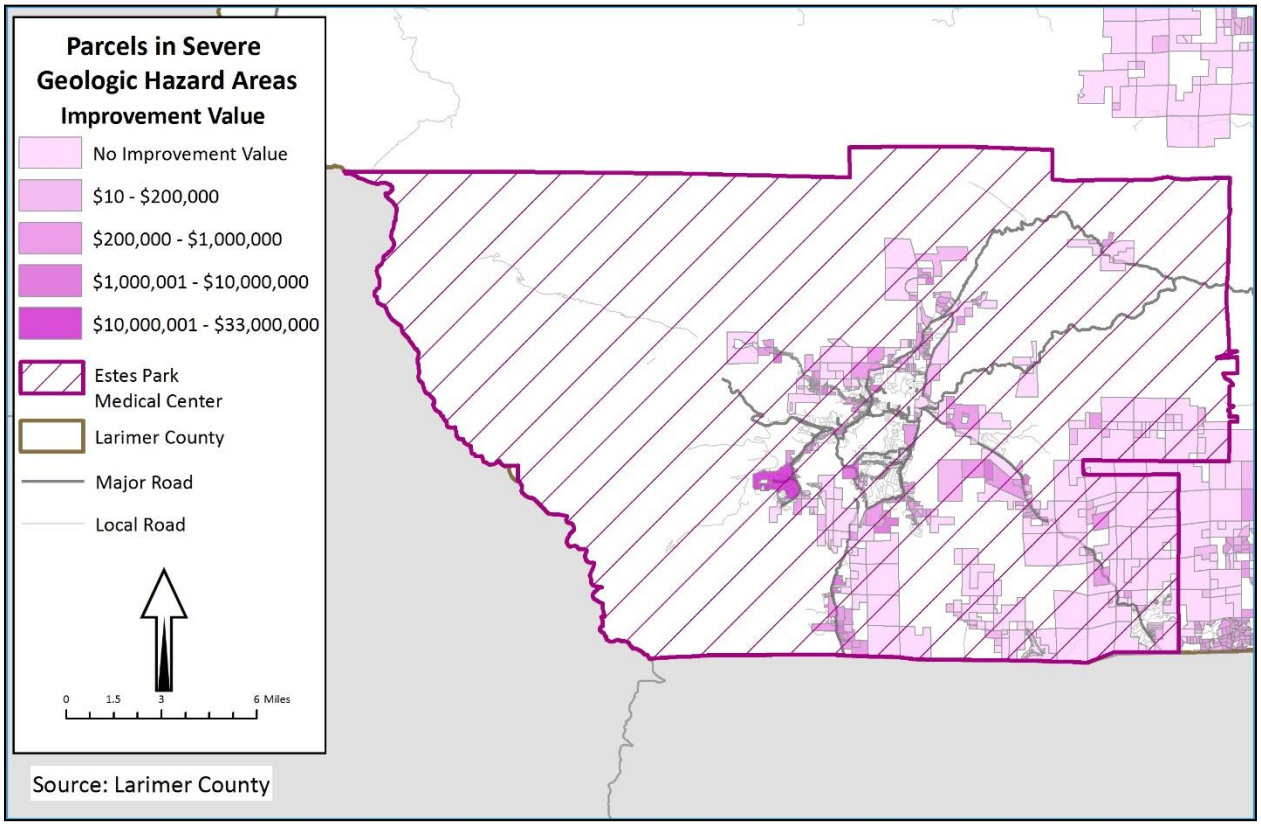


Potential Losses

The critical facility and structure exposure analysis estimates that there are 12 critical facility and 1,752 structures in Larimer County that are prone to severe geological hazards (not including the total miles of severe geological hazard prone infrastructure). The appraised value of the exposed critical facilities is over $13.1 million dollars and the exposed structures is over $409.6 million dollars.

[105] Potential expansive soils areas presently identified by the Colorado Geological Survey.

Geologic Hazard Exposure – Estes Park Medical Center Service Area[106]



There are no land subsidence areas or collapsible soil areas identified within the Estes Park Medical Center service area. Therefore, no parcels have been identified within land subsidence or collapsible soil areas within the Estes Park Medical Center service area. Additionally, because there are no areas of moderate expansive soil potential within Estes Park Medical Center service area no parcels have been identified within moderate expansive soil exposure.

Probability of Future Occurrences

Due to the uncertainty associated with existing data, it is challenging to accurately calculate probability for future events related to landslide and rockslide hazards. It can be assured however, that these hazards will continue to alter the landscape of the Estes Park Medical Center service area in the future.

Capabilities Assessment

The capability assessment examines the ability of the EPMC to implement and manage the comprehensive mitigation strategy laid out in this Plan. The strengths, weaknesses, and resources of the medical center are identified here as a means for evaluating and maintaining effective and appropriate management of the organization's hazard mitigation program.

[106] Parcels that intersect the 'Severe' geologic hazard areas used for identifying county land use. Source: Larimer County, CGS

Local Personnel

The ability of a community to implement a comprehensive mitigation strategy depends, in part, on available resources, including people and staff. The following table outlines EPMC's capabilities as they relate to key personnel.

	Full Time	Part Time	None or Not-Identified
Emergency Manager		X	
Floodplain Administrator			X
Community Planner	X		
GIS Specialist			X
Grant Writer		X	

Land Use Planning and Codes

Local land use plans and building codes are tremendous tools for evaluating local policies related to hazard mitigation and risk reduction. Additionally, comprehensive master plans, capital improvement plans, stormwater plans and zoning ordinances all present opportunities for enhanced local capabilities. The following table outlines EPMC's current capabilities as they relate to land use planning and codes.

	Yes (Y); No (N)
A zoning ordinance	Y
A hazard-specific ordinance	-
Local building codes	Y
A Comprehensive Plan / Master Plan	Y
A Capital Improvements Plan	Y
A Stormwater Plan	Y
A Continuity of Operations Plan (COOP)	Y
An Emergency Operations Plan (EOP)	Y
A Long-Term Recovery Plan	Y
Participates in the NFIP	N

Plan Maintenance and Implementation

EPMC has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how EPMC will continue public participation in the plan maintenance process.

Jurisdiction	Plan Maintenance and Implementation Strategy
EPMC	*"We will attend group meetings and will participate in the annual evaluation of the plan."* *"Post information on facility web page and leverage social media"*

Integrating Hazard Mitigation into Local Planning

Through discussions at planning meetings and the use of an online survey, individual outreach, and phone calls, each participating jurisdiction brainstormed with the planning team to identify processes for integrating hazard mitigation into their local planning mechanisms and policies. The following table lists the specific integration strategy identified by the EPMC based on the mitigation actions listed in this plan.

Jurisdiction	Strategy
EPMC	*"We will include hazard mitigation in our emergency planning, including updating out hazard assessment"*

Mitigation Action Guides

The following Mitigation Action Guide presents EPMC's new mitigation action that was developed for the 2016 Plan.

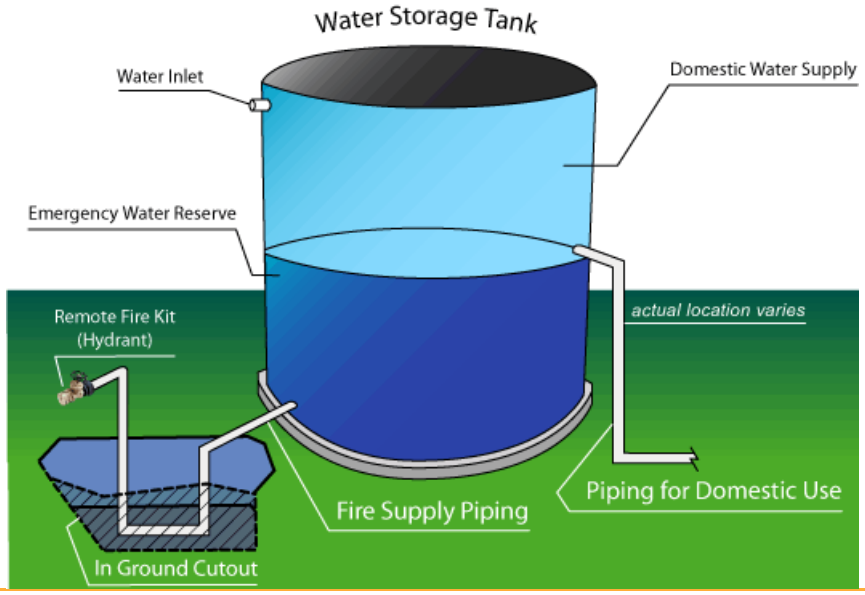
Estes Park medical Center: Medical Center Flood Mitigation	
PRIORITY: High	HAZARDS ADDRESSED: Flood
LOCATION: Estes Park Medical Center	GOALS ADDRESSED: Goals 1, 2, 4, and 5
RECOMMENDATION DATE: 6/1/2015	OBJECTIVES ADDRESSED: Objectives B, C, and E
TARGET COMPLETION DATE:12/31/2016	
ISSUE: The 2013 Flood in Estes Park illustrated the need to ensure critical facilities, such as the Estes Park Medical Center and associated properties, are protected against flooding.	
RECOMMENDATION: Follow techniques outlined in the FEMA resource guide, "Mitigation Ideas, A Resource for Reducing Risk to Natural Hazards," to protect critical facilities from flood events.	
ACTION: Upgrade facilities to mitigate against future flood impacts, including 1) implementation of a stormwater management plan and 2) design and construction of a rain gauge system to provide early warning lead time to implement flood protection measures throughout the facility.	
LEAD AGENCY: Estes Park Medical Center	EXPECTED COST: $300,000
SUPPORT AGENCIES: Loveland and Larimer Offices of Emergency Management	POTENTIAL FUNDING SOURCES: Town of Estes Park Resources, Estes Valley Medical Center resources, grant funding
PROGRESS MILESTONES: – Partner with Larimer County on Stream and Rain Gauge monitoring system to ensure Estes Park Medical Center receives notifications – Upgrade infrastructure to mitigate against future flood impacts, including communications, energy systems, and building design and construction – Relocate electrical equipment, vital hospital records, and medical equipment to flood resistant areas of the facility – Implement policies with direct mitigation actions for staff to decrease damage and loss during rainfall and flood events	

- Determine available funding mechanisms for areas of greatest need
- Secure funding

Estes Park medical Center/Prospect Park Living Center Water Storage System (Estes Park Medical Center – 1)	
PRIORITY: Medium-High	HAZARDS ADDRESSED: Water supply for Medical Center during loss of domestic water.
LOCATION: Estes Park medical Center and adjacent Prospect Park Living Center	GOALS ADDRESSED: 1. Protect people, property and natural resources
RECOMMENDATION DATE: 10/30/2015	OBJECTIVES ADDRESSED: C. Incorporate risk reduction principles into policy documents and initiatives; other institutional plans
TARGET COMPLETION DATE: 01/01/2017	
ISSUE: In the event of a local water supply interruption, the Medical Center needs to have an alternate water supply to provide continuity of operation for essential operations.	
RECOMMENDATION: Budget and equip to provide a dependable safe water supply (create storage capability) for a minimum of 96 hours of operation for all aspects of Medical Center Operation including patient care, plant operations, and, diagnostic and testing equipment.	
ACTION: Budgeting installation of needed equipment to store and/or receive potable water in sufficient quantity, working with Town, County, and, State agencies to provide potable water to the facility. Installed by Licensed contractor to insure safe dependable operation.	
LEAD AGENCY: Estes Park Medical Center, Prospect Park Living Center.	EXPECTED COST: $30-50,000
SUPPORT AGENCIES: None	POTENTIAL FUNDING SOURCES: General operating funds and/or potential grants.

PROGRESS MILESTONES:

- Determine total number of gallons needed to provide minimum water
- Budget equipment
- Partner with a contractor who is licensed to install the water storage system
- Conduct inspections and testing of the system as dictated by regulation



Letter of Intent to Participate

555 Prospect Avenue
PO Box 240
Estes Park, Colorado 80517
(970) 586-2317

LETTER OF INTENT TO PARTICIPATE

November 4, 2015

Lori R. Hodges
Larimer County Emergency Management
200 West Oak Street
Fort Collins, CO 80526

Re: "Statement of Intent to Participate" as a participating jurisdiction in the Larimer County Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Dear Ms. Hodges,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the Estes Park Medical Center (EPMC) is submitting this letter of intent to confirm that Estes Park medical Center has agreed to participate in the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, EPMC agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Larimer County OEM to complete the plan in conformance with FEMA requirements.

EPMC understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by an agreement between the Lead Jurisdiction and the Participating Jurisdiction, I Mark Gregson, interim Chief Executive Officer, commit Estes Park medical Center to the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 4th day of November:

Member of American Hospital Association • Member of Colorado Hospital Association • Member of Voluntary Hospitals of America, Inc.

Estes Valley Fire Protection District

"The Mission of the Estes Valley Fire Protection District is to provide the citizens of and visitors to the Estes Valley with superior fire prevention, fire protection and emergency services in a safe and efficient manner."

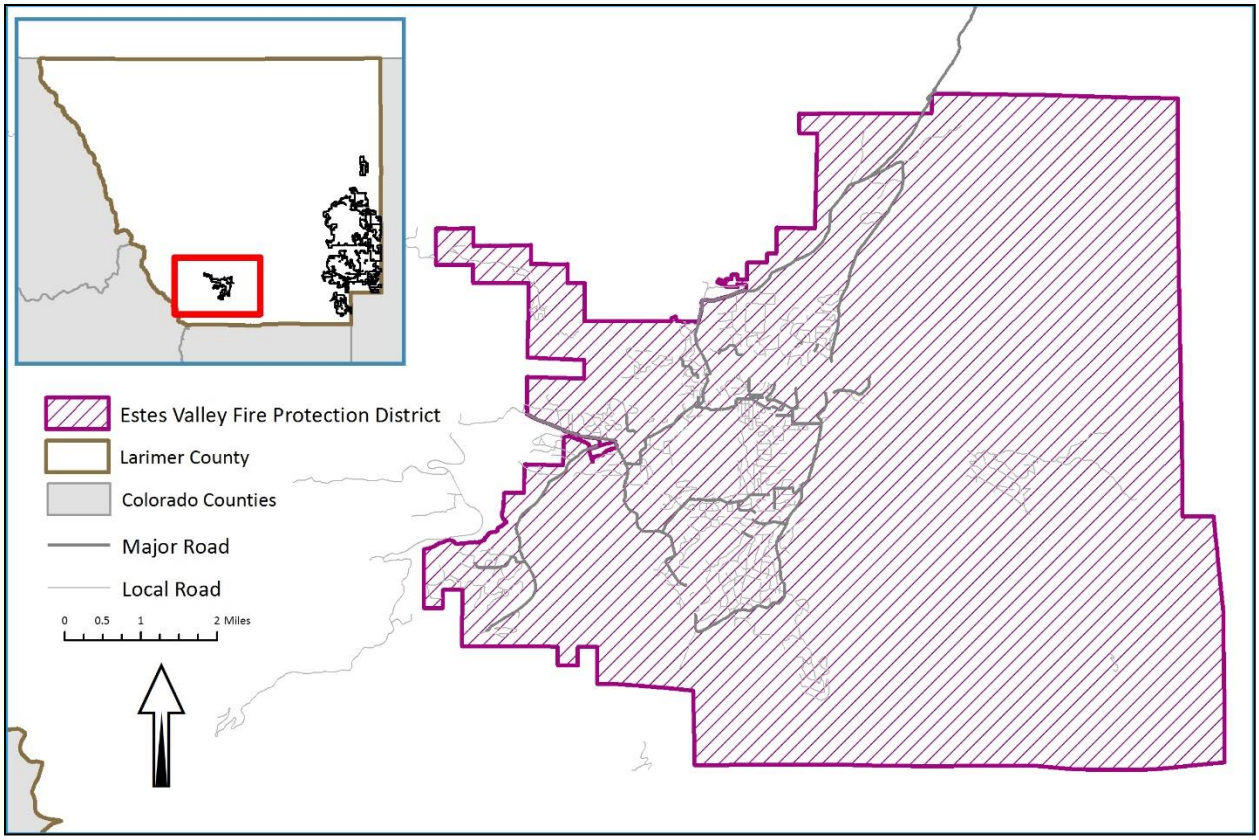
—Mission, Estes Valley Fire Protection District

Community Profile

The Estes Valley Fire Protection District (EVFPD) was established in 2009 and became autonomous on January 1, 2010. The EVFPD is comprised of 5 District Board Members, the Estes Park Volunteer Fire Department & Dive Team, Fire Chief, Training Captain, Fire Marshal and Administrative Assistant.

The Estes Valley Fire Protection District is located in southwestern Larimer County and is composed of a portion of unincorporated Larimer County and the Town of Estes Park, encompassing a 66.3 square mile area. There are 2 Fire Stations that serve the Estes Valley community:

- Station 1 - Dannels Fire Station at 901 N. St. Vrain Ave.
- Station 2 - 1600 Mills Drive.



Hazard Identification and Risk Assessment

The following Hazard Identification and Risk Assessment Summary table is based on jurisdiction-specific responses to the risk factor exercise and differs from the risk factor results that were determined at the county scale.

NATURAL HAZARD	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Fire – Wildland	1.2	0.9	0.8	0.4	0.3	3.6
Flood – Flash and Riverine	1.2	0.9	0.6	0.4	0.2	3.3
Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)	1.2	0.9	0.8	0.3	0.1	3.3
Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)	1.2	0.9	0.8	0.2	0.2	3.3
Utility Disruption	1.2	0.9	0.6	0.4	0.1	3.2
Landslide / Rockslide	1.2	0.6	0.4	0.4	0.1	2.7
Erosion / Deposition	0.9	0.6	0.4	0.3	0.1	2.3
Hazmat – Fixed and Transport	0.9	0.6	0.2	0.4	0.1	2.2
Tornado	0.6	0.3	0.2	0.4	0.1	1.6
Earthquake	0.3	0.3	0.2	0.4	0.1	1.3
Civil Disturbance	0.3	0.3	0.2	0.1	0.1	1.0
Biological Hazards / Contagion	0.3	0.3	0.2	0.1	0.1	1.0
HIGH RISK (2.5 or higher): Fire – Wildland; Flood – Flash and Riverine; Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning); Winter Storm (Blizzard Conditions, Heavy Snow Accumulation); Utility Disruption; Landslide / Rockslide						
MODERATE RISK HAZARD (2.0 - 2.4): Erosion / Deposition; Hazmat – Fixed and Transport						
Low Risk (1.9 and lower): Tornado; Earthquake; Civil Disturbance; Biological Hazards / Contagion						

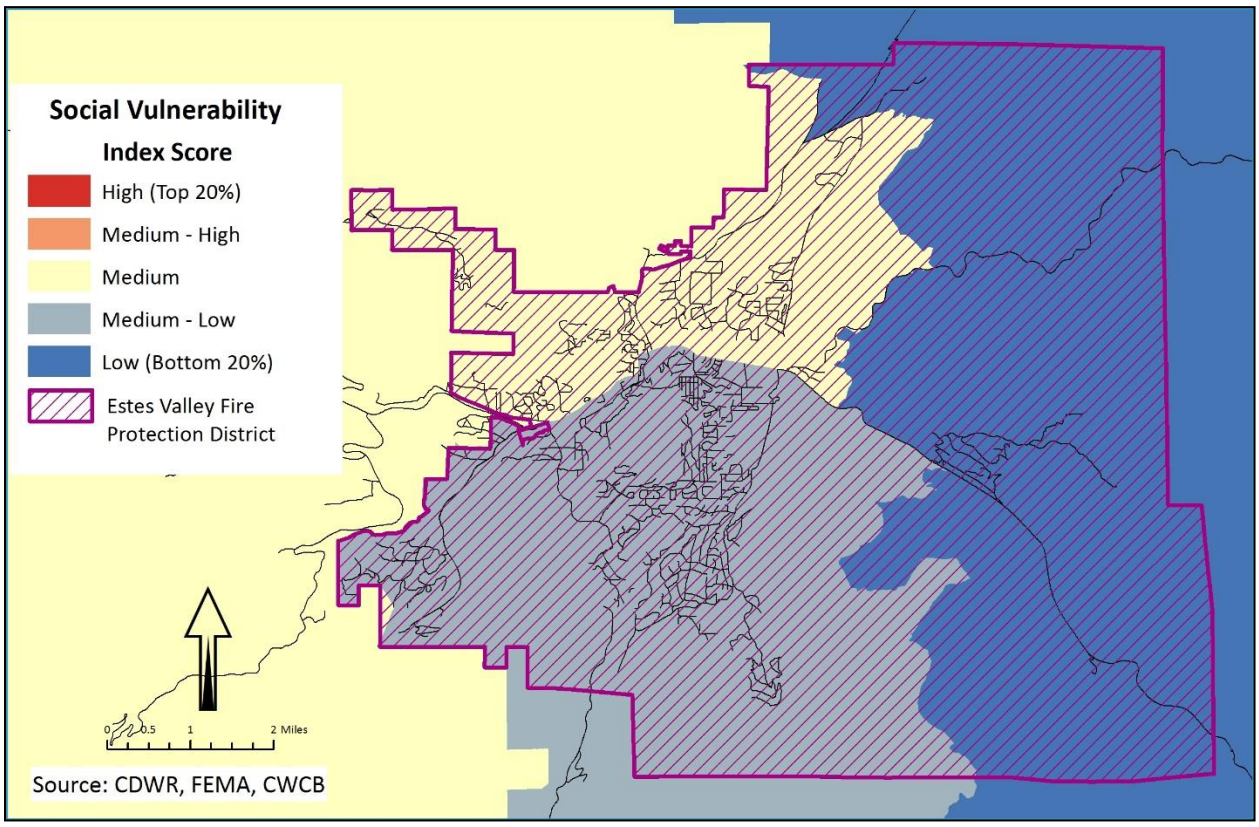
Vulnerability Assessment

This section provides a refined vulnerability assessment, specific for the Estes Valley Fire Protection District, for those hazards that were identified as being rated HIGH in the preceding section. This analysis

was conducted separately from that of the county-wide vulnerability assessment to specifically focus on the population, structures, infrastructure, and other assets unique to the Estes Valley Fire Protection District.

The results of the social vulnerability assessment are displayed on the map below. On the map, social vulnerability is represented at the census tract level by 5 classes of vulnerability: Low (bottom 20% of the county), Medium-Low, Medium, Medium-High, and High (top 20% of the county). The Estes Valley Fire Protection District's social vulnerability map shows social vulnerability within the district.

Social Vulnerability Map – Estes Valley Fire Protection District[107]



Social vulnerability is represented as the social, economic, demographic, and housing characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to hazard events. The pre-existing social conditions that contribute to disaster losses can be identified using social vulnerability indicators. Using methods identified in the Social Vulnerability Index (SoVI) developed by Cutter et. al. (2003) this layer shows the social vulnerability index scores for the State of Colorado at the census tract level. Social vulnerability is represented at the Census tract level by five classes of vulnerability: Low, Medium-Low, Medium, Medium-High, and High.

[107] Source: Colorado Division of Water Resources Dam Safety Branch, FEMA, Colorado Water Conservation Board (CWCB)

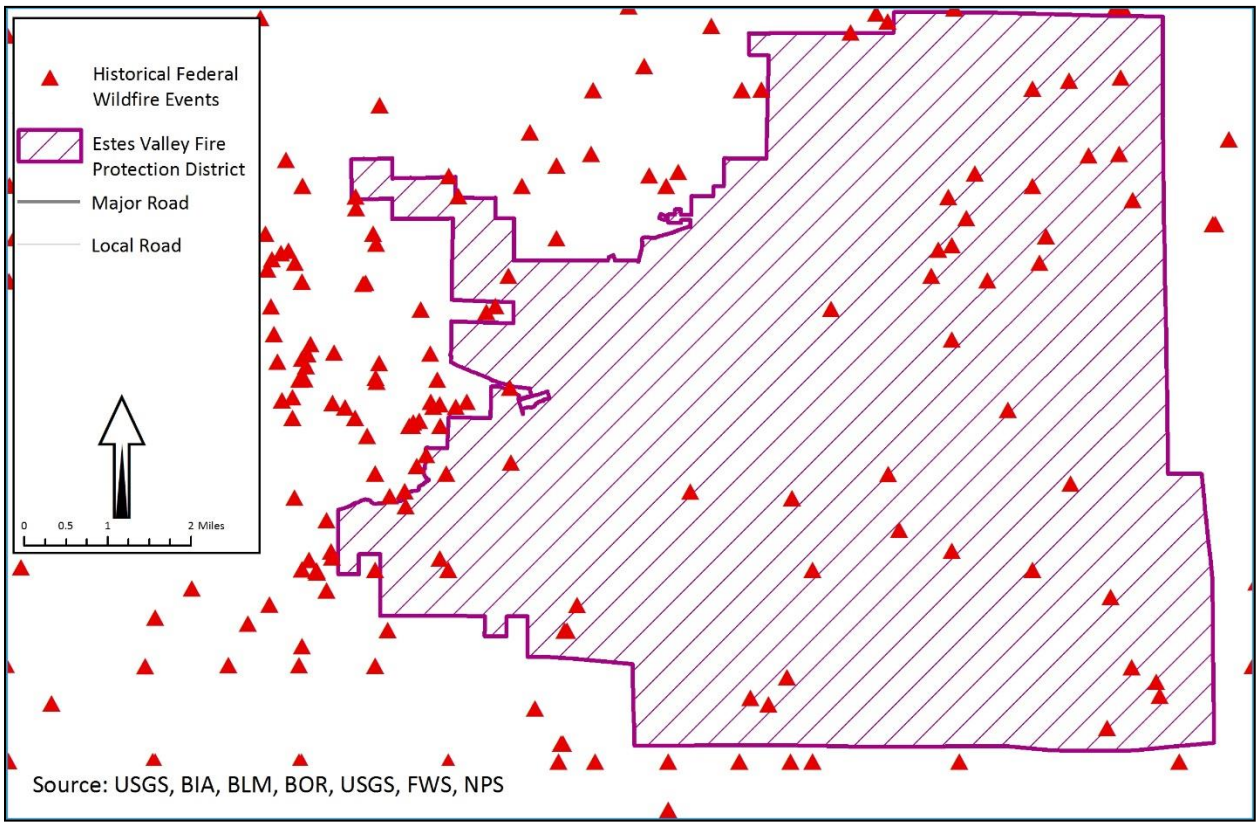
The Estes Valley Fire Protection District is characterized by a mix of low (bottom 20%) to medium levels of social vulnerability. This does not mean, however, that there a not any vulnerable populations within the District. Over time, the district should continue to monitor their social vulnerability as demographic, economic, and housing related conditions change..

Fire – Wildland

Previous Occurrences

According to USGS there have been 47 reported wildfire events in the Estes Valley Fire Protection District between 1980 and 2013. Based on the historic data showing hazardous impacts on the Estes Valley Fire Protection District, there is a great potential for wildfire events to occur at any given time in the Estes Valley Fire Protection District.

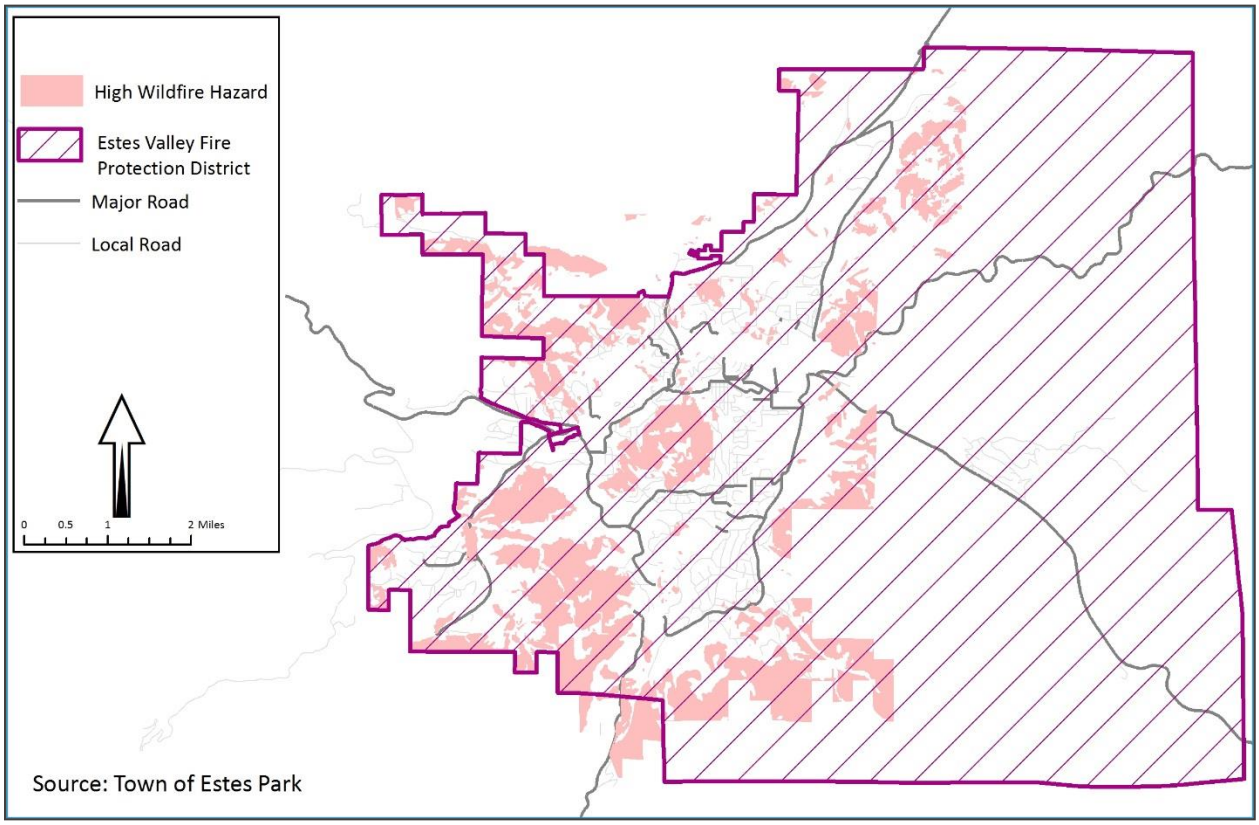
Estes Valley Fire Protection District Historical Federal Wildfire Map



Inventory Exposed

The Town of Estes Park located within the Estes Valley Fire Protection District, has established wildfire hazard zone designation to help hazard mitigation of wildfires in new developments and subdivisions. The mapped hazard areas include all areas “high-tree” fire hazard areas. Any new development or subdivision requires a mitigation plan prepared by a professional forester addressing how the development or subdivision will avoid or mitigate wildfire hazards. The following figure illustrates the high wildfire hazard zones determined by the Town of Estes Park, the Colorado State Forest Service, and Larimer County Wildfire Safety Specialist.

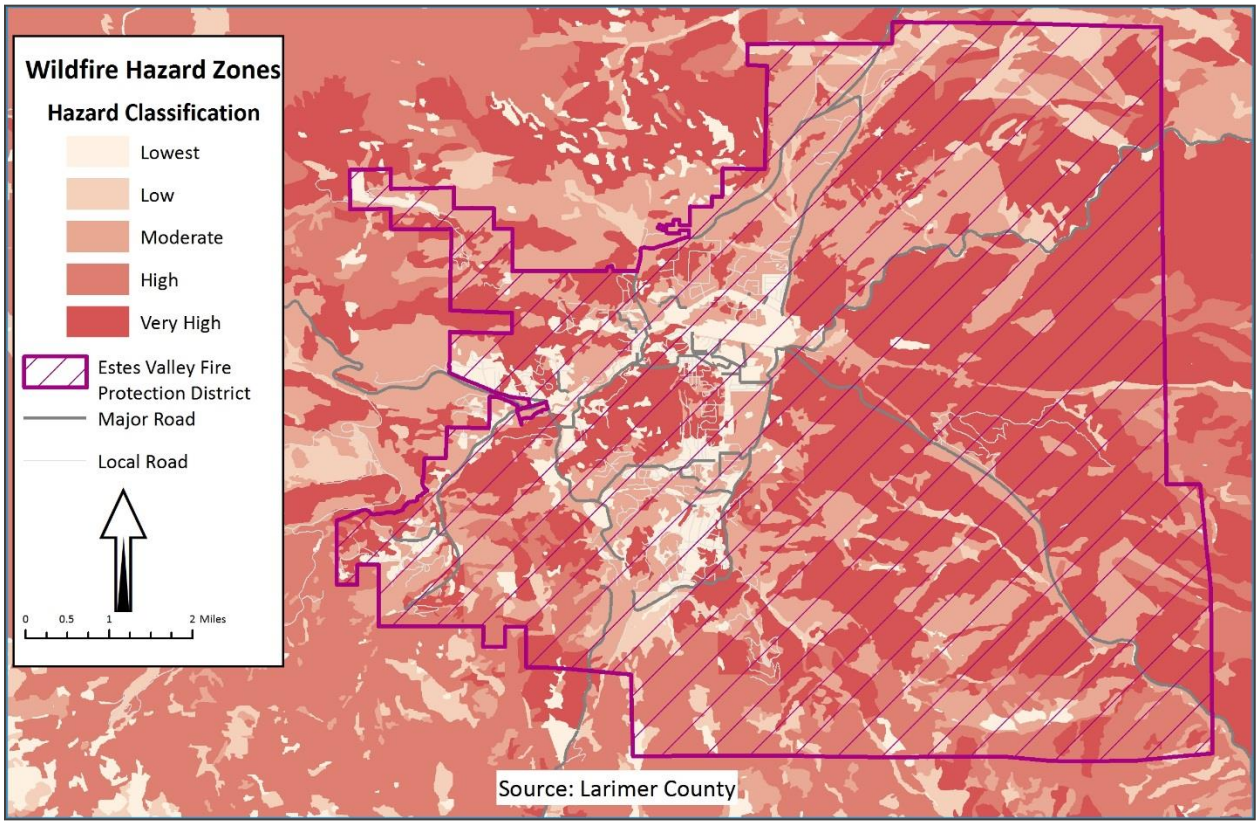
Estes Valley Fire Protection District High Wildfire Hazard Zones[108]



The following Wildfire Hazard Zone map identifies the expected wildfire behavior. There are the highest wildfire hazard zones throughout the district.

[108] High Wildfire Hazard Zones, from Town of Estes Park

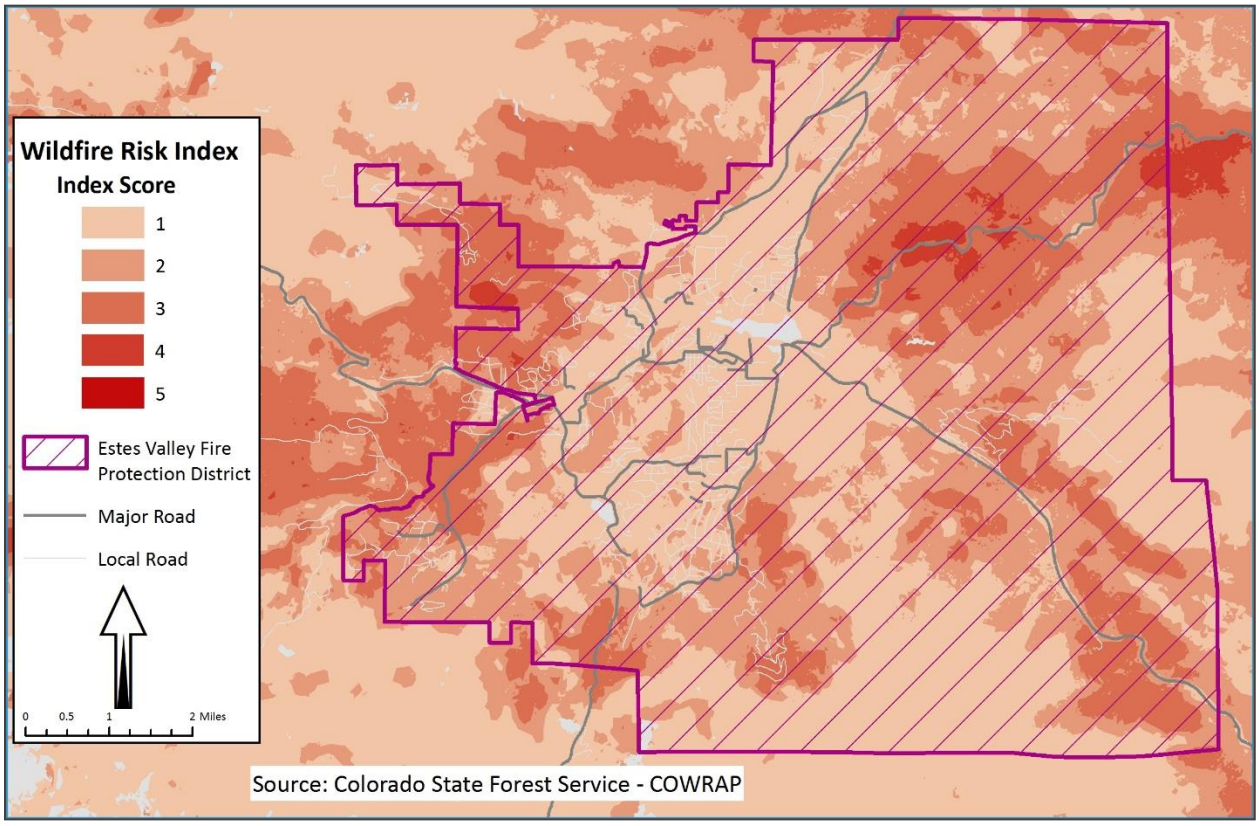
Estes Valley Fire Protection District Wildfire Hazard Zone Map[109]



The following Wildfire Risk map identifies areas with the greatest potential impacts from a wildfire, in other words, those areas most at risk. The highest wildfire risk areas in the district are located in the western and eastern regions, in areas where there are lower population densities.

[109] To be used to identify wildfire hazards within the Wildfire Mitigation Area. The hazards are determined based on vegetation cover type, habitat structure stage (cover type, tree size and crown cover percentage), southern facing aspects and 30% and greater slopes according to the Wildfire Hazard Area Mapping (WHAM) guidelines.

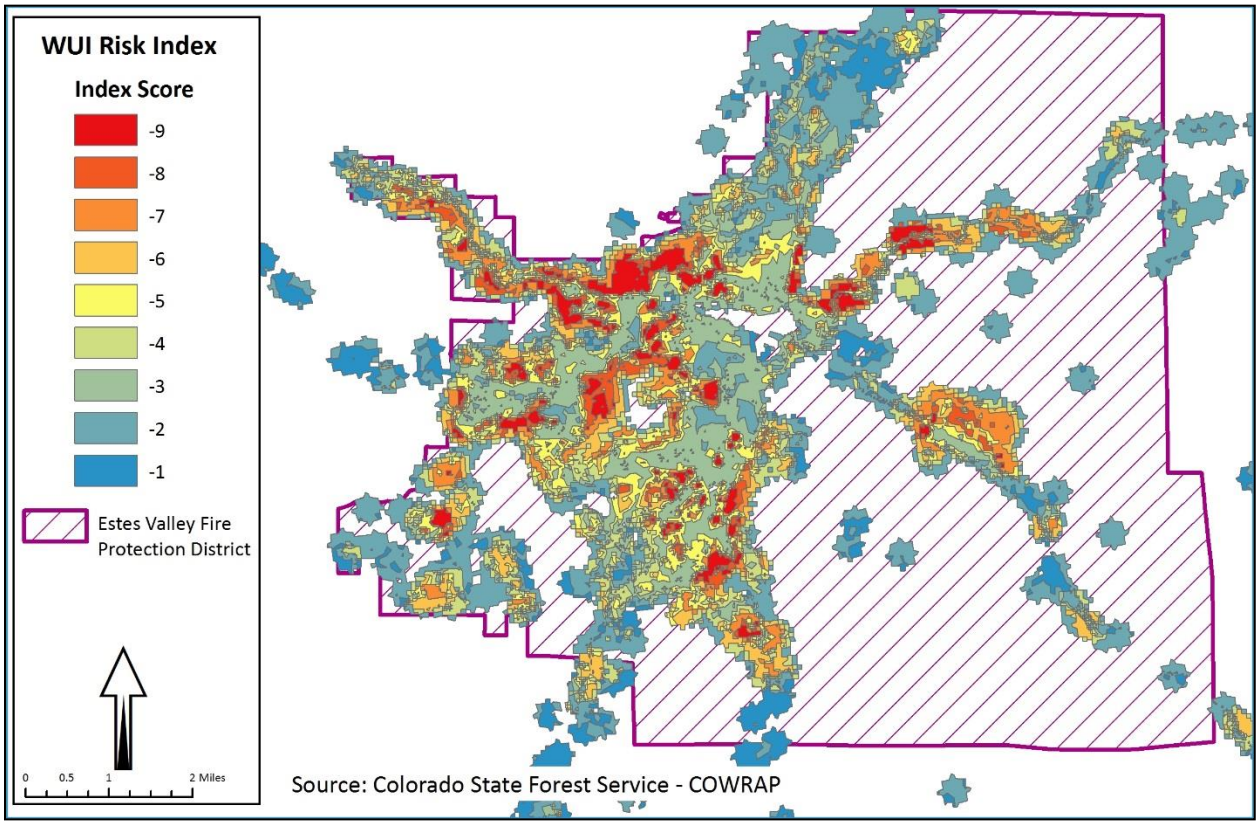
Estes Valley Fire Protection District Wildfire Risk Index Map[110]



There are a number of areas in the eastern and western regions of the district that are within the medium to highest level on the WUI Risk Index Scale. This means that the potential impact on people and homes from a wildfire in those areas is medium to high in relationship to the rest of Larimer County. This level of risk is derived by combining housing density with predicted flame length.

[110] Wildfire Risk represents the possibility of loss or harm occurring from a wildfire. Risk is derived by combining wildfire threat and fire effects. The COWRAP data set was produced statewide and ranks areas on a scale that includes: lowest risk to highest risk.

Estes Valley Fire Protection District WUI Map[111]



Fires can extensively impact the economy of an affected area, including the agricultural, recreation and tourism industries, water resources, and the critical facilities upon which the Estes Valley Fire Protection District depends. There are many areas of high wildfire threat throughout the town according to the WUI Risk Index. There are also many medium threat areas.

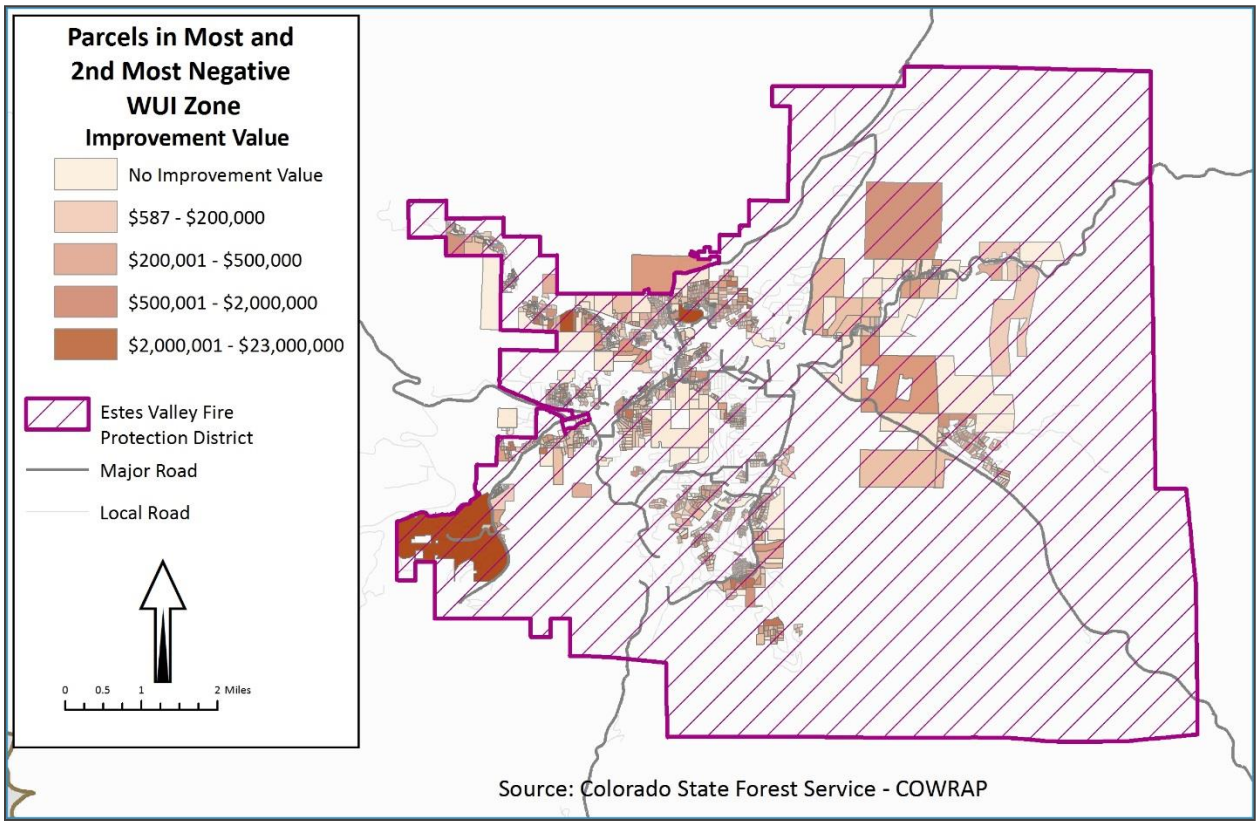
Potential Losses

The exposure data provided in the previous section (Inventory Assets Exposed) provides the clearest picture of potential losses to wildfire in the Estes Valley Fire Protection District. There is 1 critical facility located in areas with the *most negative* and 6 critical facilities located in areas with the *2nd most negative* wildfire threat total. The appraisal value of the critical facilities within these *most and 2nd most negative* threat areas is approximately $10 million dollars. There are 1,450 parcels/structures located in areas with the *most negative* and 1,338 parcels/structures located in areas with the *2nd most negative* wildfire threat

[111] Wildland Urban Interface Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length. The COWRAP data set was produced statewide and ranks areas on a scale that includes: least negative to most negative impacts.

total. The appraisal value of the parcels/structures within these *most and 2nd most negative* threat areas is over $657.79 million dollars. The risk assessment uses worst case scenario loss estimates. For this reason it is important to plan for relative levels of loss rather than specific potential loss dollar amounts.

Estes Valley Fire Protection District Parcels in the Most Negative and Second Most Negative WUI Zone[112]



Probability of Future Occurrences

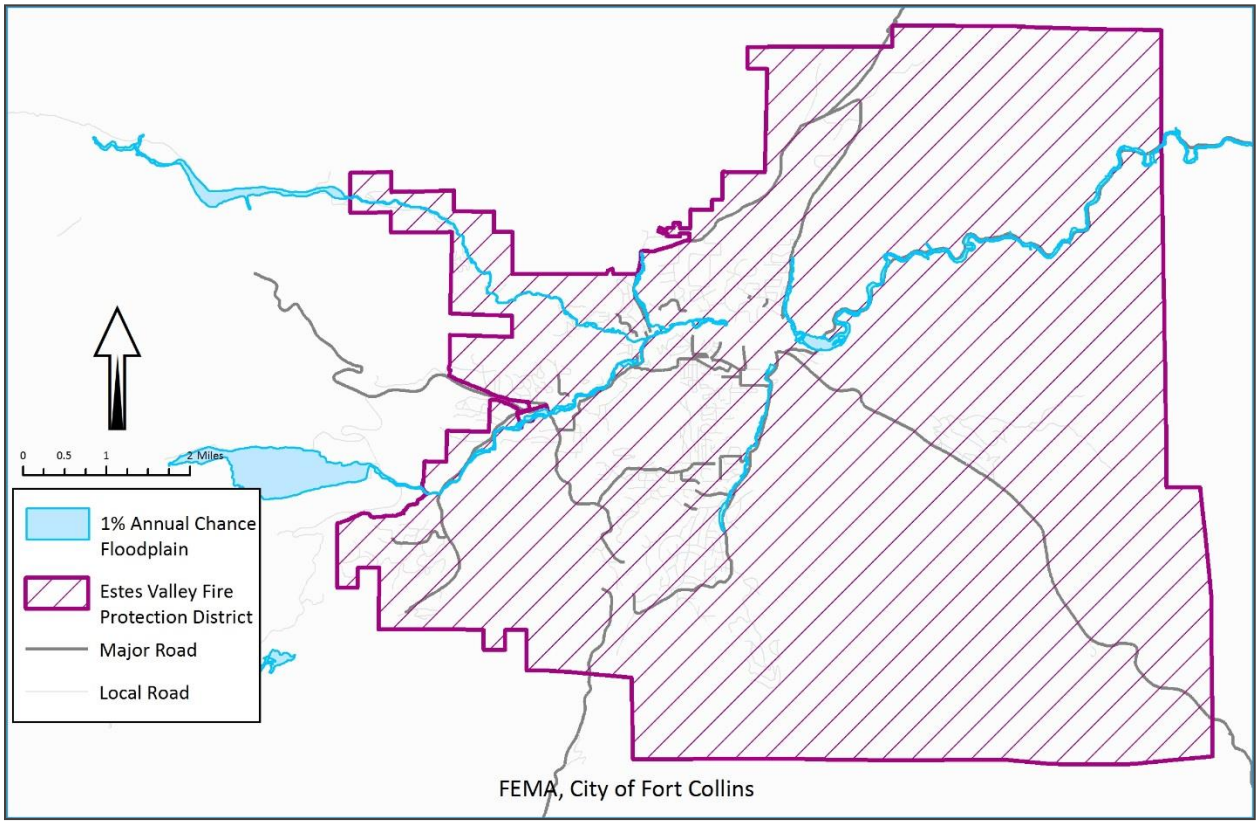
The likelihood of wildfires attaining significant size and intensity is unpredictable and highly dependent on environmental conditions and firefighting response. Weather conditions, particularly drought events, increase the likelihood of wildfires occurring. That said, it is important to note that 98% of wildfires are human-caused. Ultimately, the occurrence of future wildfire events will strongly depend on patterns of human activity and events are more likely to occur in wildfire-prone areas experiencing new or additional development.

[112] Wildland Urban Interface (WUI) Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length.

Wildfires can occur at any time of day and during any month of the year. Moreover, the length of a wildfire season and/or peak months may vary appreciably from year to year. As evidenced by the wildfire risk assessment, areas within the Estes Valley Fire Protection District that are characterized by dense development and single family homes along the wildland-urban interface are most vulnerable to wildfire.

Flood – Flash and Riverine

Estes Valley Fire Protection District Special Flood Hazard Area[113]



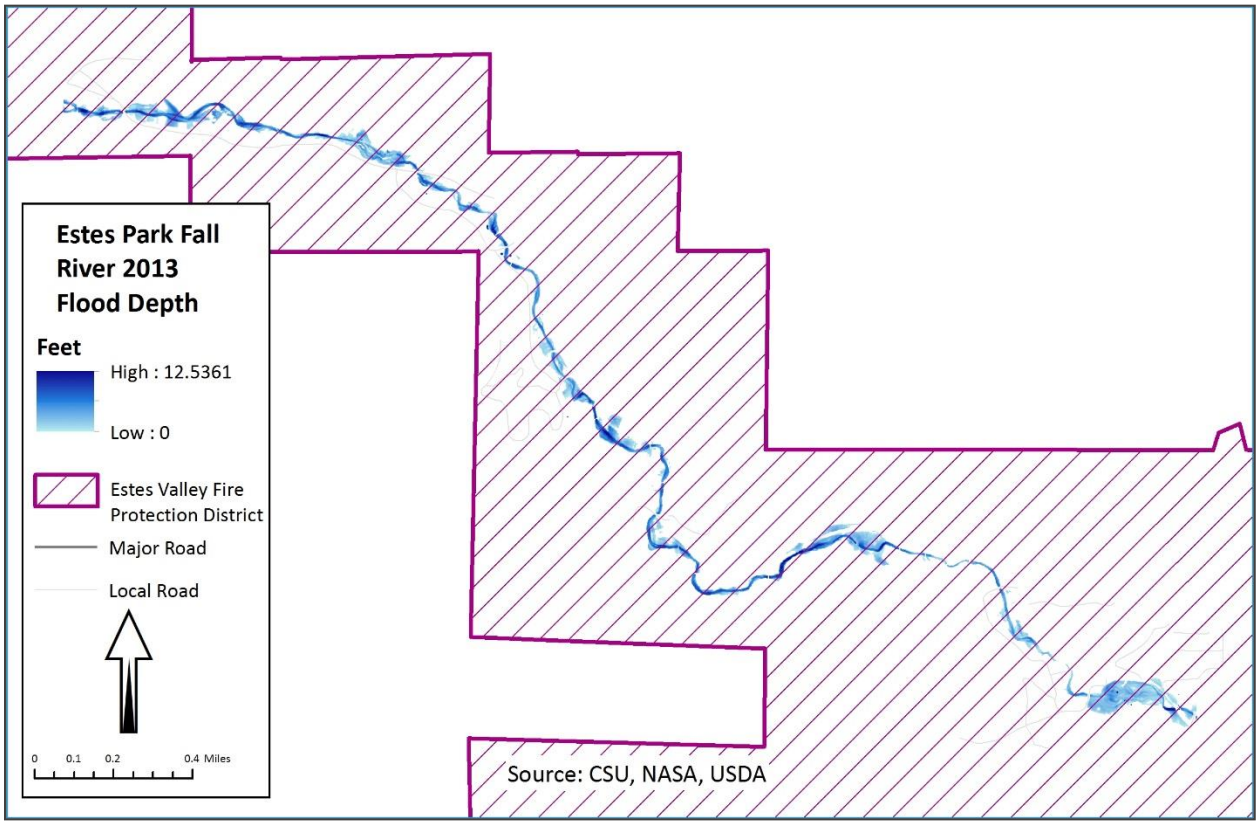
Previous Occurrences

Estes Park sustained severe damages during the September 2013 Colorado flood event. Evacuations began on September 12, 2013, at approximately 3:00AM and 2,428 contacts were made to warn and evacuate neighborhoods through the LETA911 emergency notification system. The information below was provided by the Town of Estes Park and provides a snapshot of just home many residents were impacted by the flood.

[113] This layer is compiled utilizing the most recent Special Flood Hazard Areas (SFHA) as defined by FEMA's National Flood Hazard Layer (NFHL) in combination with some recent flood studies performed by the City of Fort Collins. These areas are also referred to as the 1% Annual Chance Floodplain.

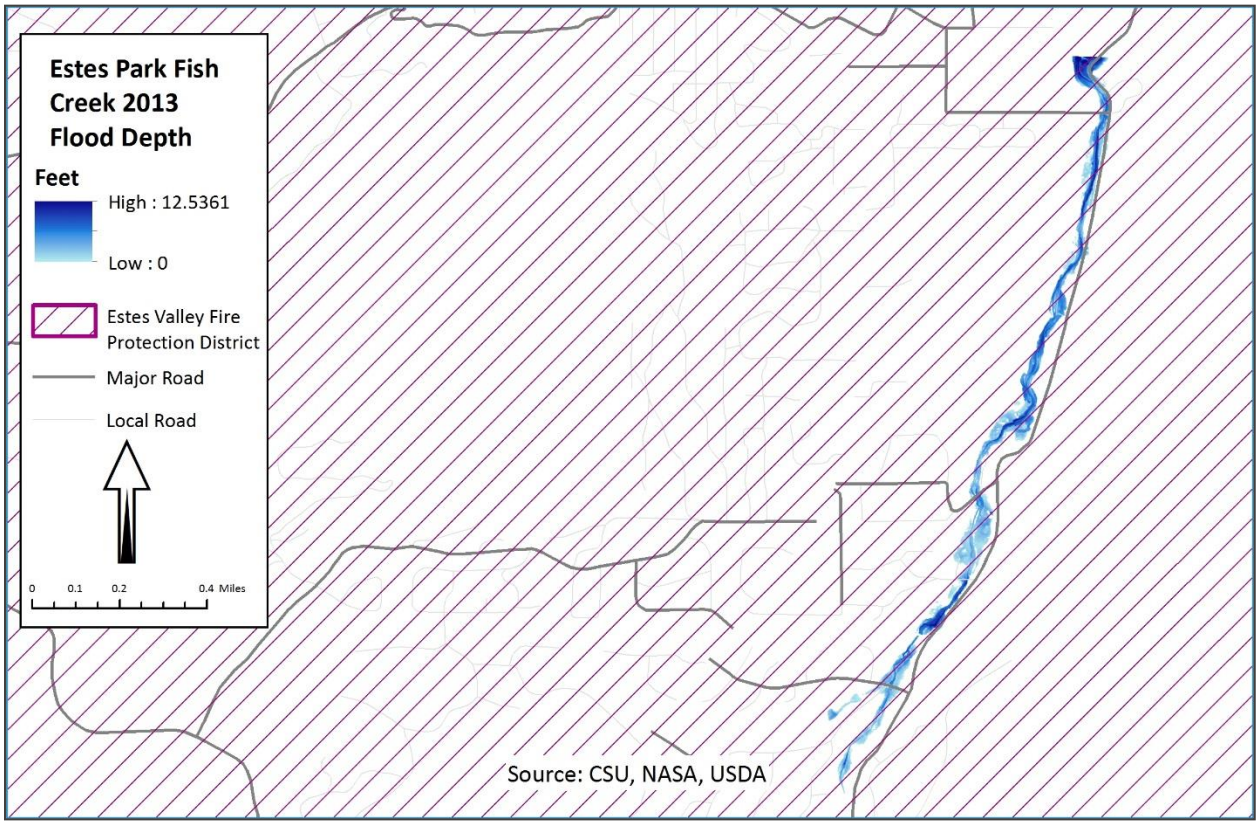
Red Cross Shelter Support:	606 people signed in
	167 people sheltered in the cents
	316 people outsourced to local hotels for varying amounts of time
Salvation Army Support:	3571 meals were served
	7000 snacks/drinks were served
	9000 gallons of water distributed
Utilities Outages and Restoration	Estimated $35-40 million in public infrastructure damage in the Estes Valley
	3.25 miles of Fish Creek Road are destroyed or damaged
	Caused outages for electric, water, gas, cable and phones
	Approximately 4,000 sewer taps were non-functional under “No Flush” orders within the Upper Thompson Sanitation District.
Structural Damage Assessments (incorporated Estes Park)	Rapid assessments completed for approximately 3,000 structures in the Estes Valley this week. Approximately 12 red tags were issued for properties that were determined to be unsafe for occupancy due to structural damage or electrical safety.
	2,383 estimated residences affected by water, mud, sewer access, road access
	183 estimated businesses affected by water, mud, sewer access, road access

Estes Valley Fire Protection District Fall River 2013 Flood Extent[114]



[114] Based on high water marks collected by the Town of Estes Park.

Estes Valley Fire Protection District Fish Creek 2013 Flood Extent[115]



In addition to the September 2013 flood two additional floods were reported according to the NOAA's Storm Events Database. On August 2, 2007 a flash flood occurred resulting in $20,000 in property damage. Another flash flood occurred on July 18, 2013 resulting in $10,000 in property damage and $5,000 in crop damage. There were no reported injuries or deaths from these two floods.

Inventory Exposed

Critical facilities are essential to the health and welfare of the whole population and are especially important both during and after hazard events. Critical structures or areas that overlap or touch the SFHA are considered "flood prone."

The critical facility and structure exposure analysis estimates that there are 5 critical facility and 750 structures in the Estes Valley Fire Protection District that are flood prone (not including the total miles of flood prone infrastructure). The appraised value of the exposed critical facilities is over $7.17 million dollars and the exposed structures is over $187.57 million dollars.

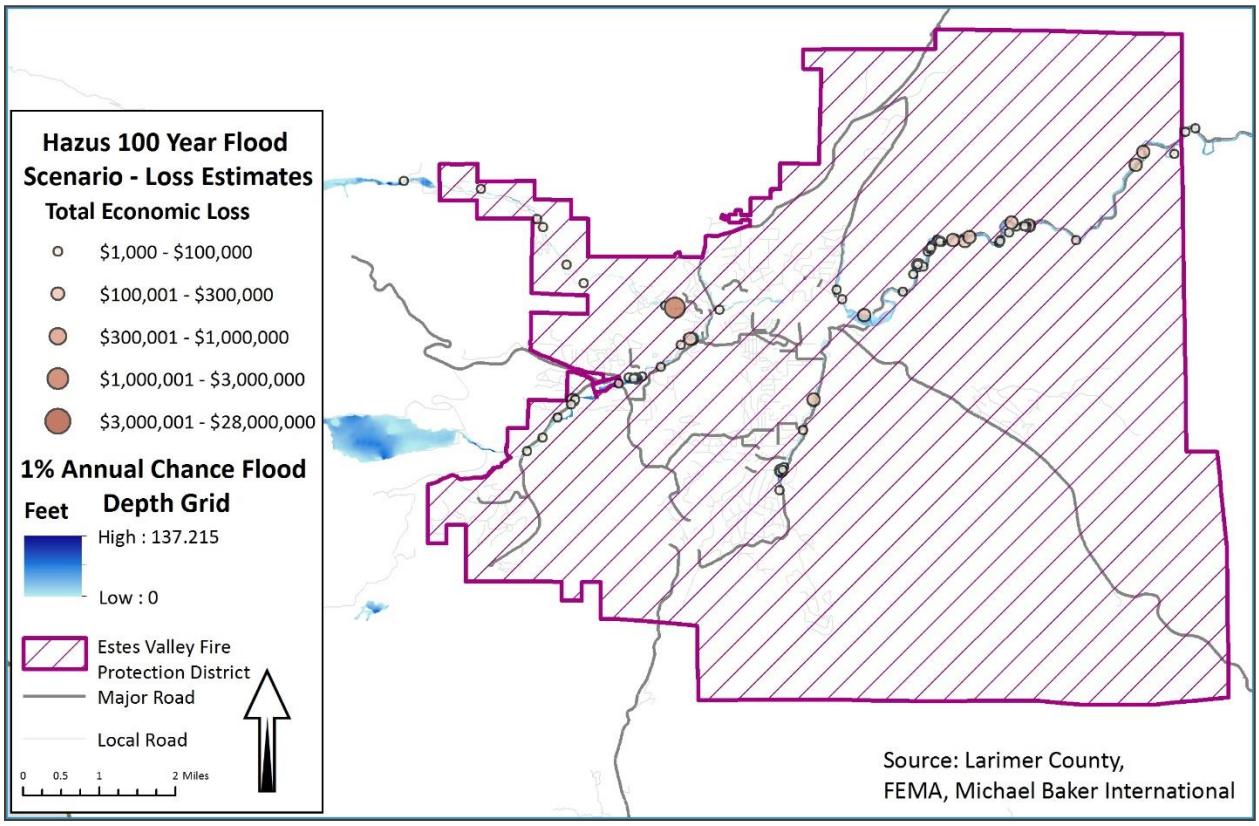
Potential Losses

Hazus estimates for the Estes Valley Fire Protection District that for a 100-year flood event, no critical facilities and approximately 106 buildings will experience flood damage. The total economic loss

[115] Based on high water marks collected by the Town of Estes Park.

estimated for the 100-year flood is over $7.4 million dollars. The estimated building loss is over $4.2 million dollars, over $2.9 million dollars in content loss, and over $240.9 thousand dollars in inventory loss.

Estes Valley Fire Protection District 1% Annual Flood Loss Estimation and Flood Depth Grid Map[116]



[116] FEMA's loss estimation modeling software, Hazus, was utilized to produce this data set. A 100 year flood scenario was defined and losses were calculated for each point (structure) that intersected the depth grid based on the Hazus depth damage curves for specific structure attributes (such as foundation type, building type, and first flood height). Information derived from Hazus-MH 2.2 flood scenario. Total Losses equals a sum of building losses, content losses, and inventory losses. 1% Annual Chance Flood flooding depth grid, produced from the best available topographic and floodplain data.

Probability of Future Occurrences

Frequency of previously reported flood events in the Estes Valley Fire Protection District provide an acceptable framework for determining the probability of future flood occurrence in the area. The probability that the district will experience a flood event can be difficult to predict or quantify.

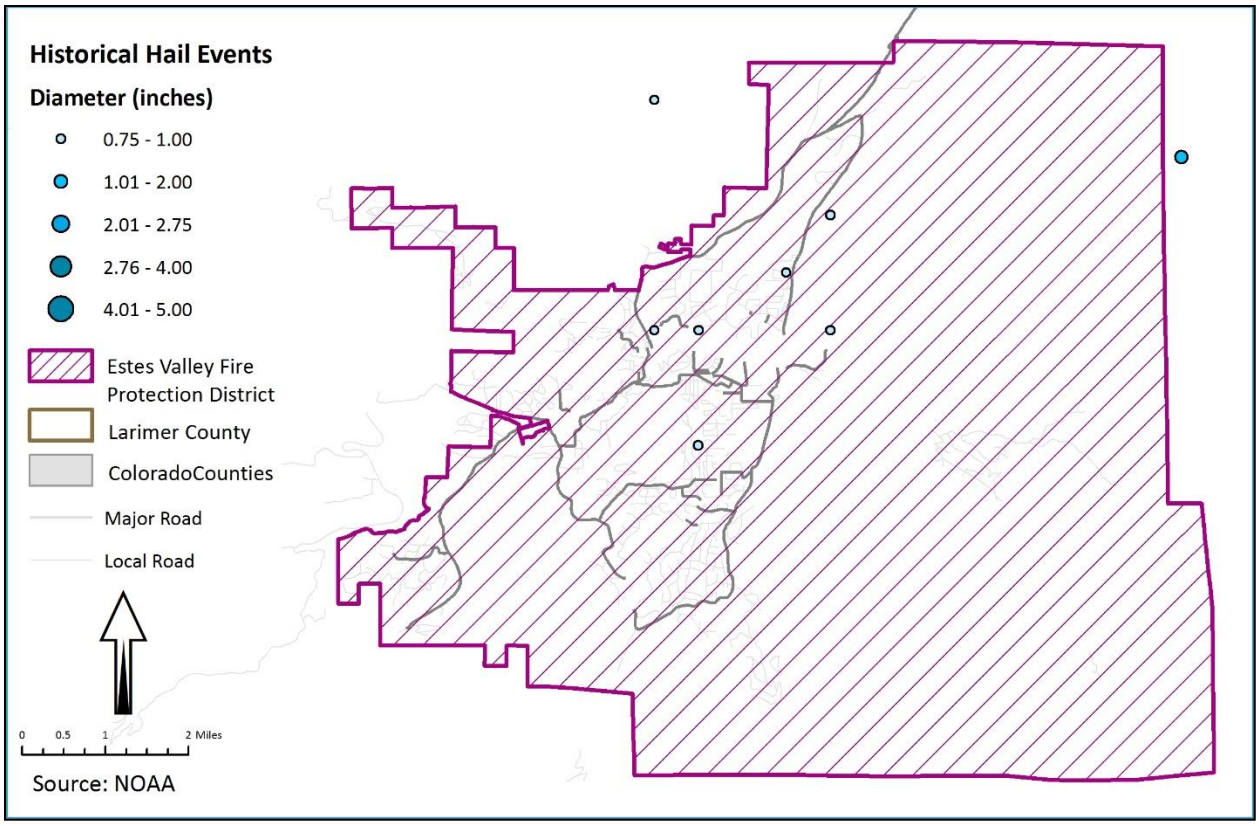
Severe flooding has the potential to inflict significant damage to people and property in the district. Mitigating flood damage requires that communities remain diligent and notify local officials of potential flood (and flash flood) prone areas near infrastructure such as roads, bridges, and buildings.

Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)

Previous Occurrences

According to NOAA's Storm Events Database there are no reported injuries, deaths, or loss in the Estes Valley Fire Protection District due to hail. There have been 6 hail events reported in the District between 1955 and 2014. Based on the historic data showing hazardous impacts on the district, there is a great potential for hail events to occur at any given time.

Historical Hail Events in Estes Valley Fire Protection District[117]



According to NOAA's Storm Events Database there is no historic data for thunderstorm wind events in the Estes Park Medical service area. Based on the historic data showing hazardous impacts on the county, there is a great potential for hail events to occur at any given time.

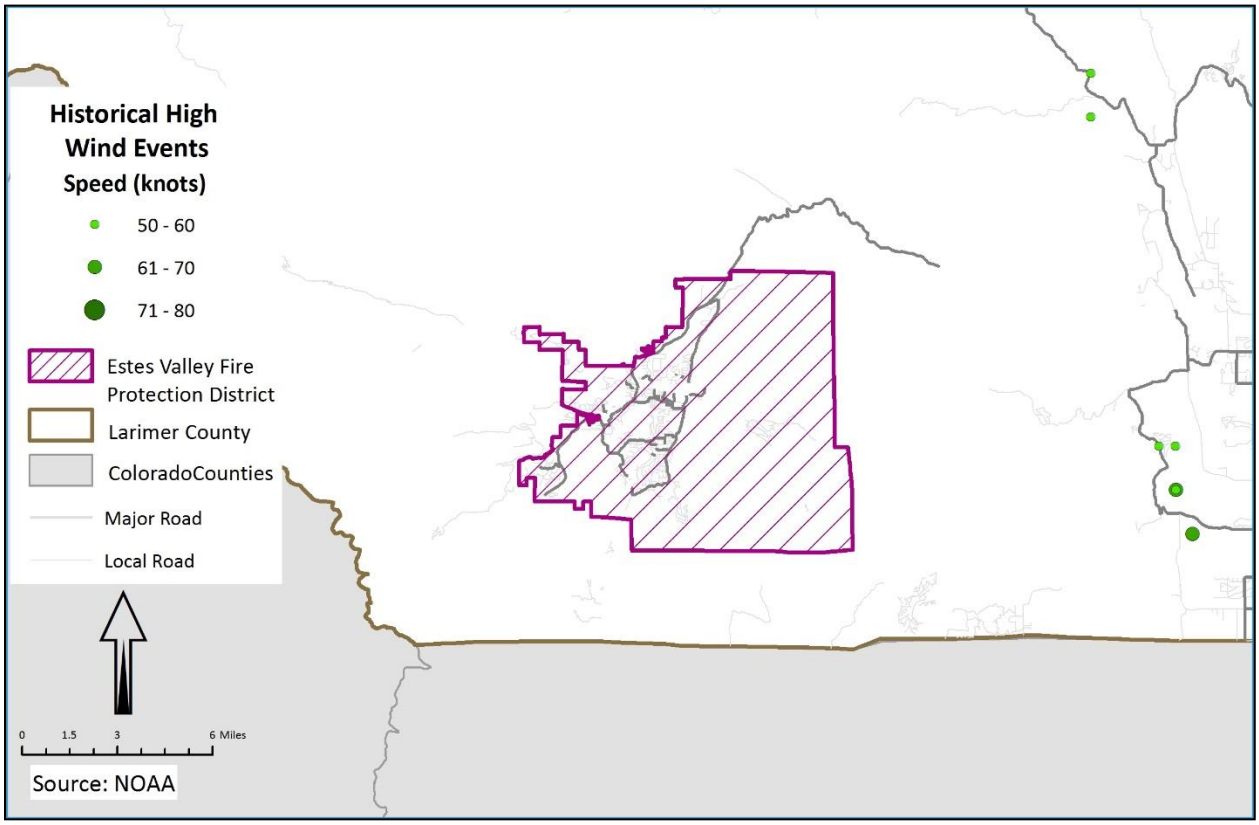
According to NOAA's Storm Events Database there have been 9 lightning events in the Estes Park Medical service area between 1996 and 2014. There have been 27 reported injuries, 4 deaths, $5,000 worth of property damage, and no reported crop damage. Based on the historic data showing hazardous impacts on the area, there is a great potential for lightning events to occur at any given time.

According to NOAA's Storm Events Database there have been 166 Windstorm events in and near the Estes Park Medical service area between 1996 and 2014. There have been 2 reported injuries, no deaths, $13.5 million dollars' worth of property damage, and no reported crop damage. There is no graphical data available showing the specific locations of these high wind events within the service area. Based on the

[117] Source: NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

historic data showing hazardous impacts on the area, there is a great potential for high wind events to occur at any given time.

Historical High Wind Events in Estes Valley Fire Protection District[118]



Inventory Exposed

All assets located in the Estes Valley Fire Protection District can be considered at risk from spring and summer storms. This includes all people, or 100% of the District's population, and all buildings and infrastructure within the district. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the District's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Inventory assets exposed to severe wind is dependent on the age of the building, type, construction material used, and condition of the structure. Possible losses to critical infrastructure include:

- Electric power disruption
- Communication disruption

[118] Source: NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

- Water and fuel shortages
- Road closures
- Damaged infrastructure components, such as sewer lift stations and treatment plants
- Damage to homes, structures, and shelters

Potential Losses

Spring and summer storms affect the entire planning area of the Estes Valley Fire Protection District including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Severe storms will remain a highly likely occurrence for the Estes Valley Fire Protection District. It is likely that lightning and hail will also be experienced in the area due to such storms.

Generally, straight-line wind events destroy private, commercial, and public property. Additional costs stem from debris removal, maintenance, repair, and response. Indirect costs include loss of industrial and commercial productivity as a result of damage to infrastructure, facilities, or interruption of services. Because no specific, countywide loss estimation exists for wind, potential losses are related to historical property damage and injuries/deaths.

Probability of Future Occurrences

Spring and summer storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past spring and summer events provide benchmarks for projecting similar conditions into the future. The probability that Estes Valley Fire Protection District will experience a spring or summer storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the Estes Valley Fire Protection District at least once every year.

Reported straight-line wind events over the past nineteen years provide an acceptable framework for determining the future occurrence in terms of event. The probability of the Estes Valley Fire Protection District experiencing a severe wind event associated with damages or injuries can be difficult to quantify, but based on historical record of 166 severe wind events since 1996, there is a high chance of this type of event occurring each year.

Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)

Previous Occurrences

According to NOAA's Storm Events Database, the Estes Valley Fire Protection District has experienced 175 Winter Storms since 1996. On March 17, 2003 there was report of a winter storm causing $15,500,000 in property damage in areas within western Larimer County above 6,000 feet. There were no deaths,

injuries or damage to crops reported for any of these storms. The Estes Valley Fire Protection District is at high risk of experiencing Winter Storms during the winter months.

Inventory Exposed

All assets located in the Estes Valley Fire Protection District can be considered at risk from winter storms. This includes all people, or 100% of the District's population, and all buildings and infrastructure within the district. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the District's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Potential Losses

Winter storms affect the entire planning area of the Estes Valley Fire Protection District including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Winter storms will remain a highly likely occurrence for the Estes Valley Fire Protection District.

Probability of Future Occurrences

Severe winter storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past severe winter events provide benchmarks for projecting similar conditions into the future. The probability that the Estes Valley Fire Protection District will experience a severe winter storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the district at least once every year.

Utility Disruption

Previous Occurrences

The Estes Valley Fire Protection District does not currently track incidences of utility disruption.

Inventory Exposed

All assets located in Estes Valley Fire Protection District are considered at risk from the impacts of utility disruption events. This includes all people, or 100% of the County's population, and all buildings and infrastructure within the District.

Potential Losses

Utility disruption events have the potential to threaten lives and disrupt business activity. However, monetary losses and casualty estimates are largely unknown.

Probability of Future Occurrences

In general, utility outages result from failures in the distribution system as opposed to shortages of supply. Distribution systems are most susceptible to failure during extreme hot and cold temperatures as well as during violent weather conditions. Regional utility failures can threaten human life, particularly when outages affect hospitals, nursing homes, or other healthcare facilities. As both population and climate variability increase across the State of Colorado, and put more pressure on aging distribution systems, it is likely that utility disturbance events will become more frequent in and around the Estes Valley Fire Protection District.

Landslide / Rockslide

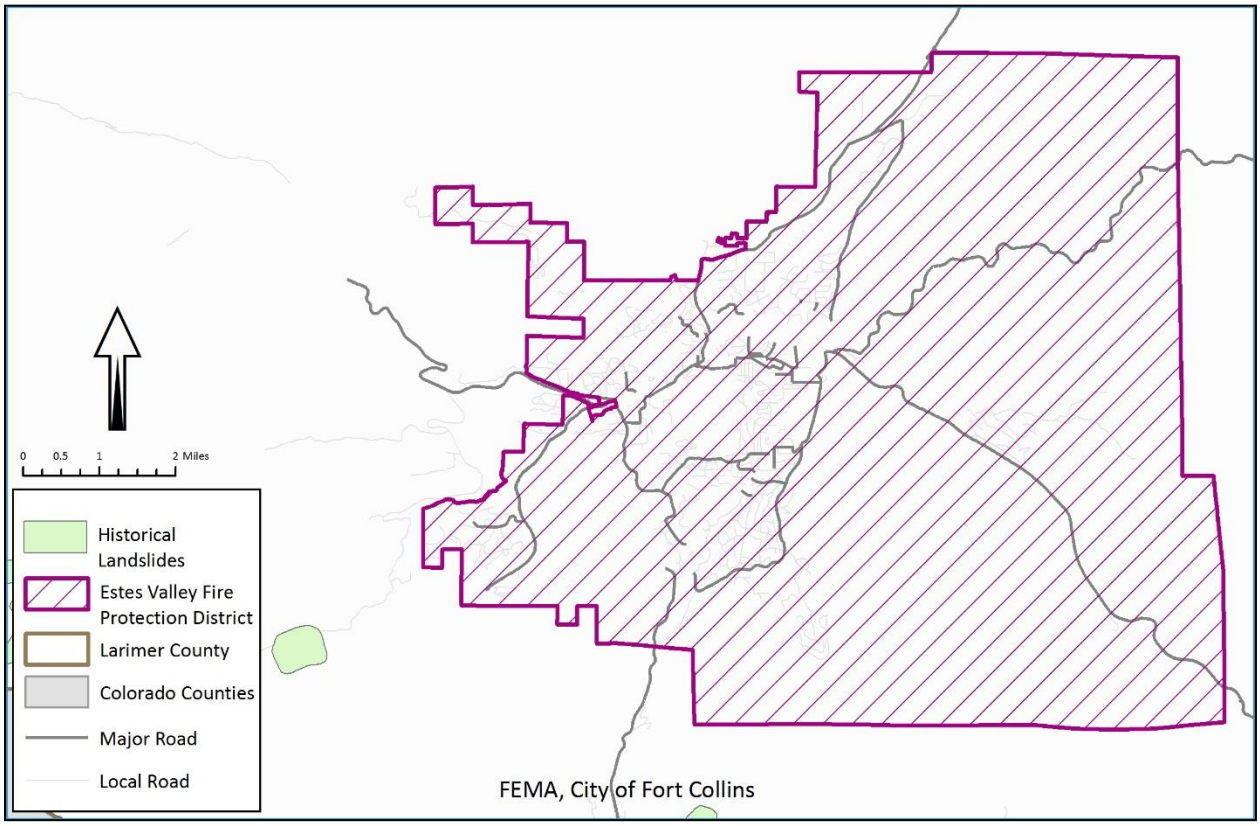
Previous Occurrences

According to the Colorado Geological Survey there have been no reported landslide events within the boundaries of the Estes Valley Fire Protection District.

Inventory Exposed

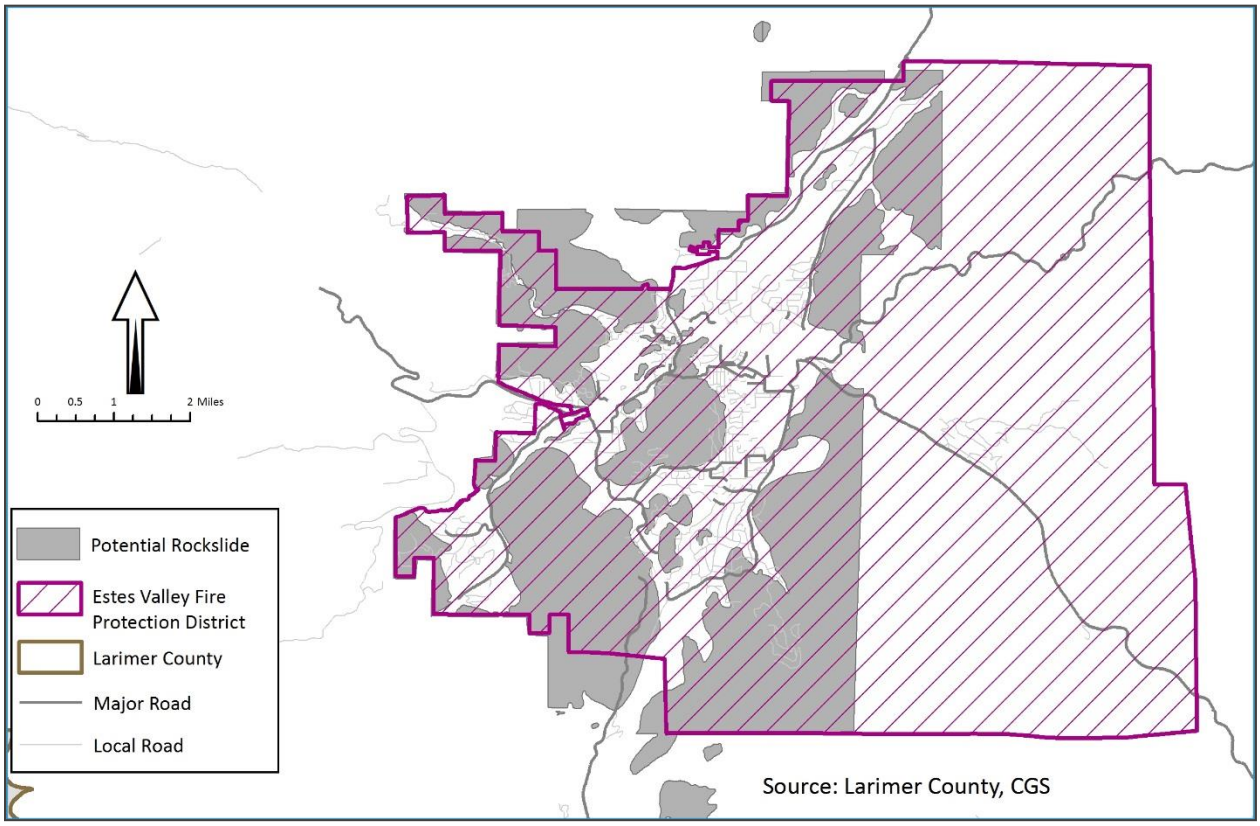
There are locations near the Estes Valley Fire Protection District that are vulnerable to landslides and rockslides. As population growth brings new development into available land in the area, more inventory assets may become exposed to landslides and rockslides hazards. The following figures show historical and potential landslide and rockslide areas that are close to the Estes Valley Fire Protection District service boundary.

Historical and Potential Landslide Areas –Estes Valley Fire Protection District [119]



[119] Historical and potential landslide areas presently identified by the Colorado Geological Survey.

Potential Rockslide Areas –Estes Valley Fire Protection District [120]

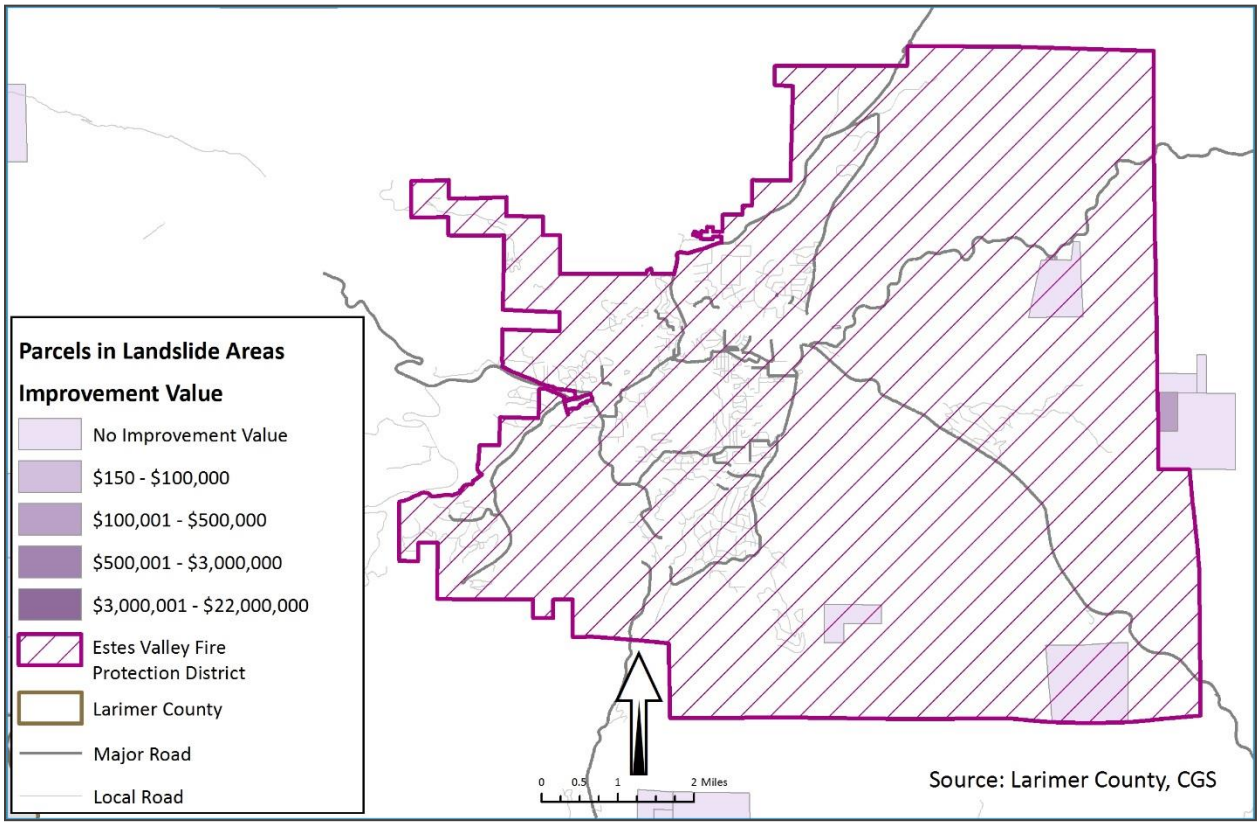


Potential Losses

The critical facility and structure exposure analysis estimates that there are no critical facility and 13 parcels/structures in the Estes Valley Fire Protection District that are prone to landslides (not including the total miles of landslide prone infrastructure). The appraised value of the exposed structures is over $388 thousand dollars.

[120] Potential rock fall areas presently identified by the Colorado Geological Survey.

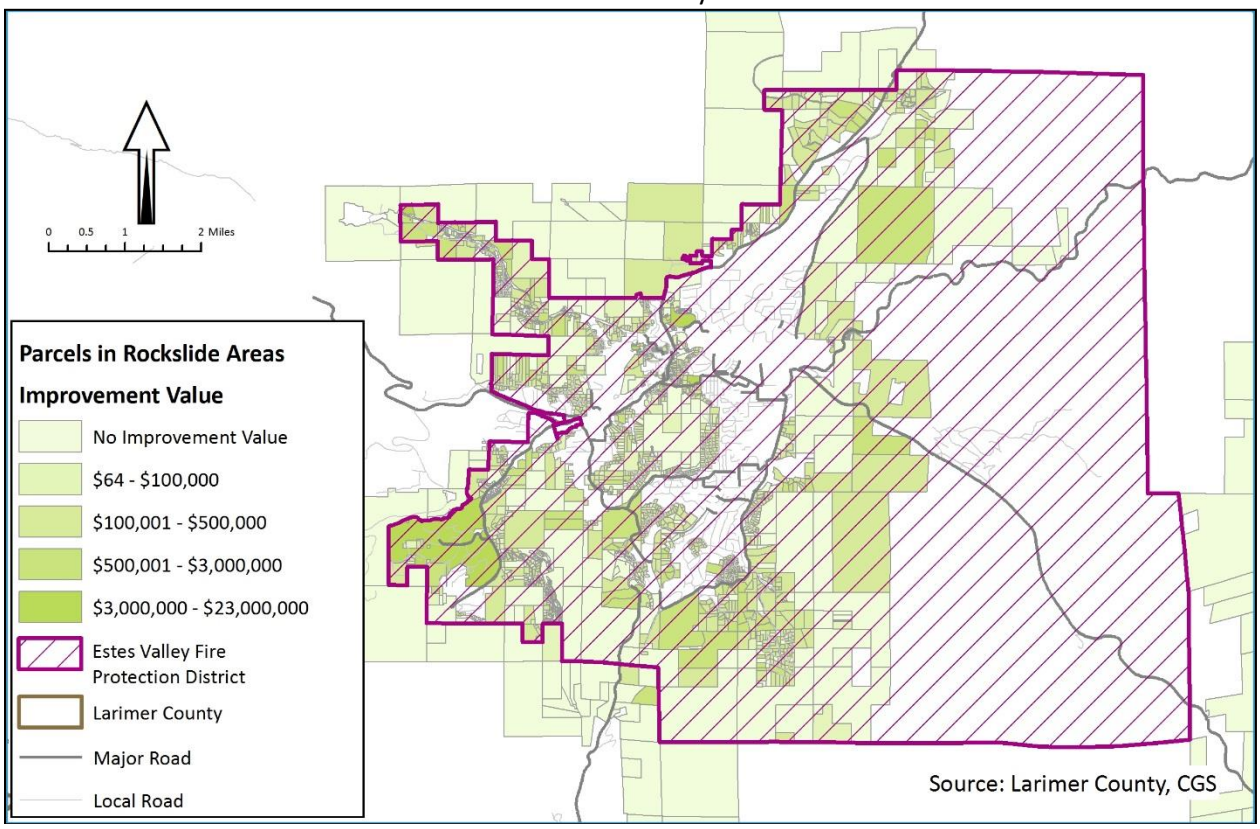
Parcels in Landslide Areas –Estes Valley Fire Protection District [121]



The critical facility and structure exposure analysis estimates that there are 9 critical facility and 2,668 structures in the Estes Valley Fire Protection District that are prone to rockslides (not including the total miles of rockslide prone infrastructure). The appraised value of the exposed critical facilities is over $9.9 million dollars and the exposed structures is over $633.3 million dollars.

[121] Parcels intersecting potential & historical landslide areas presently identified by the Colorado Geological Survey.

Parcels in Rockslide Areas – Estes Valley Fire Protection District [122]



Probability of Future Occurrences

Due to the uncertainty associated with existing data, it is challenging to accurately calculate probability for future events related to landslide and rockslide hazards. It can be assured however, that these hazards will continue to alter the landscape of the Estes Valley Fire Protection District in the future.

Overall, the probability of future occurrences of rockslide and landslide events in the Estes Valley Fire Protection District is high. Many areas of the district are prone to these types of hazard events due to their proximity to previous landslide events, their location at the base or top of steep slopes and drainage basins, or their location on infill or steep slope cuts. Individual assessments of landslide-prone areas are recommended in the future. Moreover, as development and population increase in the district, increasing numbers of structures (and people) will be exposed to future landslide and rockslide events.

Capabilities Assessment

The capability assessment examines the ability of the Estes Valley Fire Protection District to implement and manage the comprehensive mitigation strategy laid out in this Plan. The strengths, weaknesses, and resources of the community are identified here as a means for evaluating and maintaining effective and appropriate management of the district's hazard mitigation program.

[122] Parcels that intersect potential rock fall areas presently identified by the Colorado Geological Survey.

Local Personnel

The ability of a community to implement a comprehensive mitigation strategy depends, in part, on available resources, including people and staff. The following table outlines the district's capabilities as they relate to key personnel.

	Full Time	Part Time	None or Not-Identified
Emergency Manager			X
Floodplain Administrator			X
Community Planner	X		
GIS Specialist			X
Grant Writer		X	

In the Estes Valley Fire Protection District the Fire Chief takes on the role of emergency manager for the district. The district's Fire Marshal assists with community planning.

Land Use Planning and Codes

Local land use plans and building codes are tremendous tools for evaluating local policies related to hazard mitigation and risk reduction. Additionally, comprehensive master plans, capital improvement plans, stormwater plans and zoning ordinances all present opportunities for enhanced local capabilities. The following table outlines the Estes Valley Fire Protection District's current capabilities as they relate to land use planning and codes.

	Yes (Y); No (N)
A zoning ordinance	N
A hazard-specific ordinance	Y
Local building codes	Y
A Comprehensive Plan / Master Plan	N
A Capital Improvements Plan	N
A Stormwater Plan	N
A Continuity of Operations Plan (COOP)	Y
An Emergency Operations Plan (EOP)	Y
A Long-Term Recovery Plan	N
Participates in the NFIP	N

Plan Maintenance and Implementation

The Estes Valley Fire Protection District has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the district will continue public participation in the plan maintenance process.

Jurisdiction	Plan Maintenance and Implementation Strategy
Estes Valley Fire Protection District	*"Our mitigation efforts will be directed and maintained through the Fire Chief and/or the Fire Marshal of the District."* *"The District's website provides information and announcements of our mitigation efforts and plans. Any changes will be provided through our website and in the local newspapers."*

Integrating Hazard Mitigation into Local Planning

Through discussions at planning meetings and the use of an online survey, individual outreach, and phone calls, each participating jurisdiction brainstormed with the planning team to identify processes for integrating hazard mitigation into their local planning mechanisms and policies. The following table lists the specific integration strategy identified by the Estes Valley Fire Protection District based on the mitigation actions listed in this plan.

Jurisdiction	Strategy
Estes Valley Fire Protection District	*"The District will integrate the hazard mitigation actions into the Community Wildfire Preparedness Plan (CWPP) and also see how it interfaces with the adopted fire codes and our emergency operations plan. Any hazard mitigation actions should coincide with our adopted CWPP and its identified high risk areas."*

Mitigation Action Guides

The following Mitigation Action Guide presents the District's mitigation action that was developed for the 2016 Plan.

Estes Valley Fire Protection District: Wildfire Mitigation Project (Estes Valley FPD – 1)	
PRIORITY: 1	HAZARDS ADDRESSED: Wildfire risk
LOCATION: Project location	GOALS ADDRESSED: 1, 2, 3, 4, and 5
RECOMMENDATION DATE: 10/28/2015	OBJECTIVES ADDRESSED: A, C and E
TARGET COMPLETION DATE: 12/31/2019	October 31, 2016
ISSUE: One of the highest hazards our community faces is the threat of a wildfire. We recommend that property owners trim branches and remove dead material form their properties to reduce the spread of a wildfire on their property. We have found the largest deterrent to the property owner doing this work was the cost in removing the slash. In an effort to reduce the wildfire threat we have been providing a slash collection site for local residents to drop off slash free of charge. The slash is then chipped and hauled away. The district finances two slash collections per year, one in the spring and one in the fall. Each year we have seen an increase in the amount of slash that is brought to the site. For 2016 the district increased the funding for this effort from $9,000 annually to $12,000. To date we have removed thousands of cubic yards of slash thus reducing the fuel for a wildfire to our residents.	

RECOMMENDATION: Provide an economical avenue for property owners to remove slash and encourage them to reduce the fuel load on their properties.	
ACTION: Continue slash removal efforts throughout the district to reduce wildfire risk overall.	
LEAD AGENCY: Estes Valley Fire Protection District	EXPECTED COST: $12,000
SUPPORT AGENCIES: Town of Estes Park provides the slash collection location and assists in loading the chipper and removing the biomass with heavy equipment.	POTENTIAL FUNDING SOURCES: Fire District budget
PROGRESS MILESTONES: Continue to provide opportunities for community members to drop off slash free of charge.	

Letter of Intent to Participate

ESTES VALLEY
FIRE PROTECTION DISTRICT
Serving the Residents and Visitors of the Estes Valley with Superior Fire and Safety Services

LETTER OF INTENT TO PARTICIPATE

August 22, 2014

Larimer County Government
200 W. Oak St.
Fort Collins, CO 80522

Re: "Statement of Intent to Participate" as a participating jurisdiction in Larimer County's Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Dear Lori Hodges,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the Estes Valley Fire Protection District (EVFPD) is submitting this letter of intent to confirm that EVFPD has agreed to participate in the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, EVFPD agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Larimer County to complete the plan in conformance with FEMA requirements.

The EVFPD understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by an agreement between the Larimer County and the Participating Jurisdiction, I Scott Dorman, Fire Chief, commit the Estes Valley Fire Protection District to the Larimer County's Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 22nd day of August

[Signature of Chief Elected Official or Authorized Agent]

901 N. Saint Vrain Avenue • Estes Park, CO 80517 • P-970-577-0900 • F-970-577-0923

LARIMER COUNTY
COMMITTED TO EXCELLENCE

Michael Baker
INTERNATIONAL

Estes Valley Recreation and Park District

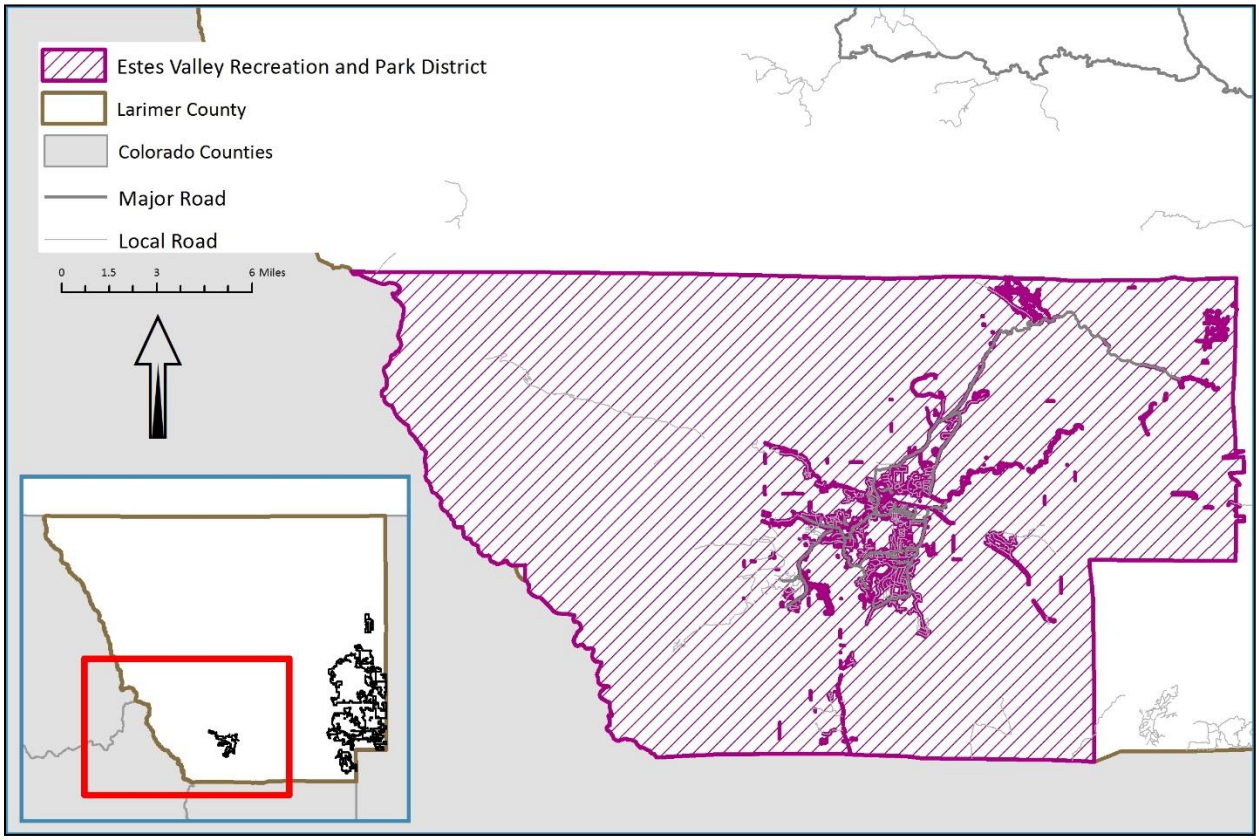
"The mission of the Estes Valley Recreation and Park District is to plan, direct, organize, and implement recreational programs, manage facilities, and provide public park and recreation opportunities for residents of the District and visitors to the community. The District will implement programs that offer a wide variety of recreational opportunities for all age groups, including both active and passive experiences. The District will provide recreational services and facilities within the financial limitations and scope of the District."

-- Mission Statement, Estes Valley Recreation and Park District

Community Profile

Estes Valley Recreation & Park District (EVRPD) is a public agency providing parks and recreation programs for members of the community and visitors to Estes Park. The District provides golf, marina, boat rentals, fishing, tennis, swimming, softball, baseball, playgrounds, picnicking, youth center, and many more recreational programs.

The District encompasses approximately 320 square miles in southwestern Larimer County and northern Boulder County, and includes within its boundaries primarily unincorporated land and the Town of Estes Park. The permanent population of the Recreation District varies between 10,800 and 11,600 in any given year. The District's boundaries have remained unchanged since its organization.



Hazard Identification and Risk Assessment

The following Hazard Identification and Risk Assessment Summary table is based on jurisdiction-specific responses to the risk factor exercise and differs from the risk factor results that were determined at the county scale.

NATURAL HAZARD	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Flood – Flash and Riverine	0.9	1.2	0.8	0.1	0.3	3.3
Fire – Wildland	0.9	0.9	0.6	0.2	0.4	3.0
Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)	1.2	0.6	0.2	0.4	0.1	2.5
Utility Disruption	0.9	0.6	0.4	0.1	0.3	2.3
Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)	0.9	0.6	0.4	0.1	0.3	2.3
Landslide / Rockslide	0.6	0.6	0.4	0.4	0.1	2.1
Erosion / Deposition	0.3	0.6	0.4	0.3	0.3	1.9
Biological Hazards / Contagion	0.6	0.3	0.2	0.4	0.2	1.7
Civil Disturbance	0.3	0.3	0.2	0.4	0.1	1.3
Earthquake	0.3	0.3	0.2	0.4	0.1	1.3
Hazmat – Fixed and Transport	0.3	0.3	0.2	0.4	0.1	1.3
Tornado	0.3	0.3	0.2	0.4	0.1	1.3
HIGH RISK (2.5 or higher): Flood – Flash and Riverine; Fire – Wildland; Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)						
MODERATE RISK HAZARD (2.0 - 2.4): Utility Disruption; Winter Storm (Blizzard Conditions, Heavy Snow Accumulation); Landslide / Rockslide						
Low Risk (1.9 and lower): Erosion / Deposition; Biological Hazards / Contagion; Civil Disturbance; Earthquake; Hazmat – Fixed and Transport; Tornado						

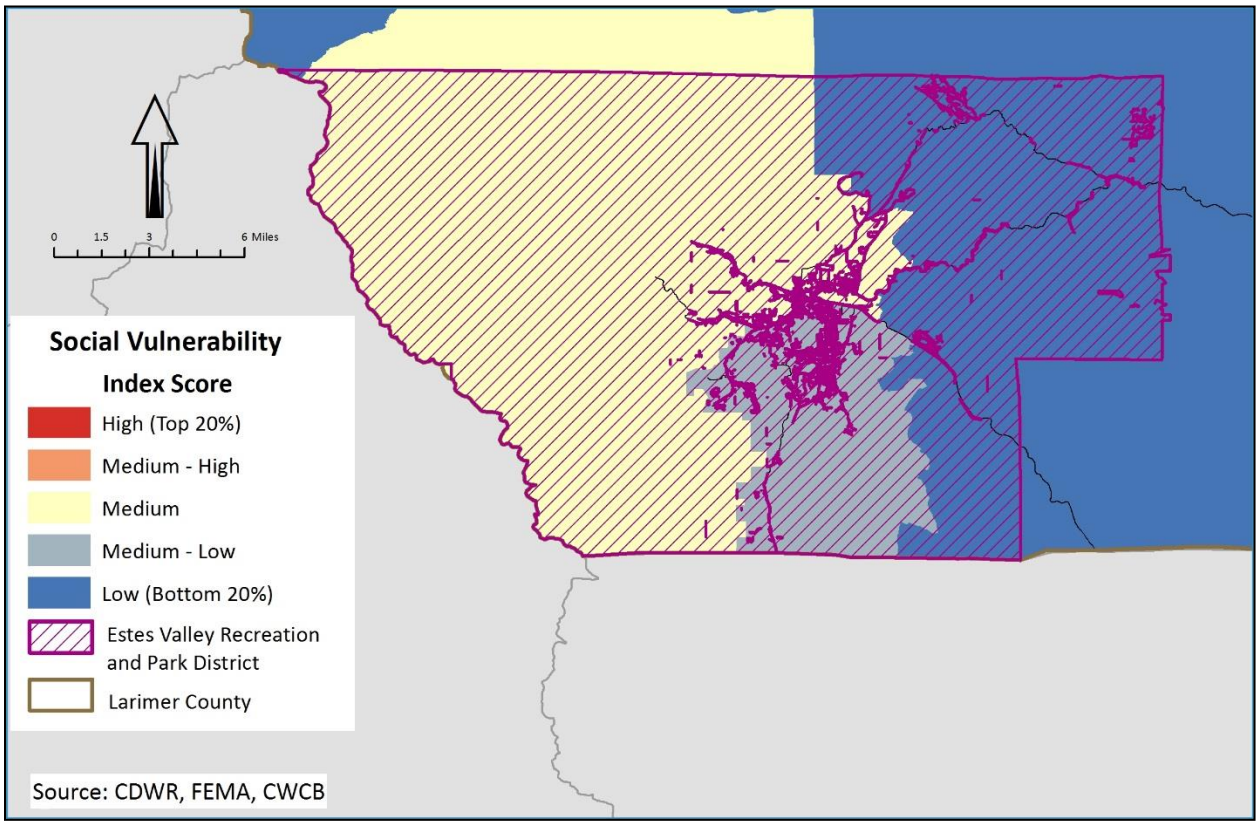
Vulnerability Assessment

This section provides a refined vulnerability assessment, specific for the Estes Valley Recreation and Park District, for those hazards that were identified as being rated HIGH in the preceding section. This analysis

was conducted separately from that of the county-wide vulnerability assessment to specifically focus on the population, structures, infrastructure, and other assets unique to the district.

The results of the social vulnerability assessment are displayed on the map below. On the map, social vulnerability is represented at the census tract level by 5 classes of vulnerability: Low (bottom 20% of the county), Medium-Low, Medium, Medium-High, and High (top 20% of the county). The Estes Valley Recreation and Park District's social vulnerability map shows social vulnerability within the district.

Social Vulnerability Map – Estes Valley Recreation and Park District[123]



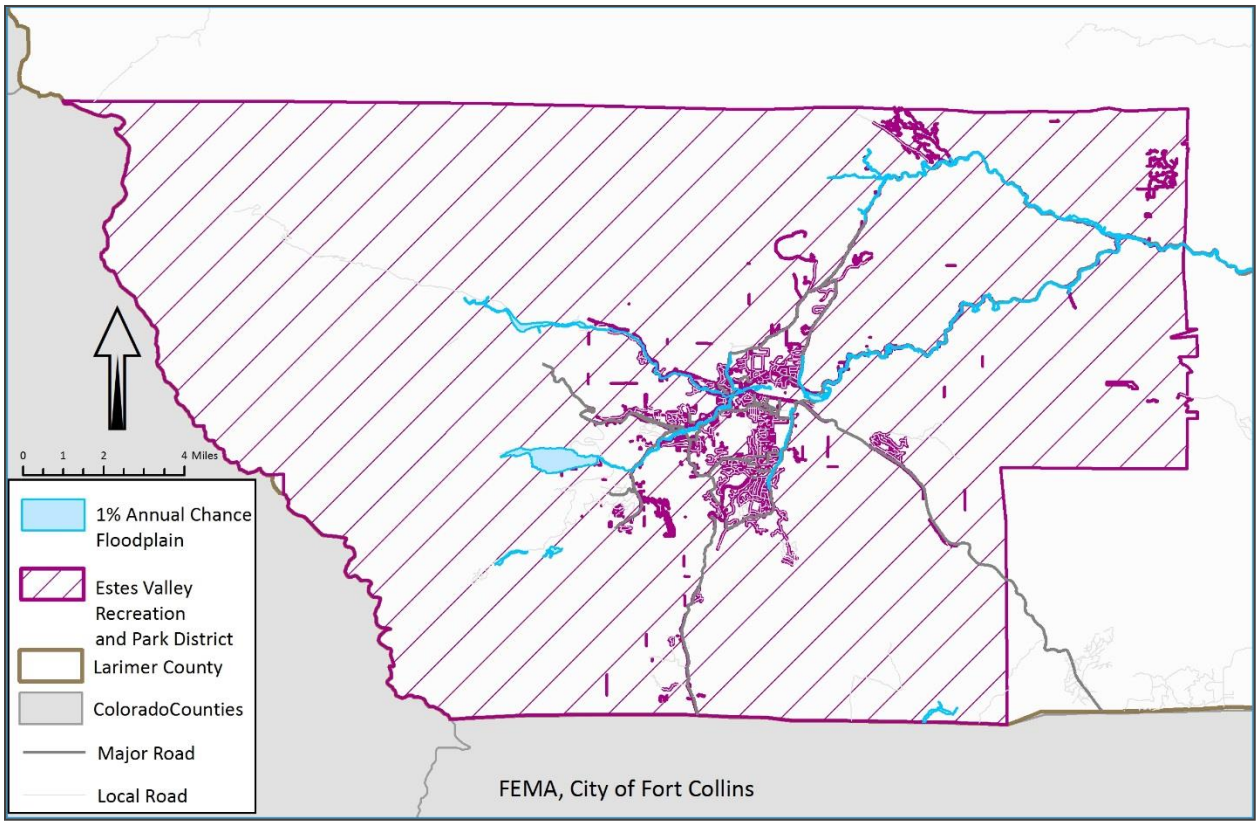
Social vulnerability is represented as the social, economic, demographic, and housing characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to hazard events. The pre-existing social conditions that contribute to disaster losses can be identified using social vulnerability indicators. Using methods identified in the Social Vulnerability Index (SoVI) developed by Cutter et. al. (2003) this layer shows the social vulnerability index scores for the State of Colorado at the census tract level. Social vulnerability is represented at the Census tract level by five classes of vulnerability: Low, Medium-Low, Medium, Medium-High, and High.

[123] Source: Colorado Division of Water Resources Dam Safety Branch, FEMA, Colorado Water Conservation Board (CWCB)

The Estes Valley Recreation and Park District is characterized by a mix of low to medium levels of social vulnerability. Social vulnerability to disasters appears to increase as we move west across the district. A closer analysis of the individual social vulnerability indicators within the district will give local emergency managers, planners, and stakeholders a clearer picture of which social vulnerability factors have the largest negative effect on the district and its resiliency. It is important that the district continue to monitor social vulnerability levels over time as demographics and economics change in the area.

Flood – Flash and Riverine

Estes Valley Recreation and Park District Special Flood Hazard Area[124]



Previous Occurrences

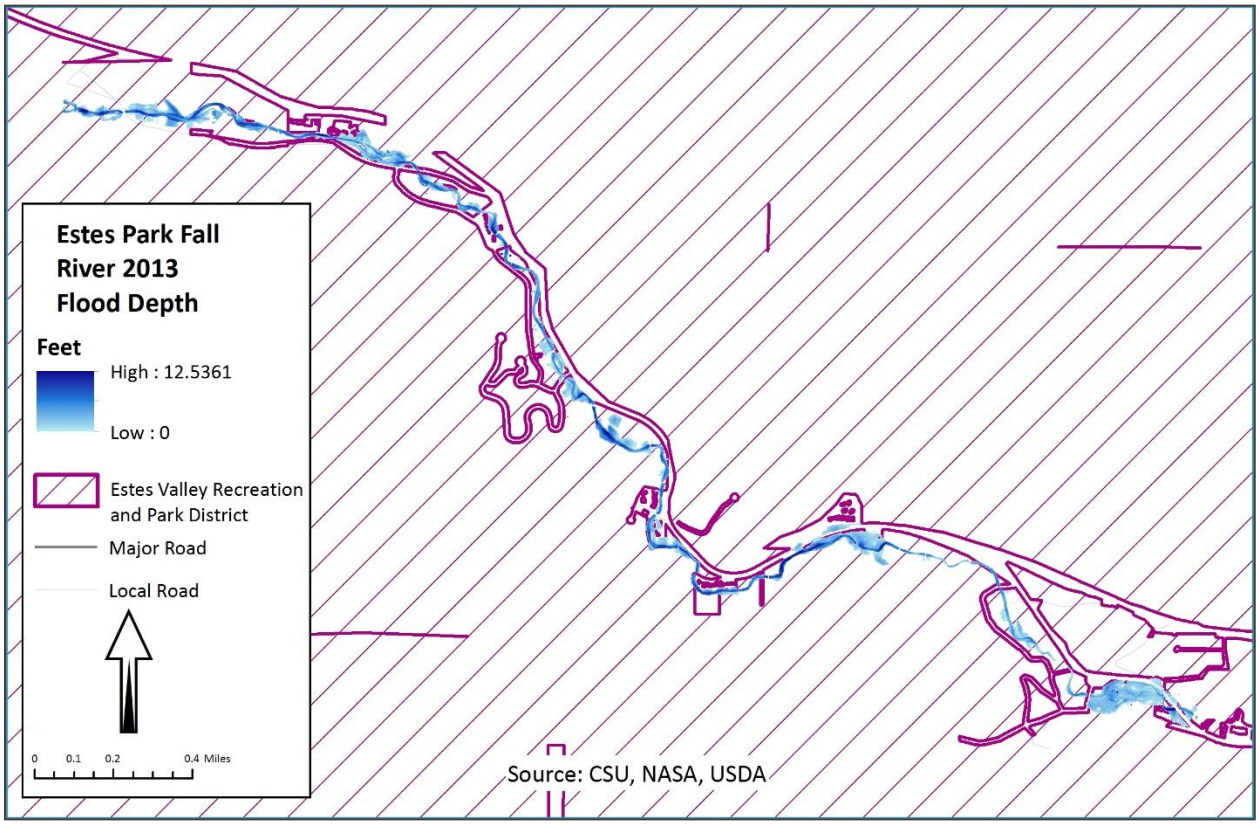
Estes Park sustained severe damages during the September 2013 Colorado flood event. Evacuations began on September 12, 2013, at approximately 3:00AM and 2,428 contacts were made to warn and evacuate neighborhoods through the LETA911 emergency notification system. The information below was

[124] This layer is compiled utilizing the most recent Special Flood Hazard Areas (SFHA) as defined by FEMA's National Flood Hazard Layer (NFHL) in combination with some recent flood studies performed by the City of Fort Collins. These areas are also referred to as the 1% Annual Chance Floodplain.

provided by the Town of Estes Park and provides a snapshot of just home many residents were impacted by the flood.

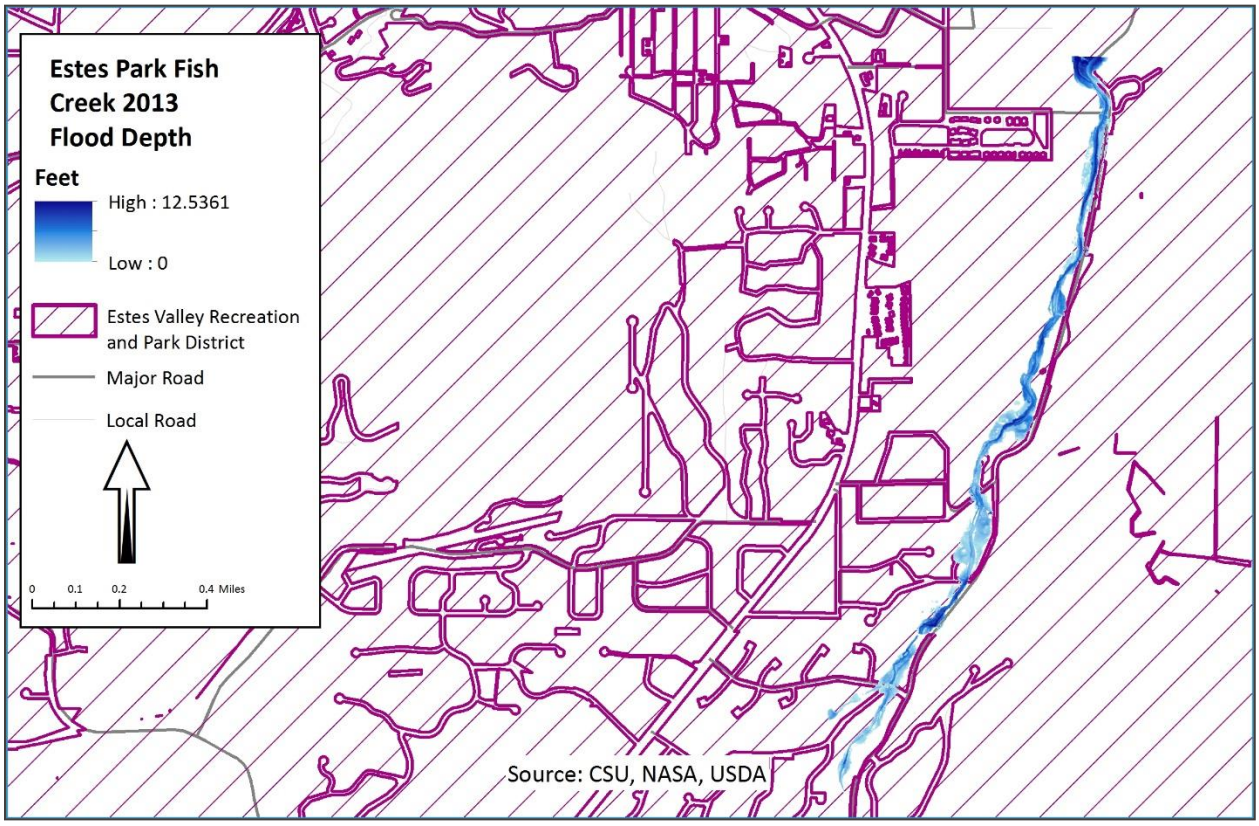
Red Cross Shelter Support:	606 people signed in
	167 people sheltered in the cents
	316 people outsourced to local hotels for varying amounts of time
Salvation Army Support:	3571 meals were served
	7000 snacks/drinks were served
	9000 gallons of water distributed
Utilities Outages and Restoration	Estimated $35-40 million in public infrastructure damage in the Estes Valley
	3.25 miles of Fish Creek Road are destroyed or damaged
	Caused outages for electric, water, gas, cable and phones
	Approximately 4,000 sewer taps were non-functional under “No Flush” orders within the Upper Thompson Sanitation District.
Structural Damage Assessments (incorporated Estes Park)	Rapid assessments completed for approximately 3,000 structures in the Estes Valley this week. Approximately 12 red tags were issued for properties that were determined to be unsafe for occupancy due to structural damage or electrical safety.
	2,383 estimated residences affected by water, mud, sewer access, road access
	183 estimated businesses affected by water, mud, sewer access, road access

Estes Valley Recreation and Park District Fall River 2013 Flood Extent[125]



[125] Based on high water marks collected by the Town of Estes Park.

Estes Valley Recreation and Park District Fish Creek 2013 Flood Extent[126]



In addition to the September 2013 flood two additional floods were reported according to the NOAA's Storm Events Database. On August 2, 2007 a flash flood occurred resulting in $20,000 in property damage. Another flash flood occurred on July 18, 2013 resulting in $10,000 in property damage and $5,000 in crop damage. There were no reported injuries or deaths from these two floods.

Inventory Exposed

Critical facilities are essential to the health and welfare of the whole population and are especially important both during and after hazard events. Critical structures or areas that overlap or touch the SFHA are considered "flood prone."

The critical facility and structure exposure analysis estimates that there are 8 critical facility and 1,349 structures in the Estes Valley Recreation and Park District that are flood prone (not including the total miles of flood prone infrastructure). The appraised value of the exposed critical facilities is over $8 million dollars and the exposed structures is over $237.87 million dollars.

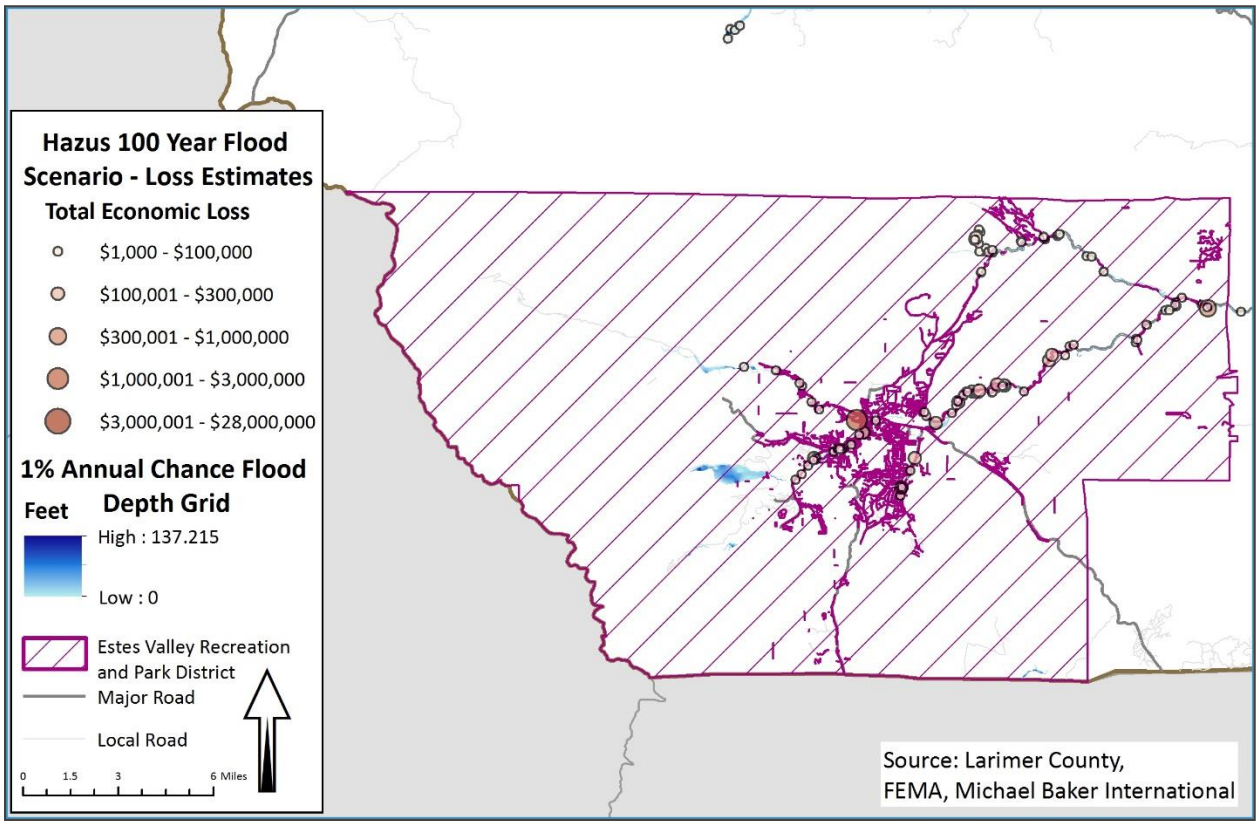
Potential Losses

Hazus estimates for the Estes Valley Recreation and Park District that for a 100-year flood event, no critical facilities and approximately 163 buildings will experience flood damage. The total economic loss

[126] Based on high water marks collected by the Town of Estes Park.

estimated for the 100-year flood is over $9.6 million dollars. The estimated building loss is over $5.3million dollars, over $3.7 million dollars in content loss, and over $561 thousand dollars in inventory loss.

Estes Valley Recreation and Park District 1% Annual Flood Loss Estimation and Flood Depth Grid Map[127]



Probability of Future Occurrences

Frequency of previously reported flood events in the Estes Valley Recreation and Park District provide an acceptable framework for determining the probability of future flood occurrence in the area. The probability that the district will experience a flood event can be difficult to predict or quantify.

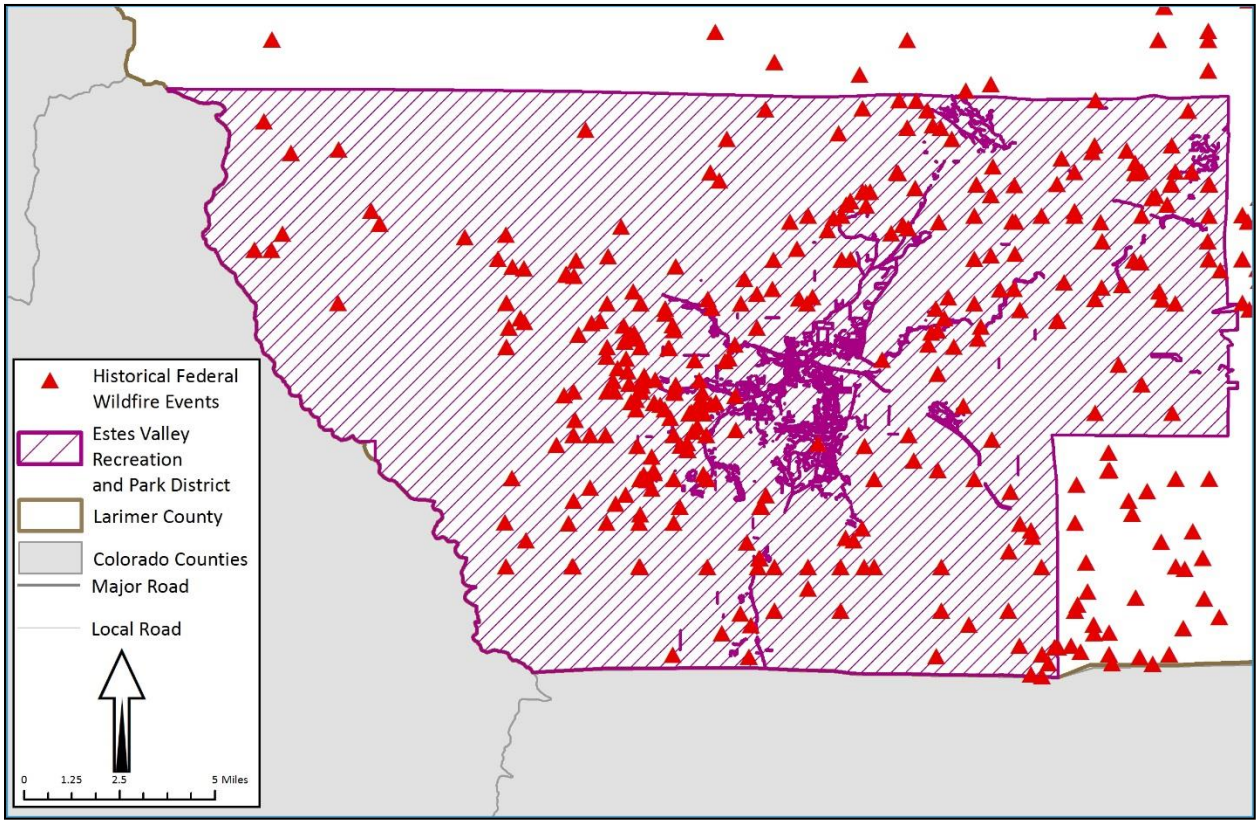
[127] FEMA's loss estimation modeling software, Hazus, was utilized to produce this data set. A 100 year flood scenario was defined and losses were calculated for each point (structure) that intersected the depth grid based on the Hazus depth damage curves for specific structure attributes (such as foundation type, building type, and first flood height). Information derived from Hazus-MH 2.2 flood scenario. Total Losses equals a sum of building losses, content losses, and inventory losses. 1% Annual Chance Flood flooding depth grid, produced from the best available topographic and floodplain data.

Severe flooding has the potential to inflict significant damage to people and property in the district. Mitigating flood damage requires that communities remain diligent and notify local officials of potential flood (and flash flood) prone areas near infrastructure such as roads, bridges, and buildings.

Fire – Wildland

Previous Occurrences

According to NOAA's Storm Events Database there have been 333 reported wildfire events in the Estes Valley Recreation and Park District. Based on the historic data showing hazardous impacts on the district, there is a great potential for wildfire events to occur at any given time.Estes Valley Recreation and Park District Historical Federal Wildfire Map[128]



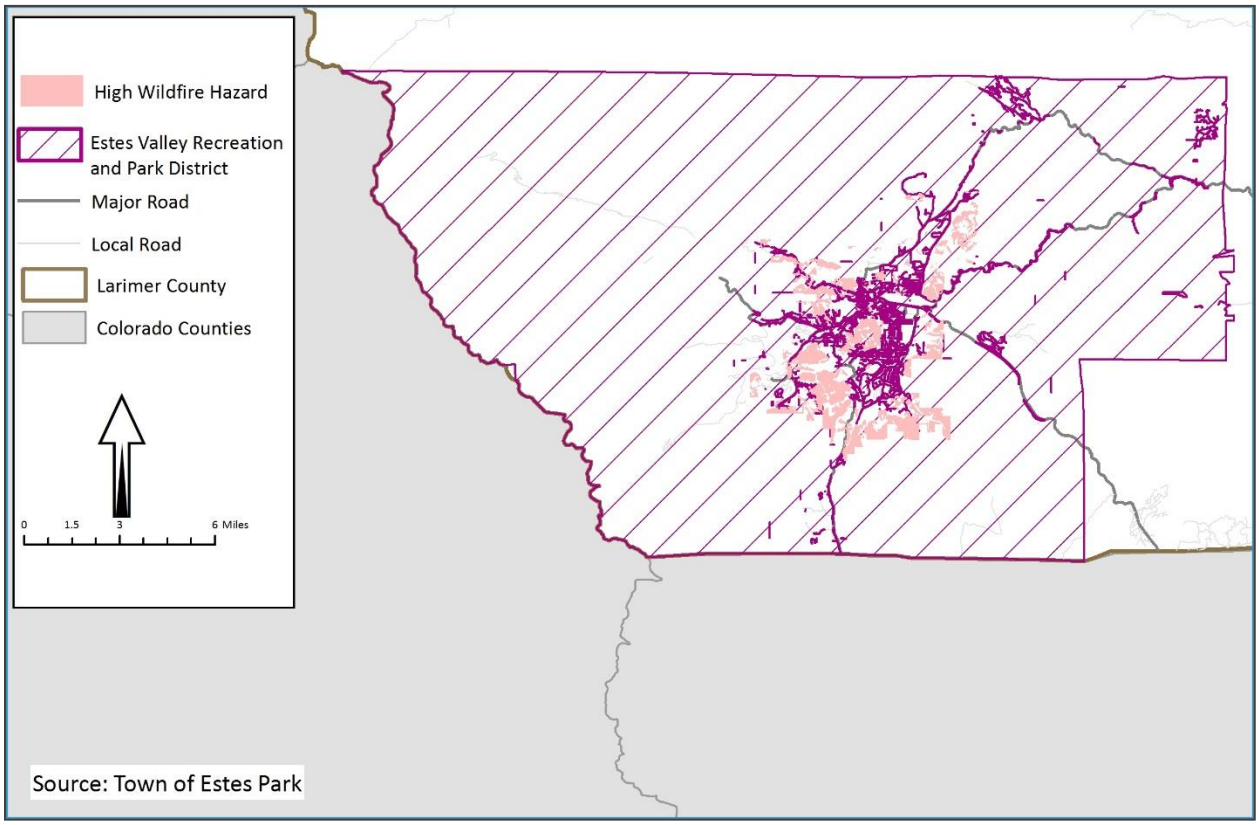
Inventory Exposed

The Town of Estes Park located within the Estes Valley Recreation and Park District, has established wildfire hazard zone designation to help hazard mitigation of wildfires in new developments and subdivisions. The mapped hazard areas include all areas "high-tree" fire hazard areas. Any new development or subdivision requires a mitigation plan prepared by a professional forester addressing how

[128] Source: Historical wildland fire occurrence data compiled by USGS from 1980 - 2013, from BIA, BLM, BOR, USGS, FWS, and NPS.

the development or subdivision will avoid or mitigate wildfire hazards. The following figure illustrates the high wildfire hazard zones determined by the Town of Estes Park, the Colorado State Forest Service, and Larimer County Wildfire Safety Specialist.

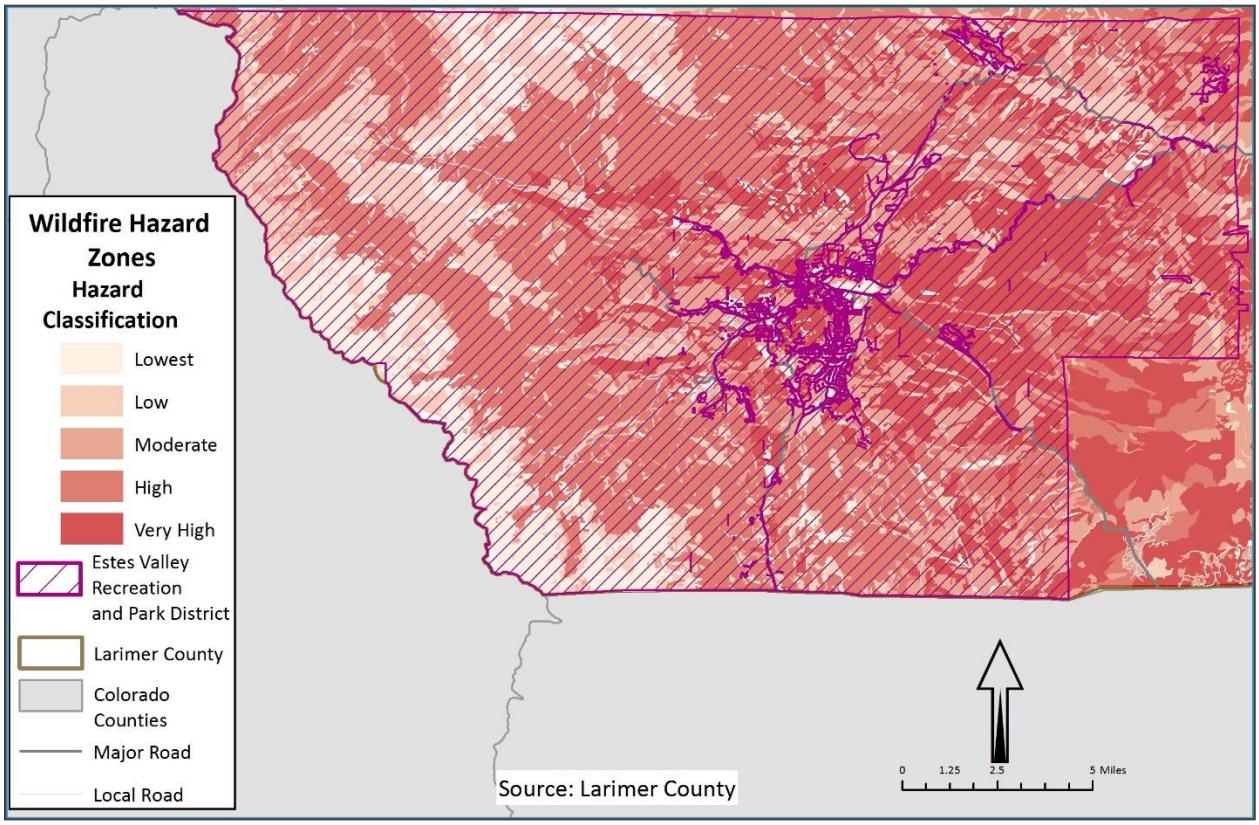
Estes Valley Recreation and Park District High Wildfire Hazard Zones[129]



The following Wildfire Hazard Zone map identifies the expected wildfire behavior. The highest wildfire hazard zones are located throughout the district. Estes Valley Recreation and Park District Wildfire Hazard

[129] High Wildfire Hazard Zones, from Town of Estes Park

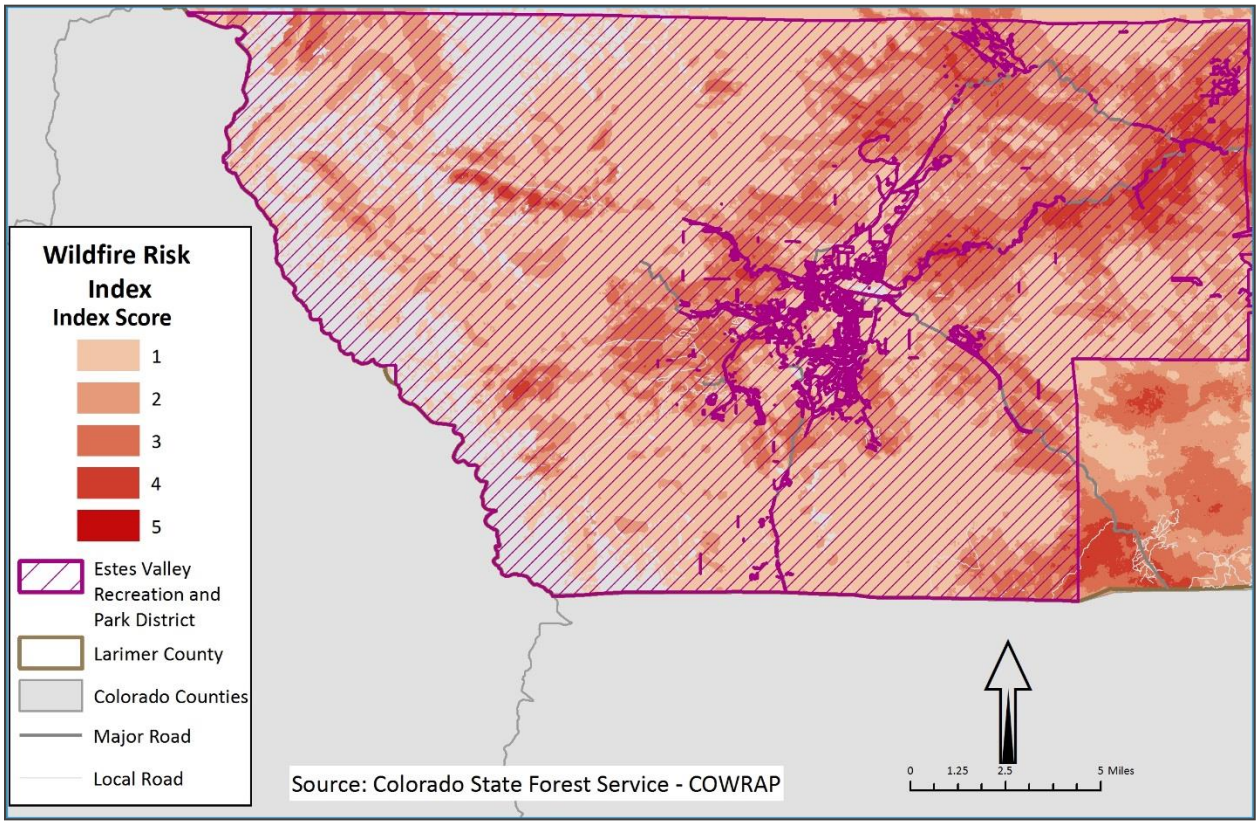
Zone Map[130]



The following Wildfire Risk map identifies areas with the greatest potential impacts from a wildfire, in other words, those areas most at risk. There are areas with the highest wildfire risk throughout the

[130] To be used to identify wildfire hazards within the Wildfire Mitigation Area. The hazards are determined based on vegetation cover type, habitat structure stage (cover type, tree size and crown cover percentage), southern facing aspects and 30% and greater slopes according to the Wildfire Hazard Area Mapping (WHAM) guidelines.

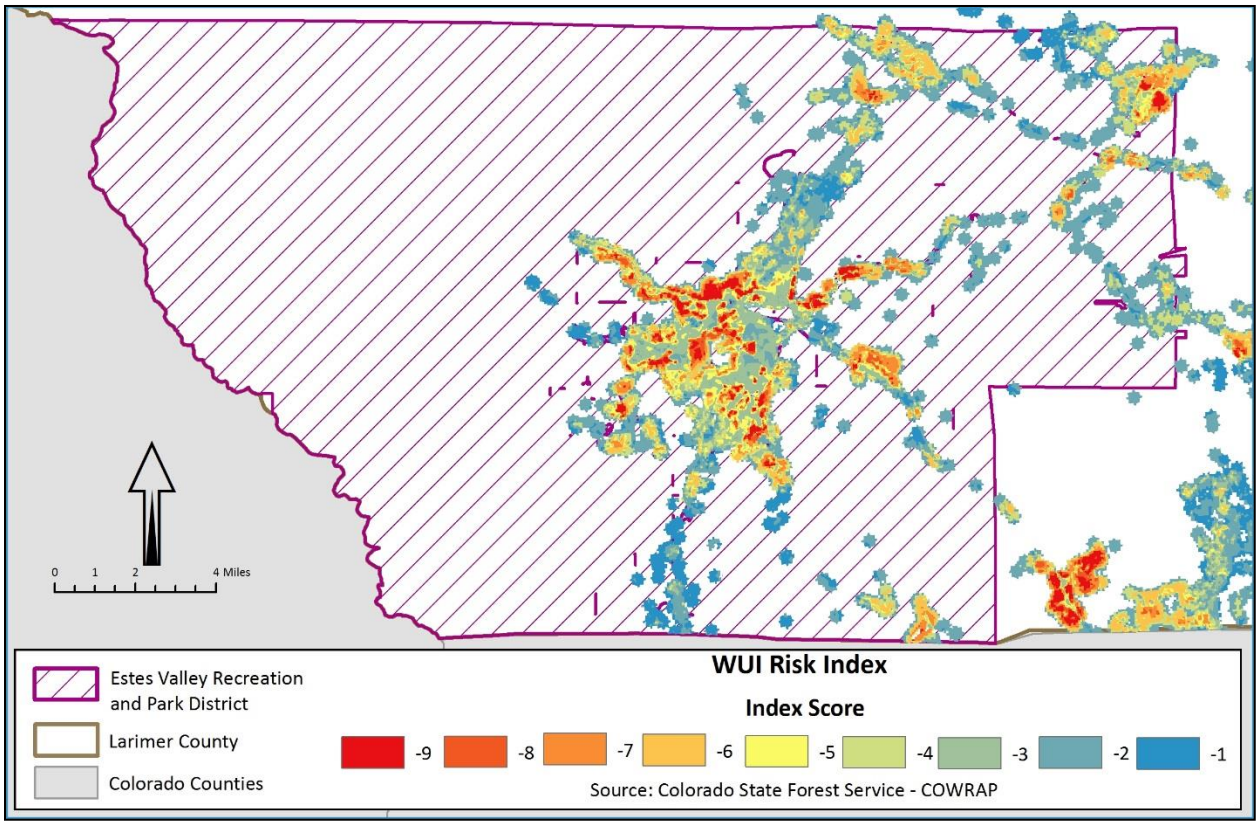
district.Estes Valley Recreation and Park District Wildfire Risk Index Map[131]



There are a number of areas in the central and northeastern regions of the district that are within the medium to highest level on the WUI Risk Index Scale. This means that the potential impact on people and homes from a wildfire in those areas is medium to high in relationship to the rest of Larimer County. This level of risk is derived by combining housing density with predicted flame length.

[131] Wildfire Risk represents the possibility of loss or harm occurring from a wildfire. Risk is derived by combining wildfire threat and fire effects. The COWRAP data set was produced statewide and ranks areas on a scale that includes: lowest risk to highest risk.

Estes Valley Recreation and Park District WUI Map[132]



Fires can extensively impact the economy of an affected area, including the agricultural, recreation and tourism industries, water resources, and the critical facilities upon which the Estes Valley Recreation and Park District depends. There are many areas of high wildfire threat throughout the town according to the WUI Risk Index. There are also many areas of medium threat.

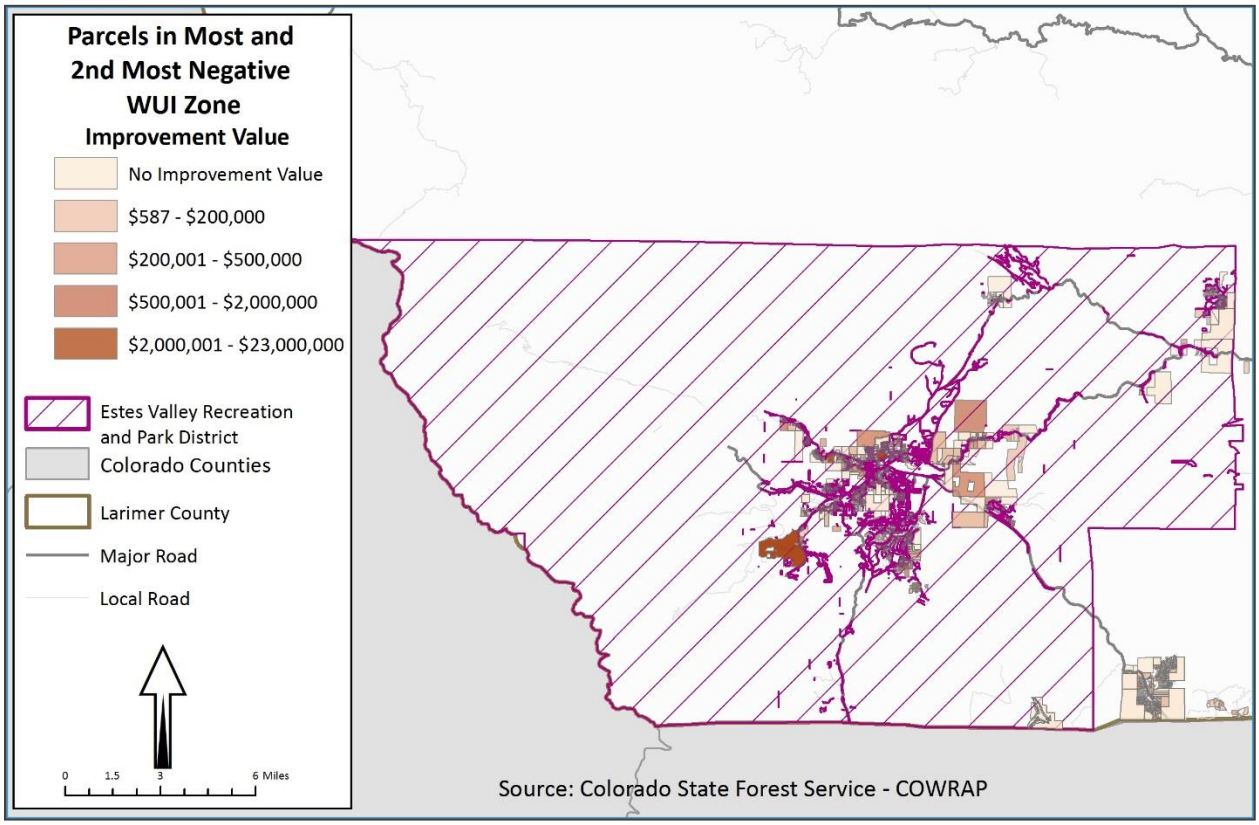
Potential Losses

The exposure data provided in the previous section (Inventory Assets Exposed) provides the clearest picture of potential losses to wildfire in the Estes Valley Recreation and Park District. There is 1 critical facility located in areas with the *most negative* and 7 critical facilities located in areas with the *2nd most negative* wildfire threat total. The appraisal value of the critical facilities within these *most and 2nd most negative* threat areas is approximately $10 million dollars. There are 1,592 parcels/structures located in

[132] Wildland Urban Interface Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length. The COWRAP data set was produced statewide and ranks areas on a scale that includes: least negative to most negative impacts. This scale stretched from -1 (least) to -9 (most) statewide.

areas with the *most negative* and 1,558 parcels/structures located in areas with the *2nd most negative* wildfire threat total. The appraisal value of the parcels/structures within these *most and 2nd most negative* threat areas is over $381.8 million dollars. The risk assessment uses worst case scenario loss estimates. For this reason it is important to plan for relative levels of loss rather than specific potential loss dollar amounts.

Estes Valley Recreation and Park District Parcels in the Most Negative and Second Most Negative WUI Zone[133]



Probability of Future Occurrences

The likelihood of wildfires attaining significant size and intensity is unpredictable and highly dependent on environmental conditions and firefighting response. Weather conditions, particularly drought events, increase the likelihood of wildfires occurring. That said, it is important to note that 98% of wildfires are human-caused. Ultimately, the occurrence of future wildfire events will strongly depend on patterns of human activity and events are more likely to occur in wildfire-prone areas experiencing new or additional development.

[133] Wildland Urban Interface Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length.

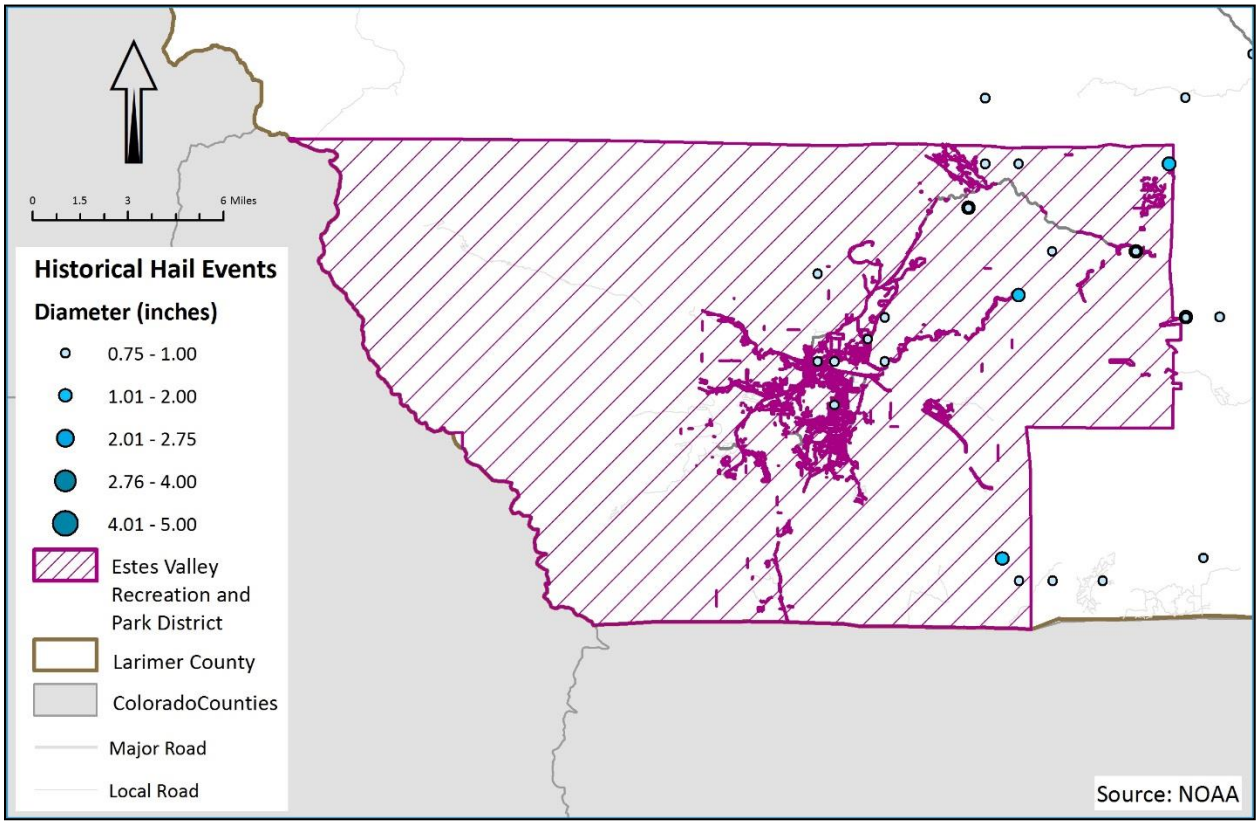
Wildfires can occur at any time of day and during any month of the year. Moreover, the length of a wildfire season and/or peak months may vary appreciably from year to year. As evidenced by the wildfire risk assessment, areas within the Estes Valley Recreation and Park District that are characterized by dense development and single family homes along the wildland-urban interface are most vulnerable to wildfire.

Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)

Previous Occurrences

According to NOAA's Storm Events Database there are no reported injuries, deaths, or loss in the Estes Valley Recreation and Park District due to hail. There have been 19 hail events reported in the district between 1955 and 2014. Based on the historic data showing hazardous impacts on the district, there is a great potential for hail events to occur at any given time.

Historical Hail Events in Estes Valley Recreation and Park District[134]



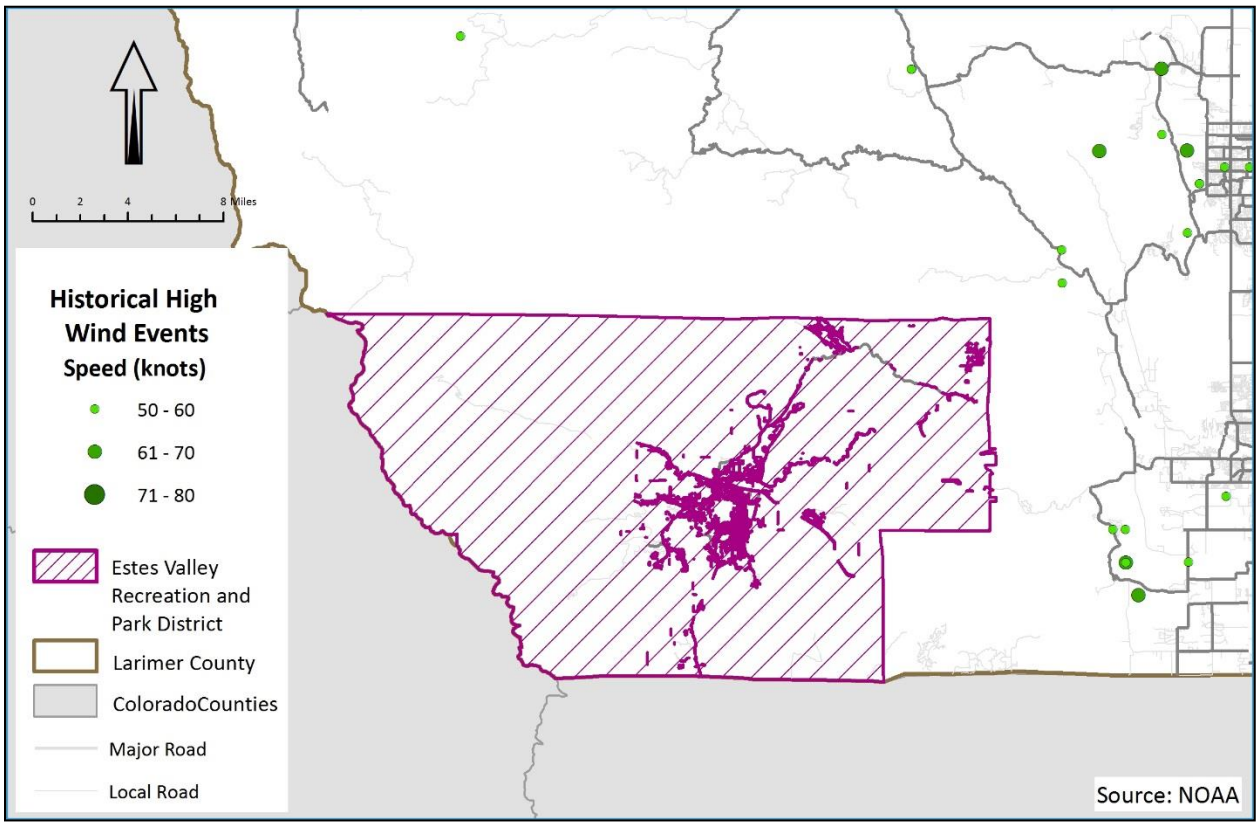
According to NOAA's Storm Events Database there is no historic data for thunderstorm wind events in the Estes Valley Recreation and Park District. Based on the historic data showing hazardous impacts on the county, there is a great potential for thunderstorm wind events to occur at any given time.

[134] Source: NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

According to NOAA's Storm Events Database there have been 9 lightning events in the Estes Valley Recreation and Park District between 1996 and 2014. There have been 27 reported injuries, 4 deaths, $5,000 worth of property damage, and no reported crop damage. Based on the historic data showing hazardous impacts on the district, there is a great potential for lightning events to occur at any given time.

According to NOAA's Storm Events Database there have been 115 windstorm events in and near the Estes Valley Recreation and Park District between 1996 and 2014. There have been 2 reported injuries, no deaths, $13.5 million dollars' worth of property damage, and no reported crop damage. There is no graphical data available showing the specific locations of these high wind events within the district. Based on the historic data showing hazardous impacts on the area, there is a great potential for high wind events to occur at any given time.

Historical High Wind Events in Estes Valley Recreation and Park District[135]



Inventory Exposed

All assets located in the Estes Valley Recreation and Park District can be considered at risk from spring and summer storms. This includes all people, or 100% of the District's population, and all buildings and infrastructure within the district. Damages primarily occur as a result of high winds, lightning strikes, hail,

[135] Source: NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

snow-loading, and flooding. Most structures, including the District's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Inventory assets exposed to severe wind is dependent on the age of the building, type, construction material used, and condition of the structure. Possible losses to critical infrastructure include:

- Electric power disruption
- Communication disruption
- Water and fuel shortages
- Road closures
- Damaged infrastructure components, such as sewer lift stations and treatment plants
- Damage to homes, structures, and shelters

Potential Losses

Spring and summer storms affect the entire planning area of the Estes Valley Recreation and Park District including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Severe storms will remain a highly likely occurrence for the Estes Valley Recreation and Park District. It is likely that lightning and hail will also be experienced in the area due to such storms.

Generally, straight-line wind events destroy private, commercial, and public property. Additional costs stem from debris removal, maintenance, repair, and response. Indirect costs include loss of industrial and commercial productivity as a result of damage to infrastructure, facilities, or interruption of services. Because no specific, countywide loss estimation exists for wind, potential losses are related to historical property damage and injuries/deaths.

Probability of Future Occurrences

Spring and summer storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past spring and summer events provide benchmarks for projecting similar conditions into the future. The probability that Estes Valley Recreation and Park District will experience a spring or summer storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the Estes Valley Recreation and Park District at least once every year.

Reported straight-line wind events over the past nineteen years provide an acceptable framework for determining the future occurrence in terms of event. The probability of the Estes Valley Recreation and

Park District experiencing a severe wind event associated with damages or injuries can be difficult to quantify, but based on historical record of 115 severe wind events since 1996, there is a high chance of this type of event occurring each year.

Capabilities Assessment

The capability assessment examines the ability of the Estes Valley Recreation and Park District to implement and manage the comprehensive mitigation strategy laid out in this Plan. The strengths, weaknesses, and resources of the community are identified here as a means for evaluating and maintaining effective and appropriate management of the district's hazard mitigation program.

Local Personnel

The ability of a community to implement a comprehensive mitigation strategy depends, in part, on available resources, including people and staff. The following table outlines the district's capabilities as they relate to key personnel.

	Full Time	Part Time	None or Not-Identified
Emergency Manager			X
Floodplain Administrator			X
Community Planner			X
GIS Specialist			X
Grant Writer		X	

Land Use Planning and Codes

Local land use plans and building codes are tremendous tools for evaluating local policies related to hazard mitigation and risk reduction. Additionally, comprehensive master plans, capital improvement plans, stormwater plans and zoning ordinances all present opportunities for enhanced local capabilities. The following table outlines the district's current capabilities as they relate to land use planning and codes.

	Yes (Y); No (N)
A zoning ordinance	N
A hazard-specific ordinance	N
Local building codes	N
A Comprehensive Plan / Master Plan	Y
A Capital Improvements Plan	Y
A Stormwater Plan	N
A Continuity of Operations Plan (COOP)	N
An Emergency Operations Plan (EOP)	N
A Long-Term Recovery Plan	N
Participates in the NFIP	N

Plan Maintenance and Implementation

The Estes Valley Recreation and Park District has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the district will continue public participation in the plan maintenance process.

Jurisdiction	Plan Maintenance and Implementation Strategy
Estes Valley Recreation and Park District	*"Our Board of Directors will review our mitigation plan on an annual basis."* *"We will post our updates on the EVRPD website."*

Integrating Hazard Mitigation into Local Planning

Through discussions at planning meetings and the use of an online survey, individual outreach, and phone calls, each participating jurisdiction brainstormed with the planning team to identify processes for integrating hazard mitigation into their local planning mechanisms and policies. The following table lists the specific integration strategy identified by the Estes Valley Recreation and Park District based on the mitigation actions listed in this plan.

Jurisdiction	Strategy
Estes Valley Recreation and Park District	*"We will base the priority of projects on the actions in our hazard mitigation plan."*

Mitigation Action Guides

The following Mitigation Action Guide presents the District's mitigation action that was developed for the 2016 Plan.

<table>
<tr><td colspan="2">Estes Valley Recreation and Park District – Fish Creek Trail (Estes Valley Rec & Park – 1)</td></tr>
<tr><td>PRIORITY: 1</td><td>HAZARDS ADDRESSED: Flood, Severe Storm</td></tr>
<tr><td>LOCATION: Estes Park, CO</td><td>GOALS ADDRESSED: 1. Protect people, property, and natural resources. 2. Improve capability to reduce disaster losses.</td></tr>
<tr><td>RECOMMENDATION DATE: 7/1/2015</td><td>OBJECTIVES ADDRESSED: E. Reduce the vulnerability of local assets to the impact of hazards.</td></tr>
<tr><td colspan="2">TARGET COMPLETION DATE: 7/1/2017</td></tr>
<tr><td colspan="2">ISSUE: Heavy flood waters down the Fish Creek Corridor in Estes Park undercut the road and several utilities along Fish Creek Rd. Though the road and the utilities are not the responsibility of the Estes Valley Recreation and Park District, we have a soft surface trail that runs the length of the corridor. The trail was supported by retaining walls, culverts, and pedestrian bridges that were all compromised during the flood event.</td></tr>
<tr><td colspan="2">RECOMMENDATION: In an effort to prevent future flood events from causing similar destruction, resiliency measures, including those pertained in Senate Bill 40 to wildlife habitat and riparian area, will be implemented into construction design, means, and methods.</td></tr>
<tr><td colspan="2">ACTION: Rebuilding, realigning, and stabilization of Fish Creek Trail.</td></tr>
<tr><td>LEAD AGENCY: Estes Valley Recreation and Park District</td><td>EXPECTED COST: $993,891.40</td></tr>
<tr><td>SUPPORT AGENCIES: FEMA, Great Outdoors Colorado, Town of Estes Park</td><td>POTENTIAL FUNDING SOURCES: FEMA, GOCO</td></tr>
<tr><td colspan="2">7.1.4 PROGRESS MILESTONES:
- Design of construction at 90%.
- Construction Start Summer 2016
- Completion Summer 2017
Point of Contact:
Estes Valley Recreation and Park District
Matt Hines, Project Manager
Matt@evrpd.com
Tom Carosello, Executive Director
TomC@evrpd.com
  </td></tr>
</table>

Letter of Intent to Participate

ESTES VALLEY RECREATION and PARK DISTRICT

LETTER OF INTENT TO PARTICIPATE

July 21, 2015

Lori R. Hodges
Larimer County Emergency Management
200 West Oak Street
Fort Collins, CO 80526

Re: "Statement of Intent to Participate" as a participating jurisdiction in the Larimer County Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Dear Ms. Hodges,
In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the Estes Valley Recreation and Park District (EVRPD) is submitting this letter of intent to confirm that EVRPD has agreed to participate in the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, EVRPD agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Larimer County OEM to complete the plan in conformance with FEMA requirements.

EVRPD understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by an agreement between the Lead Jurisdiction and the Participating Jurisdiction, I Kathy Asche, commit EVRPD to the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 21st day of July

Kathy Asche, Board President

P.O. Box 1379, 890 Big Thompson Avenue
Estes Park, CO 80517

info@evrpd.com
http://www.evrpd.com

970-586-8191 Phone
970-586-8193 Fax

LARIMER COUNTY
COMMITTED TO EXCELLENCE

Michael Baker
INTERNATIONAL

City of Fort Collins

"Three major themes of Plan Fort Collins provide direction for the vision for the next 25 years and beyond: Innovate, Sustain, and Connect."
– Plan Fort Collins, 2011

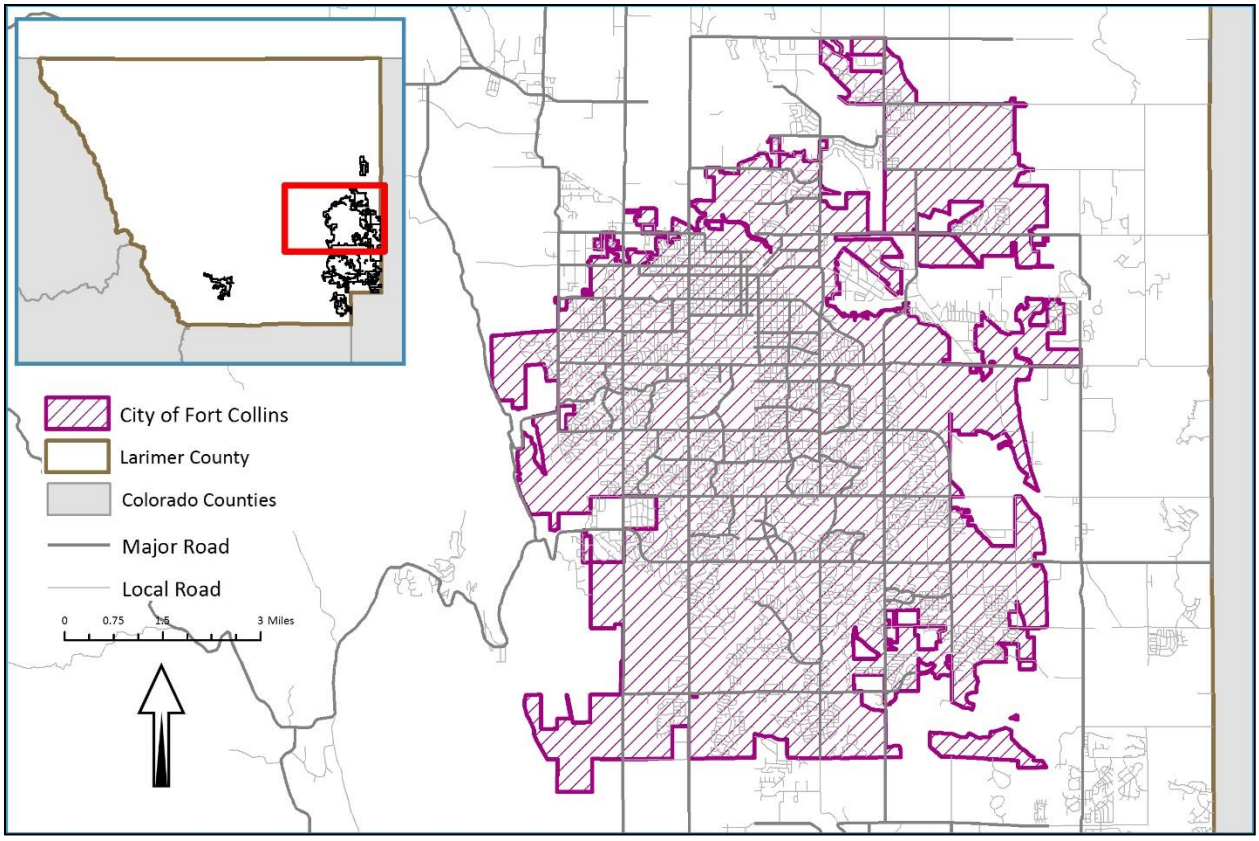
Community Profile

The City of Fort Collins is located in northern Colorado at the base of the foothills to the Rocky Mountains at approximately 5,000 feet above sea level. The City experiences on average 300 days of sunshine and approximately 14.5 inches of precipitation per year. Fort Collins was founded as a military fort in 1864 and was referred to "Camp Collins." The city is home to Colorado State University with an enrollment in 2015 of approximately 32,236 students.

There are approximately 1,600 faculty members and 4,800 additional employees at CSU, making it the largest employer in Fort Collins. The CSU campuses include the main campus in the center of Fort Collins, the Foothills Campus on the west side of town and the CSU Veterinary Teaching Hospital just south of the main campus.

Fort Collins has a mix of manufacturing and service-related businesses. Many high-tech businesses have relocated to Fort Collins because of the resources of Colorado State University and its research facilities. In addition, Fort Collins is home to many small business and entrepreneurial ventures. The brewery industry is significant in Fort Collins, ranging from small craft breweries to large national breweries, such as Anheuser Busch.

Fort Collins was incorporated in 1873. Not long ago Fort Collins was a small community, centered on Old Town and its neighborhoods. In the last 50 years the city has grown from 25,000 people in 1960 to over 140,000 people in 2010.



The table following summarizes key demographic and development related characteristics of the City of Fort Collins.

City of Fort Collins Statistics		
	City of Fort Collins	Colorado
Population, 2010	143,986	5,029,196
2000-2010 Population Change, %	18%	14.5%
% Population under 5 years, 2010	5.7%	6.8%
% Population under 19 years, 2010	25.7%	20.3
% Population 65 years and over, 2010	8.8%	10.9%
Language other than English spoken at home, % age 5+, 2009-2013	10.4%	15.9%
Homeownership Rate 2010	55.1%	65.5%
Persons Per Household 2010	2.37	2.57
Persons below poverty level, %, 2013	18.6%	13.2%
Median Household Income, 2013	$53,780	$58,433

Participation in the Community Rating System

The Community Rating System (CRS) is a voluntary national program developed by FEMA that provides flood insurance premium reductions based on a participating community's implementation of floodplain management programs that exceed the minimum requirements established by the National Flood Insurance Program (NFIP). Credit points for the CRS floodplain management activities determine a community's CRS Class. Fort Collins is currently a Class 4 community and works hard to implement policies and education campaigns that help reduce flood risk in and around the community.

In addition to participating fully in the development of the Larimer County hazard mitigation plan, the City of Fort Collins leveraged the process as an opportunity to strengthen their CRS participation. Throughout the hazard mitigation planning process, Fort Collins paid special attention to the CRS 510 steps that relate specifically to hazard mitigation and floodplain management planning processes. Below is a summary of how the City augmented the ongoing Larimer County hazard mitigation planning process with a modified CRS planning approach.

Table 53. Fort Collins' Integrated CRS and HMP Process

FEMA's 4-Phase Hazard Mitigation Planning Process	Community Rating System Planning Steps
Phase I - Planning Process	
201.6(c)(1)	1. Organize
201.6(b)(1)	2. Involve the Public
201.6(b)(2) & (3)	3. Coordinate with other agencies
Phase II - Risk Assessment	
201.6(c)(2)(i)	4. Assess the Hazard
201.6(c)(2)(ii) & (iii)	5. Assess the problem
Phase III - Mitigation Strategy	
201.6(c)(3)(i)	6. Set goals
201.6(c)(3)(ii)	7. Review possible mitigation activities
201.6(c)(3)(iii)	8. Draft a mitigation action guide
Phase IV - Plan Maintenance and Implementation	
201.6(c)(5)	9. Adopt the Plan
201.6(c)(4)	10. Implement, evaluate, revise

Fort Collins' desired outcome for developing this modified process was to align their ongoing floodplain management planning with their larger mitigation framework to facilitate the selection of the best mitigation measures for the community and its hazards. Additionally, the City's effort will make them eligible for CRS planning credit and the associated points due to the planning process including non-City stakeholders as part of the planning team and public involvement efforts.

The City of Fort Collins carried out additional public information activities and outreach projects in order to align the hazard mitigation planning process with their ongoing CRS participation activities. This section outlines the efforts taken by the City of Fort Collins to go above and beyond the minimum planning requirements established by FEMA for the hazard mitigation planning process. Appendix D provides

detailed documentation of each of the activities that the City took in order to meet the CRS planning requirements.

CRS Step 1 (Organize and Prepare the Plan) and Steps 3-8 (Assess the Hazards; Assess the Problems; Set Goals; Review Possible Activities; and Draft an Action Plan)

Step 1a. CRS credit is assigned if the office responsible for the community's land use and comprehensive planning is actively involved in the hazard mitigation planning process. The "office" may be the community's planning or community development department, a consulting firm, or a regional planning agency, provided that it performs regular land use or comprehensive planning duties for the community.

To meet this requirement, Pete Wray, a member of the Fort Collins Planning and Development Department was present and active at two of the three Planning Team meetings and was briefed and provided input for the meeting he was unable to attend. He also participated in reviewing the draft plan.

Step 1b. Credit is also assigned to communities if the planning process is conducted through a committee composed of staff from those community departments that implement or have expertise in the activities that will be reviewed in Step 7 (Review Possible Mitigation Activities).

The members of the Hazard Mitigation Planning Team included staff from a comprehensive range of community departments that implement or have expertise in the activities that will be reviewed in Step 7 (see the following table of Planning Team Members who attended 2 or more of the planning meetings).

Hazard Mitigation Planning Team Members (A primary or alternate member attended at least 2 of 3 planning meetings)	
Governmental	**Other Stakeholders**
Larimer County Health and Environment	Estes Park FPD
Larimer OEM	Crystal Lakes FPD
Town of Estes Park	Glacier View FPD
City of Fort Collins Stormwater	Poudre Canyon FPD
City of Fort Collins Streets	Poudre FPD
City of Fort Collins OEM	CSU
City of Fort Collins Environmental Services	Poudre Valley EMS
City of Fort Collins Environmental Quality	Big Thompson Watershed Coalition
City of Fort Collins Risk Management	Northern Colorado Water Conservancy District
City of Fort Collins Planning	Platte River Power Authority
City of Loveland Community Partnership	Upper Thompson Sanitation District
City of Loveland Facilities Management	
City of Loveland Risk Management	
City of Loveland OEM	
City of Loveland PD	
City of Loveland Stormwater	
City of Loveland Public Works	
City of Loveland Water & Power	
Town of Timnath	

Specifically for Fort Collins, the departments represented on the Planning Team included: Stormwater, OEM, Risk Management, Planning, Environmental Quality, Transportation/Streets, and Environmental Services. The Large Planning Team met a total of 3 times to *Assess the Hazards; Assess the Problems; Set Goals; Review Possible Activities;* and *Draft an Action Plan.*

Each community participated in the following plan update development activities:

- Attendance at Planning Team meetings, public meetings, and open houses
- Attendance at workshops and planning partner training sessions
- Coordination of data collection and analysis
- Development of Plan Goals and Objectives
- Review of the risk and vulnerability assessment; identification of hazards
- Sharing information about mitigation projects in their departments since the adoption of the 2010 Northern Colorado Regional Hazard Mitigation Plan
- Review mitigation alternatives and identify potential mitigation actions. Identification of at least one mitigation action for each 'High Priority' hazard identified for their community. Each project was prioritized and reviewed to identify their benefits and costs. Local agencies/individuals responsible for implementing and tracking these mitigation actions were also identified and included in the plan.
- Review of the mitigation recommendations chosen for the overall county and evaluation of any unmet needs
- Facilitation of public review and comment periods prior to adoption
- Development of plan implementation and maintenance protocol.

As per FEMA requirements, attendance was tracked at all planning activities. All attendance records are included in Appendix A and can be used to track and document participation in the planning process for CRS scoring purposes.

CRS Step 2: Involve the Public

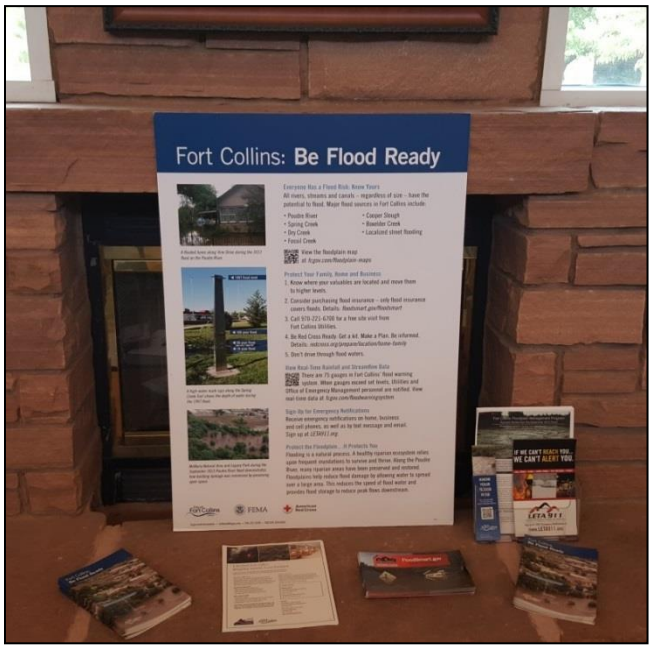
CRS points are assigned to a community if the local hazard mitigation planning process is conducted through a planning committee that includes members of the public and meets the following criteria:

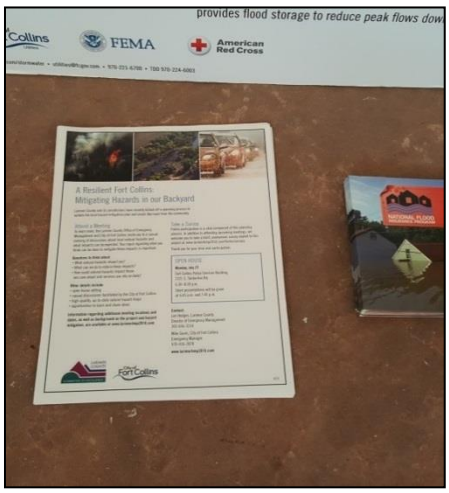
1. If the committee includes community staff (e.g., the planning committee credited under Step 1(b)), then at least one-half of the members must be representatives of the public or stakeholders for full credit. Note that receiving 50% of the maximum credit for this planning step is a prerequisite for Class 4 or better communities and item (a) is one-half of the credit for Step 2.

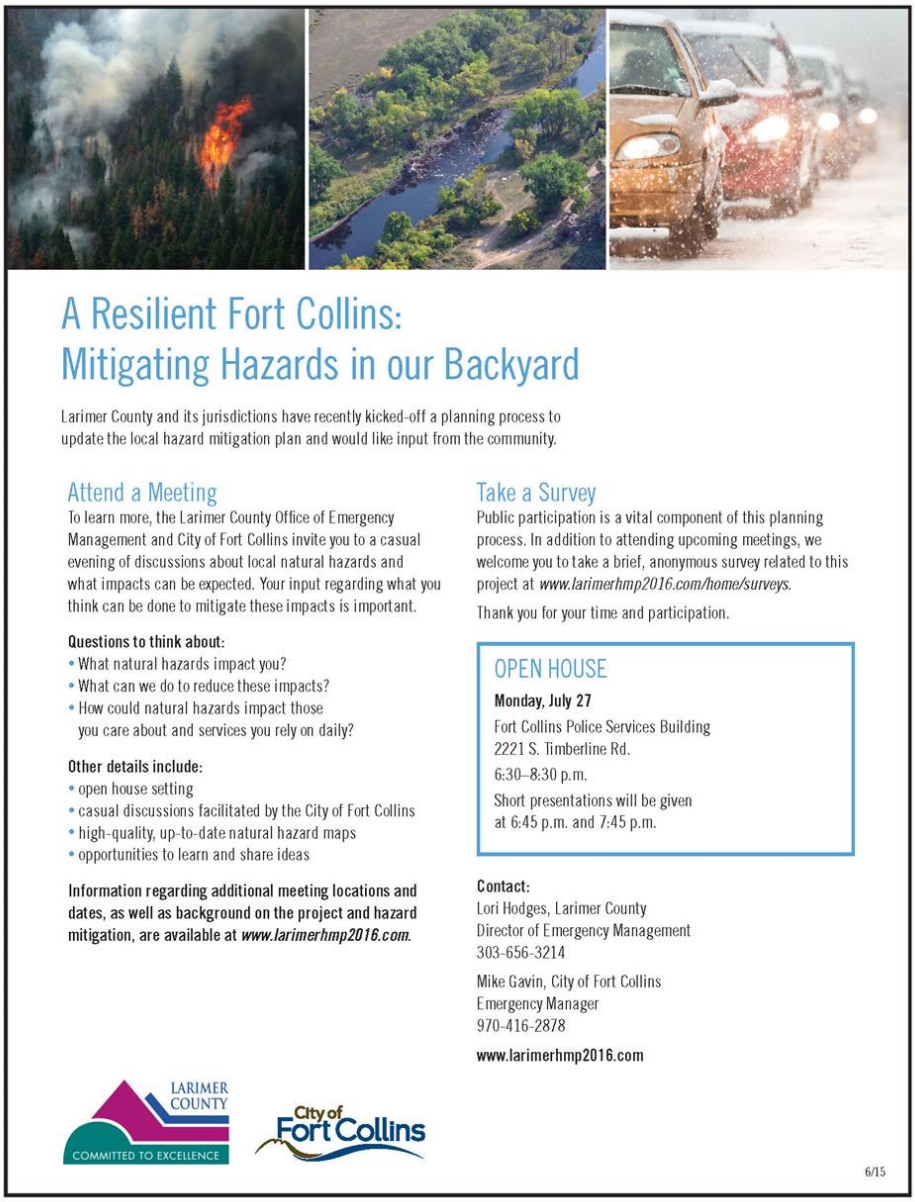
The Larimer County hazard mitigation planning committee included representatives from 8 communities and also included public stakeholders. The total number of representatives on the Planning Team that attended at least two of the three meetings was 30 and 11 of them were stakeholders. Therefore, the committee was made up of 37% public stakeholders. A full roster of the planning committee is available in Appendix D, indicating who they represent along with primary and alternate designations for some participants.

CRS credit is also possible if one or more public information meetings is held in the affected area(s) within the first two months of the planning process to obtain public input on the natural hazards, problems, and possible solutions. The meetings must be held separately from the planning committee meetings.

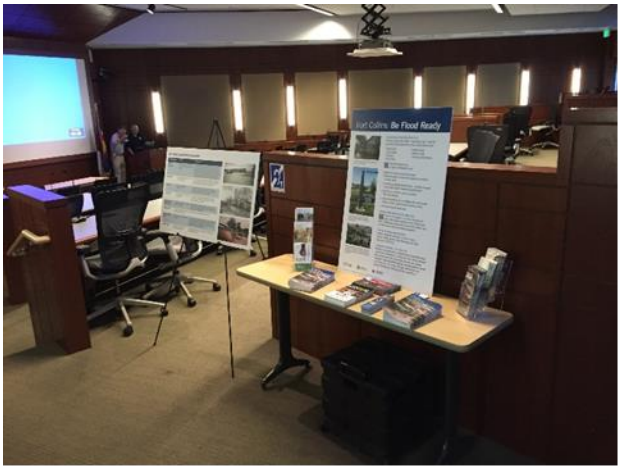
Fort Collins held a separate public outreach meeting on July 27th (within the first two months of the planning process) to inform the public about hazard mitigation, the planning process, risks facing Larimer County and opportunities to participate The following image shows the flier that Fort Collins prepared to announce their Hazard Mitigation Plan Open House and to seek input from the public via surveys on the Mitigation Plan website. The fliers were distributed by city staff at 14 locations as part of "Flood Awareness Week" displays.

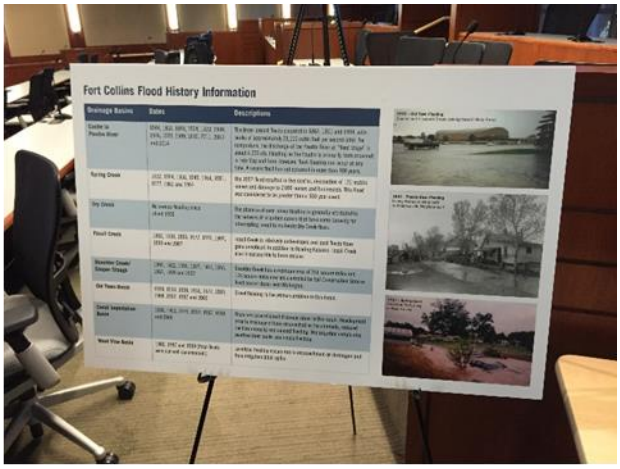


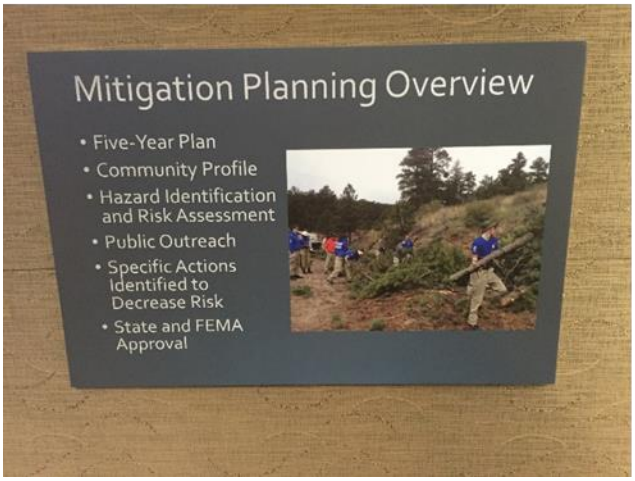




The Hazard Mitigation Plan Open House consisted of a short presentation about the Larimer County hazard mitigation planning process and provided community members with an opportunity to participate in a number of surveys related to risk perceptions, unmet needs, and resilience. Additionally, both county and city subject matter experts were on hand to answer any questions raised by attendees.







Fifteen CRS points are made available for holding one or more public meetings to obtain input on the recommended plan. The meeting(s) must be at the end of the planning process, at least two weeks before submittal of the recommended plan to the community's governing body.

A public plan review session was held towards the end of the planning process on December 2 in Fort Collins, as seen in pictures after this paragraph. During this public meeting, the draft plan was presented and attendees were asked for feedback on the various proposed mitigation strategies and the overall plan. Attendees were invited to provide comments at the meeting or at another time via the project website, email, or phone. The draft plan document was made available online for public feedback and comments and revisions were incorporated into the plan as necessary.


Fort Collins Flood History Information
Fort Collins: Be Flood Ready
City of Fort Collins


Open House Objectives
• Hazard Mitigation Planning Overview
• Hazards Profiled
• Communities Involved
• Mitigation Actions Recommended
• Getting Involved

A Resilient Larimer County: Mitigating Hazards in our Backyard

Larimer County and its jurisdictions are finalizing a planning process to update the local hazard mitigation plan and would like input from the community.

Attend a Meeting

To learn more, the Larimer County Office of Emergency Management and its major cities and towns invite you to a casual evening of discussions about local natural hazards and what impacts can be expected. Your input regarding what you think can be done to mitigate these impacts is important.

Questions to think about:

- What natural hazards impact you?
- What can we do to reduce these impacts?
- How could natural hazards impact those you care about and services you rely on daily?

Other details include:

- open house setting
- casual discussions facilitated by city representatives
- high-quality, up-to-date natural hazard maps
- opportunities to learn and share ideas

Information regarding additional meeting locations and dates, as well as background on the project and hazard mitigation, are available at *www.larimerhmp2016.com*.

OPEN HOUSE

Wednesday, Dec. 2, 6-8 p.m.
Larimer County Building
200 West Oak St.
Boyd Lake Conference Room, 1st Floor
Short presentations will be given
at 6:15 p.m. and 7:15 p.m.

Contact:
Lori Hodges, Larimer County
Director of Emergency Management
303-656-3214

Mike Gavin, City of Fort Collins
Emergency Manager
970-416-2878

Pat Mialy, Loveland Fire Rescue Authority
Emergency Manager
970-962-2534

www.larimerhmp2016.com

LARIMER COUNTY COMMITTED TO EXCELLENCE

City of Fort Collins

City of Loveland

11/15

Finally, CRS credit is assigned for each additional public information activity implemented to explain the planning process and encourage input to the planner or planning committee (up to a maximum of 30 points).

From the start of the Larimer County Multi-Jurisdictional Hazard Mitigation Planning process, the City of Fort Collins prioritized a suite of multi-faceted public outreach and information activities. The City of Fort Collins implemented the following 5 public information activities during the hazard mitigation planning process:

- Public engagement and education through the Project Website (see Chapter 3, Section 3.6 of the 2016 Larimer County Hazard Mitigation Plan)
- Social Media - Twitter and Facebook announcements
- Larimer County Safety Expo – representatives of the committee provided info on the Hazard Mitigation Planning Process and answered questions.
- Fliers at community events and Flood Awareness Week displays. The fliers announced the Open House and provided the link to the website and public surveys.
- Public Surveys – Visions for a Resilient Larimer County, Public Risk Perceptions (see Chapter 3, Section 3.6 of the 2016 Larimer County Hazard Mitigation Plan)

Fort Collins' Social Media Tracking – Hazard Mitigation and Public Awareness

7/23/2015	Twitter	Share your thoughts in a brief survey to help @LarimerCounty mitigate natural hazards. http://ow.ly/PFavJ
7/23/2015	Facebook	The Larimer County Office of Emergency Management and City of Fort Collins are hosting an open house on Monday, July 27 at 6:30 p.m. Share your thoughts and help Larimer County mitigate natural hazards! http://ow.ly/PFb5b
7/25/2015	Twitter	Discuss natural hazards that impact you what can be done to reduce these impacts http://ow.ly/PFb5b
7/25/2015	Facebook	Natural hazards pose a real threat to the people and property in our community. Take a brief survey to help the Larimer County Office of Emergency Management and City of Fort Collins mitigate natural hazards. http://www.larimerhmp2016.com/home/surveys
7/27/2015	Twitter	Reminder: Join an open house to discuss natural hazards that impact you tonight @ 6:30 p.m. http://ow.ly/PF8P0
7/27/2015	Facebook	Reminder: Join the Larimer County Office of Emergency Management and City of Fort Collins for an open house today at 6:30 p.m. at Fort Collins Police Services, 2221 S. Timberline Road, to discuss natural hazards that impact you. http://ow.ly/PF7PU

11/23/2015	Facebook	Interested in learning about how Larimer County plans for potentially hazardous events? Attend an open house on December 2, 6-8 p.m. at the Larimer County Building. Learn more: www.larimerhmp2016.com
11/23/2015	Twitter	Interested in how @larimercounty plans for hazardous events? Attend an open house Dec 2. Learn more: http://www.larimerhmp2016.com
12/2/2015	Facebook	Reminder! If you want to learn more about how Larimer County plans for potentially hazardous events, attend an open house today, 6-8 p.m. at the Larimer County Building. Learn more: www.larimerhmp2016.com
12/2/2015	Twitter	Reminder! Attend an open house today 6-8 p.m. & learn how @LarimerCounty plans for potentially hazardous events. www.larimerhmp2016.com

In addition to the information outlined in the Fort Collins Community Profile, Appendix D contains comprehensive documentation of all of the CRS-related activities that Fort Collins performed during the course of the planning project.

CRS Step 3: Coordinate

Fort Collins reviewed existing studies, reports along with the previous hazard mitigation plan to determine the community's needs and goals. This information is included in Appendix D.

Fort Collins spearheaded additional coordination, outside of the hazard mitigation planning meetings, to facilitate coordination with other agencies and to review the draft plan. Representatives from the City of Fort Collins Stormwater Department attended a meeting on July 16, 2015 with the Fort Collins Water Board that provided an overview of the mitigation planning process and asked for any additional input on the flood hazard (see Water Board meeting agenda located in Appendix D). The draft plan will also be presented to Water Board at a meeting prior to plan adoption.

In addition, emails were sent to 28 agencies seeking additional data and input, especially with regard to the flood hazard for all communities that are part of the Larimer County Hazard Mitigation Plan (see email located in Appendix D). The list of agencies who were contacted are listed below:

1. NOAA
2. Red Cross
3. FEMA Region VIII
4. Colorado State Climatologist
5. Colorado Dept. of Local Affairs
6. CWCB

7. Colorado OEM
8. Save The Poudre
9. Weld County OEM
10. Larimer County Long Term
11. Recovery Group
12. Lutheran Family Services
13. Loveland Housing Authority
14. Boulder County OEM
15. Laramie County OEM
16. Phillips County OEM
17. Poudre Fire Authority
18. Logan County OEM
19. Cheyenne County OEM
20. City of Evans OEM
21. Kit Carson County OEM
22. Lincoln County OEM
23. Sedgwick County OEM
24. Washington County OEM
25. City of Greeley OEM
26. Yuma County OEM
27. Morgan County OEM
28. Grand County OEM

CRS Steps 4 & 5: Assess the Hazard & Assess the Problem

These steps in the process assessed the flood hazard areas in detail. Appendix D has an analysis of each basin along with basin maps, specifics about flood depths, pond and roadway overtopping information, critical facilities of concern and a discussion of problems and master planning effort specific to each basin.

CRS Step 6: Set Goals

The overall goals and objectives of the Larimer County Hazard Mitigation Plan are discussed in Chapter 6 of the 2016 Larimer County Hazard Mitigation Plan.

The goal of the City of Fort Collins floodplain management program is to take a proactive, comprehensive approach to dealing with potential loss of life and property damage due to flooding. Components of this program are:

- Drainage Basin Master Planning that evaluates the flood risk and examines alternatives to mitigate the risk.
- Floodplain regulations and development criteria that attempt to balance risk with regulation
- Cost effective capital projects to reduce the flood hazard.
- Educational outreach efforts to promote awareness of the flood hazard and water quality issues.
- Drainage system maintenance so that facilities can function in a flood.
- Flood warning system maintenance and technical assistance to the Office of Emergency Management for flood response.

CRS Steps 7 & 8: Review Possible Activities & Draft Action Plan

The mitigation alternatives analysis for flooding in Fort Collins along with the recommended mitigation strategy is available in Appendix D. The Mitigation Action Guides for each category of floodplain management can be found at the end of the Fort Collins Community Profile: Mitigation Action Guides with a summary under the mitigation strategies in Appendix D. The mitigation analysis and recommendation discusses why alternatives were or were not chosen, looks at the benefits of existing programs and outlines specific strategies city-wide, basin specific as well as those to be taken by private individuals. A discussion of the Implementation follows with discussion of funding sources as well as the prioritization process. There are Mitigation Action Guides for all of the flood hazard component areas from Step 6 and all of the plans propose funding possibilities. In addition, the overall mitigation plan includes action guides for other hazards and are included in the Fort Collins Community Profile.

The City's Post-Disaster procedures use policy: *UOPS 2.0 Substantial Damage Policy* (see Appendix D) which was adopted on February 3, 2012 to calculate Substantial Damage as related to the City's floodplain management ordinance. When a structure is damaged by any cause, including but not limited to fire, flood, high wind, blizzard, seismic activity, or land movement this policy requires an evaluation to determine if the structure has been substantially damaged. If a structure is found to be substantially damaged, Fort Collins Utilities in coordination with Building Services will work with property owners to explain the requirements necessary to bring the structure into compliance. The City's Program for Public Information Plan *(City of Fort Collins Floodplain Management Public Information Committee: A Program for Public Information, pages 65-70)* has detailed the flood response outreach projects to be completed post-disaster including website information, brochure displays and social media outreach. A copy of the outreach table is included in Appendix D.

CRS Step 9: Adopt the Plan

The City of Fort Collins City Council will be adopting the 2016 Larimer County Multi-Jurisdictional Multi-Hazard Mitigation Plan.

CRS Step 10: Implement, Evaluate and Revise

The City of Fort Collins will prepare an annual evaluation report that will be provided to City Council and the media, as well as posted on the City's website for the public. See Appendix D for more details.

Hazard Identification and Risk Assessment

The following Hazard Identification and Risk Assessment Summary table is based on jurisdiction-specific responses to the risk factor exercise and differs from the risk factor results that were determined at the county scale.

NATURAL HAZARD	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Flood – Flash and Riverine	0.90	0.75	0.50	0.33	0.30	2.78
Fire – Wildland	0.83	0.83	0.33	0.33	0.40	2.71

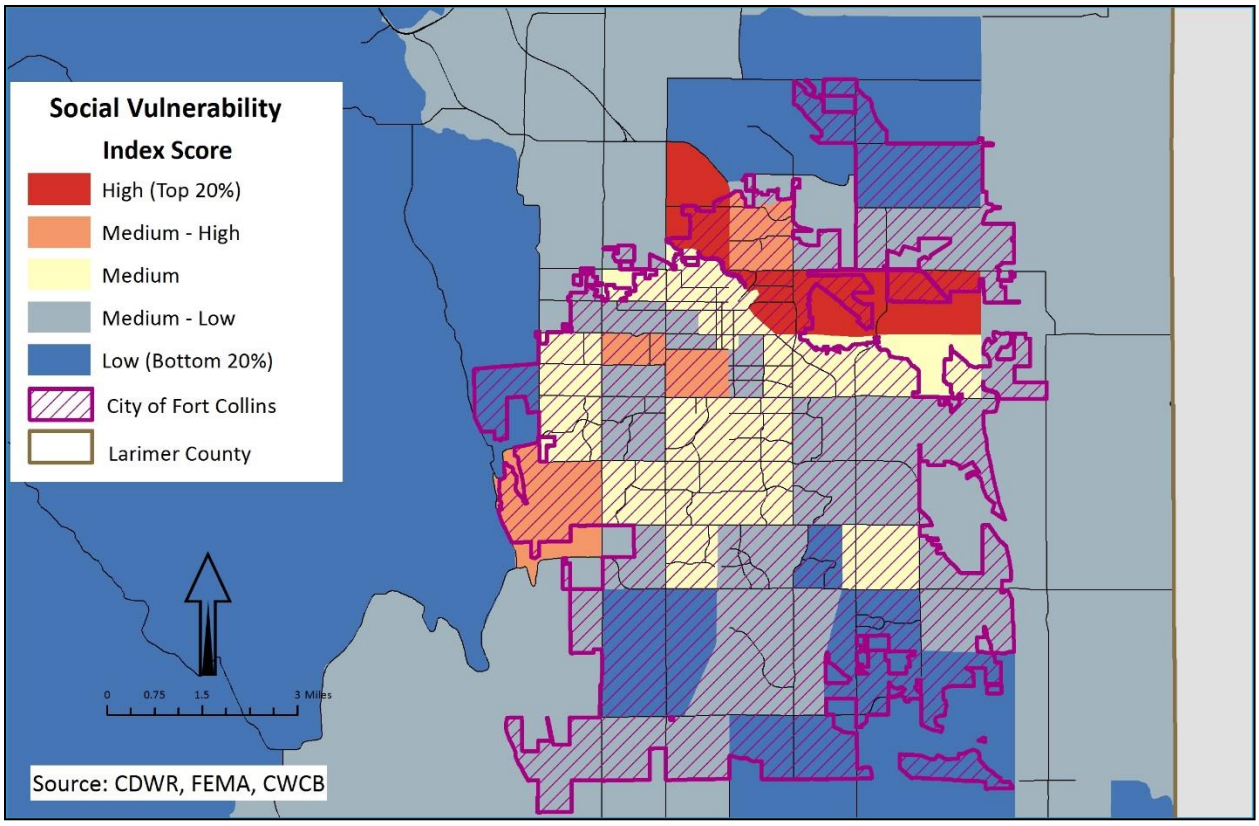
Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)	0.98	0.60	0.53	0.25	0.20	2.56
Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)	0.83	0.45	0.60	0.15	0.30	2.33
Tornado	0.60	0.75	0.40	0.38	0.13	2.25
Utility Disruption	0.75	0.38	0.40	0.40	0.20	2.13
Erosion / Deposition	0.83	0.45	0.27	0.23	0.20	1.97
Hazmat – Fixed and Transport	0.75	0.45	0.20	0.40	0.15	1.95
Biological Hazards / Contagion	0.30	0.68	0.33	0.40	0.23	1.94
Civil Disturbance	0.53	0.45	0.27	0.40	0.13	1.78
Earthquake	0.30	0.68	0.27	0.33	0.15	1.72
Landslide / Rockslide	0.53	0.38	0.25	0.28	0.13	1.55
HIGH RISK (2.5 or higher): Flood – Flash and Riverine; Fire – Wildland; Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)						
MODERATE RISK HAZARD (2.0 - 2.4): Winter Storm (Blizzard Conditions, Heavy Snow Accumulation); Tornado; Utility Disruption; Erosion / Deposition; Hazmat – Fixed and Transport; Biological Hazards / Contagion						
Low Risk (1.9 and lower): Civil Disturbance; Earthquake; Landslide / Rockslide						

Vulnerability Assessment

This section provides a refined vulnerability assessment, specific for the City of Fort Collins, for those hazards that were identified as being rated HIGH in the preceding section. This analysis was conducted separately from that of the county-wide vulnerability assessment to specifically focus on the population, structures, infrastructure, and other assets unique to Fort Collins.

The results of the social vulnerability assessment are displayed on the following map. On the map, social vulnerability is represented at the census tract level by 5 classes of vulnerability: Low (bottom 20% of the county), Medium-Low, Medium, Medium-High, and High (top 20% of the county). The City of Fort Collins social vulnerability map shows social vulnerability within the community.

Social Vulnerability Map – City of Fort Collins[136]



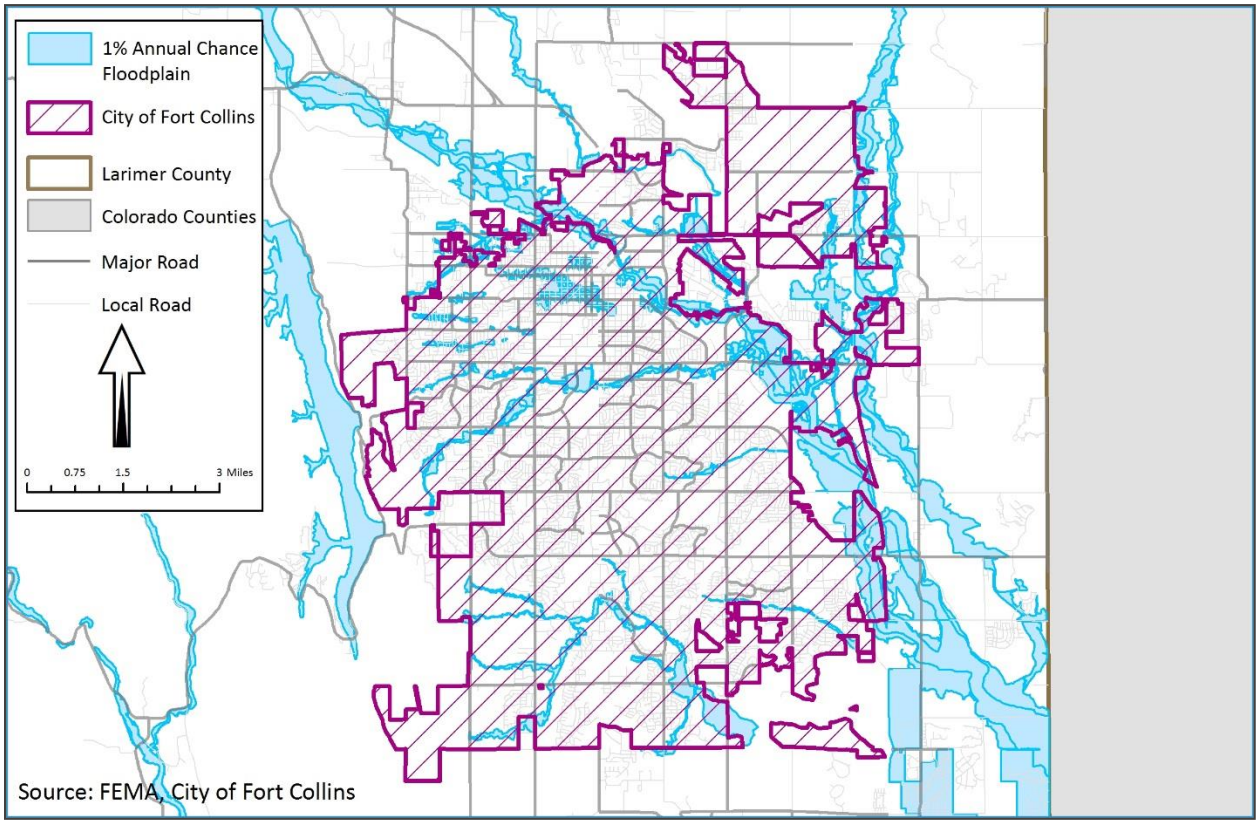
Social vulnerability is represented as the social, economic, demographic, and housing characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to hazard events. The pre-existing social conditions that contribute to disaster losses can be identified using social vulnerability indicators. Using methods identified in the Social Vulnerability Index (SoVI) developed by Cutter et. al. (2003) this layer shows the social vulnerability index scores for the State of Colorado at the census tract level. Social vulnerability is represented at the Census tract level by five classes of vulnerability: Low, Medium-Low, Medium, Medium-High, and High.

The City of Fort Collins is characterized by a mix of low (bottom 20% in the county) to high (top 20% in the county) levels of social vulnerability. The highly socially vulnerable areas are clustered in the northern part of the community. Resources and measures to reduce the social determinates of disasters may be most effectively allocated to these areas. Moreover, it is critical that the city analyze the individual social vulnerability indicators that make the northern part of the community stand out. Through ongoing evaluation, the City of Fort Collins will be able to more effectively reduce local social vulnerability and increase their resilience to hazard events.

[136] Source: Colorado Division of Water Resources Dam Safety Branch, FEMA, Colorado Water Conservation Board (CWCB)

Flood – Flash and Riverine

City of Fort Collins Special Flood Hazard Area[137]



[137] This layer is compiled utilizing the most recent Special Flood Hazard Areas (SFHA) as defined by FEMA's National Flood Hazard Layer (NFHL) in combination with some recent flood studies performed by the City of Fort Collins. These areas are also referred to as the 1% Annual Chance Floodplain.

City of Fort Collins Flood Risk Map

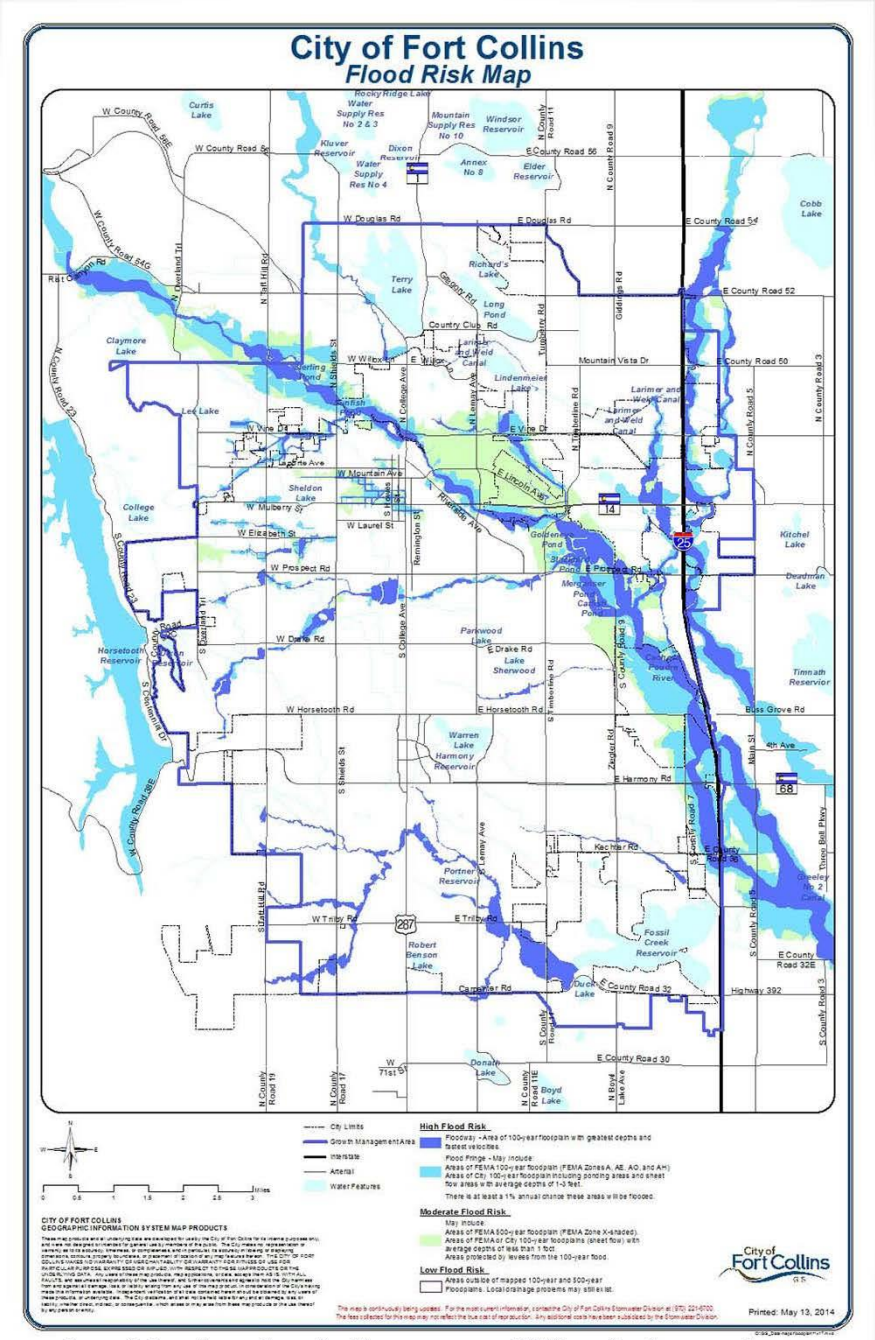


FIGURE 4 - FORT COLLINS FLOOD RISK MAP SHOWING BOTH FEMA AND CITY-DESIGNATED FLOODPLAINS

Chapter 3: Community's Public Information Needs

Previous Occurrences

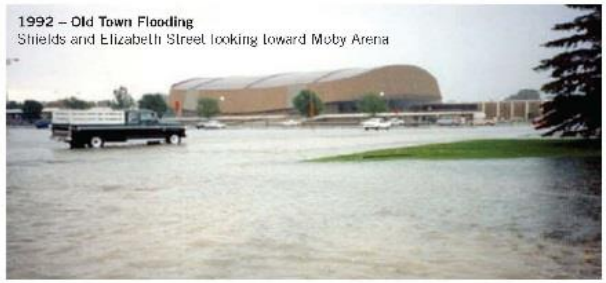
The City of Fort Collins has 12 drainage basins: the Cache la Poudre, Dry Creek, Cooper Slough/Boxelder, West Vine, Old Town, Canal Importation, Spring Creek, Foothills, Mail Creek, Fox Meadows, McClellands and Fossil Creek. All have flooded in the past for various reasons. Each basin is characterized by unique features that must be taken into account when considering hazard mitigation and flood safety. The Drainage Basin Master Plan, approved by City Council in June 2004, describes the flooding history of each basin, identifies potential problem areas and recommends improvements. The Master Plan is updated regularly to reflect changes.

Elements of the "Flood Mitigation Appendix" of the Fort Collins Stormwater Master Plan is included in Appendix D of this plan as a supplement to the risk assessment. Additionally, Appendix D includes maps and mitigation actions identified by Fort Collins Stormwater.

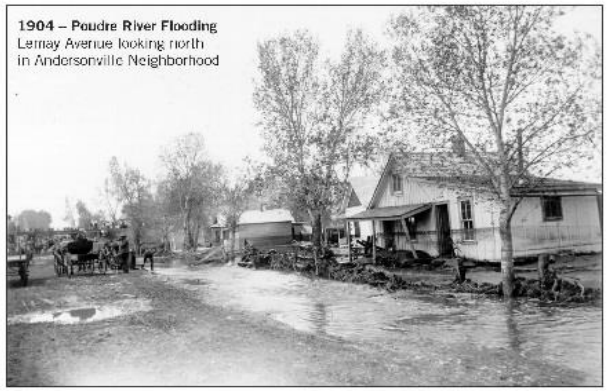
The following image illustrates the history of flooding events in the City of Fort Collins. The flood history information was shared with the public at the Hazard Mitigation Plan Open House in July, 2015.

Fort Collins Flood History Information

Drainage Basins	Dates	Descriptions
Cache la Poudre River	1844, 1864, 1891, 1904, 1923, 1930, 1976, 1983, 1999, 2010, 2011, 2013 and 2014	The three largest floods occurred in 1864, 1891 and 1904, with peaks of approximately 21,000 cubic feet per second (cfs). For comparison, the discharge of the Poudre River at "flood stage" is about 4,000 cfs. Flooding on the Poudre is primarily from snowmelt in late May and June. However, flash flooding can occur at any time. A severe flood has not occurred in more than 100 years.
Spring Creek	1902, 1904, 1938, 1949, 1951, 1961, 1977, 1983 and 1997	The 1997 flood resulted in five deaths, destruction of 120 mobile homes and damage to 2,000 homes and businesses. This flood was considered to be greater than a 500-year event.
Dry Creek	No serious flooding since about 1950	The absence of even minor flooding is generally attributed to the network of irrigation canals that have some capacity for intercepting small to moderate Dry Creek flows.
Fossil Creek	1902, 1938, 1965, 1977, 1979, 1997, 1999 and 2007	Fossil Creek is relatively undeveloped and past floods have gone unnoticed. In addition to flooding hazards, Fossil Creek also is susceptible to bank erosion.
Boxelder Creek/ Cooper Slough	1909, 1922, 1930, 1937, 1947, 1963, 1967, 1969 and 2007	Boxelder Creek has a drainage area of 251 square miles and 176 square miles now are controlled by Soil Conservation Service flood control dams near Wellington.
Old Town Basin	1904, 1933, 1938, 1951, 1977, 1983, 1988, 1992, 1997 and 2009	Street flooding is the primary problem in this basin.
Canal Importation Basin	1938, 1951, 1975, 1992, 1997, 1999 and 2009	There are several small drainage areas in this basin. Development prior to drainage criteria encroached on the channels, reduced the flow capacity and caused flooding. The irrigation canals also overflow their banks and cause flooding.
West Vine Basin	1980, 1997 and 1999 (Past floods were not well documented.)	Localized flooding occurs due to encroachment on drainages and from irrigation ditch spills.



1992 – Old Town Flooding
Shields and Elizabeth Street looking toward Moby Arena



1904 – Poudre River Flooding
Lemay Avenue looking north
in Andersonville Neighborhood

1997 – Spring Creek
Creekside Park along
College Avenue

According to NOAA's Storm Events Database there have been 40 reported injuries and 5 deaths in the City of Fort Collins caused by flooding. On July 28, 1997 14.5 inches of rain fell in 31 hours, 10 inches of that which fell within 6 hours. Debris blocked a culvert along Spring Creek causing a 10-15 foot wall of water to surge through a mobile home park destroying some homes and damaging others. That database also notes that there has been approximately $190.5 million dollars in property damage and $50,000 in crop damage from 1996 to 2014. Based on the historic occurrence of floods, City of Fort Collins is extremely vulnerable to flood events at any given time.

Inventory Exposed

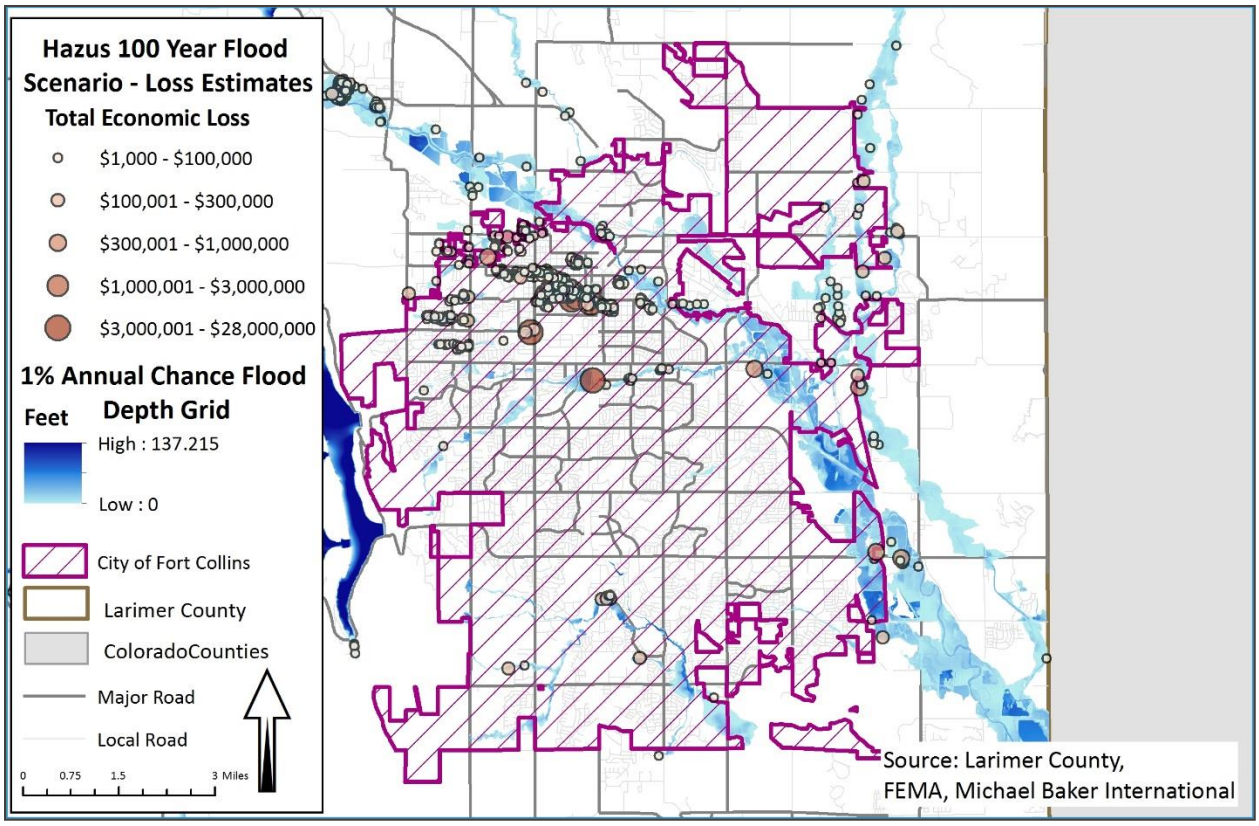
Critical facilities are essential to the health and welfare of the whole population and are especially important both during and after hazard events. Critical structures or areas that overlap or touch the SFHA are considered "flood prone."

The critical facility and structure exposure analysis estimates that, using countywide criteria, there are 48 critical facilities and 3,701 parcels/structures within the City of Fort Collins that are flood prone (not including the total miles of flood prone infrastructure). The appraised value of the exposed critical facilities is over $171.2 million dollars and the exposed structures is over $5 billion dollars. The critical facilities are identified for each basin in Appendix D. Fort Collins has prohibited new critical facilities in the floodplain since 1995.

Potential Losses

Hazus estimates for the City of Fort Collins that for a 100-year flood event, that 6 critical facilities and 1,082 parcels/structures will experience flood damage. The total economic loss by critical facilities estimated for the 100-year flood is over $424 thousand dollars. The estimated building loss is over $135 thousand dollars, over $289 thousand dollars in content loss, and no estimated inventory loss. The total economic loss by parcels/structures estimated for the 100-year flood is over $79.7 million dollars. The estimated building loss is over $34.4 million dollars, over $30.3 million dollars in content loss, and over $14.9 million dollars in inventory loss.

City of Fort Collins 1% Annual Flood Loss Estimation and Flood Depth Grid Map[138]



Probability of Future Occurrences

Frequency of previously reported flood events in the City of Fort Collins provide an acceptable framework for determining the probability of future flood occurrence in the area. The probability that the district will experience a flood event can be difficult to predict or quantify.

Severe flooding has the potential to inflict significant damage to people and property in the city. Mitigating flood damage requires that communities remain diligent and notify local officials of potential flood (and flash flood) prone areas near infrastructure such as roads, bridges, and buildings.

[138] FEMA's loss estimation modeling software, Hazus, was utilized to produce this data set. A 100 year flood scenario was defined and losses were calculated for each point (structure) that intersected the depth grid based on the Hazus depth damage curves for specific structure attributes (such as foundation type, building type, and first flood height). Information derived from Hazus-MH 2.2 flood scenario. Total Losses equals a sum of building losses, content losses, and inventory losses. 1% Annual Chance Flood flooding depth grid, produced from the best available topographic and floodplain data.

Flood Insurance and Repetitive Loss Information

Fort Collins currently has a total of 433 flood insurance policies (March 3, 2015 data) with an average premium of $586.00. The majority are Preferred Risk Policies in areas mapped outside of the FEMA 100-year floodplain.

Note: many of these may be in City-designated floodplains, such as Old Town, which still qualify for the Preferred Risk Policy.

Only 76 flood policies are in the FEMA 100-year floodplain, which is approximately 40 percent of the structures mapped in the FEMA floodplain. There is one structure that is designated by FEMA as a Repetitive Loss Property because it has had two or more flood insurance claims of more than $1,000 during a rolling 10-year period. This structure is in the Spring Creek floodplain. Examination of the claim dates and discussion with the owners indicates that the flood damage was due to local drainage issues rather than flooding from Spring Creek.

Need for Flood Warning

The City of Fort Collins operates a Flood Warning and Response system consisting of 75 gage locations that are monitored 24/7 from mid-April thru September. Low, medium and high thresholds have been established with individual emergency action plans for each location. Because of the nature of flash flooding, there is little time for flood warning and evacuation is often not a feasible option. Notifications can be sent via an auto-dialer system (LETA911.org). The City also uses social media, a local cable TV channel and the website to provide information to the public. The City has a focused public outreach effort to help residents and businesses know in advance the steps that need to be taken when a flood happens.

Natural and Beneficial Functions of the Floodplain

The City of Fort Collins recognizes the natural and beneficial functions of the floodplain. For example 66% of the Poudre River 100-year floodplain has been preserved as open space. Much of that area is managed by the City's Natural Areas program to provide beneficial habitat. These large open areas were extremely helpful in the September 2013 flood where flood water was allowed to spread out and slow down and not cause damages. The City continues to acquire new open space properties and rehabilitate areas to allow for better connectivity to the floodplain.

Fire – Wildland

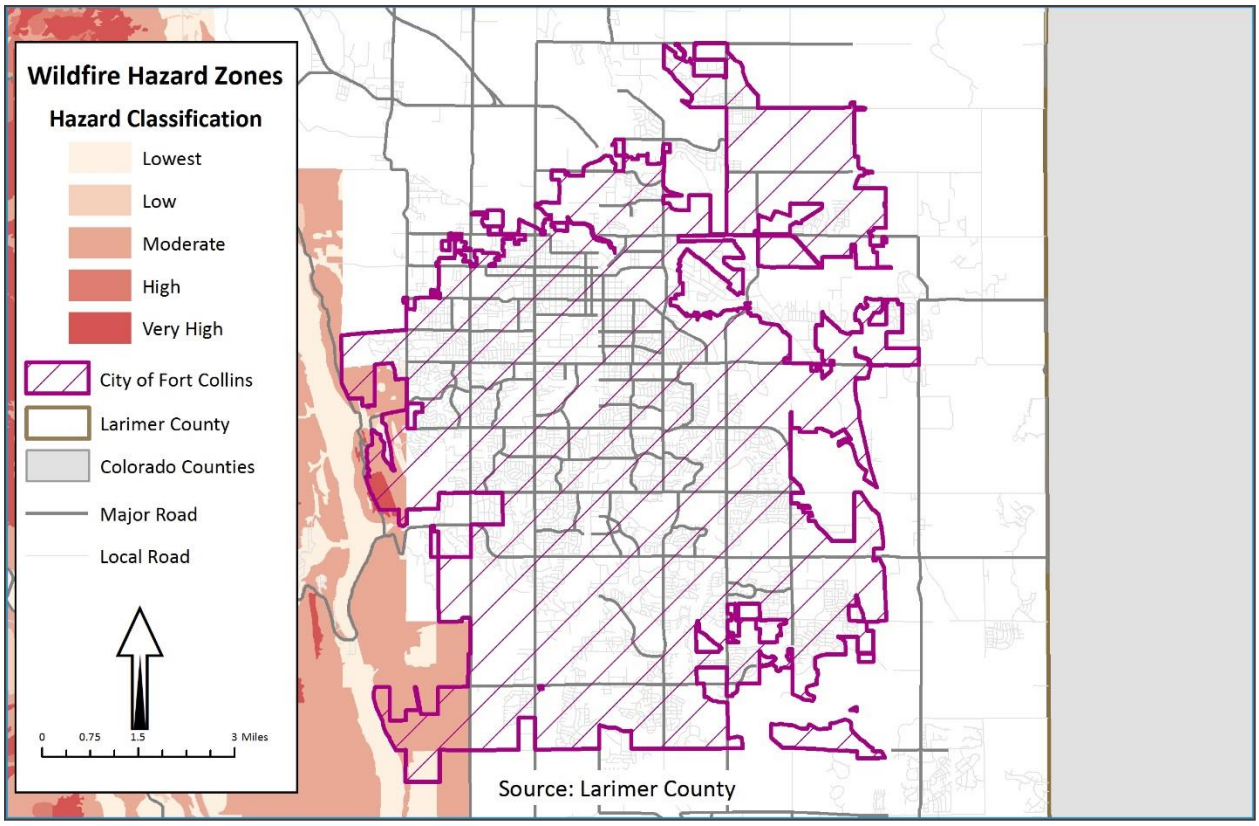
Previous Occurrences

According to NOAA's Storm Events Database there have been no reported wildfire events in the City of Fort Collins. Based on the historic data showing hazardous impacts on Larimer County, there is potential for wildfire events to occur at any given time in the city.

Inventory Exposed

The following Wildfire Hazard Zone map identifies the expected wildfire behavior. The highest wildfire hazard zones in the district are located in the western region, in areas where there are lower population densities.

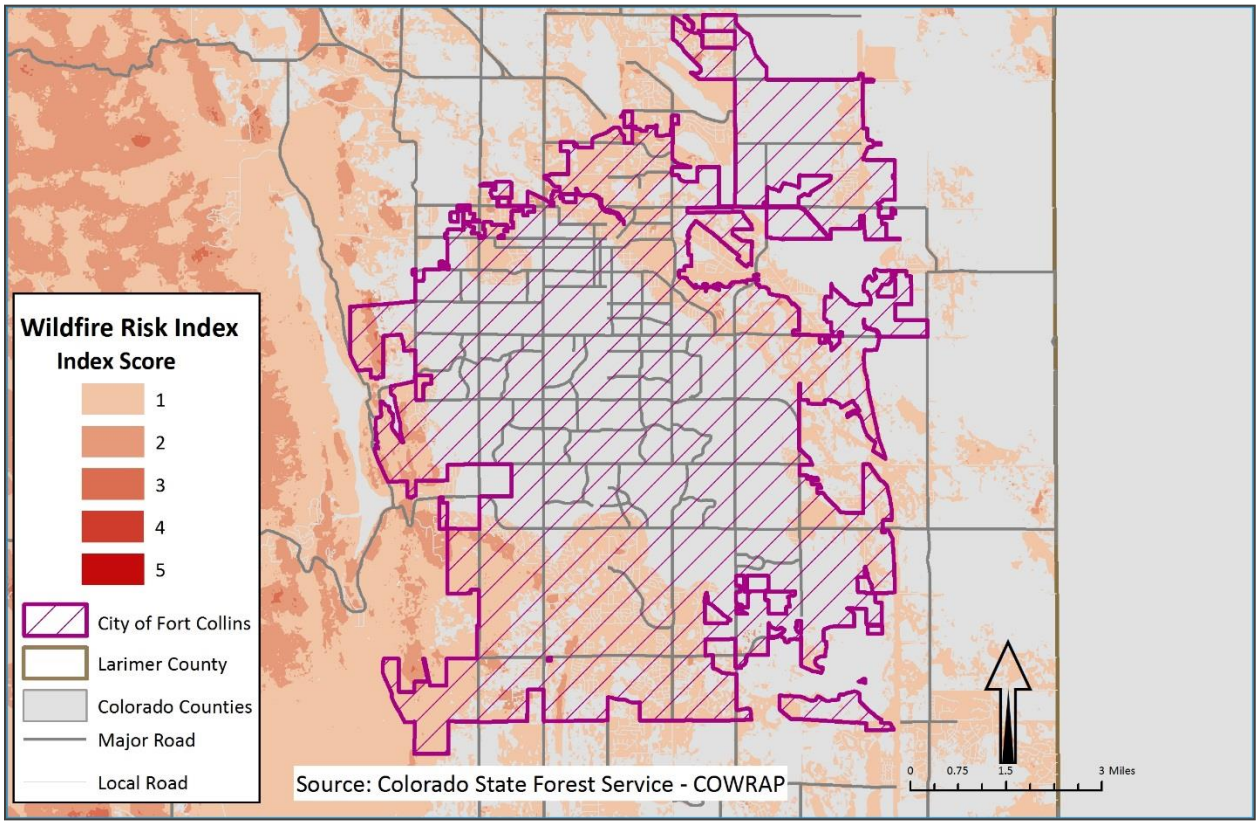
City of Fort Collins Wildfire Hazard Zone Map[139]



The following Wildfire Risk map identifies areas with the greatest potential impacts from a wildfire, in other words, those areas most at risk. The highest wildfire risk areas in the district are located in the southern and western and regions, in areas where there are lower population densities.

[139] To be used to identify wildfire hazards within the Wildfire Mitigation Area. The hazards are determined according to the Wildfire Hazard Area Mapping (WHAM) guidelines.

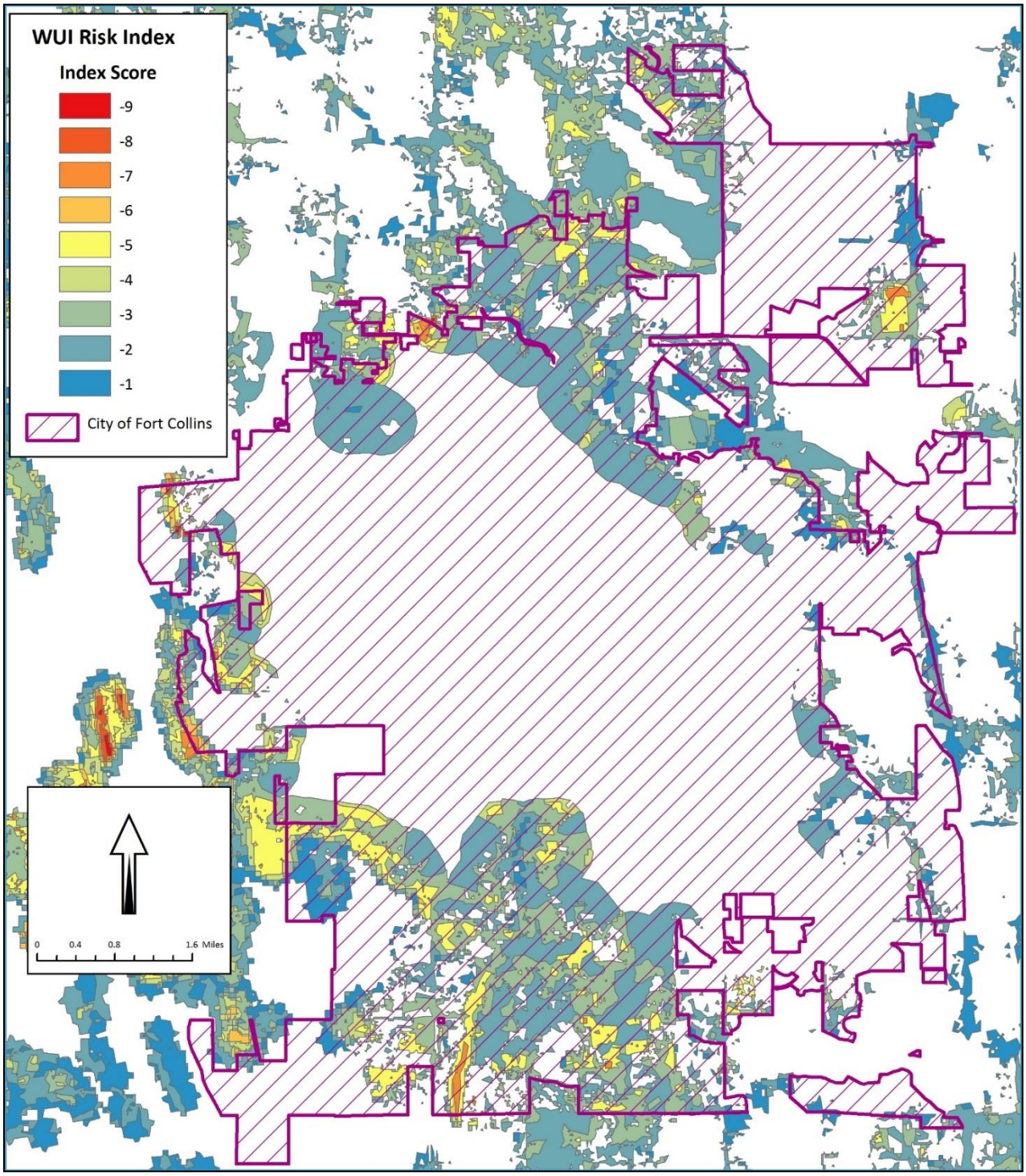
City of Fort Collins Wildfire Risk Index Map[140]



There are areas in the western and northwestern regions of the district that are within the medium to highest level on the WUI Risk Index Scale. This means that the potential impact on people and homes from a wildfire in those areas is medium to high in relationship to the rest of Larimer County. This level of risk is derived by combining housing density with predicted flame length.

[140] Wildfire Risk represents the possibility of loss or harm occurring from a wildfire. Risk is derived by combining wildfire threat and fire effects. The COWRAP dataset was produced statewide and ranks areas on a scale that includes: lowest risk to highest risk.

City of Fort Collins WUI Map[141]



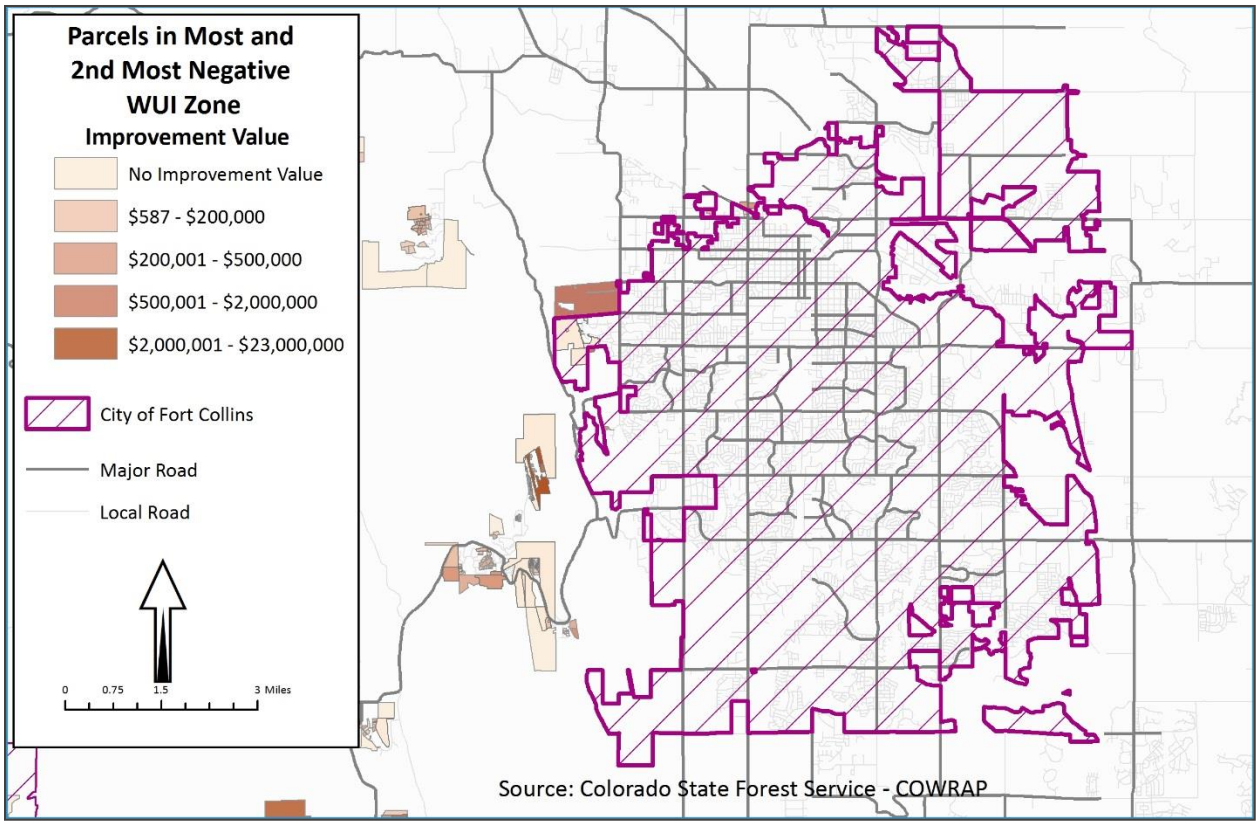
Fires can extensively impact the economy of an affected area, including the agricultural, recreation and tourism industries, water resources, and the critical facilities upon which the City of Fort Collins depends. There are areas of high and medium wildfire threat in the western portion of the city according to the WUI Risk Index.

Potential Losses

The exposure data provided in the previous section (Inventory Assets Exposed) provides the clearest picture of potential losses to wildfire in the City of Fort Collins. There are no critical facilities located in areas with the *most negative* and 2 critical facilities located in areas with the *2nd most negative* wildfire threat total. The appraisal value of the critical facilities within the *2nd most negative* threat areas is approximately $26.5 million dollars. There are 7 parcels/structures located in areas with the *most negative* and 11 parcels/structures located in areas with the *2nd most negative* wildfire threat total. The appraisal value of the parcels/structures within these *most and 2nd most negative* threat areas is over $24 million dollars. The risk assessment uses worst case scenario loss estimates. For this reason it is important to plan for relative levels of loss rather than specific potential loss dollar amounts.

[141] Wildland Urban Interface (WUI) Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length. The COWRAP data set was produced statewide and ranks areas on a scale that includes: least negative to most negative impacts. This scale stretched from -1 (least) to -9 (most) statewide.

City of Fort Collins Parcels in the Most Negative and Second Most Negative WUI Zone[142]



Probability of Future Occurrences

The likelihood of wildfires attaining significant size and intensity is unpredictable and highly dependent on environmental conditions and firefighting response. Weather conditions, particularly drought events, increase the likelihood of wildfires occurring. That said, it is important to note that 98% of wildfires are human-caused. Ultimately, the occurrence of future wildfire events will strongly depend on patterns of human activity and events are more likely to occur in wildfire-prone areas experiencing new or additional development.

Wildfires can occur at any time of day and during any month of the year. Moreover, the length of a wildfire season and/or peak months may vary appreciably from year to year. As evidenced by the wildfire risk assessment, areas within the City of Fort Collins that are characterized by dense development and single family homes along the wildland-urban interface are most vulnerable to wildfire.

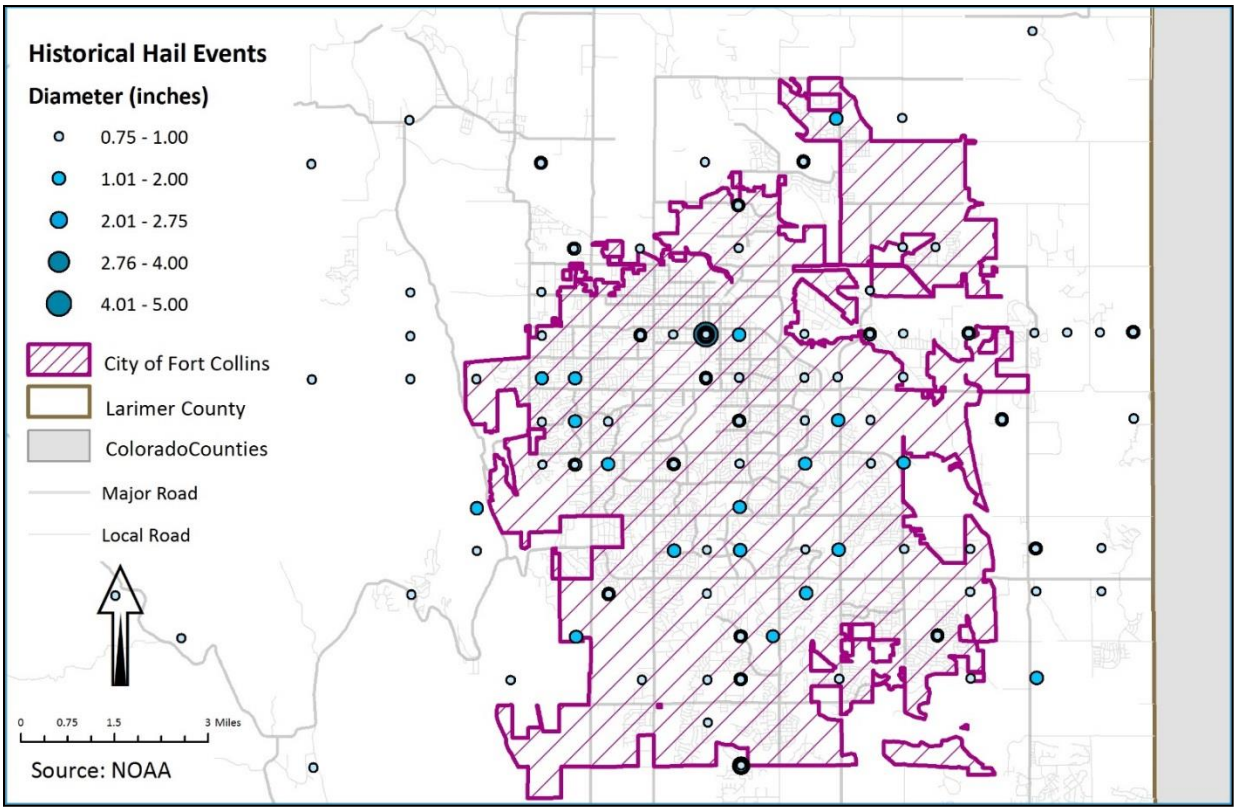
[142] Wildland Urban Interface Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length.

Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)

Previous Occurrences

According to NOAA's Storm Events Database there are no reported deaths and 1 reported injury in the City of Fort Collins due to hail. There have been 149 hail events reported in the City of Fort Collins between 1955 and 2014. Of the 149 incidents, 3 reported losses totaling $10,000. Based on the historic data showing hazardous impacts on the city, there is a great potential for hail events to occur at any given time.

Historical Hail Events in the City of Fort Collins[143]



According to NOAA's Storm Events Database there have been 2 injuries and no deaths in the City of Fort Collins due to thunderstorm wind. There have been 22 thunderstorm wind events reported in the City of Fort Collins between 1955 and 2014. Of the 22 incidents, 1 reported property losses totaling $25,000 and no crop losses. Based on the historic data showing hazardous impacts on the city, there is a great potential for hail events to occur at any given time.

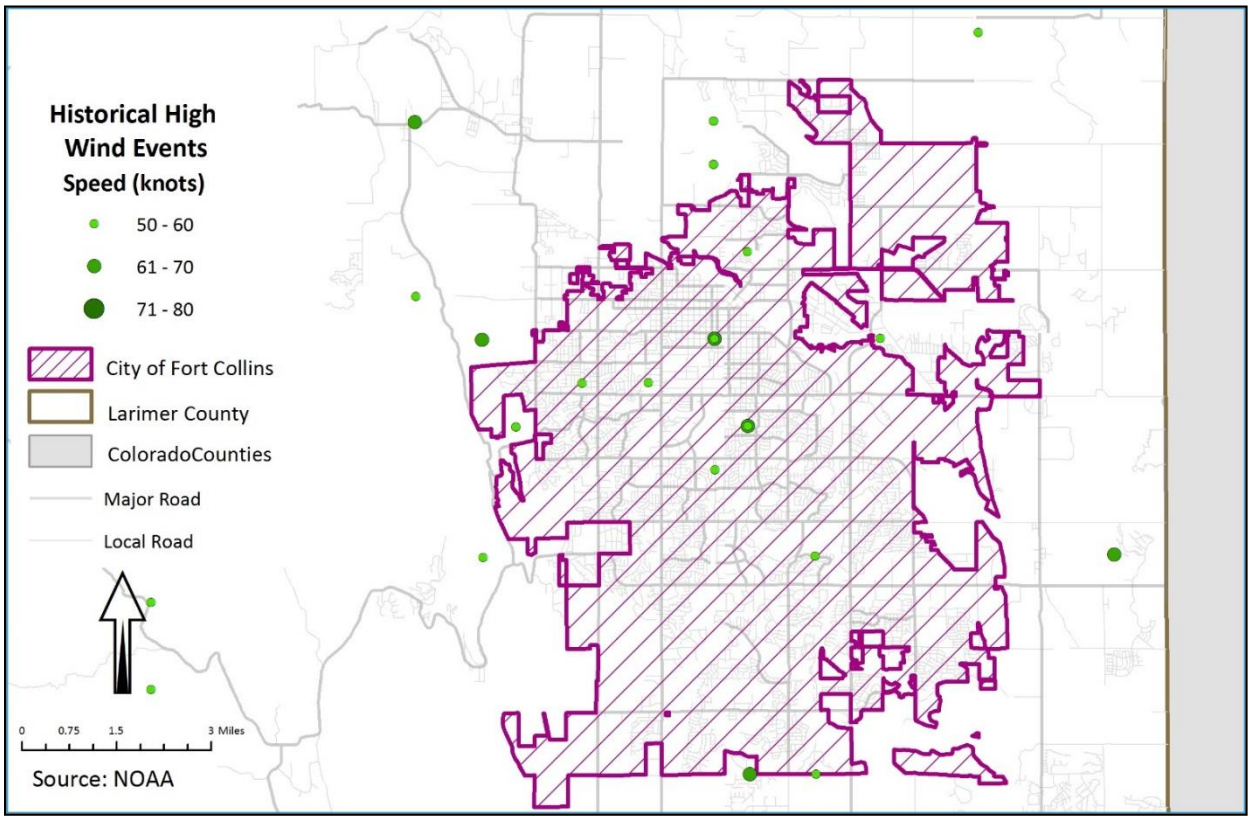
According to NOAA's Storm Events Database there have been 18 lightning events in the City of Fort Collins between 1996 and 2014. There have been 4 reported injuries, 2 deaths, $108,000 worth of property

[143] Source: NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

damage, and $5,000 worth of crop damage. Based on the historic data showing hazardous impacts on the city, there is a great potential for high wind events to occur at any given time.

According to NOAA's Storm Events Database there have been 35 Windstorm events in Larimer County between 1996 and 2014. There have been 2 reported injuries, 0 deaths, $9,000 in reported loss. Based on the historic data showing hazardous impacts on the city, there is a great potential for high wind events to occur at any given time.

Historical High Wind Events in the City of Fort Collins[144]



Inventory Exposed

All assets located in the City of Fort Collins can be considered at risk from spring and summer storms. This includes 143,986 people, or 100% of the City's population, and all buildings and infrastructure within the district. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the City's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

[144] Source: NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

Inventory assets exposed to severe wind is dependent on the age of the building, type, construction material used, and condition of the structure. Possible losses to critical infrastructure include:

- Electric power disruption
- Communication disruption
- Water and fuel shortages
- Road closures
- Damaged infrastructure components, such as sewer lift stations and treatment plants
- Damage to homes, structures, and shelters

Potential Losses

Spring and summer storms affect the entire planning area of the City of Fort Collins including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Severe storms will remain a highly likely occurrence for the City of Fort Collins. It is likely that lightning and hail will also be experienced in the area due to such storms.

Generally, straight-line wind events destroy private, commercial, and public property. Additional costs stem from debris removal, maintenance, repair, and response. Indirect costs include loss of industrial and commercial productivity as a result of damage to infrastructure, facilities, or interruption of services. Because no specific, countywide loss estimation exists for wind, potential losses are related to historical property damage and injuries/deaths.

Probability of Future Occurrences

Spring and summer storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past spring and summer events provide benchmarks for projecting similar conditions into the future. The probability that City of Fort Collins will experience a spring or summer storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the City of Fort Collins at least once every year.

Reported straight-line wind events over the past nineteen years provide an acceptable framework for determining the future occurrence in terms of event. The probability of the City of Fort Collins experiencing a severe wind event associated with damages or injuries can be difficult to quantify, but based on historical record of 35 severe wind events since 1996, there is a high chance of this type of event occurring each year.

Capabilities Assessment

The capability assessment examines the ability of the City of Fort Collins to implement and manage the comprehensive mitigation strategy laid out in this Plan. The strengths, weaknesses, and resources of the community are identified here as a means for evaluating and maintaining effective and appropriate management of the City's hazard mitigation program.

Local Personnel

The ability of a community to implement a comprehensive mitigation strategy depends, in part, on available resources, including people and staff. The following table outlines the City's capabilities as they relate to key personnel.

	Full Time	Part Time	None or Not-Identified
Emergency Manager	X		
Floodplain Administrator	X		
Community Planner	X		
GIS Specialist	X		
Grant Writer	X		

Land Use Planning and Codes

Local land use plans and building codes are tremendous tools for evaluating local policies related to hazard mitigation and risk reduction. Additionally, comprehensive master plans, capital improvement plans, stormwater plans and zoning ordinances all present opportunities for enhanced local capabilities. The following table outlines the city's current capabilities as they relate to land use planning and codes.

	Yes (Y); No (N)
A zoning ordinance	Y
A hazard-specific ordinance	Y
Local building codes	Y
A Comprehensive Plan / Master Plan	Y
A Capital Improvements Plan	Y
A Stormwater Plan	N
A Continuity of Operations Plan (COOP)	Y
An Emergency Operations Plan (EOP)	Y
A Long-Term Recovery Plan	Y
Participates in the NFIP	Y

Building codes are one tool that communities use to enhance public safety. For example, they can increase structural integrity, mitigate structure fires, and provide benefits in relation to natural hazard avoidance. In Colorado, land use regulations and building codes are typically implemented at the local level. Even without a statewide mandate, most counties and many municipalities have enacted regulations and

codes. The City of Fort Collins has adopted a local building code requirement, demonstrating their understanding of the benefits codes provide, including reduced exposure to hazards.

Plan Maintenance and Implementation

Fort Collins has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the city will continue public participation in the plan maintenance process.

Jurisdiction	Plan Maintenance and Implementation Strategy
City of Fort Collins	*"The plan will have an annual report that is made public and presented to the City Council."* *"As part of the City's Budgeting for Outcomes process, priorities will be reviewed and any new mitigation strategies will be incorporated."* *"Annual review of the HMP as part of Utilities Director Work Plan. Partnership with Office of Emergency Management for presentment to City Council"* *"Any changes to the Plan will include public meetings and postings on various websites to keep the public informed and to allow for public review and comment."* *"The City of Fort Collins continually produces reports on many of the programs that occur within our jurisdiction. These annual reports, workshops and other meetings allow for the opportunity to educate the public on the plans and actions; as well as allow the opportunity for public input."* *"As part of any mitigation project there is an extensive public outreach process including public open houses, newsletters, web pages, etc. Public awareness outreach related to flooding is an ongoing project that provides an opportunity for the public to be more informed on the risks, property protection measures, life-safety issues, etc."*

Integrating Hazard Mitigation into Local Planning

Through discussions at planning meetings and the use of an online survey, individual outreach, and phone calls, each participating jurisdiction brainstormed with the planning team to identify processes for integrating hazard mitigation into their local planning mechanisms and policies. The following table lists the specific integration strategy identified by the City of Fort Collins based on the mitigation actions listed in this plan.

Jurisdiction	Strategy
City of Fort Collins	*"The City of Fort Collins has a variety of plans that overlap with the HMP. This includes the Social Sustainability Strategic Plan, Economic Health Strategic Plan,*

	Debris Management Plans, Evacuation Plans and other emergency operation plans to name a few. When the HMP is approved by Colorado, FEMA and the City of Fort Collins, these action items will be cross referenced with the other appropriate plans and incorporated into them." *"We will continue to review our mitigation actions as part of the Budgeting for Outcomes process that prioritized projects. Public outreach related to flooding is reviewed annually as part do the City's Program for Public Information. Hazard mitigation is the key focus of any Stormwater Master Plan updates that will take place during the next 5 years."*

Mitigation Action Guides

The following Mitigation Action Guides present the City's mitigation actions that were developed for the 2016 Plan. It is important to note that the mitigation actions included in this section include a wide-range of Stormwater actions from regulatory, to education, to capital improvements. Moreover, the mitigation actions identified by Fort Collins Stormwater cover all six of the CRS activities outlined on Page 510-20 of the CRS Manual.

In addition to the mitigation actions listed below, there are a number of possible mitigation actions/focus areas that the City of Fort Collins discussed but decided not to include in the 2016 HMP. There are as follows:

- Natural Areas
- Keeping trails and access roads clear of debris and accessible
- Creating now lines along boundaries that contain high values at risk
- Implementing forest mitigation practices on existing or newly acquired properties
- Purchase of additional hand held radios
- Additional ICS, disaster preparedness, emergency operation courses
- Appropriation of proper PPE for Natural Areas fire crew members
- Acquisition of a Type 6 Wildland Brush Rig for the Natural Areas Department

By recording these emerging ideas in the 2016 Hazard Mitigation Plan, the City of Fort Collins hopes to keep them on the radar for City Council, and for future planning, HMP updates, and grants.

City of Fort Collins: Boxelder Basin Regional Stormwater (Fort Collins – 1)	
PRIORITY: High	HAZARDS ADDRESSED: Flood
LOCATION: Project location	GOALS ADDRESSED: Protect people, property and natural resources; Improve capability to reduce disaster losses
RECOMMENDATION DATE: 08/31/2009	OBJECTIVES ADDRESSED: Reduce the vulnerability of local assets to the impact of hazards; Continue to collaborate with area partners through mutual aid agreements and long-term planning efforts
TARGET COMPLETION DATE: 04/30/2016	

ISSUE: Early in 2005, stormwater planners in northern Larimer County took a holistic approach to addressing flood hazard and stormwater drainage problems in the Boxelder Creek watershed. The current BBRSA members have been working together for over 8 years. This watershed or basin encompasses over 265 square miles and extends from just north of the Wyoming border to the Poudre River on the south. Because the Boxelder Creek floodplain affects many property owners and several local governments, intensive efforts were made to develop a regional flood hazard mitigation plan. It should be noted that Coal Creek and Indian Creek both feed into Boxelder Creek near the Town of Wellington. The communities of Fort Collins, Wellington, Timnath, Windsor, and Larimer County all shared a common goal in mitigating the flood hazard posed by Boxelder Creek. The Alliance was formed in early 2005 to develop a "regional" solution that is more efficient, wide ranging and cost effective than the entities could develop independently.

It was determined that the best approach to basin wide flood hazard mitigation would be to prepare a common plan for flood mitigation improvements within the Basin. Members of the Alliance pooled funding to prepare a storm water Master Plan for the Boxelder Basin. The resulting Boxelder Creek Regional Stormwater Master Plan (Master Plan) was completed in October 2006.

RECOMMENDATION: The Boxelder Creek Master Plan developed a list of conceptual regional stormwater improvement projects and recommended the formation of a Stormwater Authority to fund and implement the regional stormwater improvements.

ACTION: The original Master Plan recommended the following Boxelder Creek Regional Stormwater Master Plan Phase I regional stormwater projects:

- Diversion of Coal Creek to Clark Reservoir
- Edson (East Side) Detention Reservoir
- Middle Boxelder Creek Stream Improvements
- Larimer and Weld Crossing Structure.

The Diversion of Coal Creek to Clark Reservoir (later known as the Coal Creek Flood Mitigation Project) was designed and construction completed by the BBRSA in cooperation with Larimer County in 2011. The project diverts stormwater flows from Coal Creek (which is tributary to Boxelder Creek) into the Clark Reservoir Inlet Canal and ultimately into Clark Reservoir.

Revisions were necessary to the master plan improvements due to site constraints and location of the detention facility, improvements to County Road 52 and the addition of the Town of Timnath as a financial partner to the BBRSA. The updated regional stormwater projects consist of:

- East Side Detention Facility

- Larimer Weld Canal Crossing Structure
- County Road 52 Improvements

Construction of the projects is phased. The East Side Detention Facility/County Road 52 Improvements began construction in August 2015 at a total cost of approximately $7.5 million. The Larimer Weld Canal Crossing Structure construction will begin in October2015 at a cost of approximately $650,000. All construction is scheduled for completion by early 2016.

LEAD AGENCY: Boxelder Basin Regional Stormwater Authority (BBRSA) – Established by IGA between Fort Collins, Larimer County and Wellington.	EXPECTED COST: Total of $19 million.
SUPPORT AGENCIES: N/A	POTENTIAL FUNDING SOURCES: BBRSA stormwater service and system development fees, FEMA grant funding, Timnath financial contributions toward the ESDF and CR52 Improvements, and some CR 52 Improvements funding from Fort Collins, Larimer County and Timnath.

PROGRESS MILESTONES:

Construction of ESDF began in August, 2015. Construction of LWCCS is targeted to begin after the irrigation season ends in October. Construction of County Road 52 Improvements began in September, 2015. All construction is targeted to be completed by early 2016. Letter of Map Revisions (LOMR's) will be submitted to FEMA in early 2016.

City of Fort Collins: Flood Warning System (FWS) Enhancements (Fort Collins – 2)	
PRIORITY: High	HAZARDS ADDRESSED: Flood, Severe Storm, Wind & Tornado
LOCATION: Poudre River, Halligan reservoir, City USC Facility, PFA EOC Facility	GOALS ADDRESSED: Protect people, property and natural resources; Improve capability to reduce disaster losses; Strengthen communication and coordination among public agencies, non-governmental organizations, businesses, and citizens
RECOMMENDATION DATE: 06/2015	OBJECTIVES ADDRESSED: Reduce the vulnerability of local assets to the impact of hazards
TARGET COMPLETION DATE: 05/2016	
ISSUE: Updating and expanding the technology component of the City's real-time flood recognition and response FWS solution	
RECOMMENDATION: Gage and communications infrastructure upgrades and new data management software acquisition	
ACTION: The City will upgrade its FWS telemetry and base station data management software and adding three gages to further expand its existing network of 75 locations.	
LEAD AGENCY: City of Fort Collins – Stormwater Utility	EXPECTED COST: $142,900 for hardware and software
SUPPORT AGENCIES: FEMA, Colorado DHSEM	POTENTIAL FUNDING SOURCES: FEMA HMGP grant award, 12.5% match from CO DHSEM, 12.5% match from City of Fort Collins
PROGRESS MILESTONES: Software acquisition, installation and setup, telemetry upgrading, and three new gage installations to be completed by May 2016.	

City of Fort Collins: East Vine Drive Property Acquisition (Fort Collins – 3)	
PRIORITY: High	HAZARDS ADDRESSED: Flood
LOCATION: East Vine Drive, Fort Collins	GOALS ADDRESSED: Protect people, property and natural resources; Improve capability to reduce disaster losses
RECOMMENDATION DATE: 9/2015	OBJECTIVES ADDRESSED: Reduce the vulnerability of local assets to the impact of hazards
TARGET COMPLETION DATE: 9/2018	
ISSUE: Structures in the Poudre River Floodway	
RECOMMENDATION: Acquisition, Deconstruction and Removal of Structures	
ACTION: The City of Fort Collins is proposing to purchase, demolish or relocate four (4) properties located along East Vine Drive in north Fort Collins, CO. The properties are located within the 100-year 1-foot floodway (Zone AE) floodplain for the Cache la Poudre River, and were subject to flooding in the September 2013 flood on the Poudre River.	
LEAD AGENCY: City of Fort Collins – Stormwater Utility	EXPECTED COST: $1.1 million
SUPPORT AGENCIES: FEMA, Colorado DHSEM	POTENTIAL FUNDING SOURCES: FEMA HMGP grant award, 12.5% match from CO DHSEM, 12.5% match from City of Fort Collins
PROGRESS MILESTONES: Property Acquisition by spring of 2016, property deconstruction completed by spring of 2017, site restoration and final completion in spring of 2018.  	

City of Fort Collins: Green Infrastructure policies and outreach (Fort Collins – 4)	
PRIORITY: High	HAZARDS ADDRESSED: Flooding
LOCATION: City of Fort Collins	GOALS ADDRESSED: Protect people, property, and natural resources; Increase public awareness of natural hazards and mitigation options;
RECOMMENDATION DATE: 1/1/2015	OBJECTIVES ADDRESSED: Incorporate risk reduction principles into policy documents and initiatives; Reduce the vulnerability of local assets to the impact of hazards
TARGET COMPLETION DATE: 12/31/2019	
ISSUE: Reduce Flooding by widening the policies that require green infrastructure, improving technologies used, increasing alternatives that can be used, improving available incentives, increasing awareness and mitigation by City agencies and the public	
RECOMMENDATION: Improved specifications, better technical details, easier access	
ACTION: Enhancement of Green Infrastructure policies through incentives, outreach, and technical support for implementation	
LEAD AGENCY: City of Fort Collins – Stormwater Utility	EXPECTED COST: $300,000/year
SUPPORT AGENCIES: City of Fort Collins Customer Connections Department	POTENTIAL FUNDING SOURCES: Fort Collins Utilities, EPA, Grants
PROGRESS MILESTONES: New construction details by end of 2016, new incentives in 2017, ongoing outreach efforts.	

City of Fort Collins: Low Impact Development Retrofits (Fort Collins – 5)	
PRIORITY: High	HAZARDS ADDRESSED: Flooding
LOCATION: City of Fort Collins	GOALS ADDRESSED: Protect people, property and natural resources; Improve capability to reduce disaster losses
RECOMMENDATION DATE: 12/2013	OBJECTIVES ADDRESSED: Reduce the vulnerability of local assets to the impact of hazards
TARGET COMPLETION DATE: 12/2018	
ISSUE: Improve water quality, Reduce Urban Flooding and Enhance community resiliency by retrofitting green infrastructure into existing City regional drainage facilities	
RECOMMENDATION: Incorporated into Drainage Master Plan Updates approved by Water Board and City Council	
ACTION: Retrofitting of Green Infrastructure facilities into existing regional facilities pub	
LEAD AGENCY: City of Fort Collins – Stormwater Utility	EXPECTED COST: Varies from project to project can range from S25 K to $200K
SUPPORT AGENCIES: City of Fort Collins Parks, City of Fort Collins Natural Areas	POTENTIAL FUNDING SOURCES: Fort Collins Utilities, City of Fort Collins Parks and Recreation, Fort Collins Sustainability Services, Grants
PROGRESS MILESTONES: Adoption of Master Plan Updates in 2013, construction as budget allows.	

City of Fort Collins: Water Reclamation and Biosolids- Improvement in Processes and Infrastructure (Fort Collins – 6)	
PRIORITY: Medium	HAZARDS ADDRESSED: All
LOCATION: Drake Water Treatment Facility-3036 Environmental Dr.	GOALS ADDRESSED: 1
RECOMMENDATION DATE: 10/09/2015	OBJECTIVES ADDRESSED: E
TARGET COMPLETION DATE: 12/31/2018	
ISSUE: Critical operations of the Fort Collin's Water Reclamation and Biosolids Facilities could be disrupted in the case of unplanned environmental emergencies, critical equipment failures, or loss of power.	
RECOMMENDATION: Improvements to facility processes that would help ensure critical operations are maintained	
ACTION: • Increase on-site process water and biosolids storage capacity • Dewatering redundancy • On-site backup power generation unit.	
LEAD AGENCY: City of Fort Collins: Water Reclamation and Biosolids Division	EXPECTED COST: 30 million dollars for all three items. Backup power may be significantly higher.
SUPPORT AGENCIES: CDPHE, EPA, FEMA	POTENTIAL FUNDING SOURCES: Rate increased, Grants, Bonds, Third Party Financing
PROGRESS MILESTONES: • Design and build additional sludge holding tank capacity. • Design and build additional dewatering systems which may include additional centrifuges or screw presses. • Scope, design, and build additional redundancy back up power supply.	

City of Fort Collins: Water Reclamation and Biosolids- Improvement in Technology (Fort Collins – 7)	
PRIORITY: Medium	HAZARDS ADDRESSED: All
LOCATION: Drake Water Treatment Facility-3036 Environmental Dr.	GOALS ADDRESSED: 1
RECOMMENDATION DATE: 10/09/2015	OBJECTIVES ADDRESSED: E
TARGET COMPLETION DATE: 12/31/2018	
ISSUE: Critical operations of the Fort Collin's Water Reclamation and Biosolids Facilities could be disrupted in the case of unplanned environmental emergencies, critical equipment failures, or loss of power.	
RECOMMENDATION: Improvements to facility processes that would help ensure critical operations are maintained	
ACTION: • Improve collection system instrumentation and monitoring • Improve perimeter and building security technology	
LEAD AGENCY: City of Fort Collins: Water Reclamation and Biosolids Division	EXPECTED COST: 30 million dollars for all three items. Backup power may be significantly higher.
SUPPORT AGENCIES: CDPHE, EPA, FEMA	POTENTIAL FUNDING SOURCES: Rate increased, Grants, Bonds, Third Party Financing
PROGRESS MILESTONES: To be determined after more planning.	

City of Fort Collins: Training in Disaster Management Large Scale Incidents (Fort Collins – 8)	
PRIORITY: High	HAZARDS ADDRESSED: All
LOCATION	GOALS ADDRESSED: 1,2,3
RECOMMENDATION DATE: 1/1/2016	OBJECTIVES ADDRESSED: B C D
TARGET COMPLETION DATE: On Going	Continual Training
ISSUE: Poudre Fire Authority needs to expand their disaster management training from fire and wildland to all hazards. As an emergency response and rescue organization, expanding their scope in areas other than response will increase the community's capability to be more resilient.	
RECOMMENDATION: Increase training and knowledge in disaster management	
ACTION: • Additional training in ICS (Command Staff Positions) • Additional training in EOC Operations G775 • Additional training in Disaster Management Operations MGT 317, 343, 345 • Command and Control of Major Emergency Operations	
LEAD AGENCY: PFA Training Division	EXPECTED COST: $5000
SUPPORT AGENCIES: Fort Collins OEM	POTENTIAL FUNDING SOURCES: Annual Budget, EMPG
PROGRESS MILESTONES: Project is dependent on scheduling courses. All training will be captured and documented and followed up with exercises for feedback and retention of skills.	

City of Fort Collins: Downtown River District Storm Sewer Improvements (Fort Collins – 9)	
PRIORITY: High	HAZARDS ADDRESSED: Flood
LOCATION: Downtown Fort Collins area between Jefferson Avenue and the Cache la Poudre River	GOALS ADDRESSED: Protect people, property and natural resources; Improve capability to reduce disaster losses
RECOMMENDATION DATE: December 2015	OBJECTIVES ADDRESSED: Reduce the vulnerability of local assets to the impact of hazards
TARGET COMPLETION DATE: June2016	
ISSUE: This area of Fort Collins has old undersized storm sewers that do not meet current drainage standards nor have a proper outfall to the River.	
RECOMMENDATION: Install a new storm sewer system to improve the drainage and reduce flooding for storms up to and including the 100-year event and improve water quality for smaller more frequent storm events (2-year an d below).	
ACTION: Flooding in the streets and downtown properties	
LEAD AGENCY: City of Fort Collins – Stormwater Utility	EXPECTED COST: $3M to construct
SUPPORT AGENCIES:	POTENTIAL FUNDING SOURCES: Stormwater Utility Fee, Grants
PROGRESS MILESTONES: This project is in the final design phase and scheduled for construction in January 2016	

Fort Collins Utilities – Public Education and Awareness (Fort Collins – 10)

PRIORITY: Low - Medium	HAZARDS ADDRESSED: Drought, Extreme Temperatures, Flood, Severe Storm, Severe Winter Weather, Wildfire
LOCATION: Fort Collins, Colorado	GOALS ADDRESSED: 1, 3, 4
RECOMMENDATION DATE: December 2015	OBJECTIVES ADDRESSED: A, D
TARGET COMPLETION DATE: Ongoing	
ISSUE: To enhance our overall preparedness, City staff and the residential and business community members need access to ongoing education through awareness campaigns, events, public outreach, website, social media and education workshops.	
RECOMMENDATION: Continue to identify, promote and present education workshops, awareness campaigns and training opportunities for City staff, residents, non-profit organizations and business owners.	

ACTION(s):

Drought:

The Water Conservation Program provides the following to achieve optimal conservation:

- Rebates for low-flow showerheads, toilets, dishwashers, clothes washer and sprinkler equipment
- Sprinkler system irrigation audits
- Home efficiency and conservation tips on website, social media and web portal
- Low Income retrofit program
- Continuous Consumption program in collaboration with Leak Detection
- Raw water irrigation at City parks
- Home Water Reports
- Partnering on graywater legislation to use graywater in homes to encourage water reuse
- Public information campaign on conservation
- Adult and youth (schools) education programs
- Business programs
- Water conservation giveaways and awards
- Xeriscape rebates, plant lists, clinics and garden design assistance

Extreme Temperatures:

- Formalize guidance around actions the public can take to prepare for and respond to extreme heat
- Identify and characterize vulnerable areas and populations of Fort Collins
- Develop and implement a public awareness and outreach campaign that notifies citizens on how to get information, prepare for and respond to extreme temperatures, specifically heat.
- Promote low income assistance program to assist with utility bill payments
- Educate homeowners and builders on energy and water efficiency (e.g., how to protect water pipes by locating them on the inside of building insulation or keeping them out of attics, crawl spaces and vulnerable outside walls)
- Provide conservation and maintenance information for homeowners (e.g., by allowing a faucet to drip during extreme cold weather, you can prevent the buildup of excessive pressure in the pipe and avoid bursting)
- Promote web programmable thermostats for remote control of heat to prevent frozen pipes

Flood:

- Use outreach activities to share and collaborate with technical assistance programs that address measures that citizens can take to be safe and prepared
- Facilitate and manage funding for mitigation measures
- Encourage homeowners to install backflow valves to prevent reverse-flow flood damage
- Encourage residents in flood-prone areas to elevate new homes or flood-proof their home
- Educate community about the need, value and reduced premiums for flood insurance (due to the City's high Community Rating System level)
- Educate the public about securing debris, propane tanks, yard items or stored objects that may be swept away, damaged or pose a hazard if picked up and washed away by floodwaters
- Advise residents that keeping storm drains clear of debris during storms (not to rely solely on City maintenance crews) could help prevent flooding of their property
- Actively promote Flood Awareness Week during flood season with various messaging tactics, including bus benches, posters, flyers, brochures, website and social media campaigns
- Educate community about our two water sources and how we can close intakes into the treatment plant when water quality is affected thanks to early warning from sensors in the Poudre Canyon
- Use stormwater construction project communications as opportunities to educate the community about our stormwater infrastructure and long-range flood protection planning

Severe Storm:

- Use appropriate outreach tactics to share important updates and contact information
- Provide messaging on service outages and restore times on website and social media

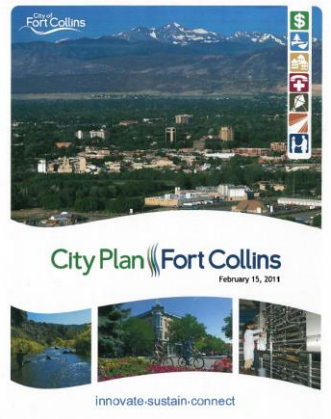
Severe Winter Weather:

- Provide messaging on service outages and restore times on website and social media
- Promote web portal where utility customers can monitor their water use (check for leaks)
- Educate homeowners about how to prevent frozen pipes

Wildfire:

- Provide messaging on website and social media, as well as youth education in schools, about how watersheds are managed to minimize wildfires in order to protect water quality
- Educate community about our two water sources and how we can close intakes into the treatment plant when water quality is affected by debris and runoff from a fire with early warning from sensors in the Poudre Canyon
- Facilitate and manage funding for mitigation measures

LEAD AGENCY: City of Fort Collins	EXPECTED COST: Most costs will be absorbed within existing annual budgeted line items, which currently supports 24 x 7 on-call communications support.
SUPPORT AGENCIES: Larimer County, Poudre Fire Authority, Fort Collins Police, LETA, United Way, American Red Cross, FEMA and other identified stakeholders and community response agencies as required to enhance overall knowledge and preparedness.	POTENTIAL FUNDING SOURCES: Annual budgets and mitigation grant opportunities.
PROGRESS MILESTONES: Continue to identify educational opportunities; pursue awareness campaigns; enhance the use of consumption data with our customers; enhance website and social media effectiveness; and track attendance at events.	

City of Fort Collins - Comprehensive Plan (City Plan) Update (Fort Collins – 11)	
PRIORITY: High	HAZARDS ADDRESSED: Drought, Land Subsidence, Extreme Temperatures, Flood, Severe Storm, Wind & Tornado, Fire, Public Health, Hazmat
LOCATION: City of Fort Collins	GOALS ADDRESSED: 1, 2, 3, 5
RECOMMENDATION DATE: 01/01/2017	OBJECTIVES ADDRESSED: A C D E
TARGET COMPLETION DATE: 06/31/2018	
ISSUE: Align updated City Plan policies and recommendations with the Hazard Mitigation Plan	
RECOMMENDATION: City Plan update process as part of Plan Fort Collins, which also includes the Transportation Master Plan update	
ACTION: Develop new City Plan policies and implementation action recommendations relating the Hazard Mitigation Plan	
LEAD AGENCY: City of Fort Collins – all Service areas	EXPECTED COST: $600,000 for consultant services, public outreach and administrative expenses
SUPPORT AGENCIES: NA	POTENTIAL FUNDING SOURCES: General Fund
PROGRESS MILESTONES: Review of Plan draft sections including policy and implementation in 2018.	

City of Fort Collins: Magnolia Storm Sewer (Fort Collins – 12)	
PRIORITY: High	HAZARDS ADDRESSED: Flood
LOCATION: Old Town Fort Collins area along Magnolia Street to the Cache la Poudre River	GOALS ADDRESSED: Protect people, property and natural resources; Improve capability to reduce disaster losses
RECOMMENDATION DATE: 2017	OBJECTIVES ADDRESSED: Reduce the vulnerability of local assets to the impact of hazards
TARGET COMPLETION DATE: 2019	
ISSUE: This area of Fort Collins has old undersized storm sewers that do not meet current drainage standards nor have a proper outfall to the River.	
RECOMMENDATION: Install a new storm sewer system to improve the drainage and reduce flooding for storms up to and including the 100-year event and improve water quality for smaller more frequent storm events (2-year an d below).	
ACTION: Design and construct new storm sewer	
LEAD AGENCY: City of Fort Collins – Stormwater Utility	EXPECTED COST: $22M
SUPPORT AGENCIES: CDOT, CWCB, FEMA	POTENTIAL FUNDING SOURCES: Stormwater Utility Fee, Grants
PROGRESS MILESTONES: Start design of this project in 2016 so that construction can be begin in 2017. This is a two phase project that will start at the downstream end (outfall to the Cache la	

Poudre River) then work its way upstream.

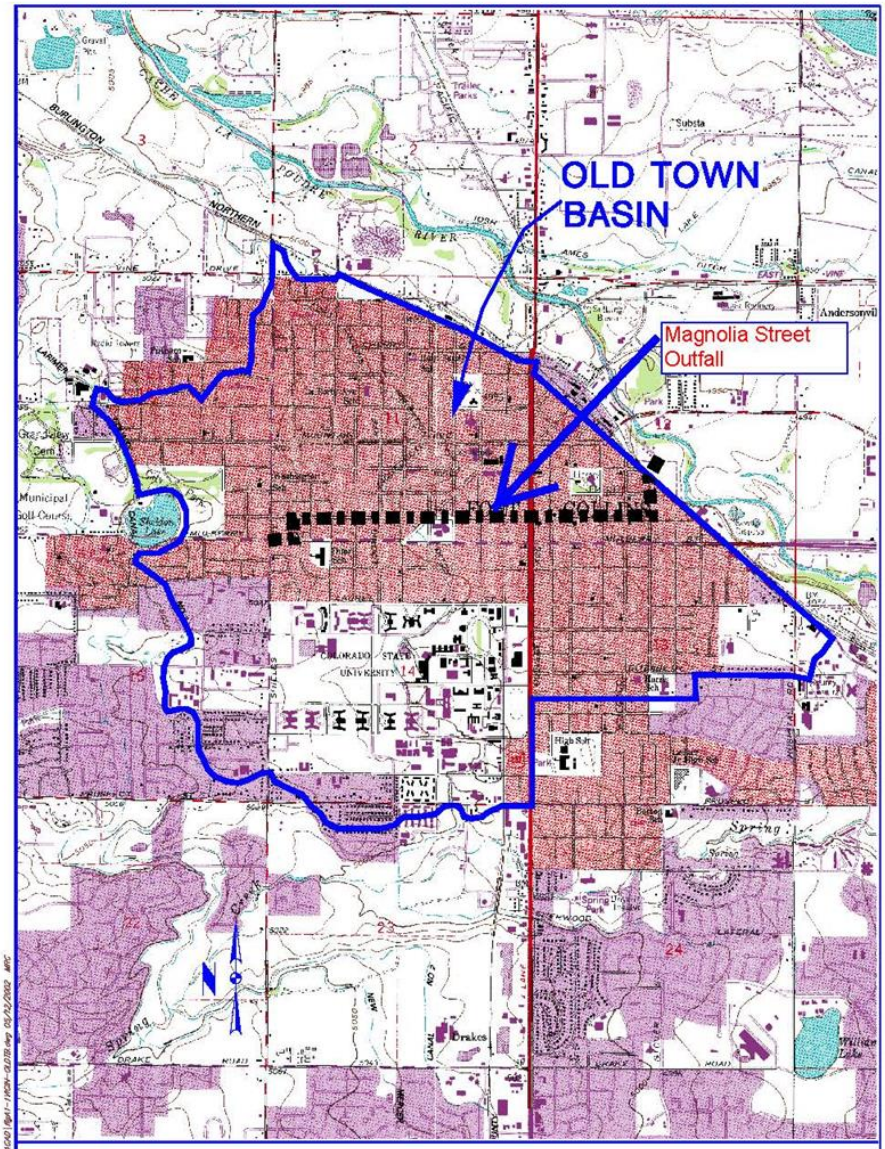


Figure R1.1 Vicinity Map for the Old Town Basin

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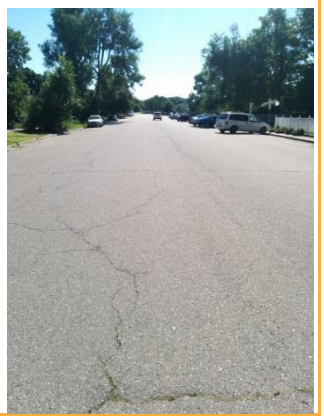
City of Fort Collins: Stormwater Master Planning (Fort Collins – 13)	
PRIORITY: High	HAZARDS ADDRESSED: Flood
LOCATION: Throughout the City	GOALS ADDRESSED: Protect people, property and natural resources; Improve capability to reduce disaster losses; Integrate hazard mitigation into other planning mechanisms
RECOMMENDATION DATE: 2015	OBJECTIVES ADDRESSED: Incorporate risk reduction principles into policy documents and initiatives, other institutional plans; Reduce the vulnerability of local assets to the impact hazards
TARGET COMPLETION DATE: 2020 (ongoing)	
ISSUE: The majority of the City's Master Plans were modeled using MODSWM software. This software is outdate and does provide robust dynamic hydrologic modeling.	
RECOMMENDATION: The City is updating the hydrology in all the Master Plans to be converted to EPA SWM.	
ACTION: Update master plans to EPA SWM.	
LEAD AGENCY: City of Fort Collins – Stormwater Utility	EXPECTED COST: $1M over a 5 year period
SUPPORT AGENCIES: Larimer County	POTENTIAL FUNDING SOURCES: Stormwater Utility Fee
PROGRESS MILESTONES: Revise one basin per year until all the master plans are updated.	

City of Fort Collins: Mulberry-Riverside Stormwater Project (Fort Collins – 14)	
PRIORITY: High	HAZARDS ADDRESSED: Flood
LOCATION: Riverside Avenue & Myrtle Street, Fort Collins	GOALS ADDRESSED: Protect people, property and natural resources; Improve capability to reduce disaster losses
RECOMMENDATION DATE: 09/15/2015	OBJECTIVES ADDRESSED: Reduce the vulnerability of local assets to the impact of hazards
TARGET COMPLETION DATE: 09/15/2018	
ISSUE: The purpose of this stormwater collection system is to mitigate flooding, property damage, and threats to life and infrastructure caused by rainfall driven flood events in the Old Town Basin in Fort Collins, CO.	
RECOMMENDATION: Feasibility study and infrastructure emplacement to be performed by City of Fort Collins Stormwater Utility and Capital Projects Group	
ACTION: New collection and conveyance structures, piping, and outfall improvements will reduce the number of homes subject to floodwaters in the area.	
LEAD AGENCY: City of Fort Collins – Stormwater Utility	EXPECTED COST: $2.5 Million
SUPPORT AGENCIES: FEMA, Colorado DHSEM	POTENTIAL FUNDING SOURCES: FEMA HMGP Grant Award, CO-DHSEM 12.5% match, City of FC 12.5% match
PROGRESS MILESTONES: Grant Award for Project Received September 2015, Phase I Feasibility April 2016, Project Construction complete Major project milestones and reporting of current project status.	





City of Fort Collins: Electric Supply (Fort Collins – 15)	
PRIORITY: Medium	HAZARDS ADDRESSED: Outages to the electric supply, Drought, Earthquake, Land Subsidence, Extreme Temperatures, Flood, Severe Storm, Wind & Tornado, Fire, Public Health, Hazmat
LOCATION: Areas throughout County and on city/county vehicles	GOALS ADDRESSED: 1, 2, 3, 4, 5
RECOMMENDATION DATE: 11/012015	OBJECTIVES ADDRESSED: : A, D, E
TARGET COMPLETION DATE: Continual	
ISSUE: Communication and Information shared with citizens within the area.	
RECOMMENDATION: Utilize banners hanging in cities and surrounding area to spread the information of potential risks. Also utilize vehicles such as buses and work trucks to spread the word. Information could contain things such as where to go to get information on suggested items for a "Go Bag", (banners are hung in Fort Collins yearly for reminders such as "Flood Awareness Week", "Mosquitos", other potential risks could be advertised to make people aware.	
ACTION: Coordination of hanging of banners in different areas and/or making of signs for use on vehicles.	
LEAD AGENCY: Larimer County	EXPECTED COST: $50,000
SUPPORT AGENCIES: City of Loveland, City of Estes Park, City of Fort Collins, Wellington, Timnath, Red Feather	POTENTIAL FUNDING SOURCES: Grants, future budgets.
PROGRESS MILESTONES:  	

City of Fort Collins: Electric Distribution (Fort Collins – 16)	
PRIORITY: High	HAZARDS ADDRESSED: Outages to the electric distribution, Extreme Temperatures, Flood, Severe Storm, Wind & Tornado, Fire, Public Health, Hazmat
LOCATION: City of Fort Collins	GOALS ADDRESSED: 1, 2
RECOMMENDATION DATE:11/01/2015	OBJECTIVES ADDRESSED: C, D, E
TARGET COMPLETION DATE: Unknown	Dependent on financing.
ISSUE: Enhanced coverage of infrastructure maintenance of the City of Fort Collins L&P. (Add another full time maintenance crew)	
RECOMMENDATION: Fully staff another full-time maintenance crew within L&P to perform maintenance and follow up to resolve issues encountered.	
ACTION: Request through BFO within the city another crew and equipment to perform maintenance of the electric infrastructure.	
LEAD AGENCY: City of Fort Collins L&P	EXPECTED COST: $200,000
SUPPORT AGENCIES: Be specific	POTENTIAL FUNDING SOURCES: Within L&P budget
PROGRESS MILESTONES: Major project milestones and reporting of current project status	

City of Fort Collins: Drainage System Maintenance (Fort Collins – 17)	
PRIORITY: High	HAZARDS ADDRESSED: Flood, Severe Storm
LOCATION: Citywide	GOALS ADDRESSED: Protect people, property and natural resources
RECOMMENDATION DATE: Ongoing	OBJECTIVES ADDRESSED: Reduce the vulnerability of local assets to the impact of hazards
TARGET COMPLETION DATE: Ongoing	
ISSUE: Ongoing maintenance of the City drainage system to prevent failures and	
RECOMMENDATION: Assessment and maintenance plan with projects prioritized by need and funding availability.	
ACTION: Replacing and repairing sections of the City drainage system as necessary.	
LEAD AGENCY: City of Fort Collins – Stormwater Utility	EXPECTED COST: 1.45 million/year
SUPPORT AGENCIES: None	POTENTIAL FUNDING SOURCES: Residential and Business Stormwater Rates
PROGRESS MILESTONES:	

City of Fort Collins: Open Space Preservation (Fort Collins – 18)	
PRIORITY: High	HAZARDS ADDRESSED: Flood
LOCATION: Citywide	GOALS ADDRESSED: Protect people, property and natural resources; Improve capability to reduce disaster losses
RECOMMENDATION DATE: Ongoing	OBJECTIVES ADDRESSED: Reduce the vulnerability of local assets to the impact of hazards
TARGET COMPLETION DATE: Ongoing	
ISSUE: Ideal use of the floodplain allows for natural flooding while limiting development to protect people and property.	
RECOMMENDATION: Protect as much of the floodplain as possible by preserving it as open space. Work to protect and maintain the quality of streams, rivers and other vital water resources.	
ACTION: Floodplain parcels owned and acquired by the City will be permanently preserved as riparian open space to reduce the flood hazard in the City.	
LEAD AGENCY: City of Fort Collins - Natural Areas	EXPECTED COST: $4M over 5 years
SUPPORT AGENCIES: City of Fort Collins-Stormwater Utility	POTENTIAL FUNDING SOURCES: Natural Areas Budget; Grants
PROGRESS MILESTONES:	

City of Fort Collins: Public Outreach (Fort Collins – 19)	
PRIORITY: High	HAZARDS ADDRESSED: Flood, Severe Storm
LOCATION: Citywide	GOALS ADDRESSED: Protect people, property and natural resources; Strengthen communication and coordination among public agencies, non-governmental organizations, businesses and citizens; Increase public awareness of natural hazards and mitigation options
RECOMMENDATION DATE: Ongoing	OBJECTIVES ADDRESSED: Continue to develop and expand public awareness and information programs
TARGET COMPLETION DATE: Ongoing	
ISSUE: Lack of public awareness concerning flood hazards.	
RECOMMENDATION: A comprehensive public outreach program outlined by the City's Program for Public Information (PPI) Committee to provide targeted outreach for flood hazards in the community.	
ACTION: Utilizing the eleven Community Message Topics developed by the PPI committee the City will continue implementing numerous public information and education projects to increase the community's awareness of flood hazards and safety.	
LEAD AGENCY: City of Fort Collins – Stormwater Utility	EXPECTED COST: $15,000/year
SUPPORT AGENCIES: FEMA, Red Cross, LETA911. OEM	POTENTIAL FUNDING SOURCES: Commercial and Residential Stormwater Rates , OEM Budget, Grants
PROGRESS MILESTONES:	

City of Fort Collins: Regulatory Programs (Fort Collins – 20)	
PRIORITY: High	HAZARDS ADDRESSED: Flood
LOCATION: Citywide	GOALS ADDRESSED: Protect people, property and natural resources; Strengthen communication and coordination among public agencies, non-governmental organizations, businesses, and citizens; Integrate hazard mitigation into other planning mechanisms
RECOMMENDATION DATE: Ongoing	OBJECTIVES ADDRESSED: Incorporate risk reduction principles into policy documents and initiatives; Reduce the vulnerability of local assets to the impact of hazards
TARGET COMPLETION DATE: Ongoing	
ISSUE: Unregulated development in the floodplain is unsafe for people and structures.	
RECOMMENDATION: Develop and enforce safe development in the floodplain.	
ACTION: Enforce current regulations for development in the floodplain and update regulations as necessary.	
LEAD AGENCY: City of Fort Collins – Stormwater Utility	EXPECTED COST: $300,000/year
SUPPORT AGENCIES: FEMA, CWCB	POTENTIAL FUNDING SOURCES: Utilities – Stormwater Budget
PROGRESS MILESTONES: n/a	

City of Fort Collins: Myrtle Street Stormwater Outfall (Fort Collins – 21)	
PRIORITY: High	HAZARDS ADDRESSED: Flood
LOCATION: Old Town Collins area along Myrtle Street	GOALS ADDRESSED: Protect people, property and natural resources; Improve capability to reduce disaster losses
RECOMMENDATION DATE: 2019	OBJECTIVES ADDRESSED: Reduce the vulnerability of local assets to the impact of hazards
TARGET COMPLETION DATE: 2020	
ISSUE: Properties and structures are flooded in the vicinity of Myrtle Street	
RECOMMENDATION: This project involves the enlargement of the existing storm sewer along Myrtle Street from Remington Street west to Sherwood Street, and directing this storm sewer into the proposed Magnolia Street Outfall at Remington and Magnolia.	
ACTION: This project will reduce flood flows along Myrtle Street east of Sherwood Street, including overtopping of College Avenue. This reduction in flows along Myrtle Street will also serve to reduce surface flow diversions that direct runoff north to Mulberry Street along Peterson Street.	
LEAD AGENCY: City of Fort Collins – Stormwater Utility	EXPECTED COST: $15M
SUPPORT AGENCIES: CDOT	POTENTIAL FUNDING SOURCES: Stormwater Utility Fee, Grants
PROGRESS MILESTONES: Design for this project will begin in 2019 and construction in 2020	

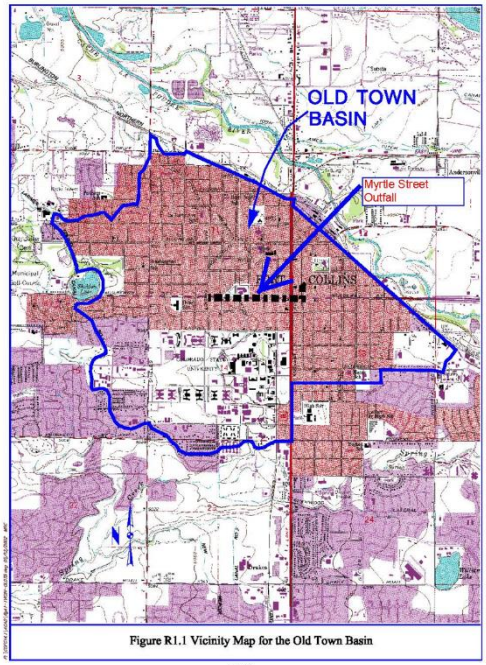


Figure R1.1 Vicinity Map for the Old Town Basin

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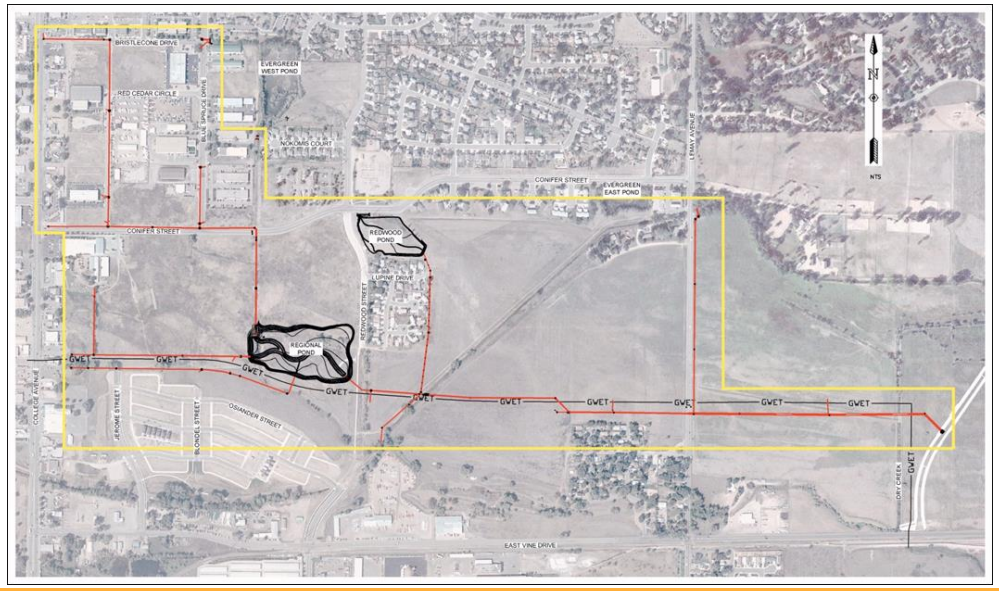
City of Fort Collins: North East College Corridor Outfall (NECCO) (Fort Collins – 22)	
PRIORITY: High	HAZARDS ADDRESSED: Flood
LOCATION: Northern Fort Collins area generally north of East Vine Drive, west of Lemay Avenue, south of the Larimer and Weld Canal, and east of College Avenue	GOALS ADDRESSED: Protect people, property and natural resources; Improve capability to reduce disaster losses
RECOMMENDATION DATE: 2015	OBJECTIVES ADDRESSED: Reduce the vulnerability of local assets to the impact of hazards
TARGET COMPLETION DATE: 2016	
ISSUE: Flooding occurs to properties along the Dry Creek flow path especially upstream of the RR	
RECOMMENDATION: The project includes a storm sewer system to mitigate local flooding (during a 100-year storm) in the area generally north of East Vine Drive, west of Lemay Avenue, south of the Larimer and Weld Canal, and east of College Avenue. The project incorporates a combination of storm sewer and increased detention to convey local storm runoff to the future East Vine Diversion Channel. The storm drainage design coordinates with the design efforts of the East Vine Drive realignment. The project also includes the construction of a stormwater detention pond and a pond outlet under Vine Drive and the Railroad Yard north of Vine Drive at Dry Creek.	
ACTION: Install storm sewer and detention ponds	
LEAD AGENCY: City of Fort Collins – Stormwater Utility	EXPECTED COST: $15M
SUPPORT AGENCIES: Larimer County	POTENTIAL FUNDING SOURCES: Stormwater Utility Fee, Grants
PROGRESS MILESTONES: Design and permitting are underway and construction is expected for mid-2016	



Poudre Fire Authority: Training in Disaster Management Large Scale Incidents (Fort Collins – 23)	
PRIORITY: High	HAZARDS ADDRESSED: All: Drought, Earthquake, Land Subsidence, Extreme Temperatures, Flood, Severe Storm, Wind & Tornado, Fire, Public Health, Hazmat
LOCATION: Poudre Fire Authority, Training Center	GOALS ADDRESSED: 1,2,3
RECOMMENDATION DATE: 1/1/2016	OBJECTIVES ADDRESSED: B, C, D
TARGET COMPLETION DATE: On Going	Continual Training
ISSUE: Poudre Fire Authority needs to expand their disaster management training from fire and wildland to all hazards. As an emergency response and rescue organization, expanding their scope in areas other than response will increase the community's capability to be more resilient.	
RECOMMENDATION: Increase training and knowledge in disaster management	
ACTION: • Additional training in ICS • Additional training in EOC Operations • Additional training in Disaster Management Operations	
LEAD AGENCY: PFA Training Division	EXPECTED COST: $2000
SUPPORT AGENCIES: Fort Collins OEM	POTENTIAL FUNDING SOURCES: Annual Budget, EMPG
PROGRESS MILESTONES: Project is dependent on scheduling courses. All training will be captured and documented.	

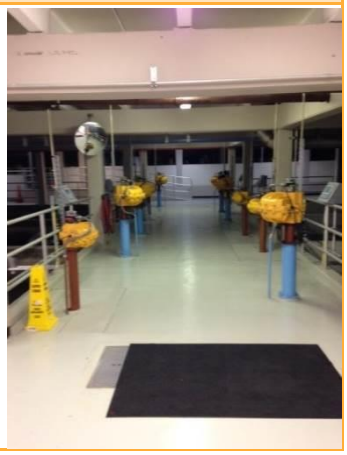
City of Fort Collins: Stream Rehabilitation and Enhancement Program (Fort Collins – 24)	
PRIORITY: High	HAZARDS ADDRESSED: Flood, Severe Storm
LOCATION: Throughout the City	GOALS ADDRESSED: Protect people, property and natural resources; Improve capability to reduce disaster losses
RECOMMENDATION DATE: 2015	OBJECTIVES ADDRESSED: Reduce the vulnerability of local assets to the impact of hazards
TARGET COMPLETION DATE: 2020 (ongoing)	
ISSUE: In 2012, The City of Fort Collins' Stormwater Master Plan was updated to include stormwater quality and stream restoration projects. The Master Plan update utilized results and information obtained from the Stormwater Utility Repurposing program in conjunction with basin- and stream-specific recommendations obtained from the following two program efforts: A.Basin-Specific Stormwater Quality Best Management Practices (BMP) Selected Plans; and, B.Stream Restoration and Stability Study and Prioritization with the Multi Criteria Decision Analysis (MCDA) Tool.	
RECOMMENDATION: Stream restoration projects were identified in an extensive study by Colorado State University (CSU). The study indicated that many of the City's streams suffer from severe bank erosion, impediments to fish passage, and have poor aquatic habitat. A Multi Criteria Decision Analysis (MCDA) Tool was utilized to prioritize the identified stream reaches for future restoration. The results of the MCDA Tool analysis are presented below for the 2nd through the 6th ranked stream reaches. The 1st ranked stream reach, Fossil Creek at Lemay Avenue is currently under construction.	
ACTION: Install WQ BMPs and construction stream enhancements throughout the City.	
LEAD AGENCY: City of Fort Collins – Stormwater Utility	EXPECTED COST: $9M over a 5 year period
SUPPORT AGENCIES: Larimer County	POTENTIAL FUNDING SOURCES: Stormwater Utility Fee, Grants
PROGRESS MILESTONES: Construct one major stream rehabilitation project every other year and one minor project every year.	

City of Fort Collins: West Vine – Forney Pond (Fort Collins – 25)	
PRIORITY: High	HAZARDS ADDRESSED: Flood
LOCATION: Northwestern Fort Collins area south of Vine Drive and east of Taft Hill Road	GOALS ADDRESSED: Protect people, property and natural resources; Improve capability to reduce disaster losses
RECOMMENDATION DATE: 2017	OBJECTIVES ADDRESSED: Reduce the vulnerability of local assets to the impact of hazards
TARGET COMPLETION DATE: 2018	
ISSUE: This area of Fort Collins was the historic flow path of Solider Creek that has been covered up or redirected by development over the years.	
RECOMMENDATION: This detention pond we capture runoff from upstream contributing area and detain it so reduced flooding downstream.	
ACTION: Flooding in downstream properties and homes	
LEAD AGENCY: City of Fort Collins – Stormwater Utility	EXPECTED COST: $4M
SUPPORT AGENCIES: Larimer County	POTENTIAL FUNDING SOURCES: Stormwater Utility Fee, Grants
PROGRESS MILESTONES: The City purchased this property and it is on the 5-year master plan priority list 	

City of Fort Collins: Water Treatment Utilities-Water Treatment Process Improvements (Fort Collins – 26)	
PRIORITY: Medium	HAZARDS ADDRESSED: Drought, Flood, Fire, Public Health
LOCATION: Fort Collin's Water Treatment Facility-4316 Laporte Ave	GOALS ADDRESSED: 1
RECOMMENDATION DATE: 10/09/2015	OBJECTIVES ADDRESSED: E
TARGET COMPLETION DATE: 2022	
ISSUE: Additional treated water storage is required to serve the citizens of Fort Collins in case of drought, flood, fires, or public health emergencies.	
RECOMMENDATION: Improvements to the water treatment process	
ACTION: Construct a new 10 million gallon treated water storage tank at the Water Treatment Facility.	
LEAD AGENCY: City of Fort Collins: Water Treatment Utilities	EXPECTED COST: $14 million
SUPPORT AGENCIES: CDPHE	POTENTIAL FUNDING SOURCES: Utilities reserves, State DWRF
PROGRESS MILESTONES: Future demand will affect the timeline of this project. 	

City of Fort Collins: Water Treatment Utilities-Water Treatment Process Improvements (Fort Collins – 27)	
PRIORITY: High	HAZARDS ADDRESSED: Drought, Public Health, Hazmat
LOCATION: Fort Collin's Water Treatment Facility-4316 Laporte Ave	GOALS ADDRESSED: 1,2
RECOMMENDATION DATE: 10/09/2015	OBJECTIVES ADDRESSED: E
TARGET COMPLETION DATE: 01/01/2024	
ISSUE: The Water Treatment Facility currently provides secondary disinfection to the City's water supply through the addition of chlorine. The chlorine is delivered to the Water Treatment Facility via truck on a weekly basis. The chlorine supply is extremely hazardous and is a threat to public safety in the event of an accident during transportation or in the case of a leak at the Water Treatment Facility. The City's water supply is also vulnerable to contamination due to an interruption in the delivery of chlorine. A mitigation strategy is to construct a sodium hypochlorite generation facility at the Water Treatment Facility in lieu of chlorine gas. This will ensure a safe and reliable supply of bleach with which to disinfect the City's drinking water supply.	
RECOMMENDATION: Improvements to the reliability and safety of the water treatment process	
ACTION: • Replacement of Chlorine gas with on-site generation of Sodium hypochlorite	
LEAD AGENCY: City of Fort Collins: Water Treatment Utilities	EXPECTED COST: $12 million
SUPPORT AGENCIES: CDPHE	POTENTIAL FUNDING SOURCES: Utilities reserves , State DWRF
PROGRESS MILESTONES: Approval of the process change from the Colorado Department of Health and funding of the project are 2 major milestones. (Photo: Hazardous Materials training for a Chlorine Gas release)	

City of Fort Collins: Water Treatment Utilities-Water Treatment Process Improvements (Fort Collins – 28)	
PRIORITY: High	HAZARDS ADDRESSED: Drought, Earthquake, Land Subsidence, Extreme Temperatures, Flood, Severe Storm, Wind & Tornado, Fire, Public Health, Hazmat
LOCATION: Fort Collin's Water Treatment Facility-4316 Laporte Ave	GOALS ADDRESSED: 1,2
RECOMMENDATION DATE: 10/09/2015	OBJECTIVES ADDRESSED: E:
TARGET COMPLETION DATE: 01/01/2018	
ISSUE: Rehabilitation of the existing Poudre River 24" Pipeline. This pipeline serves the City of Fort Collins with the majority of its drinking water. The line is almost 100 years old is a potential weakness in the City's supply system. The line is susceptible to failure from forest fires, land subsidence, and hazmat spills in the river.	
RECOMMENDATION: Improvements to the drinking water supply process	
ACTION: Rehabilitate the Poudre River 24" water supply line	
LEAD AGENCY: City of Fort Collins: Water Treatment Utilities	EXPECTED COST: $12 million
SUPPORT AGENCIES: None	POTENTIAL FUNDING SOURCES: Utilities Reserves, State DWRF
PROGRESS MILESTONES: Complete evaluation of pipeline condition prior to design (Photo: Cache la Poudre River, CO – source of water in the 24 inch Poudre pipeline)	

<table>
<tr><td colspan="2">City of Fort Collins: Water Treatment Utilities-Water Treatment Process Improvements
(Fort Collins – 29)</td></tr>
<tr><td>PRIORITY: Medium</td><td>HAZARDS ADDRESSED: [delete those not applicable] Drought, Earthquake, Land Subsidence, Extreme Temperatures, Flood, Severe Storm, Wind & Tornado, Fire, Public Health, Hazmat</td></tr>
<tr><td>LOCATION: Fort Collin’s Water Treatment Facility-4316 Laporte Ave</td><td>GOALS ADDRESSED: 1</td></tr>
<tr><td>RECOMMENDATION DATE: 10/09/2015</td><td>OBJECTIVES ADDRESSED: E</td></tr>
<tr><td colspan="2">TARGET COMPLETION DATE: 01/01/2030</td></tr>
<tr><td colspan="2">ISSUE: Water Quality in the Cache la Poudre River watershed and the Colorado-Big Thompson water system can be degraded due to Fires (drought and extreme high temperatures create a potential for fire hazards) and Pine Beetle deforestation.</td></tr>
<tr><td colspan="2">RECOMMENDATION: Improvements to the water treatment process</td></tr>
<tr><td colspan="2">ACTION:
Installation of a UV Disinfection system
Installation of Granular Activated Carbon filters
Installation of Biologically Active Carbon filtration</td></tr>
<tr><td>LEAD AGENCY: City of Fort Collins: Water Treatment Utilities</td><td>EXPECTED COST: $27 million-$100 million depending on the severity of the degradation in source water quality</td></tr>
<tr><td>SUPPORT AGENCIES: CDPHE</td><td>POTENTIAL FUNDING SOURCES: Utilities Reserves, State DWRF</td></tr>
<tr><td colspan="2">PROGRESS MILESTONES: Projects are dependent upon future water quality in the watershed.
(Photo: Filter bays at Water Treatment Facility)
  </td></tr>
</table>

City of Fort Collins: Water Treatment Utilities: Redundant Second Outlet Installation (Fort Collins – 30)	
PRIORITY: Low	HAZARDS ADDRESSED: Drought, Extreme Temperatures, Flood, Fire, Public Health,
LOCATION: City of Fort Collins: Water Treatment Utilities	GOALS ADDRESSED: 1
RECOMMENDATION DATE: 10/09/2015	OBJECTIVES ADDRESSED: D,E
TARGET COMPLETION DATE: 01/01/2025	
ISSUE: A second outlet from Horsetooth Reservoir to the Water Treatment Facility would provide an alternate drinking water supply to the City of Fort Collins in the case of a wildfire or a flood in the Colorado-Big Thompson watershed. The City currently has an outlet from the Reservoir at a single depth. The new outlet would allow for diversion for a different location and at multiple depths to mitigate the water quality effects of a fire in the watershed.	
RECOMMENDATION: Redundant second outlet form Horsetooth Reservoir to the Water Treatment Facility	
ACTION: Installing a new outlet and pipeline (redundant second outlet) from Horsetooth Reservoir to the Water Treatment Facility. This would need to be a joint project working with Bureau of Reclamation and the Northern Colorado Water Conservancy District.	
LEAD AGENCY: City of Fort Collins: Water Treatment Utilities	EXPECTED COST: The City of Fort Collin's Cost share would be ~$5 million
SUPPORT AGENCIES: Bureau of Reclamation, Northern Colorado Water Conservancy District	POTENTIAL FUNDING SOURCES State of Colorado Drinking Water Revolving Fund, Fort Collins Utilities Reserves
PROGRESS MILESTONES: Coordination and approval of project from Northern Water and Bureau of Reclamation is required. 	

City of Fort Collins: Wastewater Collection, Sewer By-Pass Pumping (Fort Collins – 31)	
PRIORITY: Medium	HAZARDS ADDRESSED: Earthquake, Land Subsidence, Extreme Temperatures, Flood, Severe Storm, Wind & Tornado, Fire, Public Health, Hazmat
LOCATION: City of Fort Collins: Wastewater Collection System	GOALS ADDRESSED: Protect people and natural resources
RECOMMENDATION DATE: 10/27/2015	OBJECTIVES ADDRESSED: Reduce the vulnerability of local assets to the impact of hazards
TARGET COMPLETION DATE: TBD	
ISSUE: Loss of a portion of the wastewater collection system.	
RECOMMENDATION: Sewer by-pass pumping.	
ACTION: Setup a temporary by-pass for sewer flows using pumps and surface piping. Construction of up to a quarter mile of temporary surface pipe to downstream manhole. By-pass pump for up to 30 days until permanent sewer line is restored.	
LEAD AGENCY: City of Fort Collins: Wastewater Collection	EXPECTED COST: The City of Fort Collin's Cost share would be ~$100,000
SUPPORT AGENCIES: City of Fort Collins Traffic Operations; Other Wastewater Districts (Boxelder and South Fort Collins)	POTENTIAL FUNDING SOURCES: Potential Federal Grants.
PROGRESS MILESTONES: Project planning, design, and acquisition of temporary water system.	

City of Fort Collins: Water Distribution: Temporary Water System (Fort Collins – 32)	
PRIORITY: Medium	HAZARDS ADDRESSED: Earthquake, Land Subsidence, Extreme Temperatures, Flood, Severe Storm, Wind & Tornado, Fire, Public Health, Hazmat
LOCATION: City of Fort Collins: Water Distribution System	GOALS ADDRESSED: Protect people, property and natural resources; Improve capability to reduce disaster losses.
RECOMMENDATION DATE: 10/27/2015	OBJECTIVES ADDRESSED: Reduce the vulnerability of local assets to the impact of hazards.
TARGET COMPLETION DATE: TBD	
ISSUE: Loss of a portion of the water distribution system.	
RECOMMENDATION: Temporary water system.	
ACTION: Construct up to a mile of temporary water main with services until permanent service is restored. Temporary system would be constructed on the surface and connected to a fire hydrant located outside of the damaged zone.	
LEAD AGENCY: City of Fort Collins: Water Distribution	EXPECTED COST: The City of Fort Collin's Cost share would be ~$100,000
SUPPORT AGENCIES: City of Fort Collins Traffic Operations; Other Water Districts (ELCO, North Weld, FCLWD)	POTENTIAL FUNDING SOURCES: Potential Federal Grants.
PROGRESS MILESTONES: Project planning, design, and acquisition of temporary water system. 	

Letter of Intent to Participate

City Manager's Office
City Hall
300 LaPorte Ave.
PO Box 580
Fort Collins, CO 80522
970.221.6505
970.224.6107 - fax
fcgov.com

August 14, 2014

Lori Hodges
Larimer County
200 West Oak
Fort Collins, CO. 80524

Re: "Statement of Intent to Participate" as a participating jurisdiction in Larimer County Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Dear Lori Hodges,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the City of Fort Collins is submitting this letter of intent to confirm that the City of Fort Collins has agreed to participate in the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, the City of Fort Collins agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to the Larimer County to complete the plan in conformance with FEMA requirements.

The City of Fort Collins understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

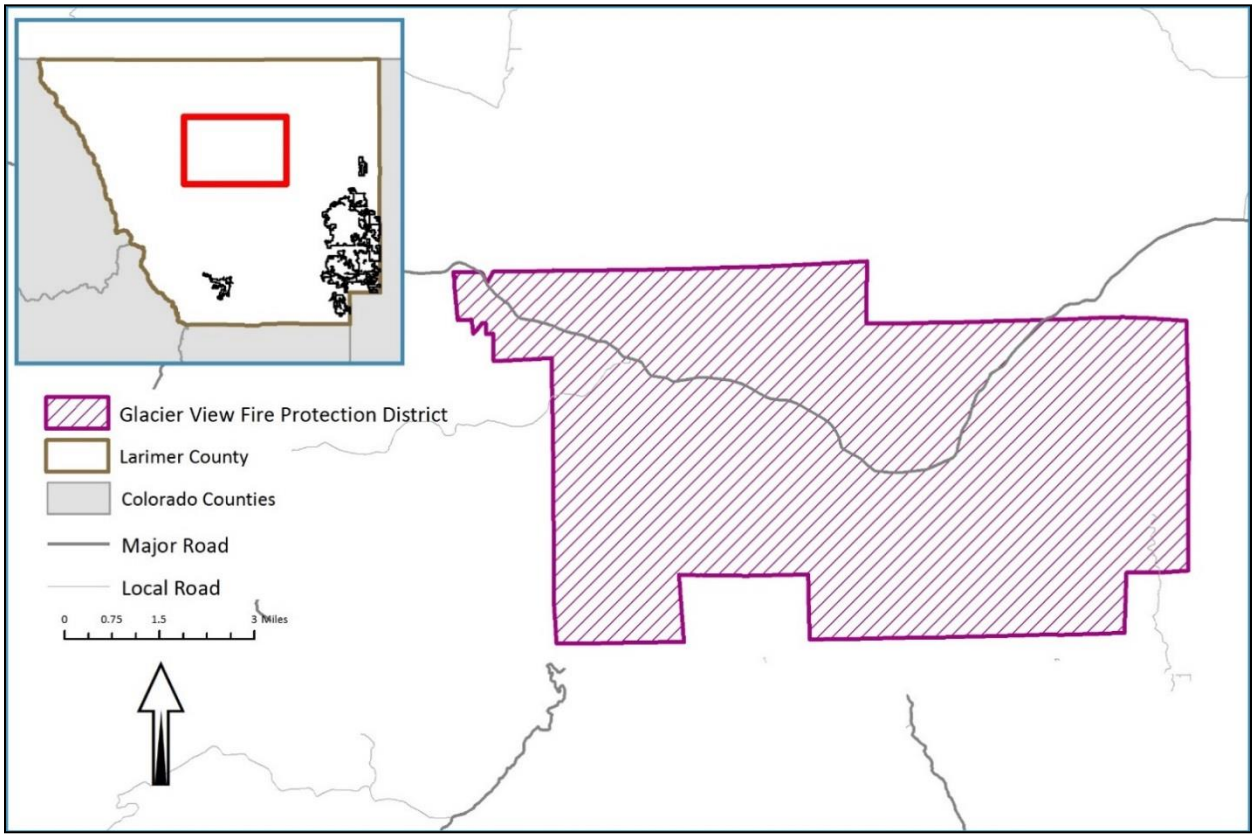
Therefore, with a full understanding of the obligations incurred by an agreement between the Lead Jurisdiction and the Participating Jurisdiction, I, Darin Atteberry commit the City of Fort Collins to the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 14th day of August

Glacier View Fire Protection District

Community Profile

Glacier View Fire Protection District (GVFPD) is a volunteer department with over 20 firefighters and a support group of 8 members. The district covers approximately 56 miles; average response time for the first fire vehicle to arrive on scene is approximately 8 to 11 minutes after being paged. GVFPD responds to all emergencies within the district, except for strictly law enforcement calls. GVFPD is located in central portion of Larimer County in the mountains northwest of Fort Collins.



Hazard Identification and Risk Assessment

The following Hazard Identification and Risk Assessment Summary table is based on jurisdiction-specific responses to the risk factor exercise and differs from the risk factor results that were determined at the county scale.

NATURAL HAZARD	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Fire – Wildland	1.2	0.9	0.8	0.4	0.3	3.6
Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)	1.2	0.75	0.7	0.3	0.3	3.2

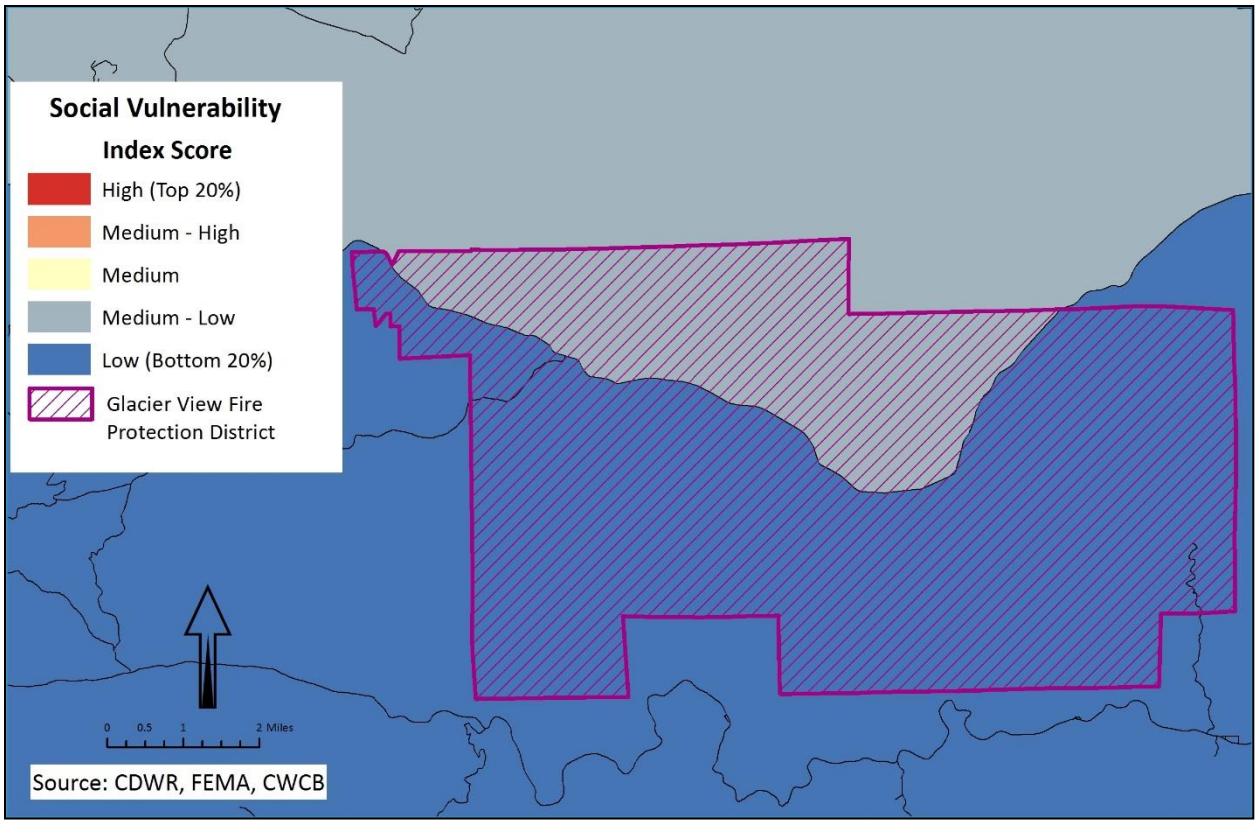
Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)	0.9	0.4	0.6	0.3	0.2	2.4
Flood – Flash and Riverine	0.6	0.6	0.5	0.4	0.3	2.4
Utility Disruption	0.6	0.4	0.4	0.4	0.15	2
Erosion / Deposition	0.9	0.3	0.2	0.4	0.1	1.9
Earthquake	0.6	0.4	0.2	0.4	0.1	1.7
Hazmat – Fixed and Transport	0.6	0.3	0.3	0.4	0.1	1.7
Civil Disturbance	0.6	0.3	0.2	0.4	0.1	1.6
Landslide / Rockslide	0.4	0.3	0.2	0.4	0.1	1.4
Biological Hazards / Contagion	0.3	0.3	0.2	0.4	0.1	1.3
Tornado	0.3	0.3	0.2	0.4	0.1	1.3
HIGH RISK (2.5 or higher): Fire – Wildland; Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)						
MODERATE RISK HAZARD (2.0 - 2.4): Flood – Flash and Riverine; Utility Disruption; Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)						
Low Risk (1.9 and lower): Erosion / Deposition; Earthquake; Hazmat – Fixed and Transport Civil Disturbance; Landslide / Rockslide; Biological Hazards / Contagion; Tornado						

Vulnerability Assessment

This section provides a refined vulnerability assessment, specific for the Glacier View Fire Protection District, for those hazards that were identified as being rated HIGH in the preceding section. This analysis was conducted separately from that of the county-wide vulnerability assessment to specifically focus on the population, structures, infrastructure, and other assets unique to the District.

The results of the social vulnerability assessment are displayed on the map below. On the map, social vulnerability is represented at the census tract level by 5 classes of vulnerability: Low (bottom 20% of the county), Medium-Low, Medium, Medium-High, and High (top 20% of the county). The District's social vulnerability map shows social vulnerability within the district.

Social Vulnerability Map – Glacier View Fire Protection District[145]



Social vulnerability is represented as the social, economic, demographic, and housing characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to hazard events. The pre-existing social conditions that contribute to disaster losses can be identified using social vulnerability indicators. Using methods identified in the Social Vulnerability Index (SoVI) developed by Cutter et. al. (2003) this layer shows the social vulnerability index scores for the State of Colorado at the census tract level. Social vulnerability is represented at the Census tract level by five classes of vulnerability: Low, Medium-Low, Medium, Medium-High, and High.

The Glacier View Fire Protection District is characterized by a mix of low to medium-low levels of social vulnerability. Currently, the social vulnerability indicators that contribute to higher vulnerability to hazards in the district are lower than they are in the majority of Larimer County. This does not mean, however, that there a not any vulnerable populations within the district. Over time, the district should continue to monitor their social vulnerability as demographic, economic, and housing related conditions change.

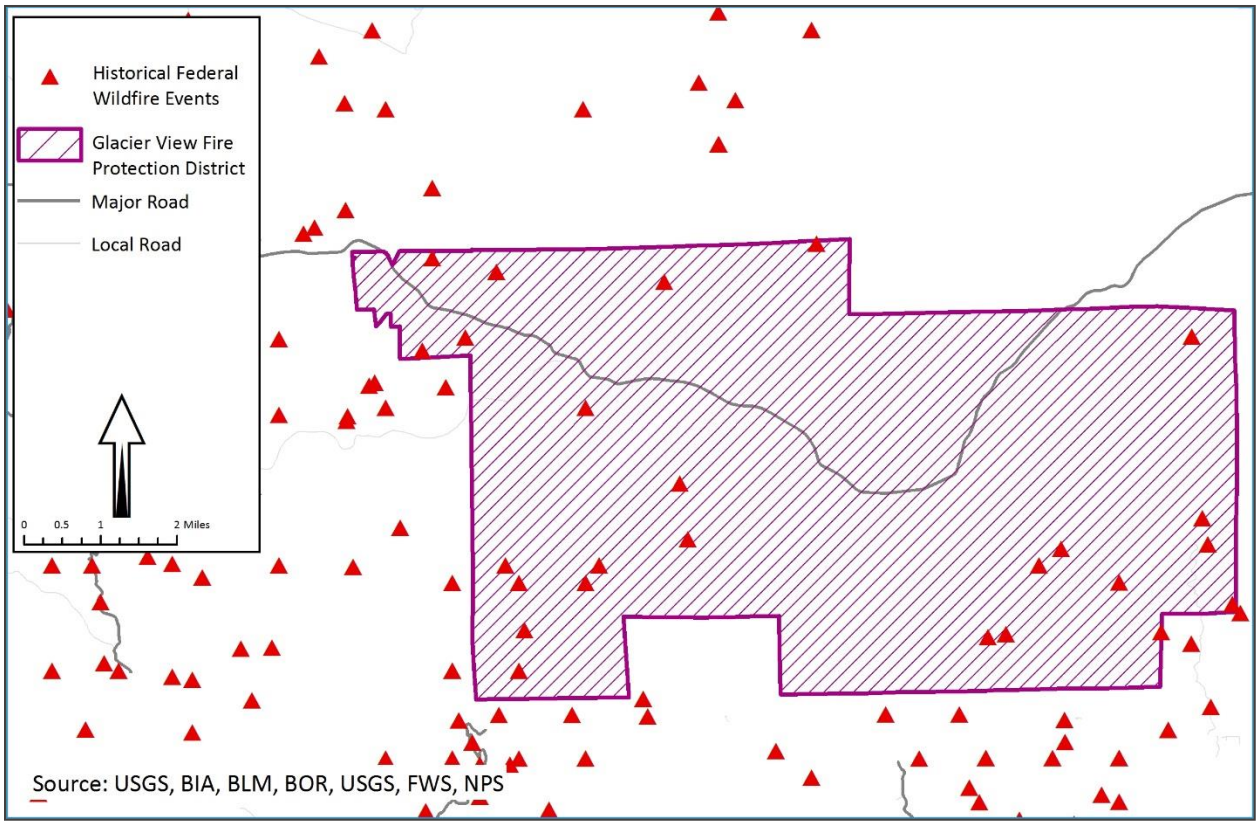
[145] Source: Colorado Division of Water Resources Dam Safety Branch, FEMA, Colorado Water Conservation Board (CWCB)

Fire – Wildland

Previous Occurrences

According to NOAA's Storm Events Database there have been 24 reported wildfire events in the Glacier View Fire Protection District. Based on the historic data showing hazardous impacts on district, there is a great potential for wildfire events to occur at any given time.

Glacier View Fire Protection District Historical Federal Wildfire Map[146]

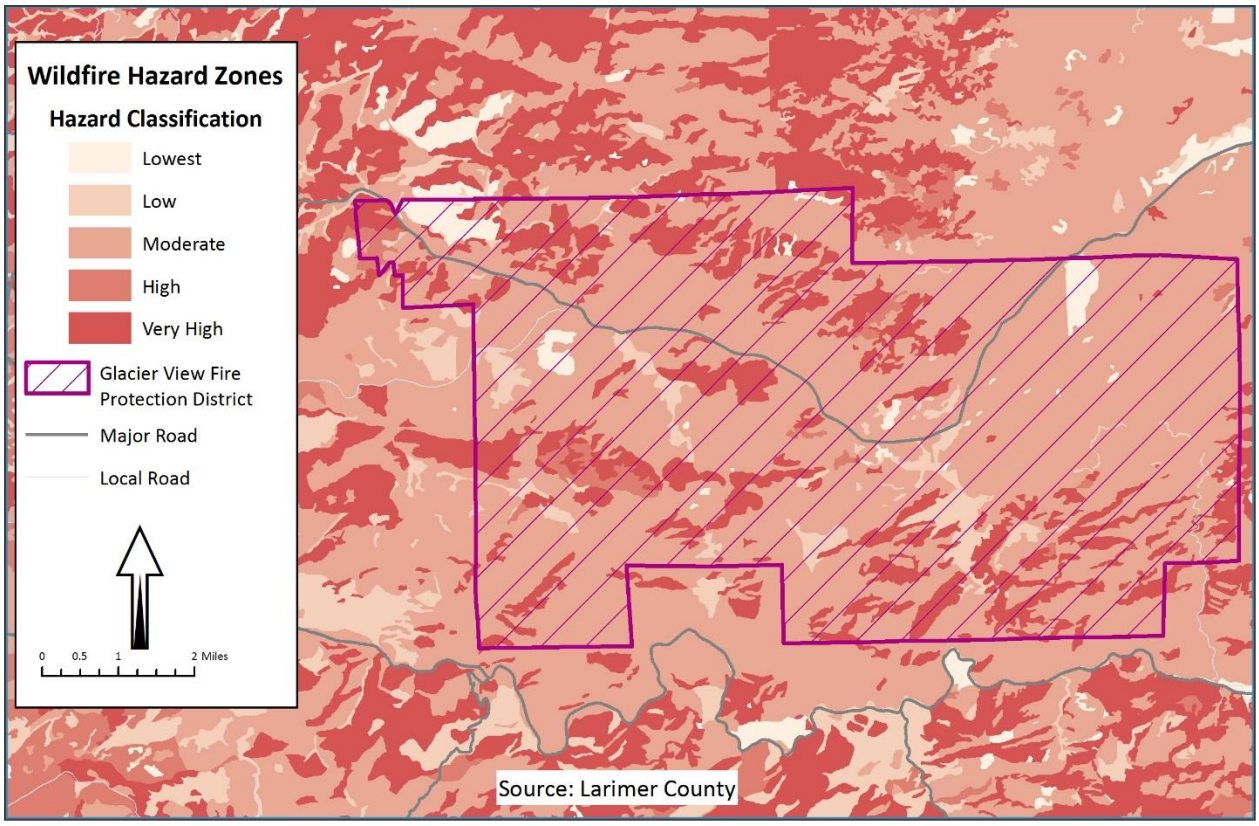


Inventory Exposed

The following Wildfire Hazard Zone map identifies the expected wildfire behavior. There are areas with the highest wildfire hazard zones throughout the district. These areas are characterized by lower population densities.

[146] Historical wildland fire occurrence data compiled by USGS from 1980 - 2013, from BIA, BLM, BOR, USGS, FWS, and NPS.

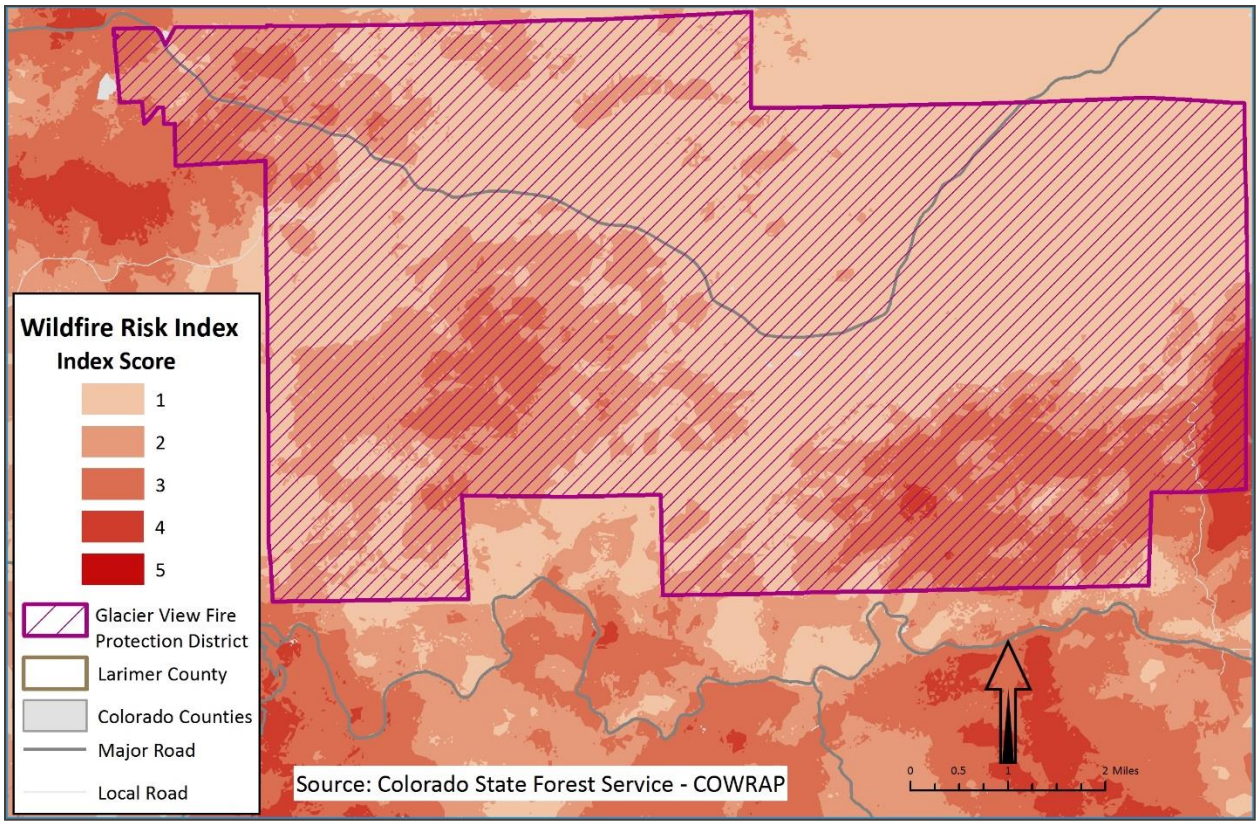
Glacier View Fire Protection District Wildfire Hazard Zone Map[147]



The following Wildfire Risk map identifies areas with the greatest potential impacts from a wildfire, in other words, those areas most at risk. There are areas with the highest wildfire hazard zones throughout the district. These areas are characterized by lower population densities.

[147] To be used to identify wildfire hazards within the Wildfire Mitigation Area. The hazards are determined according to the Wildfire Hazard Area Mapping (WHAM) guidelines.

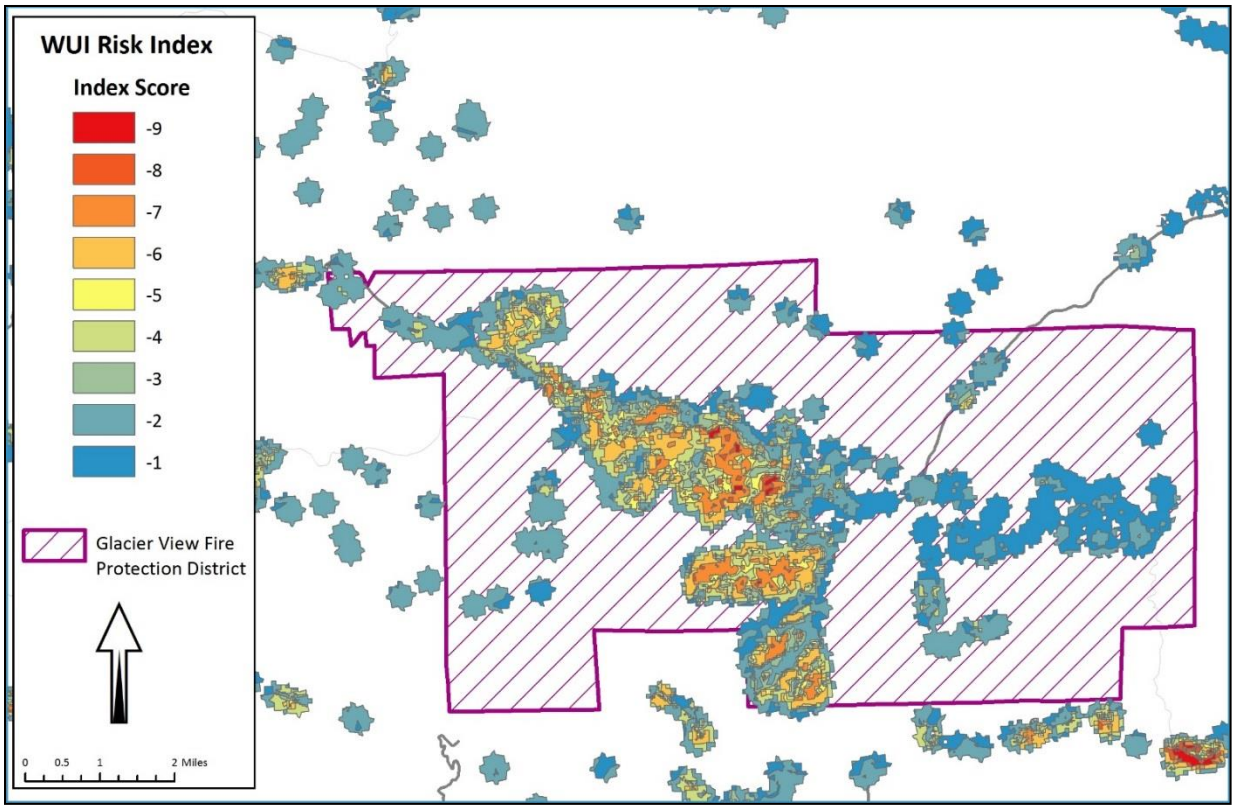
Glacier View Fire Protection District Wildfire Risk Index Map[148]



There are a number of areas in the central region of the district that are within the medium to highest level on the WUI Risk Index Scale. This means that the potential impact on people and homes from a wildfire in those areas is medium to high in relationship to the rest of Larimer County. This level of risk is derived by combining housing density with predicted flame length.

[148] Wildfire Risk represents the possibility of loss or harm occurring from a wildfire. Risk is derived by combining wildfire threat and fire effects. The COWRAP data set was produced statewide and ranks areas on a scale that includes: lowest risk to higest risk. All risk rankings are present in Larimer County.

Glacier View Fire Protection District WUI Map

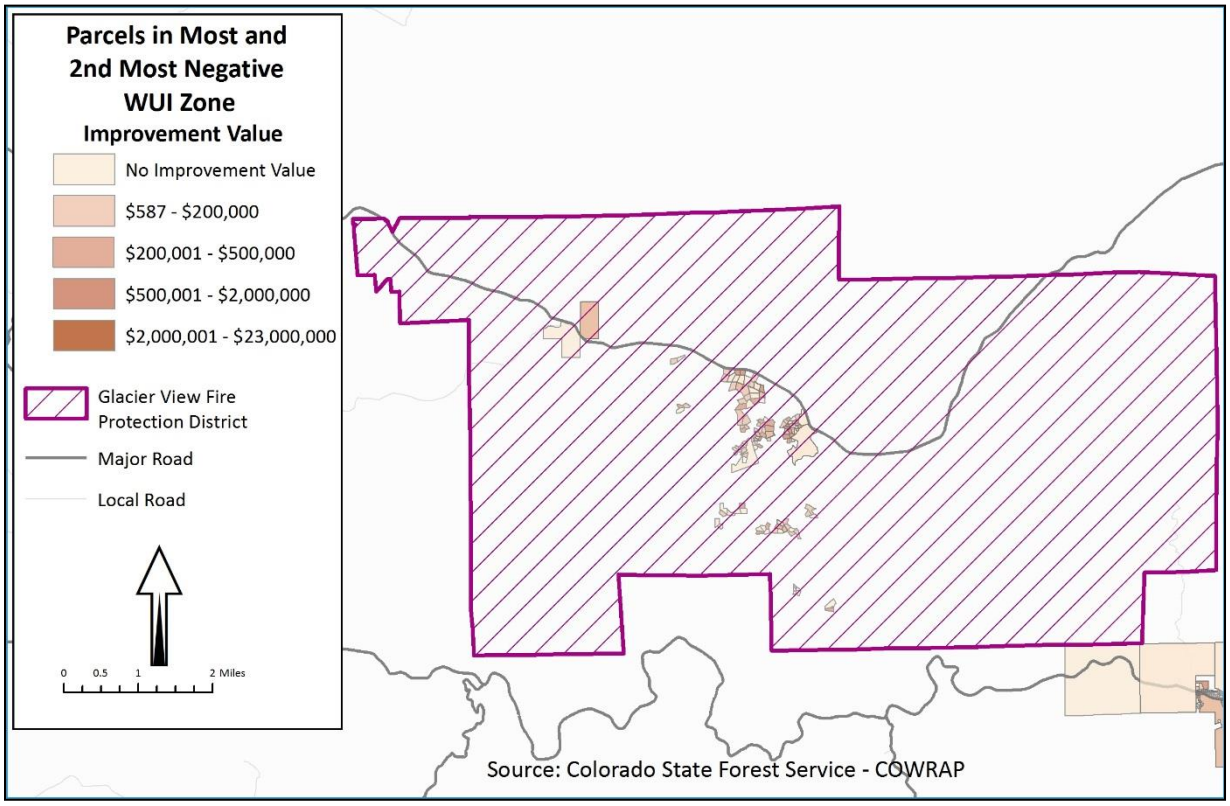


Fires can extensively impact the economy of an affected area, including the agricultural, recreation and tourism industries, water resources, and the critical facilities upon which the Glacier View Fire Protection District depends. There are areas of high and medium wildfire threat in the central portion of the district according to the WUI Risk Index. There are no critical facilities located in areas with the *most negative* and *2nd most negative* wildfire threat total.

Potential Losses

The exposure data provided in the previous section (Inventory Assets Exposed) provides the clearest picture of potential losses to wildfire in the Glacier View Fire Protection District. There are 46 parcels/structures located in areas with the *most negative* and 115 parcels/structures located in areas with the *2nd most negative* wildfire threat total. The appraisal value of the parcels/structures within these *most and 2nd most negative* threat areas is over $22.1 million dollars. The risk assessment uses worst case scenario loss estimates. For this reason it is important to plan for relative levels of loss rather than specific potential loss dollar amounts.

Glacier View Fire Protection District Parcels in the Most Negative and Second Most Negative WUI Zone[149]



Probability of Future Occurrences

The likelihood of wildfires attaining significant size and intensity is unpredictable and highly dependent on environmental conditions and firefighting response. Weather conditions, particularly drought events, increase the likelihood of wildfires occurring. That said, it is important to note that 98% of wildfires are human-caused. Ultimately, the occurrence of future wildfire events will strongly depend on patterns of human activity and events are more likely to occur in wildfire-prone areas experiencing new or additional development.

Wildfires can occur at any time of day and during any month of the year. Moreover, the length of a wildfire season and/or peak months may vary appreciably from year to year. As evidenced by the wildfire risk assessment, areas within the Glacier View Fire Protection District that are characterized by

[149] Wildland Urban Interface Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length.

dense development and single family homes along the wildland-urban interface are most vulnerable to wildfire.

Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)

Previous Occurrences

According to NOAA's Storm Events Database, the Glacier View Fire Protection District has experienced 175 Winter Storms since 1996. On March 17, 2003 there was report of a winter storm causing $15,500,000 in property damage in areas within western Larimer County above 6,000 feet. There were no deaths, injuries or damage to crops reported for any of these storms. The District is at high risk of experiencing Winter Storms during the winter months.

Inventory Exposed

All assets located in the Glacier View Fire Protection District can be considered at risk from winter storms. This includes all people, or 100% of the District's population, and all buildings and infrastructure within the district. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the District's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Potential Losses

Winter storms affect the entire planning area of the Glacier View Fire Protection District including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Winter storms will remain a highly likely occurrence for the District.

Probability of Future Occurrences

Severe winter storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past severe winter events provide benchmarks for projecting similar conditions into the future. The probability that the Glacier View Fire Protection District will experience a severe winter storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the district at least once every year.

Capabilities Assessment

The capability assessment examines the ability of the Glacier View Fire Protection District to implement and manage the comprehensive mitigation strategy laid out in this Plan. The strengths, weaknesses, and

resources of the community are identified here as a means for evaluating and maintaining effective and appropriate management of the District's hazard mitigation program.

Local Personnel

The ability of a community to implement a comprehensive mitigation strategy depends, in part, on available resources, including people and staff. The following table outlines the District's capabilities as they relate to key personnel.

	Full Time	Part Time	None or Not-Identified
Emergency Manager			X
Floodplain Administrator			X
Community Planner			X
GIS Specialist			X
Grant Writer			x

Land Use Planning and Codes

Local land use plans and building codes are tremendous tools for evaluating local policies related to hazard mitigation and risk reduction. Additionally, comprehensive master plans, capital improvement plans, stormwater plans and zoning ordinances all present opportunities for enhanced local capabilities. The following table outlines the district's current capabilities as they relate to land use planning and codes.

	Yes (Y); No (N)
A zoning ordinance	N
A hazard-specific ordinance	-
Local building codes	Y
A Comprehensive Plan / Master Plan	-
A Capital Improvements Plan	-
A Stormwater Plan	-
A Continuity of Operations Plan (COOP)	-
An Emergency Operations Plan (EOP)	Y
A Long-Term Recovery Plan	-
Participates in the NFIP	-

Plan Maintenance and Implementation

Glacier View Fire Protection District has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the district will continue public participation in the plan maintenance process.

Jurisdiction	Plan Maintenance and Implementation Strategy
Glacier View Fire Protection District	"Annually, the district will review the plan and determine mitigation action progress." "Monthly Board meetings will be open to public where the plan can be discussed. Additionally we have a website that information can be posted for viewing."

Integrating Hazard Mitigation into Local Planning

Through discussions at planning meetings and the use of an online survey, individual outreach, and phone calls, each participating jurisdiction brainstormed with the planning team to identify processes for integrating hazard mitigation into their local planning mechanisms and policies. The following table lists the specific integration strategy identified by the district based on the mitigation actions listed in this plan.

Jurisdiction	Strategy
Glacier View Fire Protection District	*"We will conduct community outreach program where we advise residents on how to mitigate their own properties, Glacier does have community slash piles. In our annual review of fire codes we'll look for opportunities to integrate and strengthen our fire codes with mitigation actions."*

Mitigation Action Guides

The following Mitigation Action Guide present Glacier View Fire Protection District's new mitigation actions that were developed for the 2016 Plan.

Glacier View Fire Protection District: Community Wildfire Protection Plan (Glacier View FPD – 1)	
PRIORITY: High	HAZARDS ADDRESSED: Wildfire / Urban Interface Wildfire
LOCATION: 1414 Green Mountain Dr., Livermore, CO 80536	GOALS ADDRESSED: 1, 2, 3, 4, 5
RECOMMENDATION DATE: 11/11/2015	OBJECTIVES ADDRESSED: A - E
TARGET COMPLETION DATE: 12/31/2021	
ISSUE: The Glacier View Fire Protection District has identified the need to update the Districtwide Community Wildfire Plan.	
RECOMMENDATION: To investigate and develop an update of this plan with staff assistance.	
ACTION: The purpose of the Community Wildfire Protection Plan is risk analysis, fire behavior analysis and community wildfire hazard rating (WHR). The results of the Community Wildfire Protection Plan is to provide a comprehensive, scientifically-based assessment of the wildfire hazards and risk within our jurisdiction.	
LEAD AGENCY: Glacier View Fire	EXPECTED COST: staff hours 40 / staff cost $3,500.00

Prevention District	
SUPPORT AGENCIES: Larimer County Sheriff's Office, Emergency Services	POTENTIAL FUNDING SOURCES: District revenues from property taxes (gas/oil revenue included) and specific ownership taxes
PROGRESS MILESTONES: Research Community Outreach Plan, Issue RFP, Select Vendor, Create Plan, Implement Plan, Review & Update Plan as needed.	

Glacier View Fire Protection District: Community Outreach (Glacier View FPD – 2)	
PRIORITY: High	HAZARDS ADDRESSED: Flood / Fire
LOCATION: Glacier View Fire Protection District	GOALS ADDRESSED: 2, 4
RECOMMENDATION DATE: 11/11/2015	OBJECTIVES ADDRESSED: A, B
TARGET COMPLETION DATE: ongoing	
ISSUE: Property owners in the Glacier View Fire Protection district need education in the most effective fire mitigation steps to take, when and how to safely evacuate in case of flood or fire, how to sign up for LETA, and how to ensure that their insurance is sufficient to allow them to recover from a disaster.	
RECOMMENDATION: Community outreach and education efforts.	
ACTION: Hold regular educational meetings covering the subjects of fire mitigation, evacuation, and property insurance. These meetings to take place on multiple occasions during the summer (when more property owners are in the area).	
LEAD AGENCY: Glacier View Fire Prevention District	EXPECTED COST: Staffing for each meeting (all volunteer): one presenter, 2-3 people to set up/tear down meeting area. Having a LETA rep on hand for at least some of the presentations is helpful. Cost: funding for copying and purchase of educational handouts and refreshments. $2000
SUPPORT AGENCIES: LETA, possibly LCES	POTENTIAL FUNDING SOURCES: Glacier View Fire Protection District; possible grants for materials costs.
PROGRESS MILESTONES: Continue to hold 4-5 presentations each summer, covering the subjects of fire mitigation, evacuation, and property insurance.	

Glacier View Fire Protection District: Fire Mitigation Assessments (Glacier View FPD – 3)	
PRIORITY: High	HAZARDS ADDRESSED: Flood
LOCATION: Glacier View Fire Protection District	GOALS ADDRESSED: 2, 4
RECOMMENDATION DATE: 11/11/2015	OBJECTIVES ADDRESSED: A, B, E
TARGET COMPLETION DATE: 12/31/2021	
ISSUE: Property owners in the Glacier View Fire Protection district need education in the most effective fire mitigation steps to take and assistance in determining if they've done all they can to mitigate their property.	
RECOMMENDATION: One-on-one mitigation assessments.	
ACTION: Provide fire mitigation assessments to district property owners. At the request of local property owners, teams of two or more members of the fire department will meet with them to tour their property and provide mitigation advice and assessment.	
LEAD AGENCY: Glacier View Fire Protection District	EXPECTED COST: Staffing (all volunteer) of two-member teams for assessments throughout the year (with the majority in the summer). Funding for copying and purchasing educational handouts. $1500
SUPPORT AGENCIES: None	POTENTIAL FUNDING SOURCES: Glacier View Fire Protection District; grants for materials costs.
PROGRESS MILESTONES: Continue to provide assessments to property owners upon request, performing each assessment within two weeks of request as often as possible.	

Letter of Intent to Participate

GLACIER VIEW FIRE PROTECTION DISTRICT

LETTER OF INTENT TO PARTICIPATE

December 15, 2014

Lori R. Hodges
Larimer County Emergency Management
200 West Oak Street
Fort Collins, CO 80526

Re 'Statement of Intent to Participate' as a participating jurisdiction in the Larimer County Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Dear Ms. Hodges,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the Glacier View Fire Protection District is submitting this letter of intent to confirm that Glacier View Fire Protection District has agreed to participate in the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, Glacier View Fire Protection District agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Larimer County OEM to complete the plan in conformance with FEMA requirements.

Glacier View Fire Protection District understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by an agreement between the Lead Jurisdiction and the Participating Jurisdiction I David Burk, commit Glacier View Fire Protection District to the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 15 day of December 2014

David Burk
Board President

1414 Green Mountain Drive
Livermore, CO 80536

Office 970.493.3353
Fax 970.493.3376

Town of Johnstown

The 2006 Johnstown Vision states that as Johnstown evolves, the community desires to preserve:

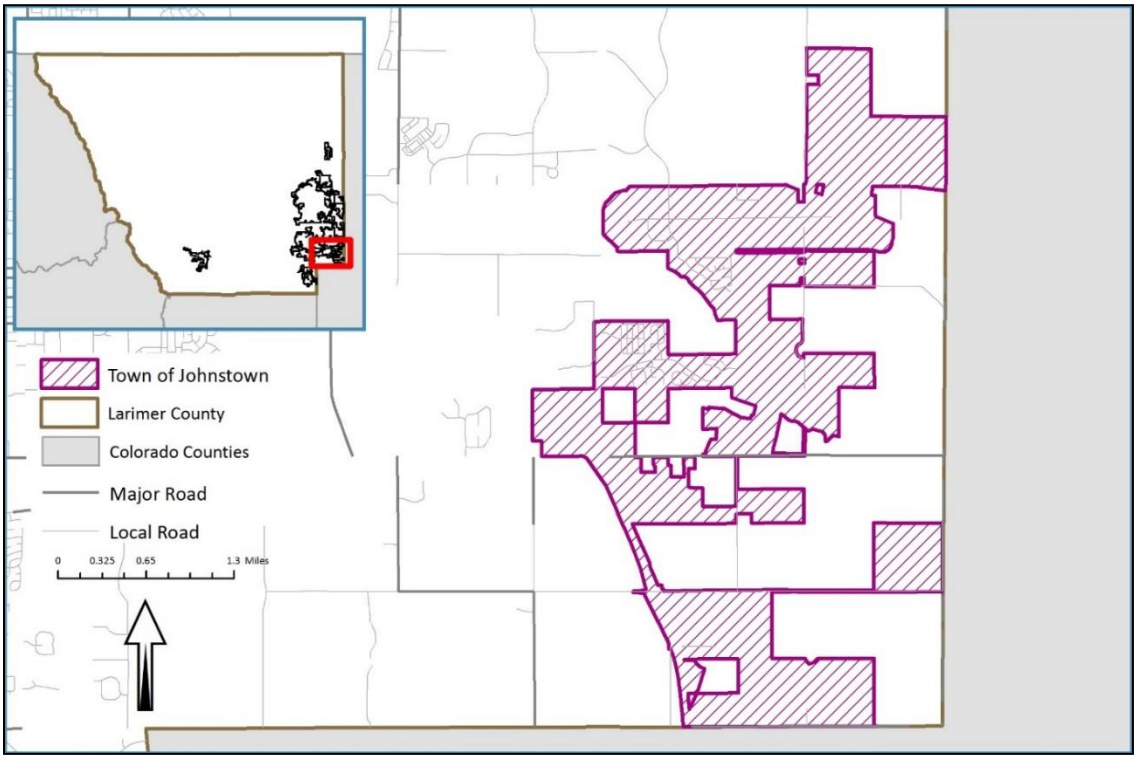
- The qualities of a small town
- Available neighborhoods
- Its open feel, wide streets, parks, agricultural areas, and open space
- The social atmosphere of an inclusive community, and
- The heart of the community – Downtown

This vision "confidently states that the Town of Johnstown will be a community that cherishes its small town roots, its history as a service center for a large agricultural industry and a social center to the area's farm families. The Vision also looks to the future, by visualizing improvements where families of all sizes and types will live and work. The vision for the community is clear." – Johnstown Area Comprehensive Plan (2006)

Community Profile

The Town of Johnstown is located in both Larimer and Weld Counties along I-25 approximately 41 miles north of Denver. The town was incorporated in 1907, and in 20100 had an area of approximately 13.52 square miles. Johnstown was built along the Great West Railroad.

The Johnstown community has experienced rapid growth in recent years. The growth presents challenges related to infrastructure, services, and community character. It also represents opportunities, as the fiscal resources of the Town have been increasing as well.



The following table summarizes key demographic and development related characteristics of the Town of Johnstown.

Town of Johnstown Statistics		
	Town of Johnstown	Colorado
Population, 2010	9,887	5,029,196
2000-2010 Population Change, %	61%	14.5%
% Population under 5 years, 2010	9.4%	6.8%
% Population under 19 years, 2010	33.1%	20.3
% Population 65 years and over, 2010	8.7%	10.9%
Language other than English spoken at home, % age 5+, 2009-2013	10.8%	15.9%
Homeownership Rate 2010	83.9%	65.5%
Persons Per Household 2010	2.95	2.57
Persons below poverty level, %, 2013	5.1%	13.2%
Median Household Income, 2013	$74,752	$58,433

Hazard Identification and Risk Assessment

The Town of Johnstown is situated in both Larimer and Weld Counties. For the purpose of this plan, spatially analyzed hazard risks have been assessed for the areas of the town that lie specifically within Larimer County.

The following Hazard Identification and Risk Assessment Summary table is based on jurisdiction-specific responses to the risk factor exercise and differs from the risk factor results that were determined at the county scale.

NATURAL HAZARD	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Tornado	0.6	0.6	0.4	0.4	0.1	2.10
Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)	0.6	0.3	0.4	0.2	0.2	1.70
Utility Disruption	0.6	0.3	0.2	0.4	0.2	1.70
Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)	0.6	0.3	0.4	0.2	0.2	1.70
Flood – Flash and Riverine	0.6	0.3	0.2	0.2	0.3	1.60
Erosion / Deposition	0.6	0.3	0.2	0.1	0.2	1.40
Landslide / Rockslide	0.3	0.3	0.2	0.4	0.1	1.30

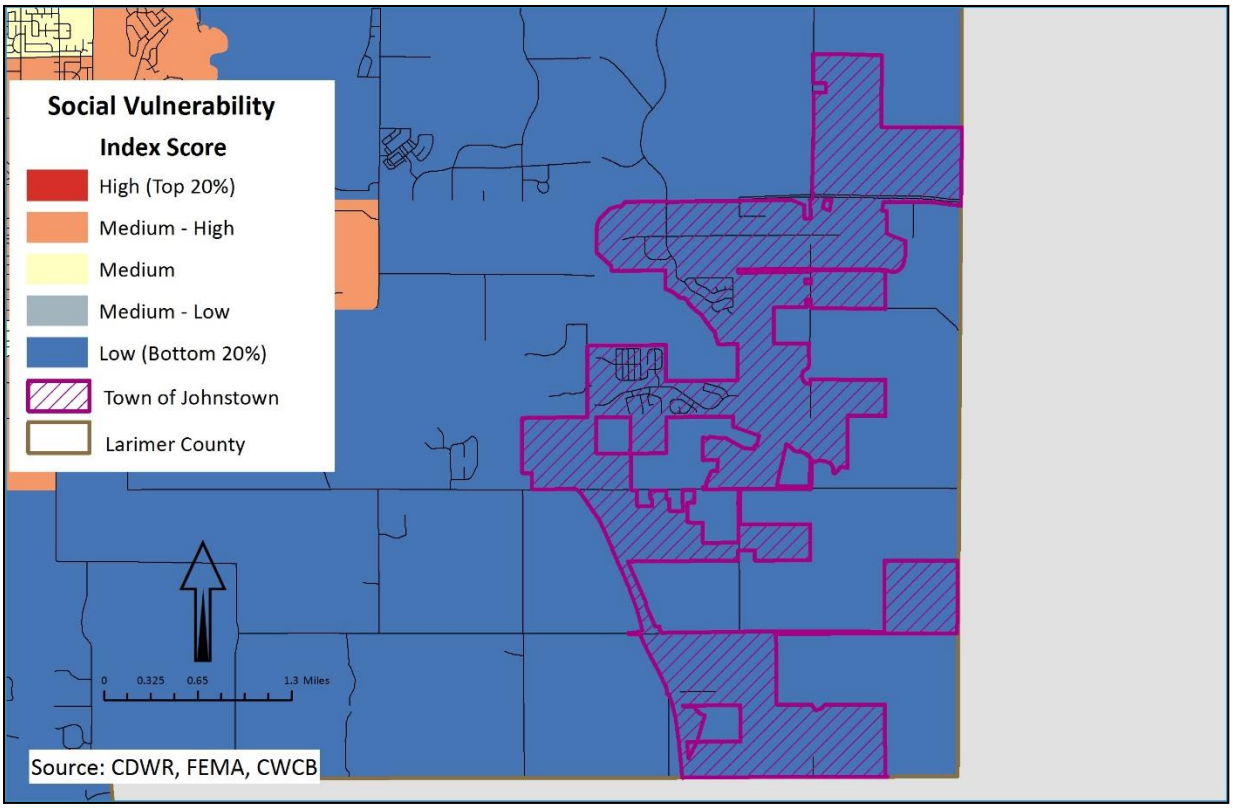
Hazmat – Fixed and Transport	0.3	0.3	0.2	0.4	0.1	1.30
Fire – Wildland	0.3	0.3	0.2	0.3	0.2	1.30
Earthquake	0.3	0.3	0.2	0.4	0.1	1.30
Civil Disturbance	0.3	0.3	0.2	0.3	0.1	1.20
Biological Hazards / Contagion	0.3	0.3	0.2	0.1	0.1	1.00
HIGH RISK (2.5 or higher): None						
MODERATE RISK HAZARD (2.0 - 2.4): Tornado						
Low Risk (1.9 and lower): Winter Storm (Blizzard Conditions, Heavy Snow Accumulation); Utility Disruption; Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning); Flood – Flash and Riverine ; Erosion / Deposition; Landslide / Rockslide; Hazmat – Fixed and Transport; Fire – Wildland; Earthquake; Civil Disturbance; Biological Hazards / Contagion						

Vulnerability Assessment

This section provides a refined vulnerability assessment, specific for the Town of Johnstown, for those hazards that were identified as being rated HIGH in the preceding section. This analysis was conducted separately from that of the county-wide vulnerability assessment to specifically focus on the population, structures, infrastructure, and other assets unique to the Town of Johnstown.

The results of the social vulnerability assessment are displayed on the map below. On the map, social vulnerability is represented at the census tract level by 5 classes of vulnerability: Low (bottom 20% of the county), Medium-Low, Medium, Medium-High, and High (top 20% of the county). The Town of Johnstown's social vulnerability map shows social vulnerability within the community.

Social Vulnerability Map – Town of Johnstown[150]



Social vulnerability is represented as the social, economic, demographic, and housing characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to hazard events. The pre-existing social conditions that contribute to disaster losses can be identified using social vulnerability indicators. Using methods identified in the Social Vulnerability Index (SoVI) developed by Cutter et. al. (2003) this layer shows the social vulnerability index scores for the State of Colorado at the census tract level. Social vulnerability is represented at the Census tract level by five classes of vulnerability: Low, Medium-Low, Medium, Medium-High, and High.

Johnstown is characterized low levels of social vulnerability (bottom 20% in the county). This does not mean, however, that there aren't any socially vulnerable residents living in the community or that social vulnerability levels will remain the same over time. Close analysis of the individual social vulnerability indicators within the community will give local emergency managers, planners, and stakeholders a clearer picture of which social vulnerability factors threaten the community the most and where social and economic resources should be allocated in order to reduce vulnerability. Over time, the town should continue to monitor their progress as demographic, economic, and housing related conditions change.

[150] Source: Colorado Division of Water Resources Dam Safety Branch, FEMA, Colorado Water Conservation Board (CWCB)

Capabilities Assessment

The capability assessment examines the ability of Johnstown to implement and manage the comprehensive mitigation strategy laid out in this Plan. The strengths, weaknesses, and resources of the community are identified here as a means for evaluating and maintaining effective and appropriate management of the town's hazard mitigation program.

Local Personnel

The ability of a community to implement a comprehensive mitigation strategy depends, in part, on available resources, including people and staff. The following table outlines the town's capabilities as they relate to key personnel.

	Full Time	Part Time	None or Not-Identified
Emergency Manager		X	
Floodplain Administrator	X		
Community Planner	X		
GIS Specialist			X
Grant Writer			X

In Johnstown the Police Chief serves as the Emergency Manger as needed during an event.

Land Use Planning and Codes

Local land use plans and building codes are tremendous tools for evaluating local policies related to hazard mitigation and risk reduction. Additionally, comprehensive master plans, capital improvement plans, stormwater plans and zoning ordinances all present opportunities for enhanced local capabilities. The following table outlines the town's current capabilities as they relate to land use planning and codes.

	Yes (Y); No (N)
A zoning ordinance	Y
A hazard-specific ordinance	N
Local building codes	Y
A Comprehensive Plan / Master Plan	Y
A Capital Improvements Plan	N
A Stormwater Plan	Y
A Continuity of Operations Plan (COOP)	Y
An Emergency Operations Plan (EOP)	Y
A Long-Term Recovery Plan	N
Participates in the NFIP	Y

Building codes are one tool that communities use to enhance public safety. For example, they can increase structural integrity, mitigate structure fires, and provide benefits in relation to natural hazard avoidance.

In Colorado, land use regulations and building codes are typically implemented at the local level. Even without a statewide mandate, most counties and many municipalities have enacted regulations and codes. Johnstown has adopted a local building code requirement, demonstrating their understanding of the benefits codes provide, including reduced exposure to hazards.

Plan Maintenance and Implementation

Johnstown has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the town will continue public participation in the plan maintenance process.

Jurisdiction	Plan Maintenance and Implementation Strategy
Town of Johnstown	*"Annual review of HMP and mitigation actions by Town Council"* *"Provision of public information on website"*

Integrating Hazard Mitigation into Local Planning

Through discussions at planning meetings and the use of an online survey, individual outreach, and phone calls, each participating jurisdiction brainstormed with the planning team to identify processes for integrating hazard mitigation into their local planning mechanisms and policies. The following table lists the specific integration strategy identified by Johnstown based on the mitigation actions listed in this plan.

Jurisdiction	Strategy
Town of Johnstown	*"We will maintain our floodplain regulations and update as needed so that they align with the HMP"*

Mitigation Action Guides

The following Mitigation Action Guides present Johnstown's new mitigation actions that were developed for the 2016 Plan.

Town of Johnstown: Community Outreach Project (Johnstown – 1)	
PRIORITY: 1	HAZARDS ADDRESSED: All
LOCATION: Town of Johnstown	GOALS ADDRESSED: 1,4
RECOMMENDATION DATE: 10/23/2015	OBJECTIVES ADDRESSED: A
TARGET COMPLETION DATE: 9/1/2016	
ISSUE: After the 2013 Floods, it became apparent that more outreach is needed to citizens regarding the hazards in our town and surrounding areas and how best to respond.	
RECOMMENDATION: In partnership with Larimer County, we would like to enhance our public outreach program for the Town of Johnstown	
ACTION: We will use existing educational materials as well as develop materials specific to the Town of Johnstown to increase hazard and risk preparedness, response to educate our citizens. Provide additional information using our Town web site and Facebook page as a part of our ongoing social media program.	
LEAD AGENCY: Town of Johnstown	EXPECTED COST: $5,000

SUPPORT AGENCIES: Larimer County OEM	POTENTIAL FUNDING SOURCES: Town general fund, Larimer County outreach materials.
PROGRESS MILESTONES: - Partner with Larimer County to distribute educational materials to citizens of the Town. - Create town specific outreach materials and educational programs outlining risks and hazards in the area - Participate in the Larimer Connects Project.	

Town of Johnstown: NFIP Promotion and Administration (Johnstown – 2)	
PRIORITY: 1	HAZARDS ADDRESSED: Flooding
LOCATION: Big Thompson River	GOALS ADDRESSED: 1
RECOMMENDATION DATE: Ongoing	OBJECTIVES ADDRESSED: C & E
TARGET COMPLETION DATE: Ongoing	
ISSUE: As participants in the NFIP the Community will continue to promote wise use of floodplains through ordinance administration and periodic update, promotion of flood insurance and staff training, including encouragement of Certified Floodplain Manager status.	
RECOMMENDATION: The benefits are to flood-prone building owners who choose to insure against flood losses, and to taxpayers who no longer would be faced with subsidizing those potential losses.	
ACTION: Continued administration of floodplain regulations and updates to town ordinances.	
LEAD AGENCY: Floodplain Management Officials	EXPECTED COST: Can be accomplished within existing budgets
SUPPORT AGENCIES: PW Department	POTENTIAL FUNDING SOURCES: N/A
PROGRESS MILESTONES: Floodplain reviews prior to permitting any development in the floodplain. Floodplain information is posted on the Town of Johnstown web site. Updates to town ordinances with regard to floodplain regulations.	

Letter of Intent to Participate

LETTER OF INTENT TO PARTICIPATE

Town of Johnstown

November 16, 2015

Lori R. Hodges
Larimer County Emergency Management
200 West Oak Street
Fort Collins, CO 80526

Re: "Statement of Intent to Participate" as a participating jurisdiction in the Larimer County Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Dear Ms. Hodges,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the Town of Johnstown is submitting this letter of intent to confirm that the Town of Johnstown has agreed to participate in the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, the Town of Johnstown agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Larimer County OEM to complete the plan in conformance with FEMA requirements.

The Town of Johnstown understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by an agreement between the Lead Jurisdiction and the Participating Jurisdiction, I, Mark Romanowski, commit the Town of Johnstown to the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 16th day of November, 2015 _____
Signature

Livermore Fire Protection District

"To limit the loss of life, injury, and property by providing emergency fire and medical services, in accordance with the Colorado Revised Statutes."
– Mission Statement, Livermore Fire Protection District

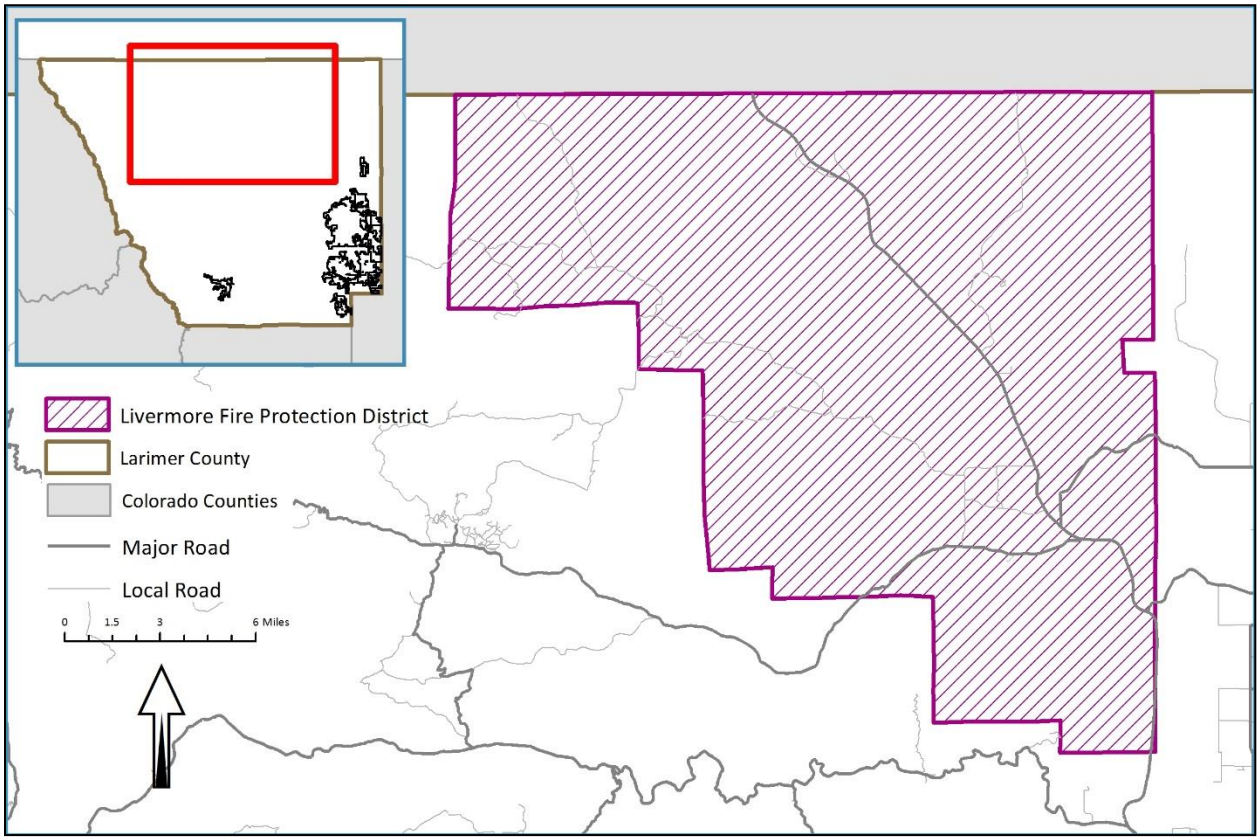
Community Profile

The Livermore Fire Department was incorporated in 1991 as an all-volunteer, privately funded fire department. In 1997, by general election, Livermore Fire Protection District was formed as a Special Fire District, funded by landowner property taxes in unincorporated Larimer County and tax deductible donations from the community.

Livermore Fire Protection District (LFPD) serves one of the largest fire protection districts and covers roughly 310 square miles. This includes 28 miles of US Highway 287. LFPD currently has two stations:

- Station 1 on 311 Red Feather Lakes Road or County Road 74E
- Station 2 on 8017 W. Cherokee Park or W. County Road 80C.

LFPD is the local responding agency for 911 emergency calls including: wildland fire, structure fire, vehicle accidents, medical emergencies, and smoke reports within our district. LFPD also responds to surrounding districts with mutual aid agreements. The district has a budget of about $120,000/year with an operations budget of about $70,000.



Highway 287 greatly impacts the LFPD and affects its need for equipment and training. The highway is a source of severe accidents including hazmat incidents and vehicle fires. Obviously, as an important part of the US DOT infrastructure, it is an important consideration of LPFD's HMP and emergency responses. Accidents, storms, fires, hazmat; all potentially close this highway. Every year citizens die on this road due to bad weather. Many thousands of dollars in property are lost as well as lost time in shipping products over the road

Hazard Identification and Risk Assessment

The following Hazard Identification and Risk Assessment Summary table is based on jurisdiction-specific responses to the risk factor exercise and differs from the risk factor results that were determined at the county scale.

NATURAL HAZARD	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)	0.9	0.6	0.8	0.4	0.3	3.00
Utility Disruption	0.9	0.6	0.6	0.4	0.3	2.80
Fire – Wildland	0.9	0.3	0.6	0.4	0.4	2.60
Flood – Flash and Riverine	0.9	0.6	0.4	0.4	0.2	2.50
Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)	0.9	0.3	0.4	0.4	0.2	2.20
Erosion / Deposition	0.6	0.3	0.6	0.3	0.3	2.10
Hazmat – Fixed and Transport	0.6	0.3	0.6	0.4	0.2	2.10
Landslide / Rockslide	0.6	0.3	0.4	0.4	0.2	1.90
Tornado	0.3	0.3	0.4	0.4	0.1	1.50
Civil Disturbance	0.3	0.3	0.2	0.4	0.1	1.30
Earthquake	0.3	0.3	0.2	0.4	0.1	1.30
Biological Hazards / Contagion	0.3	0.3	0.2	0.2	0.1	1.10
HIGH RISK (2.5 or higher): Winter Storm (Blizzard Conditions, Heavy Snow Accumulation); Utility Disruption; Fire – Wildland; Flood – Flash and Riverine						
MODERATE RISK HAZARD (2.0 - 2.4): Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning); Erosion / Deposition; Hazmat – Fixed and Transport						

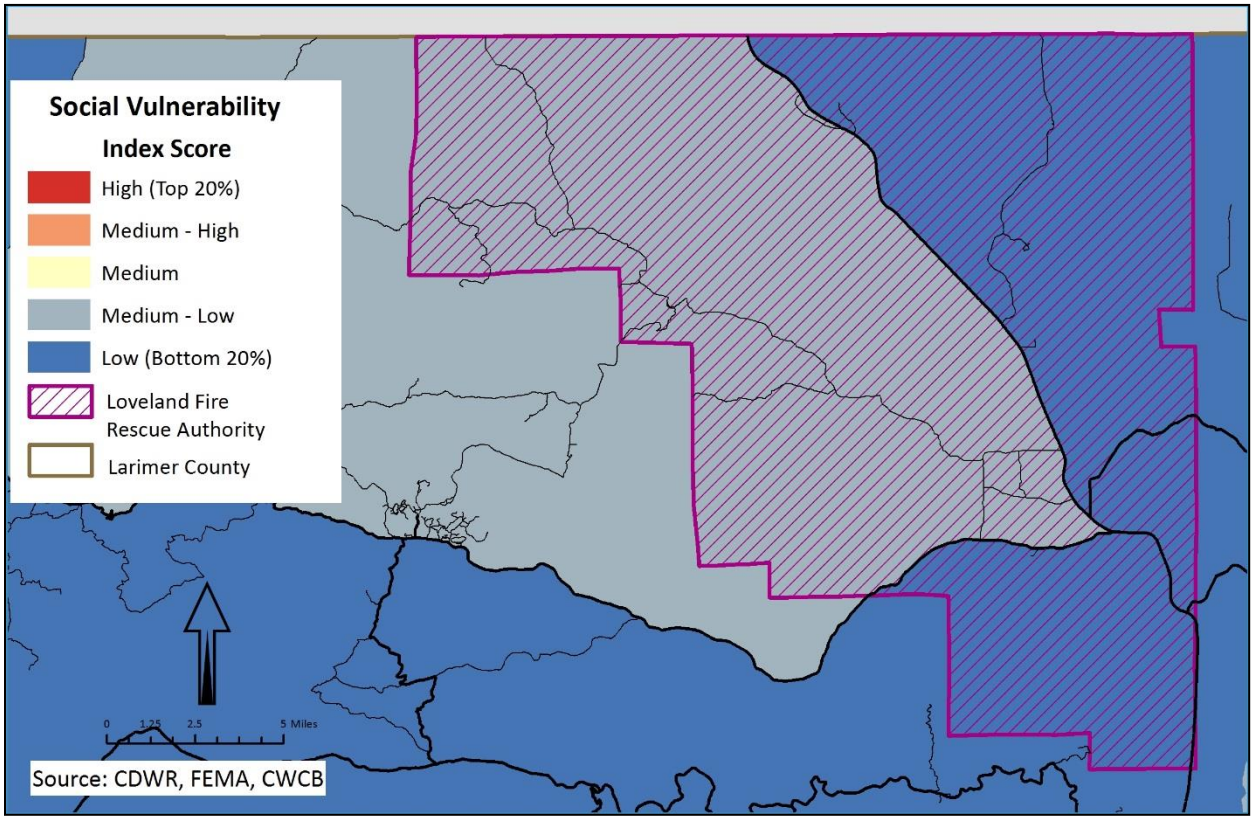
Low Risk (1.9 and lower): Landslide / Rockslide; Tornado; Civil Disturbance; Earthquake; Biological Hazards / Contagion

Vulnerability Assessment

This section provides a refined vulnerability assessment, specific for the Livermore Fire Protection District, for those hazards that were identified as being rated HIGH in the preceding section. This analysis was conducted separately from that of the county-wide vulnerability assessment to specifically focus on the population, structures, infrastructure, and other assets unique to the Livermore Fire Protection District.

The results of the social vulnerability assessment are displayed on the map below. On the map, social vulnerability is represented at the census tract level by 5 classes of vulnerability: Low (bottom 20% of the county), Medium-Low, Medium, Medium-High, and High (top 20% of the county). The Livermore Fire Protection District's social vulnerability map shows social vulnerability within the district.

Social Vulnerability Map – Livermore Fire Protection District[151]



[151] Source: Colorado Division of Water Resources Dam Safety Branch, FEMA, Colorado Water Conservation Board (CWCB)

Social vulnerability is represented as the social, economic, demographic, and housing characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to hazard events. The pre-existing social conditions that contribute to disaster losses can be identified using social vulnerability indicators. Using methods identified in the Social Vulnerability Index (SoVI) developed by Cutter et. al. (2003) this layer shows the social vulnerability index scores for the State of Colorado at the census tract level. Social vulnerability is represented at the Census tract level by five classes of vulnerability: Low, Medium-Low, Medium, Medium-High, and High.

The Livermore Fire Protection District is characterized by a mix of low to medium-low levels of social vulnerability. This does not mean, however, that there aren't any socially vulnerable people in the district or that local social vulnerability levels will remain the same over time. Close analysis of the individual social vulnerability indicators within the district's boundaries will give local emergency managers, planners, and stakeholders a clearer picture of which social vulnerability factors threaten the community the most and where social and economic resources should be allocated in order to reduce vulnerability. Over time, the fire protection district and county should continue to monitor their progress as demographic, economic, and housing related conditions change over time.

Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)

Previous Occurrences

According to NOAA's Storm Events Database, the Livermore Fire Protection District has experienced 174 Winter Storms since 1996. On March 17, 2003 there was report of a winter storm causing $31 million in property damage below 6,000 feet to above 9,000 feet in elevation, portions of which directly impacted LFPD areas. There were no deaths, injuries or damage to crops reported for any of these storms. The Livermore Fire Protection District is at high risk of experiencing Winter Storms during the winter months.

Inventory Exposed

All assets located in the Livermore Fire Protection District can be considered at risk from winter storms. This includes all people, or 100% of the District's population, and all buildings and infrastructure within the district. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out. Potential losses to livestock and crops (hay, alfalfa, and pasture) also need to be considered.

Potential Losses

Winter storms affect the entire planning area of the Livermore Fire Protection District including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Winter storms will remain a highly likely occurrence for the Livermore Fire Protection District.

Probability of Future Occurrences

Severe winter storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past severe winter events provide benchmarks for projecting similar conditions into the future. The probability that the Livermore Fire Protection District will experience a severe winter storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the district at least once every year.

Utility Disruption

Previous Occurrences

The Livermore Fire Protection District does not currently track incidences of utility disruption within its service area. The Poudre Valley REA would be the best potential resource for this information relating to electrical services.

Inventory Exposed

All assets located in the Livermore Fire Protection District are considered at risk from the impacts of utility disruption events. This includes all people, or 100% of the District's population, and all buildings and infrastructure within the District.

Potential Losses

Utility disruption events have the potential to threaten lives and disrupt business activity. However, monetary losses and casualty estimates are largely unknown. Most LFPD residents depend on propane as a utility. This can be disrupted when roads are impassible by any disturbance (fire, weather, flood, etc.). Utility disruptions may also cause livestock losses if heat and water are not available.

Probability of Future Occurrences

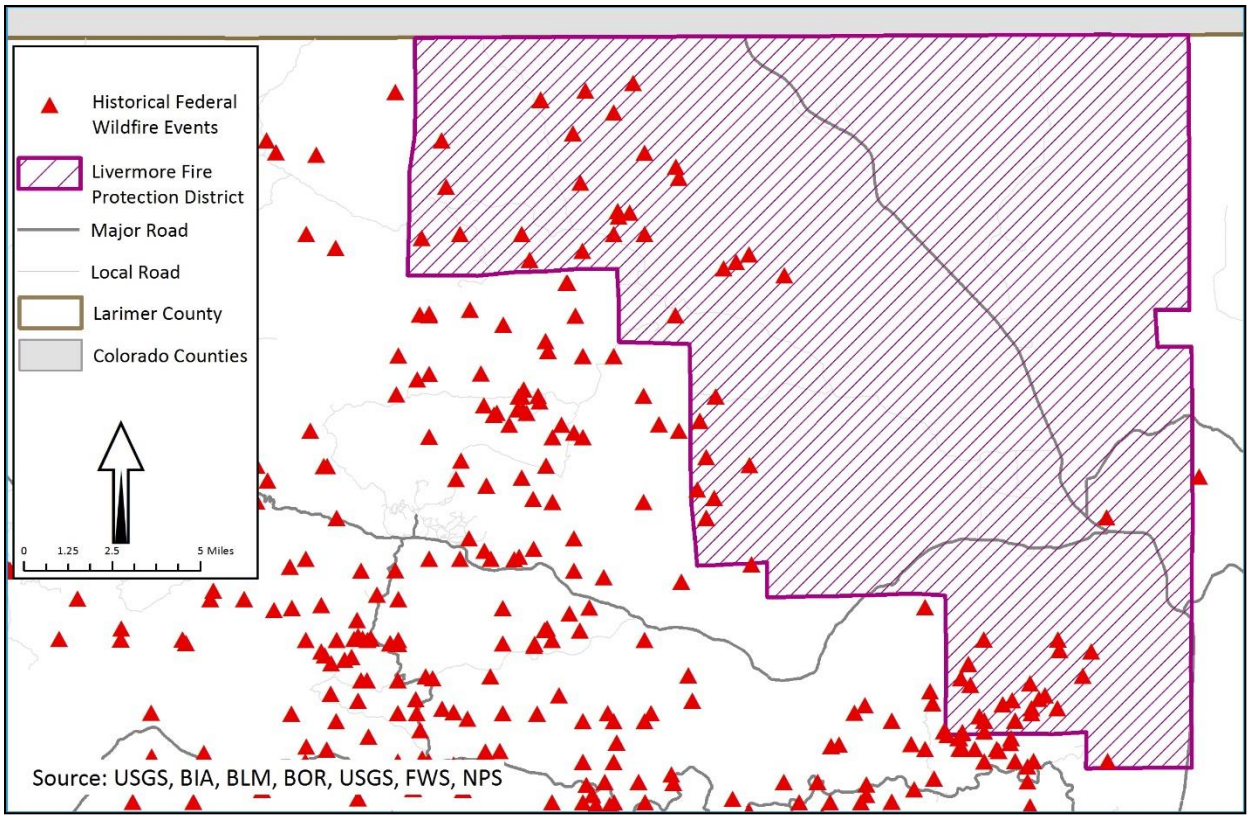
In general, utility outages result from failures in the distribution system as opposed to shortages of supply. Distribution systems are most susceptible to failure during extreme hot and cold temperatures as well as during violent weather conditions. Regional utility failures can threaten human life, particularly when outages affect hospitals, nursing homes, or other healthcare facilities. As both population and climate variability increase across the State of Colorado, and put more pressure on aging distribution systems, it is likely that utility disturbance events will become more frequent in and around the Livermore Fire Protection District.

Fire – Wildland

Previous Occurrences

According to NOAA's Storm Events Database there have been 62 reported/documented wildfire events in the Livermore Fire Protection District. Based on the historic data showing hazardous impacts on the district, there is a great potential for wildfire events to occur at any given time. The LFPD has experienced years with over 18 wildland fires, so the NOAA event count does not fully represent action wildland fire occurrences. The following map only shows federally reported wildland fires. LFPD regularly experiences fires across its entire district.

Livermore Fire Protection District Historical Federal Wildfire Map[152]

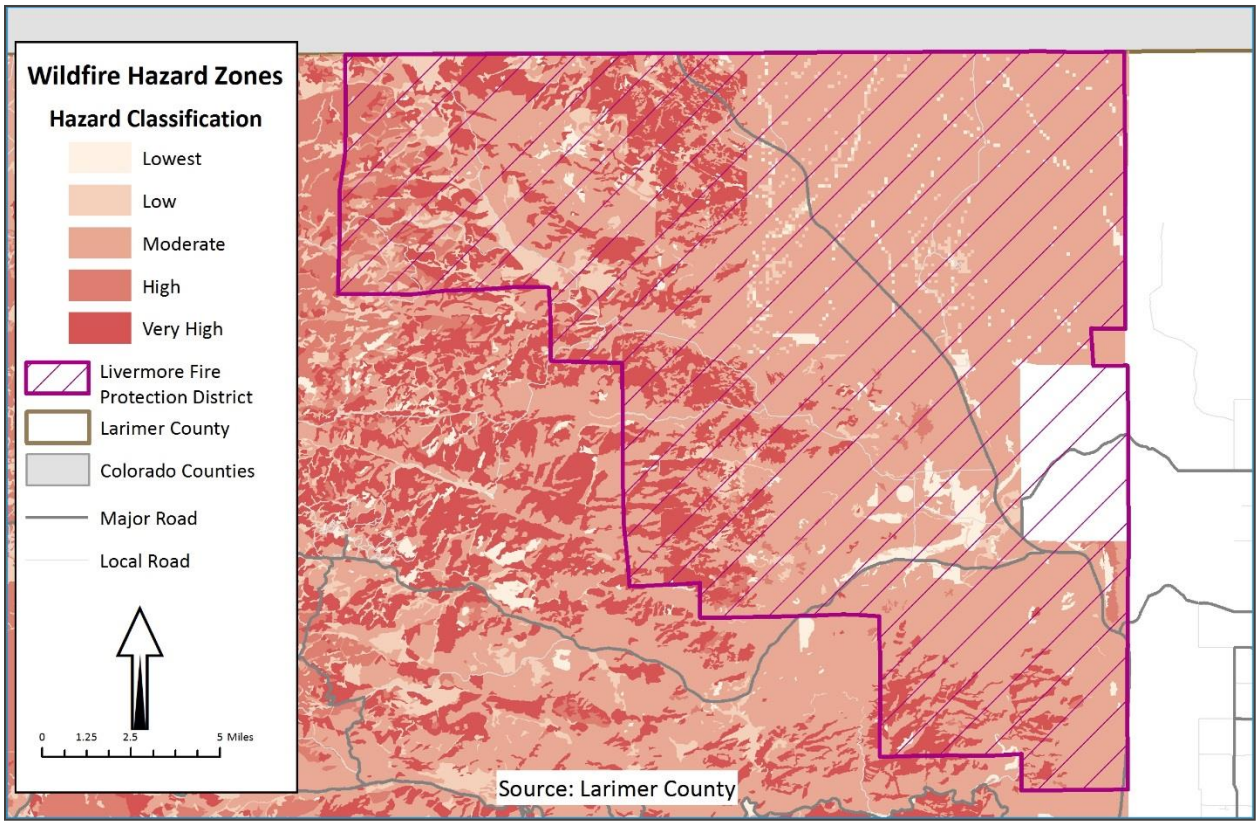


Inventory Exposed

The following Wildfire Hazard Zone map identifies expected wildfire behavior. The highest wildfire hazard zones in the district are located in the western region, in areas where there are lower population densities.

[152]Source: Historical wildland fire occurrence data compiled by USGS from 1980 - 2013, from BIA, BLM, BOR, USGS, FWS, and NPS.

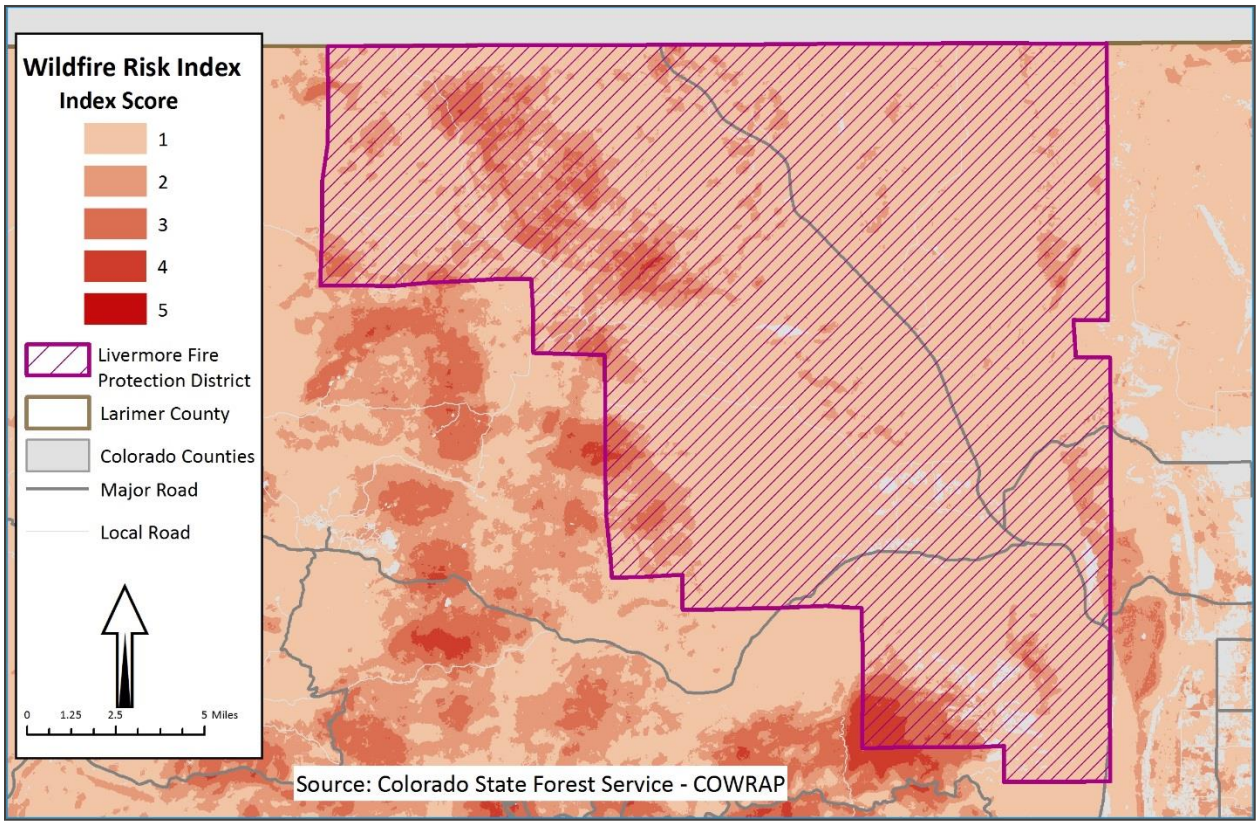
Livermore Fire Protection District Wildfire Hazard Zone Map[153]



The following Wildfire Risk map identifies areas with the greatest potential impacts from a wildfire, in other words, those areas most at risk. The highest wildfire risk areas in the district are located in the southwestern and northwestern region, in areas where there are lower population densities.

[153] To be used to identify wildfire hazards within the Wildfire Mitigation Area. The hazards are determined based on vegetation cover type, habitat structure stage (cover type, tree size and crown cover percentage), southern facing aspects and 30% and greater slopes according to the Wildfire Hazard Area Mapping (WHAM) guidelines.

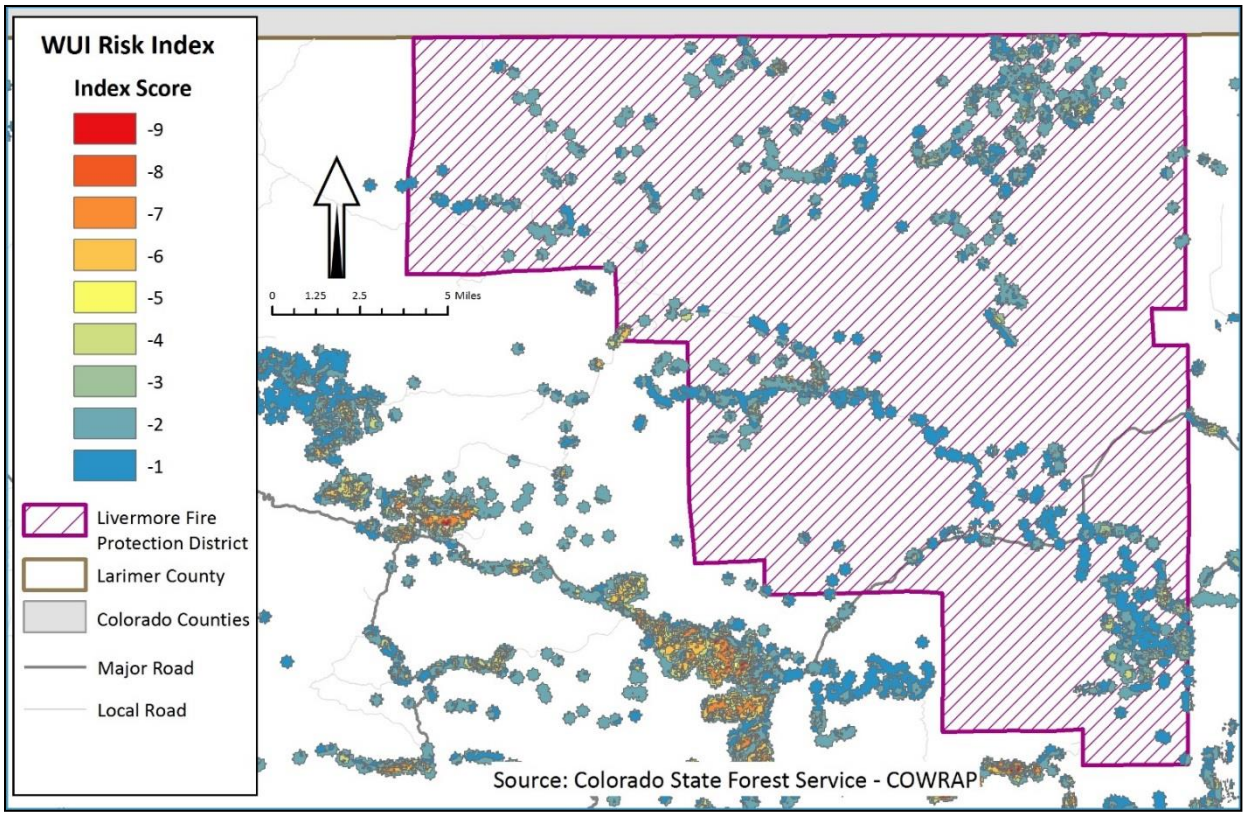
Livermore Fire Protection District Wildfire Risk Index Map[154]



Due to the low population densities within the Livermore Fire Protection District there is minimal areas of medium to the highest level on the WUI Risk Index Scale. The majority of the county has a lower WUI risk index scale. This level of risk is derived by combining housing density with predicted flame length.

[154] Wildfire Risk represents the possibility of loss or harm occurring from a wildfire. Risk is derived by combining wildfire threat and fire effects. The COWRAP data set was produced statewide and ranks areas on a scale that includes: lowest risk to highest risk. All risk rankings are present in Larimer County.

Livermore Fire Protection District WUI Map[155]



Fires can extensively impact the economy of an affected area, including the agricultural, recreation and tourism industries, water resources, and the critical facilities upon which the Livermore Fire Protection District depends. There are no critical facilities located in areas with the *most negative* and *2nd most negative* wildfire threat total.

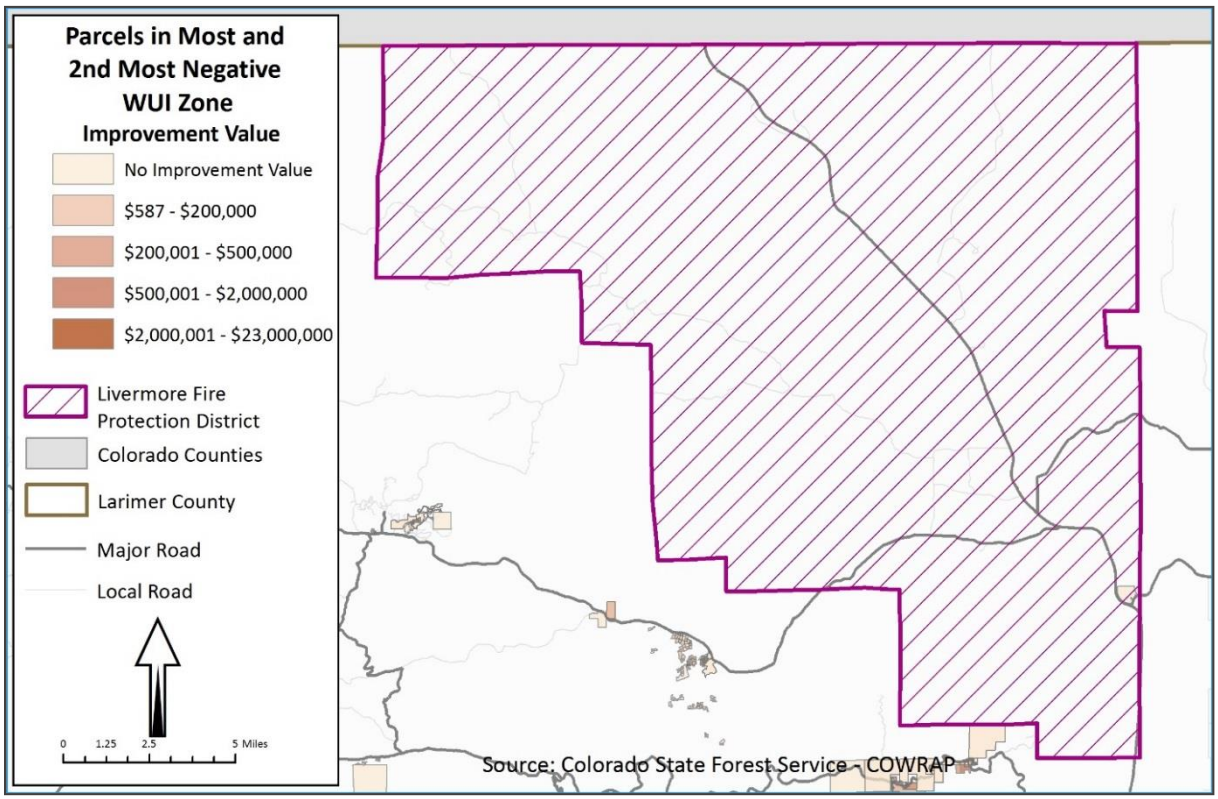
Potential Losses

The exposure data provided in the previous section (Inventory Assets Exposed) provides the clearest picture of potential losses to wildfire in the Livermore Fire Protection District. There is 1 parcel/structure located in areas with the *2nd most negative* wildfire threat. The appraisal value of the parcel/structure

[155] Wildland Urban Interface Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length. The COWRAP data set was produced statewide and ranks areas on a scale that includes: least negative to most negative impacts. This scale stretched from -1 (least) to -9 (most) statewide.

within these *2nd most negative* threat areas is roughly $5,000 dollars. The risk assessment uses worst case scenario loss estimates. For this reason it is important to plan for relative levels of loss rather than specific potential loss dollar amounts. Potential losses to livestock and crops (hay, alfalfa, and pasture) also need to be considered.

Livermore Fire Protection District Parcels in the Most Negative and Second Most Negative WUI Zone[156]



Probability of Future Occurrences

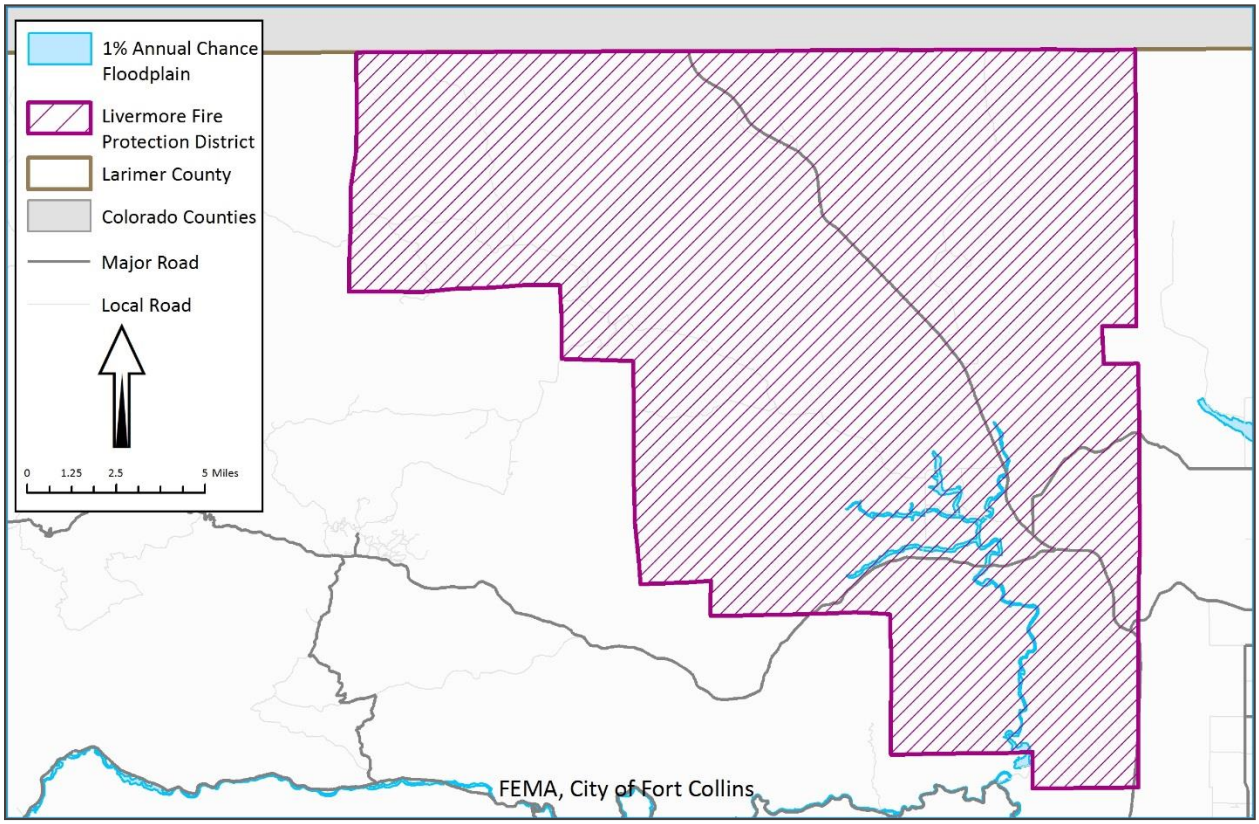
The likelihood of wildfires attaining significant size and intensity is unpredictable and highly dependent on environmental conditions and firefighting response. Weather conditions, particularly drought events, increase the likelihood of wildfires occurring. Within the LFPD, lightning-caused fires account for over 50% of instances. Ultimately, the occurrence of future wildfire events will strongly depend on patterns of human activity and events are more likely to occur in wildfire-prone areas experiencing new or additional development.

[156] Wildland Urban Interface Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length.

Wildfires can occur at any time of day and during any month of the year. Moreover, the length of a wildfire season and/or peak months may vary appreciably from year to year. As evidenced by the wildfire risk assessment, areas within the Livermore Fire Protection District that are characterized by dense development and single family homes along the wildland-urban interface are most vulnerable to wildfire.

Flood – Flash and Riverine

Livermore Fire Protection District Special Flood Hazard Area[157]



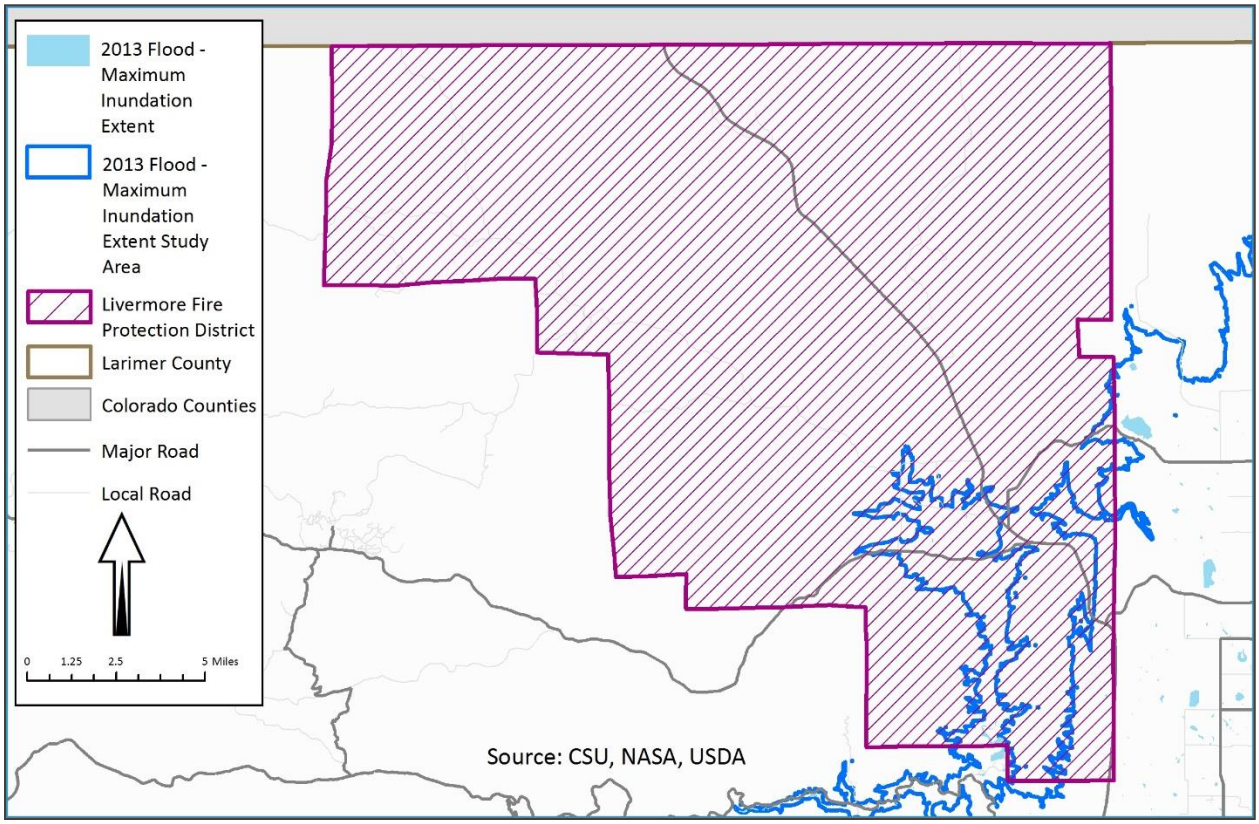
Previous Occurrences

According to NOAA's Storm Events Database there have been no reported injuries or deaths in the Livermore Fire Protection District caused by flooding. On July 14, 2014 a flash flood occurred in the Livermore community. This event reported $10,000 in property loss and $10,000 in crop loss. Based on the historic data showing hazardous impacts on the district, there is a great potential for flooding events to occur at any given time. It should also be noted that residents regularly experience flooding in non-

[157] This layer is compiled utilizing the most recent Special Flood Hazard Areas (SFHA) as defined by FEMA's National Flood Hazard Layer (NFHL) in combination with some recent flood studies performed by the City of Fort Collins. These areas are also referred to as the 1% Annual Chance Floodplain.

special flood hazard areas, on many of the smaller streams in the area. These flooding events can be damaging to roads, structures, crops, and infrastructure and can also cause erosion issues.

Livermore Fire Protection District 2013 Flood Extent[158]



Maximum flood extent—a key data need for disaster response and mitigation—is rarely quantified due to storm-related cloud cover and the low temporal resolution of optical sensors. While change detection approaches can circumvent these issues through the identification of inundated land and soil from post-flood imagery, their accuracy can suffer in the narrow and complex channels of increasingly developed and heterogeneous floodplains. The data depicted above is from a study that explored the utility of the Operational Land Imager (OLI) and Independent Component Analysis (ICA) for addressing these challenges in the unprecedented 2013 Flood along the Colorado Front Range, USA. The approach was able to

[158] Multi-Temporal Independent Component Analysis and Landsat 8 for Delineating Maximum Extent of the 2013 Colorado Front Range Flood

simultaneously distinguish flood-related water and soil moisture from pre-existing water bodies and other spectrally similar classes within the narrow and braided channels of the study site.

Inventory Exposed

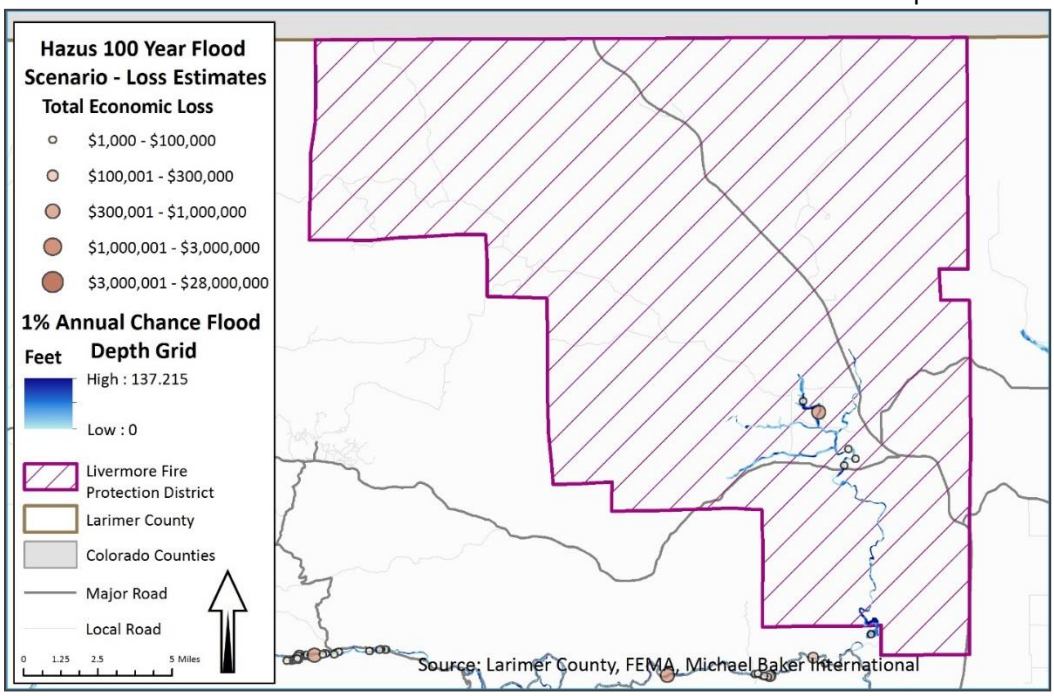
Critical facilities are essential to the health and welfare of the whole population and are especially important both during and after hazard events. Critical structures or areas that overlap or touch the SFHA are considered "flood prone."

The critical facility and structure exposure analysis estimates that there are no critical facilities and 75 parcels/structures in the Livermore Fire Protection District that are flood prone (not including the total miles of flood prone infrastructure). The appraised value of these exposed structures is over $8.3 million dollars. These figures do not account for numerous homes that are along many of the smaller unmapped streams and drainages throughout the LFPD area. These smaller streams oftentimes flood and cause damages during rainfall events.

Potential Losses

Hazus estimates for the Livermore Fire Protection District that for a 100-year flood event, approximately 5 buildings will experience flood damage. The estimated building loss is over $211 thousand dollars, content loss over $178 thousand dollars, and inventory loss $171 thousand dollars. Potential losses to livestock and crops (hay, alfalfa, and pasture) also need to be considered.

Livermore Fire Protection District 1% Annual Flood Loss Estimation and Flood Depth Grid Map[159]



Probability of Future Occurrences

Frequency of previously reported flood events in the Livermore Fire Protection District provide an acceptable framework for determining the probability of future flood occurrence in the area. The probability that the district will experience a flood event can be difficult to predict or quantify.

Severe flooding has the potential to inflict significant damage to people and property in the district. Mitigating flood damage requires that communities remain diligent and notify local officials of potential flood (and flash flood) prone areas near infrastructure such as roads, bridges, and buildings.

[159] FEMA's loss estimation modeling software, Hazus, was utilized to produce this data set. A 100 year flood scenario was defined and losses were calculated for each point (structure) that intersected the depth grid based on the Hazus depth damage curves for specific structure attributes (such as foundation type, building type, and first flood height). Information derived from Hazus-MH 2.2 flood scenario.

Total Losses equals a sum of building losses, content losses, and inventory losses.

1% Annual Chance Flood flooding depth grid, produced from the best available topographic and floodplain data.

Capabilities Assessment

The capability assessment examines the ability of the LFPD to implement and manage the comprehensive mitigation strategy laid out in this Plan. The strengths, weaknesses, and resources of the community are identified here as a means for evaluating and maintaining effective and appropriate management of the district's hazard mitigation program.

Local Personnel

The ability of a community to implement a comprehensive mitigation strategy depends, in part, on available resources, including people and staff. The following table outlines the district's capabilities as they relate to key personnel.

	Full Time	Part Time	None or Not-Identified
Emergency Manager			X
Floodplain Administrator			X
Community Planner			X
GIS Specialist			X
Grant Writer		X	

Land Use Planning and Codes

Local land use plans and building codes are tremendous tools for evaluating local policies related to hazard mitigation and risk reduction. Additionally, comprehensive master plans, capital improvement plans, stormwater plans and zoning ordinances all present opportunities for enhanced local capabilities. The following table outlines the district's current capabilities as they relate to land use planning and codes.

	Yes (Y); No (N)
A zoning ordinance	N
A hazard-specific ordinance	N
Local building codes	N
A Comprehensive Plan / Master Plan	N
A Capital Improvements Plan	N
A Stormwater Plan	N
A Continuity of Operations Plan (COOP)	N
An Emergency Operations Plan (EOP)	N
A Long-Term Recovery Plan	N
Participates in the NFIP	N

Plan Maintenance and Implementation

The LFPD has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the district will continue public participation in the plan maintenance process.

Jurisdiction	Plan Maintenance and Implementation Strategy
LFPD	*"Our Fire District Board will help review plans in cooperation with County resources."* *"We have a newsletter which can be used to reach most homeowner and landowners. We can also use LFPD's web site and (possibly) Larimer County's web site."*

Integrating Hazard Mitigation into Local Planning

Through discussions at planning meetings and the use of an online survey, individual outreach, and phone calls, each participating jurisdiction brainstormed with the planning team to identify processes for integrating hazard mitigation into their local planning mechanisms and policies. The following table lists the specific integration strategy identified by LFPD based on the mitigation actions listed in this plan.

Jurisdiction	Strategy
LFPD	*"We will continue to conduct outreach to the community HOAs and ROAs to encourage mitigation for wildfire, structure fire, and be an advocate for road safety, first aid training. We will continue to work with the county when they request assistance for reviewing development plans as they pertain to fire issues."*

Mitigation Action Guides

The following Mitigation Action Guides present the District's new mitigation actions that were developed for the 2016 Plan.

Livermore FPD: Cistern Mitigation (Livermore FPD – 1)	
PRIORITY: High	HAZARDS ADDRESSED: Fire
LOCATION: Livermore Fire Protection District	GOALS ADDRESSED: 1 and 2
RECOMMENDATION DATE: 11/01/2015	OBJECTIVES ADDRESSED: E
TARGET COMPLETION DATE: 01/01/2020	
ISSUE: The Livermore Fire Protection District has no municipal water system. Water for fire protection must be obtained from a few existing cisterns or from natural water bodies. Access, distance, and reliability to water sources are a problem. Some of our areas are many miles from an accessible water source.	
RECOMMENDATION: Determine five areas that are in high need of reliable water for firefighting. This would be based on values to be protected, distance to reliable water, and risk of fire damage.	
ACTION: After targeting areas for this improvement we would work with land owners/managers to obtain right-of-ways and easements. Once obtained we would purchase 2500 gallon cisterns and	

work with contractors for installation (burial) to include marking, and protecting tanks and piping, and laying down a road base, if needed, so apparatus may access the tanks in all weather. Once installed, Livermore Fire would fill, regularly inspect, maintain the tanks, and their access.	
LEAD AGENCY: Livermore Fire Protection District	EXPECTED COST: $4000 per tank, installed. $20,000 for five tanks.
SUPPORT AGENCIES: If applicable as land managers: Larimer County, Colorado Division of Wildlife, United States Forest Service.	POTENTIAL FUNDING SOURCES: Livermore Fire Protection District, HOA and ROAs, Land Managers (USFS, Larimer County, DOW), Grants.
PROGRESS MILESTONES: 1. Determine the best locations for five cisterns. 2. Obtain easements, right of ways to installation locations. 3. Obtain quotes for tanks and installations. 4. Purchase tanks, select vendors. Work with them on the installations. 5. Fill and maintain the tanks. 6. Map tank locations on LFPD maps.	

Livermore FPD: New Station (Livermore FPD – 2)	
PRIORITY: High	HAZARDS ADDRESSED: Drought, Earthquake, Land Subsidence, Extreme Temperatures, Flood, Severe Storm, Wind & Tornado, Fire, Public Health, Hazmat
LOCATION: Livermore Fire Protection District	GOALS ADDRESSED: 1, 2, 3, 4, 5
RECOMMENDATION DATE: 11/01/2015	OBJECTIVES ADDRESSED: A, B, D, E
TARGET COMPLETION DATE: 01/01/2020	
ISSUE: Our existing Fire Station 1 is too small to hold needed apparatus, maintenance equipment, records, training equipment, and seating for personnel during meetings and training.	
RECOMMENDATION: This station needs to be remodeled or a new station built to accommodate our needs with some room for more expansion.	
ACTION: Determine best location for a new station with consideration given to risks, call loads, types of calls, available land, and a location in keeping with the nature of the community. Design should accommodate at least one structural engine, one water tender, one brush truck, one rescue, and a squad. Additionally, secure office space is required, a classroom/community room, decontamination room and equipment, 2000 square feet of storage for supplies and equipment. Minimum of 4000 gallon cistern to be included for fire use. Well water must not need to be treated as does our existing station.	
LEAD AGENCY: Livermore Fire Protection District	EXPECTED COST: $840,000, based on an approximate 80'X70' building at $150 square foot.
SUPPORT AGENCIES: Larimer County	POTENTIAL FUNDING SOURCES: Livermore Fire Protection District, Fundraising, Grants. Potentially the sale of existing property.
PROGRESS MILESTONES: 1. Property selection based on water availability, access to US 287 or County Rd 74 E. A relatively level tract of land able to hold building with parking and driveways and septic system. 2. Work with architect and obtain estimated building costs. 3. Obtain funding. 4. Select contractor. 5. Provide for continuation of services to the District during construction.	

Livermore FPD: Private Land Fire Mitigation (Livermore FPD – 3)	
PRIORITY: High	HAZARDS ADDRESSED: Fire
LOCATION: Private wooded lands in Livermore Fire Protection's District	GOALS ADDRESSED: 1, 3, 4, 5
RECOMMENDATION DATE: 11/01/2015	OBJECTIVES ADDRESSED: C, D, E
TARGET COMPLETION DATE: 01/01/2020	
ISSUE: There are about 42,000 forested acres on private land. Some of these properties have been adequately mitigated to urban fire codes and some have not been touched. Most of these properties have a very high fuel load after the Mountain Pine Beetle infestation. These properties pose a risk not only to their owner's lands but also to adjoining properties. Mitigation is expensive, takes experts if "burn" operations are conducted; and some land owners have hundreds of acres which need treatment. For many of these owners the cost of making the property more fire-resistive is prohibitive.	
RECOMMENDATION: Identify high risk properties and use a Community Wildfire Protection Plan to help find funding and resources to mitigate these properties. Mitigation would include removal of excess ladder fuels, dead and downed trees.	
ACTION: Reach property owners, HOAs, and ROAs and perform hazard assessments. Project treatment costs and identify methods for mitigation. When possible use community resources and/or state and federal resources.	
LEAD AGENCY: Livermore Fire Protection District	EXPECTED COST: $2,000,000
SUPPORT AGENCIES: Larimer County, USFS, State of Colorado.	POTENTIAL FUNDING SOURCES: Livermore Fire Protection District, State of Colorado, Larimer County, USFS, FEMA, grants.
PROGRESS MILESTONES: 1. Contact private landowners, HOAs, and ROAs, and obtain agreement to perform assessment in their properties. 2. Complete assessments. 3. Obtain cost estimates. 4. Look for grant funding, owner funding, for mitigation. 5. Obtain assistance from USFS or Colorado State Forest in mitigation work, consultation. 6. Observe and measure mitigation during and after work is performed. 7. Plan future mitigation for properties that do not meet standards or need further improvements.	

Livermore FPD: Snow Rescue Vehicle (Livermore FPD – 4)	
PRIORITY: Medium	HAZARDS ADDRESSED: Storm, Fire
LOCATION: Project location	GOALS ADDRESSED: 1, 2, 3.
RECOMMENDATION DATE: 11/01/2015	OBJECTIVES ADDRESSED: E, D
TARGET COMPLETION DATE: 01/01/2019	
ISSUE: In severe weather, particularly snowstorms; there are many miles of public and private roads which will not be cleared. Any emergency response (Law, Fire, EMS) may be delayed for hours or days until roads can be cleared. Many residential roads are not maintained and can be impassable until a contractor can remove snow. Some of these roads are miles long.	
RECOMMENDATION: Obtain a vehicle which is capable to transporting responders and supplies/equipment into a scene, and be capable of removing citizens trapped or in distress when over the road vehicles are not able to make access.	

ACTION: Determine vehicle configurations adaptable to fire and EMS situations that can travel off-road or over snow-closed road. Obtain trailer for such vehicle, if needed, obtain storage location which will be accessible to Livermore Fire Protection Members when roads are impassable. Train members on the use operation, use, and driving. Livermore Fire would maintain and repair this vehicle. We would also make other agencies aware of this capability and of its availability for situations in their district. We would also make this available for organizations providing essential services for our area. (REA, Verizon, etc.)	
LEAD AGENCY: Livermore Fire Protection District	EXPECTED COST: Enclosed, heated for multiple personnel and supine patients: $110,000.
SUPPORT AGENCIES: Livermore Fire Protection District, TBD.	POTENTIAL FUNDING SOURCES: Livermore Fire Protection District, fund raising, grants.
PROGRESS MILESTONES: 1. Determine design/capacity parameters to include dimensions, weight, ability to be used over a variety or terrain and narrow roads. Ability to respond to multiple types of missions; i.e. EMS, Fire, Rescue. 2: Obtain storage facility meeting objectives above. 3. Select vendor of vehicle and determine cost. 4. Match cost with available funding and apply for grants. 5. Obtain grant and purchase equipment. Install LFPD equipment. 6. Extensive training on maintenance and operation of the vehicle for LFPD members.	

Livermore FPD: State and Federal Land Fire Mitigation (Livermore FPD – 5)	
PRIORITY: High	HAZARDS ADDRESSED: Fire
LOCATION: U.S. Forest Service and Division of Wildlife lands.	GOALS ADDRESSED: 1, 2, 3, 5
RECOMMENDATION DATE: 11/01/2015	OBJECTIVES ADDRESSED: C, D, E
TARGET COMPLETION DATE: 01/01/2020	
ISSUE: There are 31,360 acres of USFS land and 23,680 acres of DOW and state land trust land which is intertwined with private lands in the Livermore Fire Protection District. These lands have had little or no fire mitigation and are in especially bad condition since the Mountain Pine Beetle infestation has left many trees dead and increased fire load in these forests. Fire originating on these lands will threaten private property.	
RECOMMENDATION: Identify high value private and public risks expose to the increased fire loads next to these lands and perform mitigation to include removal of excess ladder fuels and downed trees.	
ACTION: Communicate and cooperate with the USFS and the DOW to target dangerous areas in our district and to encourage and facilitate mitigation actions. This should be part of a larger Community Wildfire Protection Plan which LFPD is developing.	
LEAD AGENCY: Livermore Fire Protection District	EXPECTED COST: $2,700,000.
SUPPORT AGENCIES: Larimer County, USFS, Colorado DOW.	POTENTIAL FUNDING SOURCES: Livermore Fire Protection District, State of Colorado, Larimer County, USFS, FEMA, grants.
PROGRESS MILESTONES: 1. Meet with USFS and or State DOW managers and agree to assess forested lands. 2. Prioritize lands for mitigation placing higher priorities on public lands next to	

occupied private land. 3. Acquire funding for mitigation projects. 4. Begin mitigation planning by USFS and DOW.

Letter of Intent to Participate

LIVERMORE *Fire Protection District*

P.O. Box 28 • Livermore • Colorado 80536

Letter of Intent to Participate

June 12, 2015

Lori R. Hodges
Larimer County Emergency Management
200 West Oak Street
Fort Collins, Co 80526

Re: "Statement of Intent to Participate" as a participating jurisdiction in the Larimer County Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Dear Ms. Hodges,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR 201.6, which specifically identify criteria that allow for multi-jurisdiction mitigation plans, the Livermore Fire Protection District is submitting this letter of intent to confirm that Livermore Fire Protection District has agreed to participate in the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, Livermore Fire Protection District agrees to meet the requirements for mitigation plans identified in 44 CFR 201.6 and to provide such cooperation as is necessary and in a timely manner to Larimer County OEM to complete the plan in conformance with FEMA requirements.

Livermore Fire Protection District understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan)

Therefore, with a full understanding of the obligations incurred by an agreement between the Lead Jurisdiction and the Participating Jurisdiction, I Donn Maynard, commit Livermore Fire Protection District to the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 15 day of June, 2015

Donn Maynard/Chief LFPD

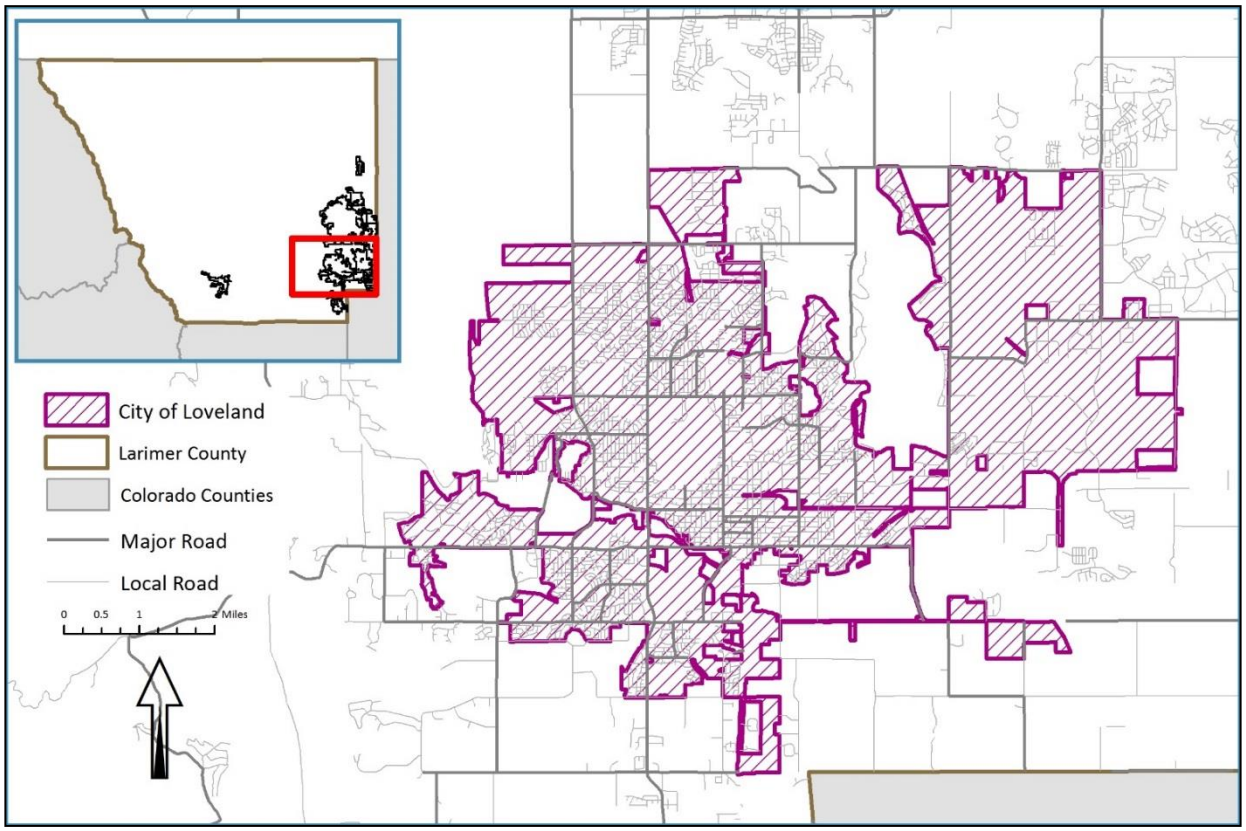
City of Loveland

"A vibrant community – surrounded by natural beauty – where you belong."
– Community Vision, Create Loveland Comprehensive Plan, 2015

Community Profile

Loveland is located south of Fort Collins. Both cities have expanded steadily toward each other over the last several decades and are considered a single metropolitan area by the U.S. government. The establishment of county-owned open space between the two communities in the 1990s was intended to create a permanent buffer between them. Currently, Loveland's northern city limits are now contiguous with those of Windsor, which has expanded westward from Weld County across Interstate 25.

Loveland has aggressively expanded its incorporated limits eastward to capitalize on the interchange of Interstate 25 and U.S. Highway 34, and is currently developing the area. In the last decade, the intersection has become a primary commercial hub of northern Colorado, with the construction of shopping centers and the Budweiser Events Center. A new medical center and mall have also been built on the Interstate 25 and U.S. Highway 34 interchange. This area is known as Centerra. The interchange area is shared with its smaller neighbor Johnstown, of Weld County.



The following table summarizes key demographic and development related characteristics of the City of Loveland.

City of Loveland Statistics		
	City of Loveland	Colorado
Population, 2010	66,859	5,029,196
2000-2010 Population Change, %	24%	14.5%
% Population under 5 years, 2010	6.8%	6.8%
% Population under 19 years, 2010	26.3%	20.3
% Population 65 years and over, 2010	14.9%	10.9%
Language other than English spoken at home, % age 5+, 2009-2013	8.3%	15.9%
Homeownership Rate 2010	65.9%	65.5%
Persons Per Household 2010	2.44	2.57
Persons below poverty level, %, 2013	10.5%	13.2%
Median Household Income, 2013	$54,977	$58,433

Hazard Identification and Risk Assessment

The following Hazard Identification and Risk Assessment Summary table is based on jurisdiction-specific responses to the risk factor exercise and differs from the risk factor results that were determined at the county scale.

NATURAL HAZARD	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)	0.99	0.67	0.65	0.24	0.29	2.84
Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)	0.97	0.62	0.60	0.28	0.18	2.66
Flood – Flash and Riverine	0.78	0.72	0.48	0.31	0.28	2.57
Fire – Wildland	0.76	0.60	0.40	0.27	0.30	2.33
Utility Disruption	0.72	0.46	0.45	0.40	0.21	2.24
Tornado	0.53	0.65	0.42	0.38	0.14	2.12
Erosion / Deposition	0.74	0.46	0.35	0.25	0.25	2.05
Hazmat – Fixed and Transport	0.60	0.51	0.33	0.39	0.15	1.99
Biological Hazards / Contagion	0.46	0.55	0.37	0.30	0.22	1.90
Civil Disturbance	0.51	0.39	0.33	0.39	0.20	1.83

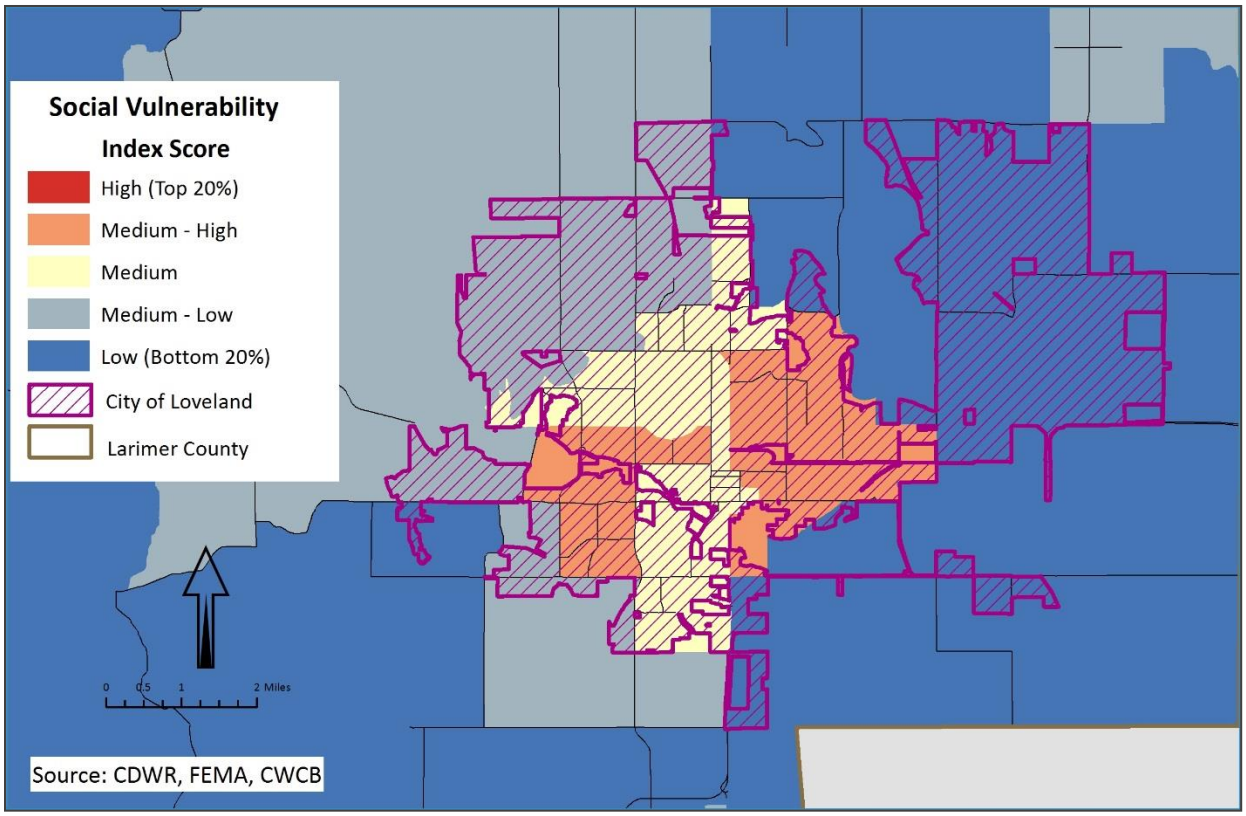
Landslide / Rockslide	0.58	0.42	0.28	0.37	0.16	1.80
Earthquake	0.30	0.53	0.38	0.40	0.13	1.75
HIGH RISK (2.5 or higher): Winter Storm (Blizzard Conditions, Heavy Snow Accumulation); Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning); Flood – Flash and Riverine						
MODERATE RISK HAZARD (2.0 - 2.4): Fire – Wildland; Utility Disruption; Tornado; Erosion / Deposition; Hazmat – Fixed and Transport						
Low Risk (1.9 and lower): Biological Hazards / Contagion; Civil Disturbance; Landslide / Rockslide; Earthquake						

Vulnerability Assessment

This section provides a refined vulnerability assessment, specific for the City of Loveland, for those hazards that were identified as being rated HIGH in the preceding section. This analysis was conducted separately from that of the county-wide vulnerability assessment to specifically focus on the population, structures, infrastructure, and other assets unique to the City.

The results of the social vulnerability assessment are displayed on the map below. On the map, social vulnerability is represented at the census tract level by 5 classes of vulnerability: Low (bottom 20% of the county), Medium-Low, Medium, Medium-High, and High (top 20% of the county). The City of Loveland's social vulnerability map shows social vulnerability within the community.

Social Vulnerability Map – City of Loveland[160]



Social vulnerability is represented as the social, economic, demographic, and housing characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to hazard events. The pre-existing social conditions that contribute to disaster losses can be identified using social vulnerability indicators. Using methods identified in the Social Vulnerability Index (SoVI) developed by Cutter et. al. (2003) this layer shows the social vulnerability index scores for the State of Colorado at the census tract level. Social vulnerability is represented at the Census tract level by five classes of vulnerability: Low, Medium-Low, Medium, Medium-High, and High.

Loveland is characterized by a mix of low to medium-high levels of social vulnerability. The south eastern area of the city has higher levels of social vulnerability to disasters than the rest of the community. There is also a pocket of highly socially vulnerable residents in the south west portion of the city. A closer look at the individual social vulnerability indicators within Loveland will give local emergency managers, planners, and stakeholders an even clearer picture of where resources should be prioritized in order to

[160] Source: Colorado Division of Water Resources Dam Safety Branch, FEMA, Colorado Water Conservation Board (CWCB)

reduce vulnerability in the community. Over time, Loveland should continue to monitor their social vulnerability as demographic, economic, and housing related conditions change.

Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)

Previous Occurrences

According to NOAA's Storm Events Database, the City of Loveland has experienced 74 Winter Storms since 1996. On March 17, 2003 there was report of a winter storm causing $15,500,000 in property damage in areas of Larimer County below 6,000 feet and eastern Larimer County. There were no deaths, injuries or damage to crops reported for any of these storms. The City of Loveland is at high risk of experiencing Winter Storms during the winter months.

Inventory Exposed

All assets located in the City of Loveland can be considered at risk from winter storms. This includes 66,859 people, or 100% of the City's population, and all buildings and infrastructure within the city. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the City's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Potential Losses

Winter storms affect the entire planning area of the City of Loveland including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Winter storms will remain a highly likely occurrence for the City of Loveland.

Probability of Future Occurrences

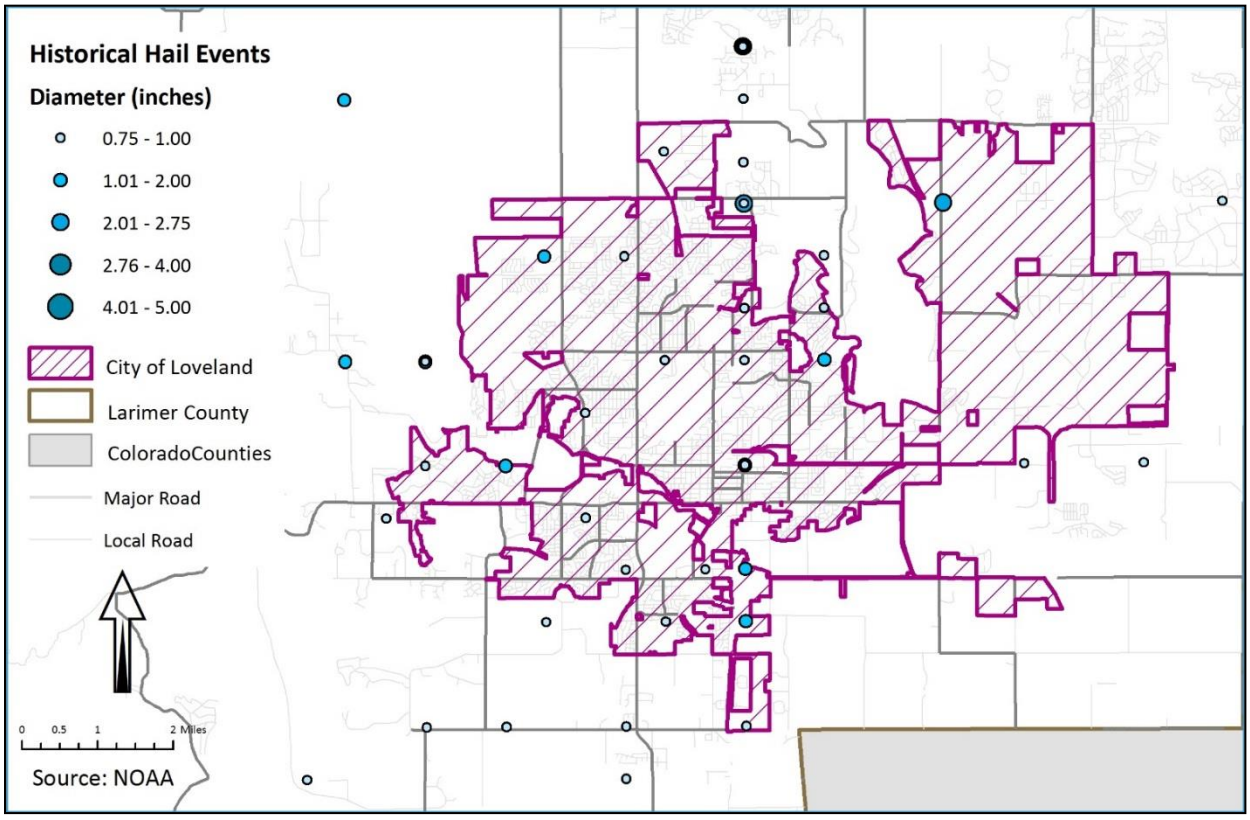
Severe winter storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past severe winter events provide benchmarks for projecting similar conditions into the future. The probability that the City of Loveland will experience a severe winter storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the city at least once every year.

Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)

Previous Occurrences

According to NOAA's Storm Events Database there are no reported injuries or deaths in the City of Loveland due to hail. There have been 35 hail events reported in city between 1955 and 2014. Of the 35 incidents, 3 reported losses totaling $13 thousand dollars. Based on the historic data showing hazardous impacts on the city, there is a great potential for hail events to occur at any given time.

Historical Hail Events in the City of Loveland[161]



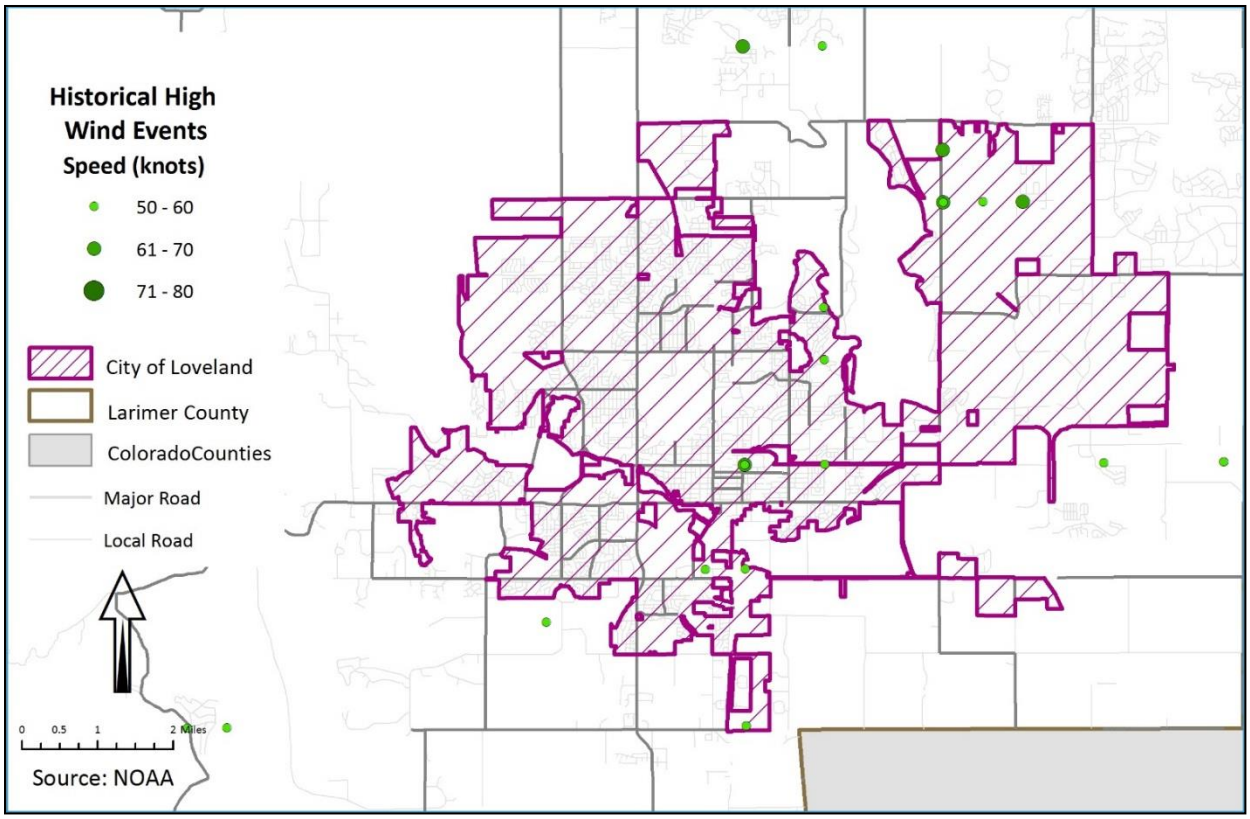
According to NOAA's Storm Events Database there have been 7 injuries and 2 deaths in the City of Loveland due to thunderstorm wind. There have been 16 thunderstorm wind events reported in city between 1955 and 2014. Of the 16 incidents, 3 reported property losses totaling $26 thousand dollars and no crop losses. Based on the historic data showing hazardous impacts on the city, there is a great potential for hail events to occur at any given time.

According to NOAA's Storm Events Database there have been 9 lightning events in the City of Loveland between 1996 and 2014. There have been 12 reported injuries, 2 deaths, $104,000 worth of property damage, and no crop damage. Based on the historic data showing hazardous impacts on the city, there is a great potential for lightning events to occur at any given time.

According to NOAA's Storm Events Database there have been 25 Windstorm events in the City of Loveland between 1996 and 2014. There have been 14 reported injuries, 2 deaths, over $5,000 worth of property damage, and no reported crop damage.

[161] Source: NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

Historical High Wind Events in the City of Loveland[162]



Inventory Exposed

All assets located in the City of Loveland can be considered at risk from spring and summer storms. This includes 66,859 people, or 100% of the City's population, and all buildings and infrastructure within the district. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the City's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Inventory assets exposed to severe wind is dependent on the age of the building, type, construction material used, and condition of the structure. Possible losses to critical infrastructure include:

- Electric power disruption
- Communication disruption
- Water and fuel shortages
- Road closures

[162] Source: NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

- Damaged infrastructure components, such as sewer lift stations and treatment plants
- Damage to homes, structures, and shelters

Potential Losses

Spring and summer storms affect the entire planning area of the City of Loveland including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Severe storms will remain a highly likely occurrence for the City of Loveland. It is likely that lightning and hail will also be experienced in the area due to such storms.

Generally, straight-line wind events destroy private, commercial, and public property. Additional costs stem from debris removal, maintenance, repair, and response. Indirect costs include loss of industrial and commercial productivity as a result of damage to infrastructure, facilities, or interruption of services. Because no specific, countywide loss estimation exists for wind, potential losses are related to historical property damage and injuries/deaths.

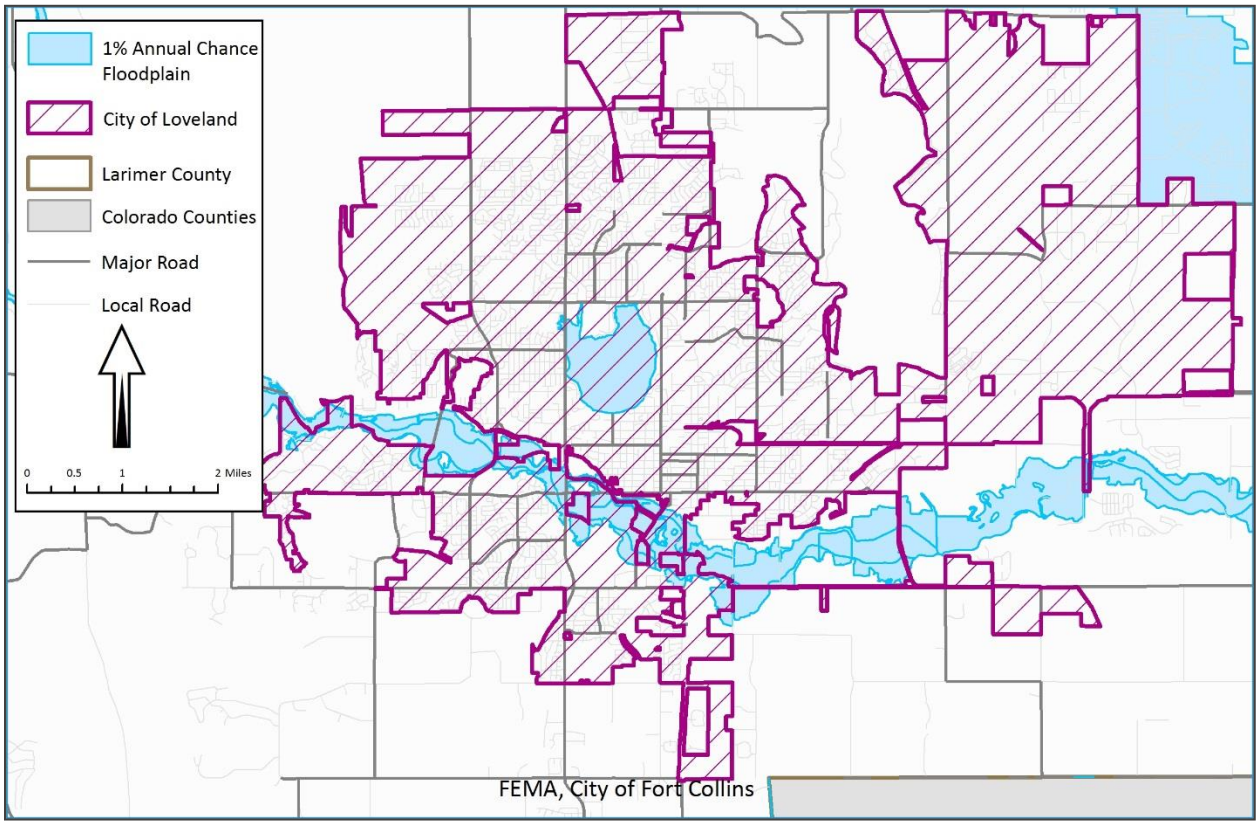
Probability of Future Occurrences

Spring and summer storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past spring and summer events provide benchmarks for projecting similar conditions into the future. The probability that City of Loveland will experience a spring or summer storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the City of Loveland at least once every year.

Reported straight-line wind events over the past nineteen years provide an acceptable framework for determining the future occurrence in terms of event. The probability of the City of Loveland experiencing a severe wind event associated with damages or injuries can be difficult to quantify, but based on historical record of 25 severe wind events since 1996, there is a high chance of this type of event occurring each year.

Flood – Flash and Riverine

City of Loveland Special Flood Hazard Area[163]

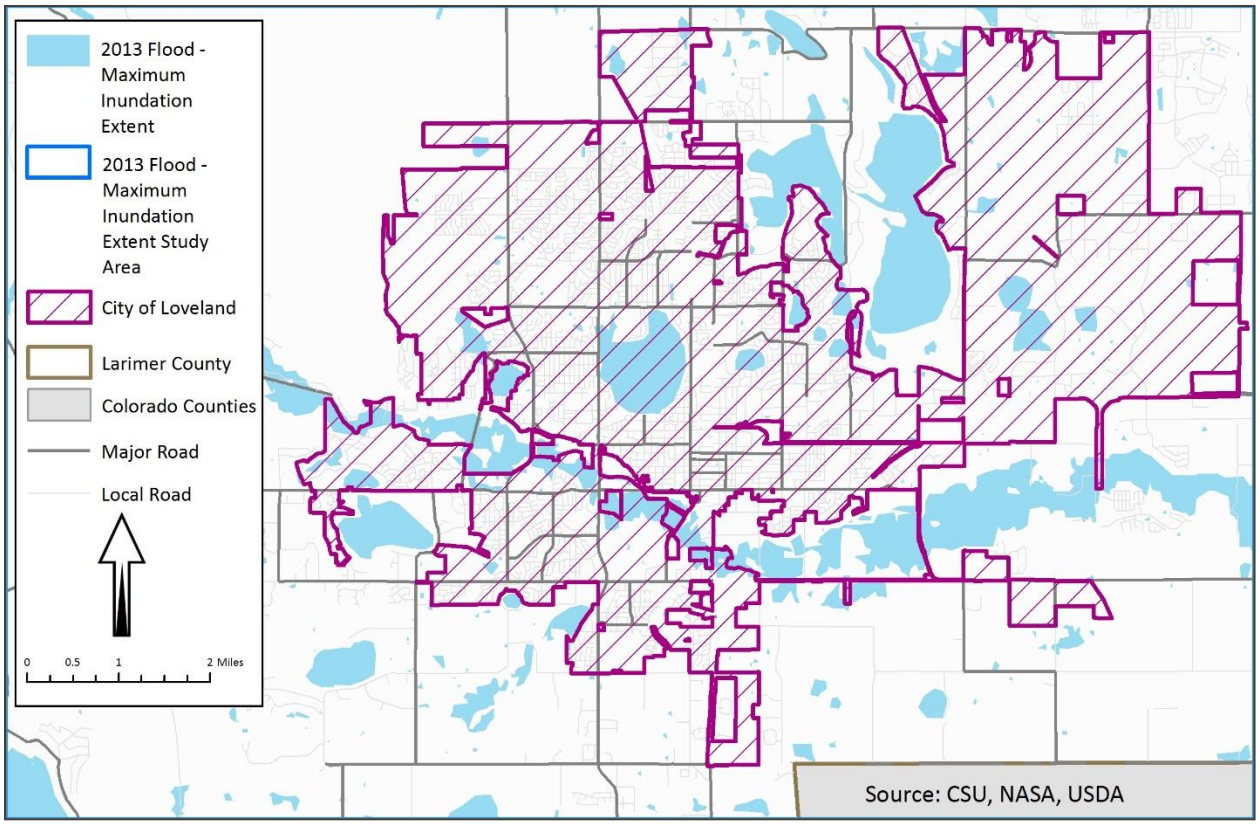


Previous Occurrences

According to NOAA's Storm Events Database there have been no reported injuries, property loss, or crop damage in the City of Loveland caused by flooding. A flash flood was reported on June 3, 2005. Based on the historic data showing hazardous impacts on the city, there is a great potential for flooding events to occur at any given time.

[163] This layer is compiled utilizing the most recent Special Flood Hazard Areas (SFHA) as defined by FEMA's National Flood Hazard Layer (NFHL) in combination with some recent flood studies performed by the City of Fort Collins. These areas are also referred to as the 1% Annual Chance Floodplain.

City of Loveland 2013 Flood Extent[164]



Maximum flood extent—a key data need for disaster response and mitigation—is rarely quantified due to storm-related cloud cover and the low temporal resolution of optical sensors. While change detection approaches can circumvent these issues through the identification of inundated land and soil from post-flood imagery, their accuracy can suffer in the narrow and complex channels of increasingly developed and heterogeneous floodplains. The data depicted above is from a study that explored the utility of the Operational Land Imager (OLI) and Independent Component Analysis (ICA) for addressing these challenges in the unprecedented 2013 Flood along the Colorado Front Range, USA. The approach was able to simultaneously distinguish flood-related water and soil moisture from pre-existing water bodies and other spectrally similar classes within the narrow and braided channels of the study site.

Inventory Exposed

Critical facilities are essential to the health and welfare of the whole population and are especially important both during and after hazard events. Critical structures or areas that overlap or touch the SFHA are considered "flood prone."

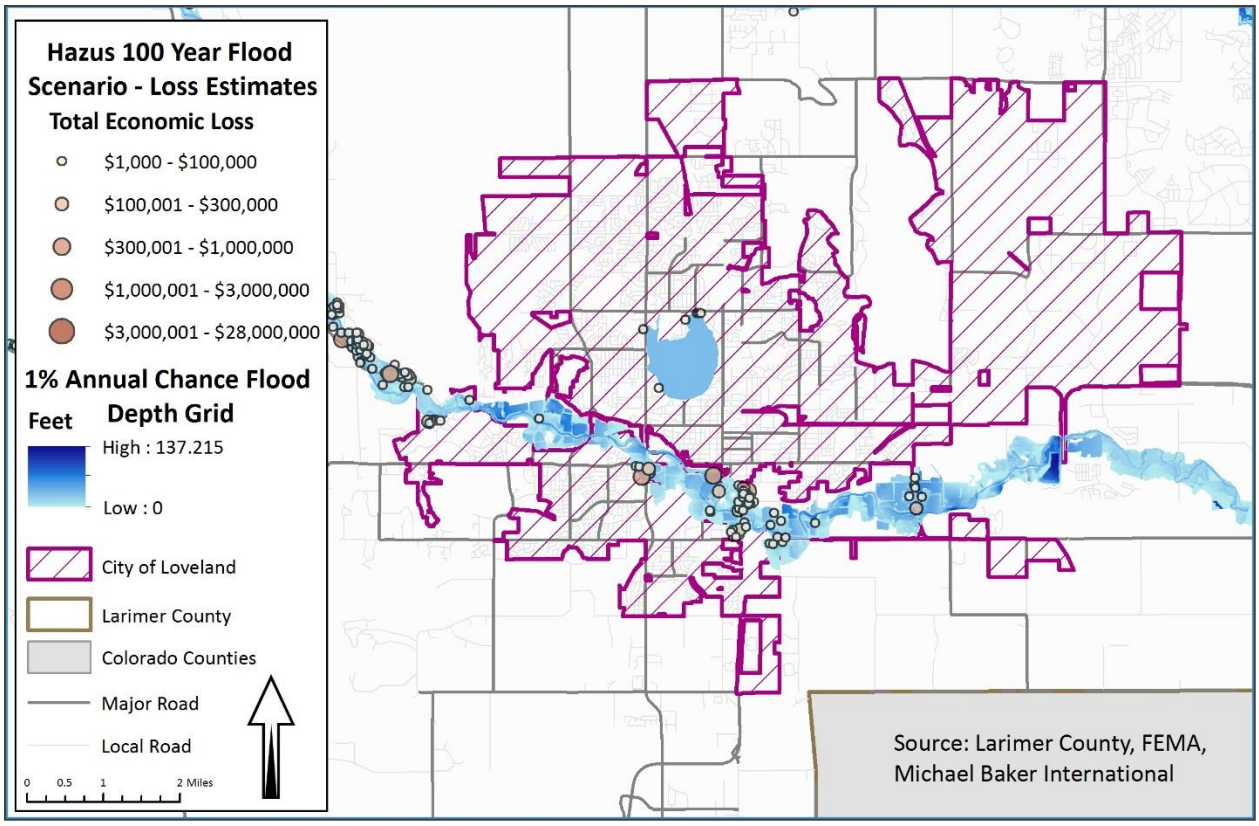
[164] Multi-Temporal Independent Component Analysis and Landsat 8 for Delineating Maximum Extent of the 2013 Colorado Front Range Flood

The critical facility and structure exposure analysis estimates that there are 6 critical facilities and 374 parcels/structures in the Livermore Fire Protection District that are flood prone (not including the total miles of flood prone infrastructure). The appraised value of these exposed critical facilities is over $18.7 million dollars. The appraised value of these exposed structures is over $119.1 million dollars.

Potential Losses

Hazus estimates for the City of Loveland that for a 100-year flood event, approximately 1 critical facility and 12 buildings will experience flood damage. The estimated critical facility building loss is over $125 thousand dollars, content loss of over $680 thousand dollars, and no inventory loss. The estimated building loss is over $1.4 million dollars, content loss over $1.7 million dollars, and inventory loss over $388 thousand dollars.

City of Loveland 1% Annual Flood Loss Estimation and Flood Depth Grid Map[165]



Probability of Future Occurrences

Frequency of previously reported flood events in the City of Loveland provide an acceptable framework for determining the probability of future flood occurrence in the area. The probability that the district will experience a flood event can be difficult to predict or quantify.

[165] FEMA's loss estimation modeling software, Hazus, was utilized to produce this data set. A 100 year flood scenario was defined and losses were calculated for each point (structure) that intersected the depth grid based on the Hazus depth damage curves for specific structure attributes (such as foundation type, building type, and first flood height). Information derived from Hazus-MH 2.2 flood scenario. Total Losses equals a sum of building losses, content losses, and inventory losses. 1% Annual Chance Flood flooding depth grid, produced from the best available topographic and floodplain data.

Severe flooding has the potential to inflict significant damage to people and property in the city. Mitigating flood damage requires that communities remain diligent and notify local officials of potential flood (and flash flood) prone areas near infrastructure such as roads, bridges, and buildings.

Capabilities Assessment

The capability assessment examines the ability of the City of Loveland to implement and manage the comprehensive mitigation strategy laid out in this Plan. The strengths, weaknesses, and resources of the community are identified here as a means for evaluating and maintaining effective and appropriate management of the City's hazard mitigation program.

Local Personnel

The ability of a community to implement a comprehensive mitigation strategy depends, in part, on available resources, including people and staff. The following table outlines the city's capabilities as they relate to key personnel.

	Full Time	Part Time	None or Not-Identified
Emergency Manager	X		
Floodplain Administrator	X		
Community Planner	X		
GIS Specialist	X		
Grant Writer		X	

Land Use Planning and Codes

Local land use plans and building codes are tremendous tools for evaluating local policies related to hazard mitigation and risk reduction. Additionally, comprehensive master plans, capital improvement plans, stormwater plans and zoning ordinances all present opportunities for enhanced local capabilities. The following table outlines the city's current capabilities as they relate to land use planning and codes.

	Yes (Y); No (N)
A zoning ordinance	Y
A hazard-specific ordinance	Y
Local building codes	Y
A Comprehensive Plan / Master Plan	Y
A Capital Improvements Plan	Y
A Stormwater Plan	Y
A Continuity of Operations Plan (COOP)	Y
An Emergency Operations Plan (EOP)	Y
A Long-Term Recovery Plan	Y
Participates in the NFIP	Y

Building codes are one tool that communities use to enhance public safety. For example, they can increase structural integrity, mitigate structure fires, and provide benefits in relation to natural hazard avoidance. In Colorado, land use regulations and building codes are typically implemented at the local level. Even without a statewide mandate, most counties and many municipalities have enacted regulations and codes. The City of Loveland has adopted a local building code requirement, demonstrating their understanding of the benefits codes provide, including reduced exposure to hazards.

Plan Maintenance and Implementation

The City of Loveland has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the city will continue public participation in the plan maintenance process.

Jurisdiction	Plan Maintenance and Implementation Strategy
City of Loveland	*"Our mitigation actions will be reviewed and updated annually."* *"Mitigation actions, activities and information will be integrated into existing public education programs and shared via website and or social media."*

Integrating Hazard Mitigation into Local Planning

Through discussions at planning meetings and the use of an online survey, individual outreach, and phone calls, each participating jurisdiction brainstormed with the planning team to identify processes for integrating hazard mitigation into their local planning mechanisms and policies. The following table lists the specific integration strategy identified by the City of Loveland based on the mitigation actions listed in this plan.

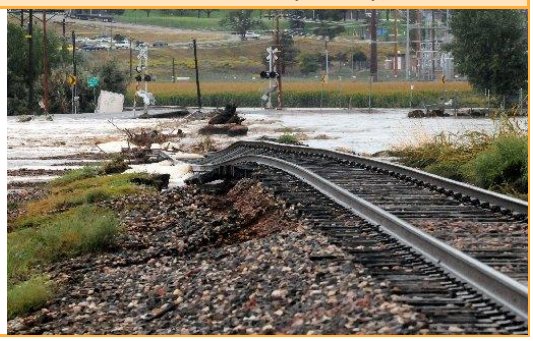
Jurisdiction	Strategy
City of Loveland	*"We will integrate hazard Mitigation actions into our existing public education/community training programs to continually increase awareness about local hazards and potential consequences."* *"We will incorporate mitigation actions from the 2016 Larimer County Plan into our soon-to-be-developed Mitigation Master Plan."*

Mitigation Action Guides

The following Mitigation Action Guides present Loveland's new mitigation actions that were developed for the 2016 Plan. In addition to the mitigation actions listed below, the City of Loveland expects additional mitigation actions to be included in their Mitigation Master Plan, for which planning will being in early 2016.

City of Loveland: Sodium Hypo Chlorite for Water Treatment (Loveland – 1)	
PRIORITY: High	HAZARDS ADDRESSED: Tornado, Fire, Public Health, Hazmat
LOCATION: Water Treatment Plant	GOALS ADDRESSED: 1, 2
RECOMMENDATION DATE: 01/01/2013	OBJECTIVES ADDRESSED: E
TARGET COMPLETION DATE: 12/31/2016	
ISSUE: Compressed chlorine gas, stored in multiple 1-ton cylinders, is used to treat municipal water supply. Storing and using chlorine gas on-site pose as a threat for explosions, leaks, or even as targets of opportunity. Breathing in chlorine gas is a deadly to all organic life, including humans. Big T Elementary School is located within the toxic footprint for accidental release plume modeling. This is a high target of opportunity.	
RECOMMENDATION: Replacement of chlorine gas as water treatment product with safer product Sodium Hypo Chlorite	
ACTION: Eliminating chlorine gas as the method to disinfect water during the water treatment process. We would replace chlorine gas disinfection with sodium hypo chlorite which is in liquid form and is much safer than chlorine gas. A chemical building specifically for storage and delivery is part of the project scope.	
LEAD AGENCY: Water Division	EXPECTED COST: $1m
SUPPORT AGENCIES: Building, Fire, Risk Management, CDPHE, EPA	POTENTIAL FUNDING SOURCES: city internal budget, bond, loan
PROGRESS MILESTONES: The construction of the chemical building is underway. Funding is secured. Design and engineering are completed.	

City of Loveland: Railroad Ave Improvements (Loveland – 2)	
PRIORITY: Medium	HAZARDS ADDRESSED: Flood, Severe Storm
LOCATION: Railroad Ave at Old Fairgrounds Park	GOALS ADDRESSED: 1, 2
RECOMMENDATION DATE: 09/12/2013	OBJECTIVES ADDRESSED: E
TARGET COMPLETION DATE: 12/31/2017	

ISSUE: During the 2013 and the 1976 Floods, Railroad Ave on both sides of the bridge flooded. During both events, all of the North-South routes across the Big T river were cut off by flood waters. Motorists were forced to drive more than 30 miles east to find a viable river crossing. Emergency vehicles that were on one side of the river were unable to respond to the opposite side for emergencies.	
RECOMMENDATION: Railroad Ave elevation change on both sides of the bridge and add second bridge	
ACTION: The base height of Railroad Ave roadway will be raised on both sides of the bridge and a second bridge will be added. This project will provide better flood management along Railroad Ave. It will also provide the City, County, and State with an open route over the Big T River during the next large flood.	
LEAD AGENCY: Public Works	EXPECTED COST: $3.6m
SUPPORT AGENCIES: Storm Water, Engineering, FHWA, CDOT, Larimer County	POTENTIAL FUNDING SOURCES: FHWA, city internal budget (this would be a high priority project if funding is secured, otherwise it is a medium priority)
PROGRESS MILESTONES: Conceptual design and floodplain analysis are completed. The City needs funding for the design, engineering, and construction of this project. Project is awaiting FHWA approval for funding	

City of Loveland: Staff Gages (Loveland – 3)	
PRIORITY: High	HAZARDS ADDRESSED: Flood, Severe Storm
LOCATION: Big T River Corridor	GOALS ADDRESSED: 1, 2, 3, 4
RECOMMENDATION DATE: 09/12/2013	OBJECTIVES ADDRESSED: A
TARGET COMPLETION DATE: 12/31/2016	
ISSUE: There is no means to quickly measure river height changes. All of the Big T River telemetry gages were lost during the flood.	
RECOMMENDATION: Install Staff gages on key bridges throughout the Big T River corridor. The staff gage is used for a fast visual indication of the surface level in reservoirs, rivers, irrigation channels, and wherever accuracy and readability are important. Staff gage information can be used in an indirect way to estimate stream flow without having to make a detailed flow measurement. They virtually never need replacement under normal conditions. Ideally, gauges could be placed through the entire river corridor.	
ACTION: Identify which bridges can provide a safe vantage point for gauge reading, purchase and install gauges.	
LEAD AGENCY: Storm Water	EXPECTED COST: $25,000
SUPPORT AGENCIES: Larimer County, CDOT, Big T watershed forum, Public Works,	POTENTIAL FUNDING SOURCES: City internal budget, grant

PROGRESS MILESTONES: identify funding for gauges and staff time, identify key bridges that can provide a safe vantage point for gauge reading. Purchase gauges and schedule staff time to install gauges during low river flows.

City of Loveland: Foothills Solar Facility (Loveland – 4)	
PRIORITY: Medium	HAZARDS ADDRESSED: Earthquake, Land Subsidence, Flood, Severe Storm, Wind & Tornado, Fire
LOCATION: West of Mehaffey Park	GOALS ADDRESSED: 1, 2, 3, 5
RECOMMENDATION DATE: 09/12/2013	OBJECTIVES ADDRESSED: C, D, E
TARGET COMPLETION DATE: 12/31/2016	
ISSUE: The 2013 Flood destroyed the Idylwilde Dam, hydro plant, and Penstock power generating system that supplied power to the lower portion of the Big T Canyon. This solar facility, in conjunction with the Foothill Substation, will serve as redundant power source for the city. Additional power is also needed on the west side of the city.	
RECOMMENDATION: Construct solar power generation site (and substation) on the west side of the city.	
ACTION: Develop an 18 acre solar facility to be located on the city owned property between West 22nd and West 29th Streets, west of Mehaffey Park.	
LEAD AGENCY: Power	EXPECTED COST: $5.1m
SUPPORT AGENCIES: Building, Planning, FEMA, Platte River Power Authority,	POTENTIAL FUNDING SOURCES: City internal budget, FEMA Flood recovery ((this would be a high priority project if funding is secured, otherwise it is a medium priority)

PROGRESS MILESTONES: Site is city owned. Obtain approval from FEMA for this as an Alternate Project under Disaster Recovery funds. Design and engineering are completed. Construction expected to begin 2016 Q2 and be completed by December 2016.

City of Loveland: Foothills Substation (Loveland – 5)	
PRIORITY: High	HAZARDS ADDRESSED: Earthquake, Land Subsidence, Flood, Severe Storm, Wind & Tornado, Fire
LOCATION: West of Mehaffey Park	GOALS ADDRESSED: 1,2,3,5
RECOMMENDATION DATE: 09/12/2013	OBJECTIVES ADDRESSED: C, D, E
TARGET COMPLETION DATE: 09/30/2017	
ISSUE: The 2013 Flood destroyed the Idylwilde Dam and Penstock power generating system that supplied power to the lower portion of the Big T Canyon. This power substation, in conjunction with the Foothills Solar facility, will serve as redundant power source for the city.	
RECOMMENDATION: Construct a power substation (and Solar power facility) on the west side of the city.	
ACTION: Develop a 2.4 acre substation to be located on the city owned property between West 22nd and West 29th Streets, west of Mehaffey Park. The City elected to participate in the FEMA Alternate Program and build this substation project rather than rebuild the Idylwilde Dam and Penstock that was damaged during the 2013 Flood.	
LEAD AGENCY: Power	EXPECTED COST: $4m
SUPPORT AGENCIES: Building, Planning, Platte River Power Authority, Larimer County,	POTENTIAL FUNDING SOURCES: city internal budget
PROGRESS MILESTONES: Site is city owned and being re-zoned. Design and engineering are completed. Construction will begin 2016 Q2 and be completed by Sept 2017	

City of Loveland: Fleet Tracking & Communications (Loveland – 6)	
PRIORITY: Medium	HAZARDS ADDRESSED: Flood, Severe Storm, Wind & Tornado, Fire, Public Health, Hazmat
LOCATION: 200 N. Wilson Ave	GOALS ADDRESSED: 1, 2, 3
RECOMMENDATION DATE: 10/15/2015	OBJECTIVES ADDRESSED: C, D, E
TARGET COMPLETION DATE: 12/31/2019	
ISSUE: During daily operations or emergencies, not all personnel or vehicles in the field have radios for communications and there is no means to have a snapshot perspective of where a city vehicle is at any given time.	
RECOMMENDATION: Add an 800 MHz radio and GPS tracking to priority vehicles	
ACTION: Determine which and how many city vehicles should have GPS locators and have them installed. Install 800 MHz radios in all city vehicles.	
LEAD AGENCY: Fleet Management	EXPECTED COST: $500,000
SUPPORT AGENCIES: Public Works, Emergency Communications, WAC, GPS vendor, NCRCN	POTENTIAL FUNDING SOURCES: city internal budget, grant (this would be a high priority project if funding is secured, otherwise it is a medium priority)
PROGRESS MILESTONES: This project is not yet started. Funding needs to be secured and then design and vendor quotes need to be obtained. 	

Letter of Intent to Participate

City of Loveland

Office of Emergency Management
• 410 East Fifth Street • Loveland, Colorado 80537
(970) 962-2534 • FAX (970) 962-2912
www.cityofloveland.org

LETTER OF INTENT TO PARTICIPATE

August 26, 2014

William Cahill, City Manager
City of Loveland
500 E. 3rd Street
Loveland, CO 80537

Re: "Statement of Intent to Participate" as a participating jurisdiction in Northern Colorado Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Dear Lori Hodges, EM Director,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the City of Loveland / Loveland Fire Rescue Authority is submitting this letter of intent to confirm that City of Loveland has agreed to participate in the Northern Colorado Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, City of Loveland agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Larimer County to complete the plan in conformance with FEMA requirements.

The City of Loveland understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.)
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by an agreement between the Lead Jurisdiction and the Participating Jurisdiction, I, William Cahill, commit the City of Loveland to the Northern Colorado Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 26 day of August 2014 Signature William Cahill

LARIMER COUNTY
COMMITTED TO EXCELLENCE

Michael Baker
INTERNATIONAL

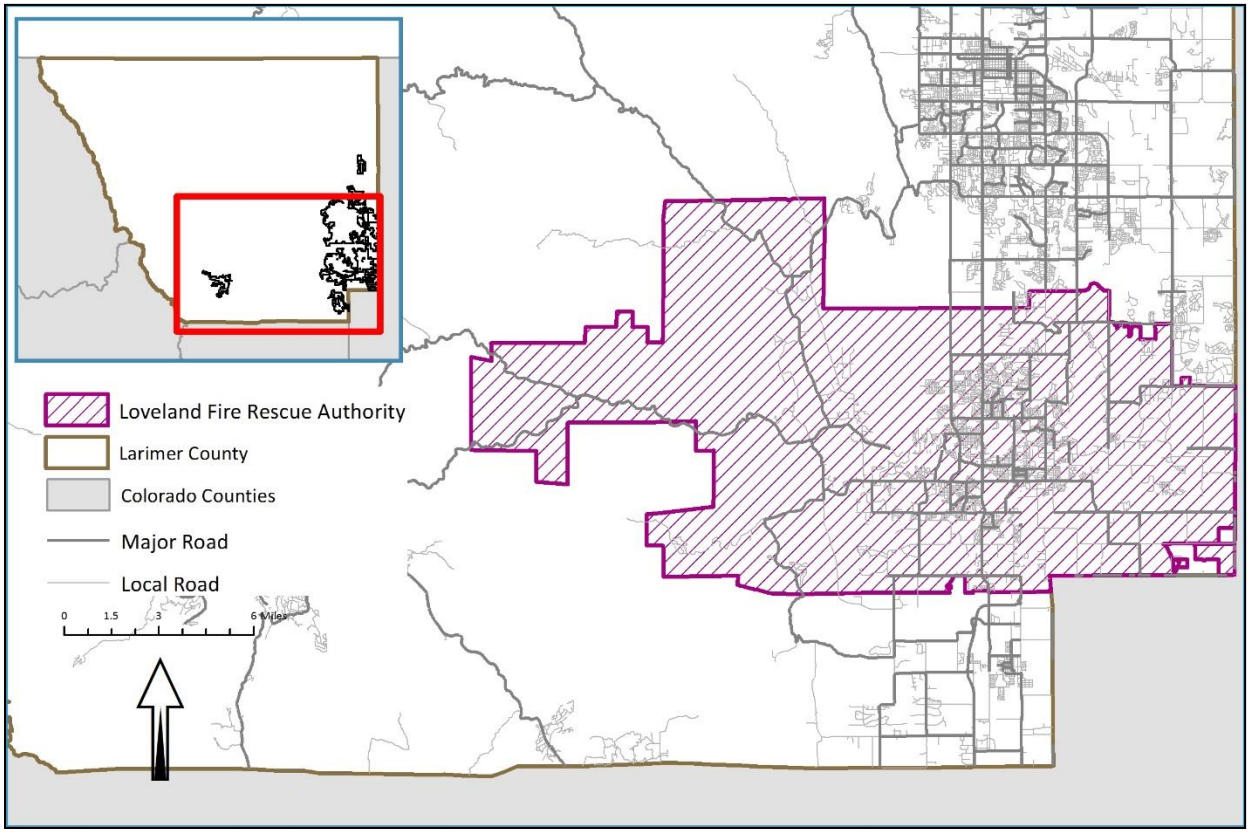
Loveland Fire Rescue Authority

"Through commitment, compassion and courage, the mission of the Loveland Fire Rescue Authority (LFRA) is to protect life and property."
— LFRA Mission Statement

Community Profile

The Loveland Fire Rescue Authority (LFRA) is a combination department that utilizes both career and volunteer firefighters. LFRA staff consists of approximately 90 career members (including both uniformed and civilian employees) and approximately 6 - 12 Reserve (volunteer) Firefighters. These department members operate under the leadership of a career Fire Chief. The department also receives valuable citizen input from the Fire and Rescue Advisory Commission.

The Loveland Fire Rescue Authority provides fire and rescue services in an area totaling approximately 197 square miles. The agency serves residents living within the City of Loveland, and residents living within the Loveland Rural Fire Protection District, for a combined population of approximately 97,500.



Hazard Identification and Risk Assessment

The following Hazard Identification and Risk Assessment Summary table is based on jurisdiction-specific responses to the risk factor exercise and differs from the risk factor results that were determined at the county scale.

NATURAL HAZARD	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Fire – Wildland	1.2	0.9	0.7	0.4	0.3	3.5
Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)	1.2	0.7	0.8	0.2	0.3	3.3
Utility Disruption	1.0	0.7	0.8	0.4	0.3	3.3
Hazmat – Fixed and Transport	1.2	0.7	0.6	0.3	0.3	3.1
Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)	1.0	0.7	0.8	0.2	0.3	3.1
Flood – Flash and Riverine	0.9	0.9	0.6	0.3	0.3	3.0
Tornado	0.7	0.9	0.6	0.4	0.2	2.8
Landslide / Rockslide	0.9	0.7	0.4	0.3	0.2	2.5
Erosion / Deposition	0.7	0.6	0.4	0.3	0.3	2.4
Civil Disturbance	0.6	0.6	0.3	0.3	0.2	2.0
Earthquake	0.3	0.4	0.6	0.4	0.2	1.9
Biological Hazards / Contagion	0.4	0.4	0.4	0.2	0.2	1.8
HIGH RISK (2.5 or higher): Fire – Wildland; Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning); Utility Disruption; Hazmat – Fixed and Transport; Winter Storm (Blizzard Conditions, Heavy Snow Accumulation); Flood – Flash and Riverine; Tornado; Landslide / Rockslide						
MODERATE RISK HAZARD (2.0 - 2.4): Erosion / Deposition; Civil Disturbance; Earthquake						
Low Risk (1.9 and lower): Earthquake; Biological Hazards / Contagion						

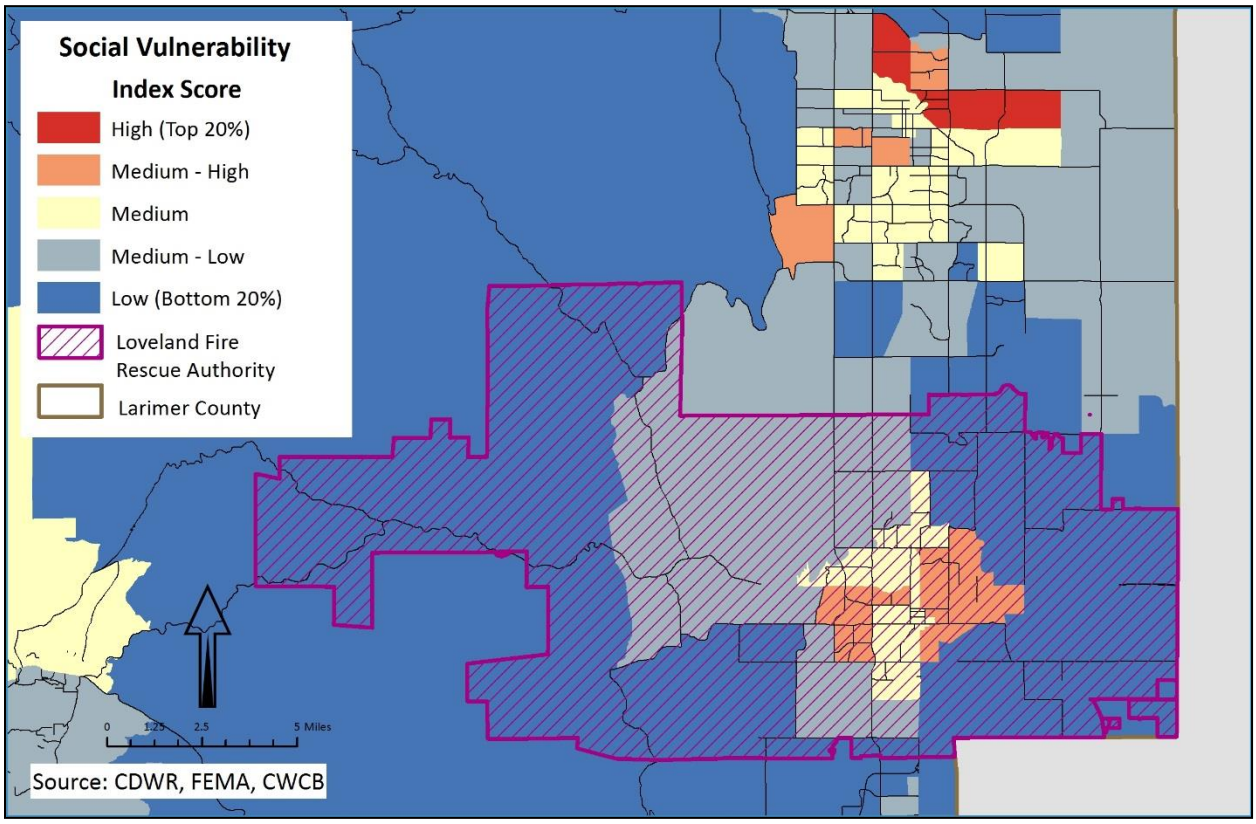
Vulnerability Assessment

This section provides a refined vulnerability assessment, specific for the Loveland Fire Rescue Authority, for those hazards that were identified as being rated HIGH in the preceding section. This analysis was

conducted separately from that of the county-wide vulnerability assessment to specifically focus on the population, structures, infrastructure, and other assets unique to the Loveland Fire Rescue Authority.

The results of the social vulnerability assessment are displayed on the map below. On the map, social vulnerability is represented at the census tract level by 5 classes of vulnerability: Low (bottom 20% of the county), Medium-Low, Medium, Medium-High, and High (top 20% of the county). The Loveland Fire Rescue Authority's social vulnerability map shows social vulnerability within the district.

Social Vulnerability Map – Loveland Fire Rescue Authority[166]



Social vulnerability is represented as the social, economic, demographic, and housing characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to hazard events. The pre-existing social conditions that contribute to disaster losses can be identified using social vulnerability indicators. Using methods identified in the Social Vulnerability Index (SoVI) developed by Cutter et. al. (2003) this layer shows the social vulnerability index scores for the State of Colorado at the census tract

[166] Source: Colorado Division of Water Resources Dam Safety Branch, FEMA, Colorado Water Conservation Board (CWCB)

level. Social vulnerability is represented at the Census tract level by five classes of vulnerability: Low, Medium-Low, Medium, Medium-High, and High.

The Loveland Fire Rescue Authority is characterized by a mix of low to medium-high levels of social vulnerability. The central eastern area of the service boundary has higher levels of social vulnerability to disasters than the rest of the community. A closer look at the individual social vulnerability indicators within the area will give local emergency managers, planners, and stakeholders an even clearer picture of where resources should be prioritized in order to reduce vulnerability in the community. Over time, Loveland Fire Rescue Authority should continue to monitor local social vulnerability as demographic, economic, and housing related conditions change.

Fire – Wildland

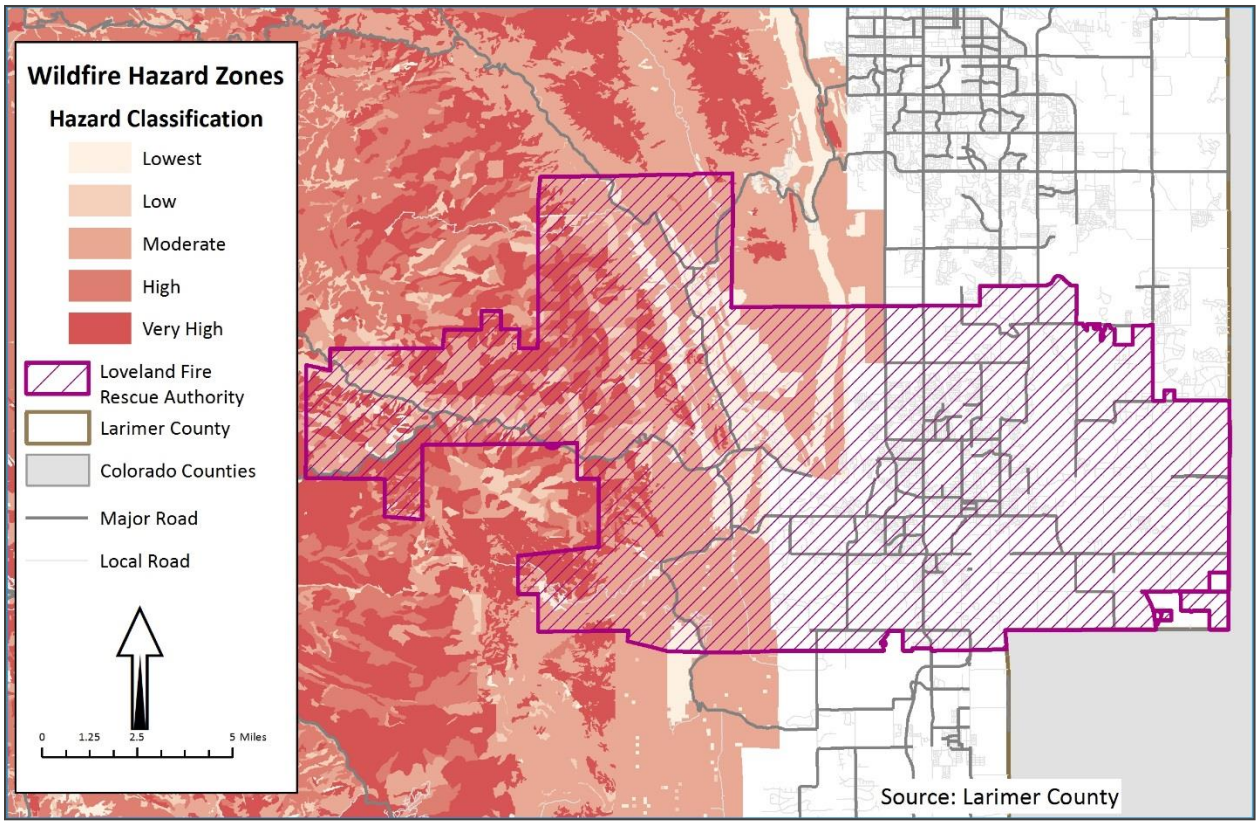
Previous Occurrences

According to NOAA's Storm Events Database, there have been 63 reported damaging wildfire events in the Loveland Fire Rescue Authority. Based on the historic data showing hazardous impacts on Larimer County, there is potential for wildfire events to occur at any given time in the Loveland Fire Rescue Authority service area.

Inventory Exposed

The following Wildfire Hazard Zone map identifies the expected wildfire behavior. The highest wildfire hazard zones in the district are located in the western region, in areas where there are lower population densities.

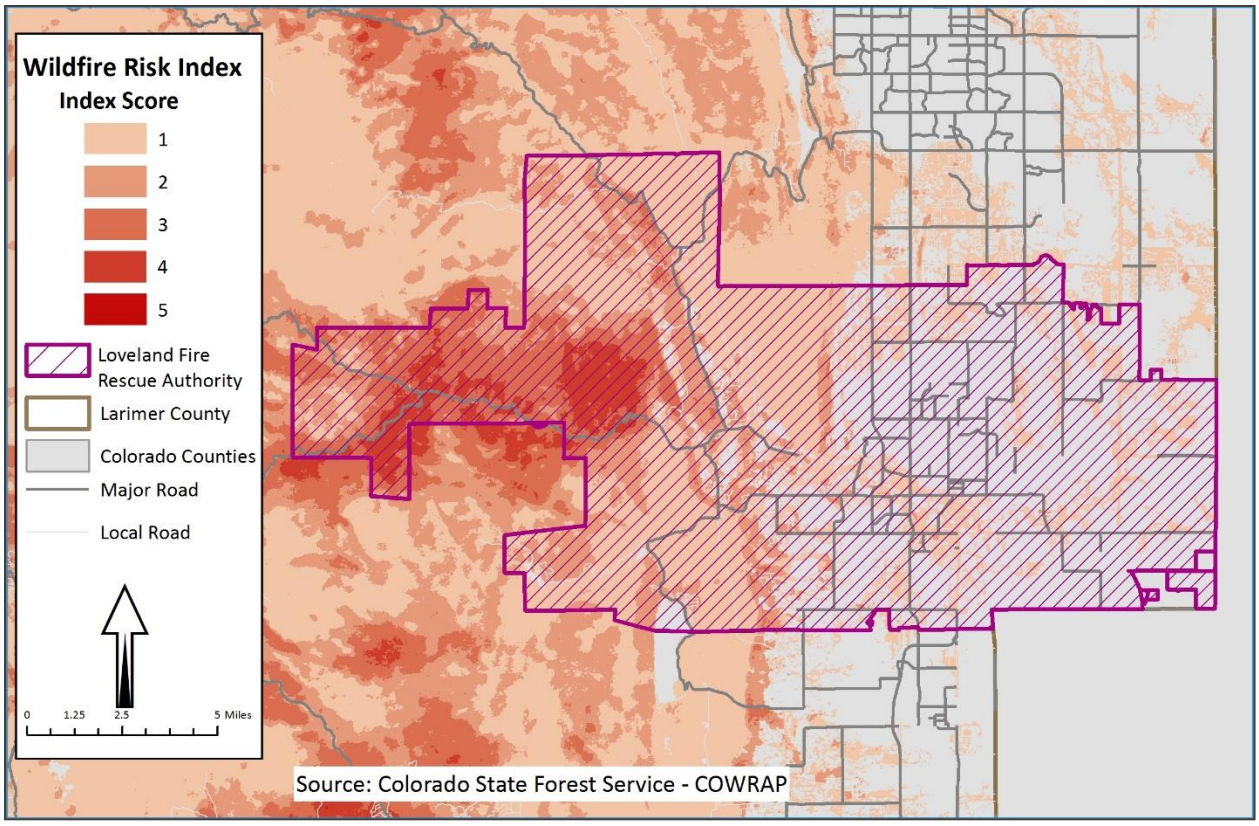
Loveland Fire Rescue Authority Wildfire Hazard Zone Map[167]



The following Wildfire Risk map identifies areas with the greatest potential impacts from a wildfire, in other words, those areas most at risk. The highest wildfire risk areas in the district are located in the western region, in areas where there are lower population densities.

[167] To be used to identify wildfire hazards within the Wildfire Mitigation Area. The hazards are determined based on vegetation cover type, habitat structure stage (cover type, tree size and crown cover percentage), southern facing aspects and 30% and greater slopes according to the Wildfire Hazard Area Mapping (WHAM) guidelines.

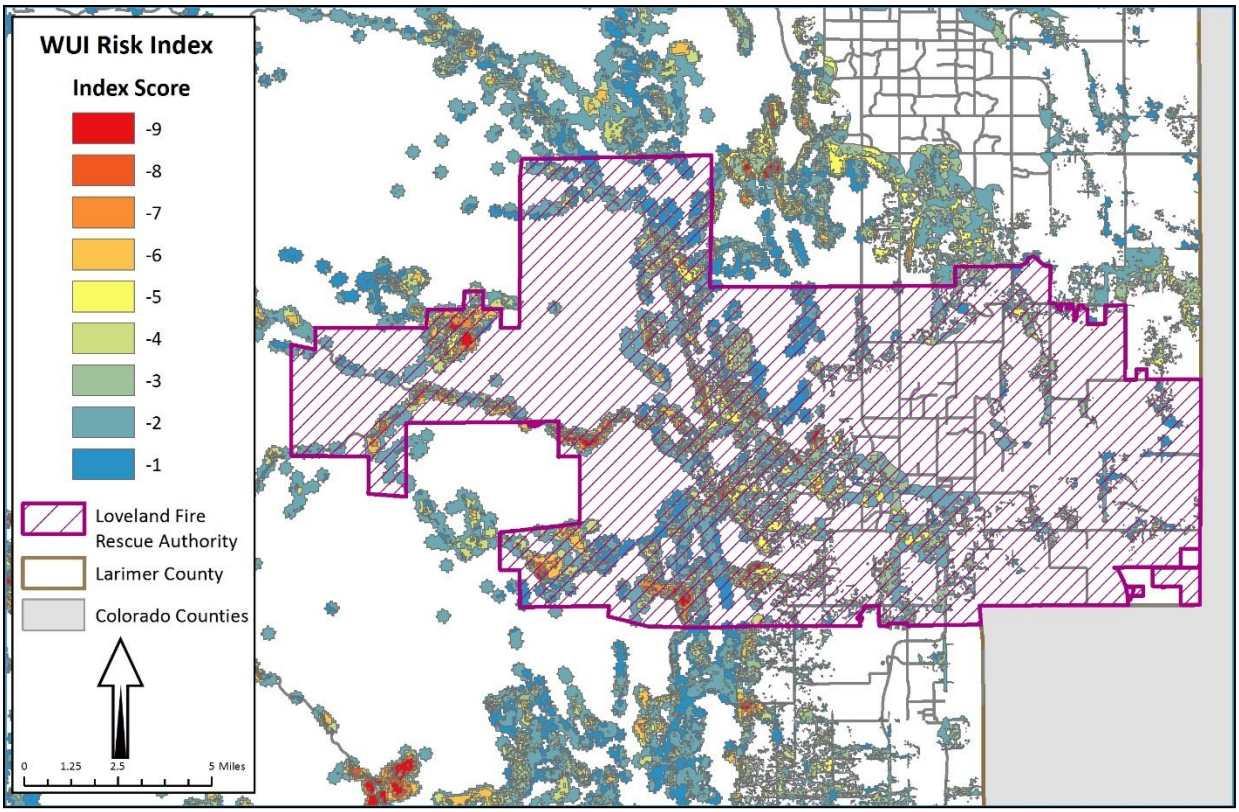
Loveland Fire Rescue Authority Wildfire Risk Index Map[168]



There are areas in the western region of the Loveland Fire Rescue Authority that are within the medium to highest level on the WUI Risk Index Scale. This means that the potential impact on people and homes from a wildfire in those areas is medium to high in relationship to the rest of Larimer County. This level of risk is derived by combining housing density with predicted flame length.

[168] Wildfire Risk represents the possibility of loss or harm occurring from a wildfire. Risk is derived by combining wildfire threat and fire effects. The COWRAP data set was produced statewide and ranks areas on a scale that includes: lowest risk to highest risk.

Loveland Fire Rescue Authority WUI Map[169]



Fires can extensively impact the economy of an affected area, including the agricultural, recreation and tourism industries, water resources, and the critical facilities upon which the Loveland Fire Rescue Authority depends. There are areas of high and medium wildfire threat in the western portion of the district according to the WUI Risk Index. There is 1 critical facility located in areas with the most negative and 2nd most negative wildfire threat total. The appraisal value of the critical facility within the most and 2nd most negative wildfire threat areas is over $58 thousand dollars.

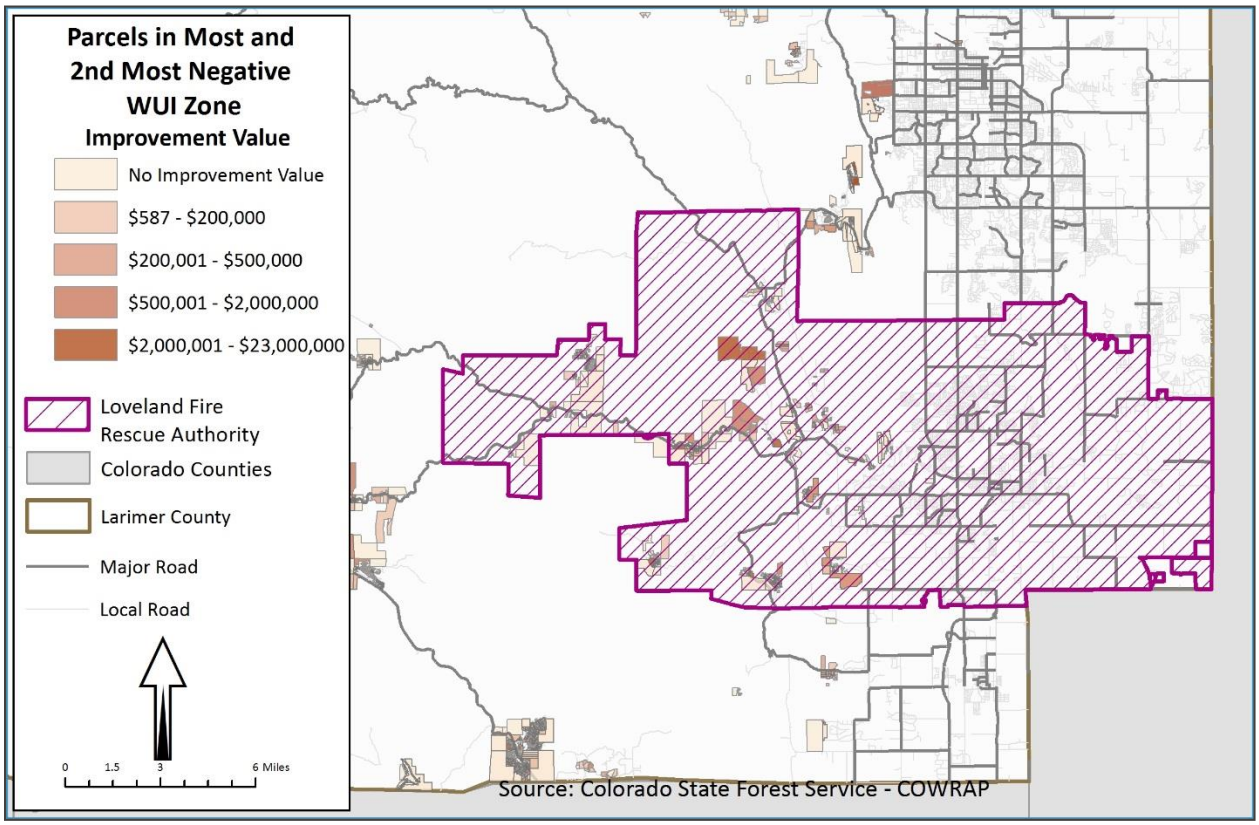
Potential Losses

The exposure data provided in the previous section (Inventory Assets Exposed) provides the clearest picture of potential losses to wildfire in the Loveland Fire Rescue Authority. There are 385 parcels/structures located in areas with the most negative and 544 parcels/structures located in areas

[169] Wildland Urban Interface (WUI) Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length. The COWRAP data set was produced statewide and ranks areas on a scale that includes: least negative to most negative impacts. This scale stretched from -1 (least) to -9 (most) statewide.

with the 2nd most negative wildfire threat total. The appraisal value of the parcels/structures within these most and 2nd most negative threat areas is over $178 million dollars. The risk assessment uses worst case scenario loss estimates. For this reason it is important to plan for relative levels of loss rather than specific potential loss dollar amounts.

Loveland Fire Rescue Authority service area Parcels in the Most Negative and Second Most Negative WUI Zone[170]



Probability of Future Occurrences

The likelihood of wildfires attaining significant size and intensity is unpredictable and highly dependent on environmental conditions and firefighting response. Weather conditions, particularly drought events, increase the likelihood of wildfires occurring. That said, it is important to note that 98% of wildfires are human-caused. Ultimately, the occurrence of future wildfire events will strongly depend on patterns of human activity and events are more likely to occur in wildfire-prone areas experiencing new or additional development.

[170] Wildland Urban Interface (WUI) Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length.

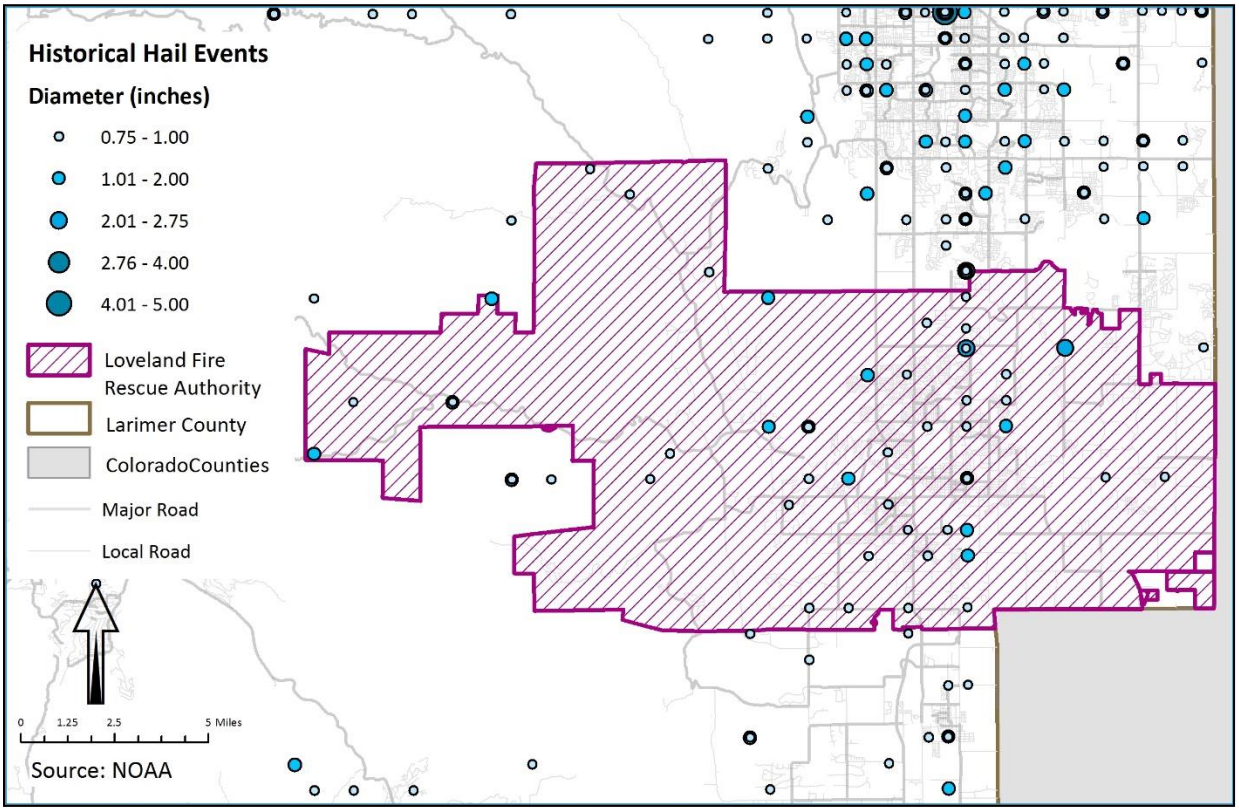
Wildfires can occur at any time of day and during any month of the year. Moreover, the length of a wildfire season and/or peak months may vary appreciably from year to year. As evidenced by the wildfire risk assessment, areas within the Loveland Fire Rescue Authority service area that are characterized by dense development and single family homes along the wildland-urban interface are most vulnerable to wildfire.

Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)

Previous Occurrences

According to NOAA's Storm Events Database there are no reported injuries or deaths in the Loveland Fire Rescue Authority service area due to hail. There have been 68 hail events reported in the service area between 1955 and 2014. Reported losses total $13,000. Based on the historic data showing hazardous impacts on the service area, there is a great potential for hail events to occur at any given time.

Historical Hail Events in Loveland Fir Rescue Authority[171]



According to NOAA's Storm Events Database there have been 7 injuries and 2 deaths in the Loveland Fir Rescue Authority service area due to thunderstorm wind. There have been 16 thunderstorm wind events reported in service area between 1955 and 2014. Of the 16 incidents, 3 reported property losses totaling

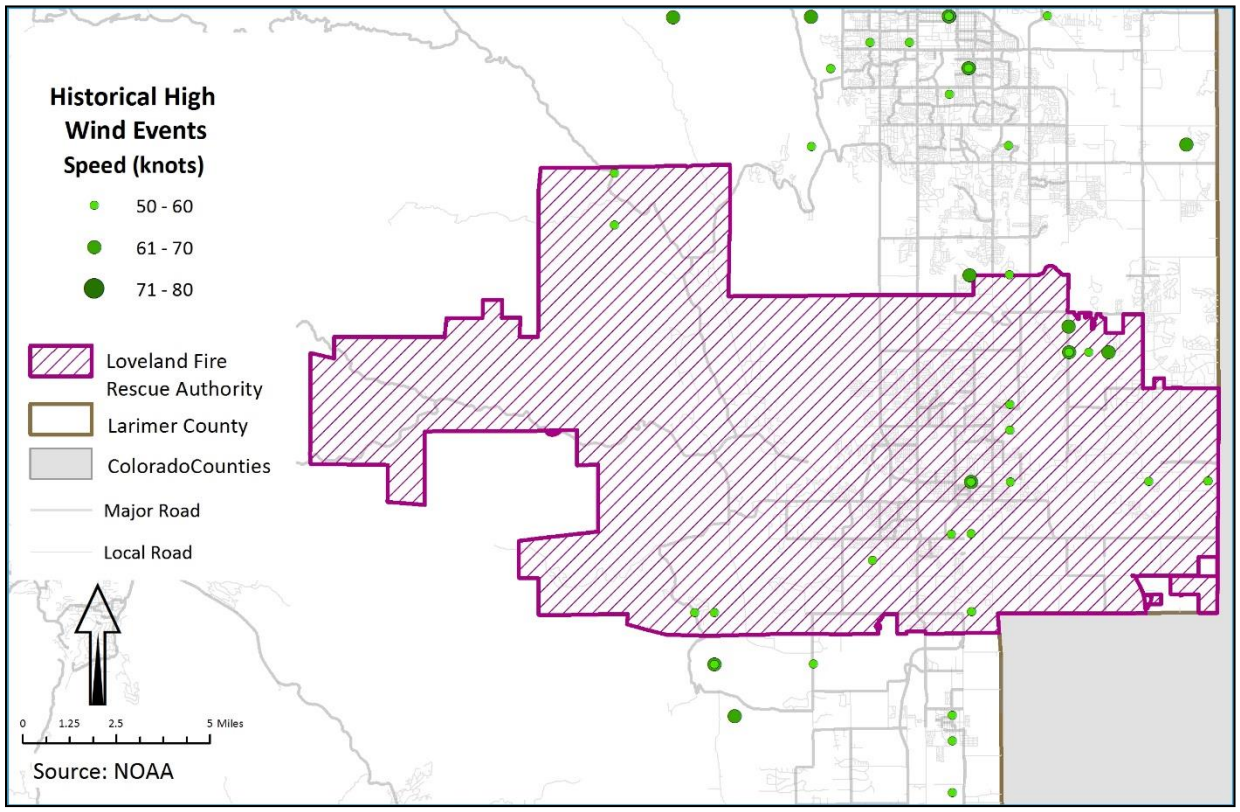
[171] Source: NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

$26 thousand dollars and no crop losses. Based on the historic data showing hazardous impacts on the service area, there is a great potential for hail events to occur at any given time.

According to NOAA's Storm Events Database there have been 9 lightning events in Loveland Fir Rescue Authority service area between 1996 and 2014. There have been 12 reported injuries, 2 deaths, $104,000 worth of property damage, and no crop damage. Based on the historic data showing hazardous impacts on the service area, there is a great potential for lightning events to occur at any given time.

According to NOAA's Storm Events Database there have been 34 Windstorm events in the Loveland Fire Rescue Authority service area between 1996 and 2014. There have been 15 reported injuries, 2 deaths, over $14,000 in damages.

Historical High Wind Events in Loveland Fire Rescue Authority[172]



Inventory Exposed

All assets located in the Loveland Fire Rescue Authority can be considered at risk from spring and summer storms. This includes 97,500people, or 100% of the Authority's population, and all buildings and infrastructure within the district. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the Authority's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented

[172] Source: NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Inventory assets exposed to severe wind is dependent on the age of the building, type, construction material used, and condition of the structure. Possible losses to critical infrastructure include:

- Electric power disruption
- Communication disruption
- Water and fuel shortages
- Road closures
- Damaged infrastructure components, such as sewer lift stations and treatment plants
- Damage to homes, structures, and shelters

Potential Losses

Spring and summer storms affect the entire planning area of the Loveland Fire Rescue Authority including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Severe storms will remain a highly likely occurrence for the Loveland Fire Rescue Authority. It is likely that lightning and hail will also be experienced in the area due to such storms.

Generally, straight-line wind events destroy private, commercial, and public property. Additional costs stem from debris removal, maintenance, repair, and response. Indirect costs include loss of industrial and commercial productivity as a result of damage to infrastructure, facilities, or interruption of services. Because no specific, countywide loss estimation exists for wind, potential losses are related to historical property damage and injuries/deaths.

Probability of Future Occurrences

Spring and summer storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past spring and summer events provide benchmarks for projecting similar conditions into the future. The probability that Loveland Fire Rescue Authority service area will experience a spring or summer storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the Loveland Fire Rescue Authority service area at least once every year.

Reported straight-line wind events over the past nineteen years provide an acceptable framework for determining the future occurrence in terms of event. The probability of the Loveland Fire Rescue Authority service area experiencing a severe wind event associated with damages or injuries can be difficult to

quantify, but based on historical record of 25 severe wind events since 1996, there is a high chance of this type of event occurring each year.

Utility Disruption

Previous Occurrences

The Loveland Fire Rescue Authority does not currently track incidences of utility disruption.

Inventory Exposed

All assets located in the Loveland Fire Rescue Authority are considered at risk from the impacts of utility disruption events. This includes 97,500people, or 100% of the County's population, and all buildings and infrastructure within the County.

Potential Losses

Utility disruption events have the potential to threaten lives and disrupt business activity. However, monetary losses and casualty estimates are largely unknown.

Probability of Future Occurrences

In general, utility outages result from failures in the distribution system as opposed to shortages of supply. Distribution systems are most susceptible to failure during extreme hot and cold temperatures as well as during violent weather conditions. Regional utility failures can threaten human life, particularly when outages affect hospitals, nursing homes, or other healthcare facilities. As both population and climate variability increase across the State of Colorado, and put more pressure on aging distribution systems, it is likely that utility disturbance events will become more frequent in and around the Loveland Fire Rescue Authority service area.

Hazmat – Fixed and Transport

Previous Occurrences

Based on data supplied by the Pipeline and Hazardous Materials Safety Administration's (PHMSA) Incident Reports Database there have been 68 reported HAZMAT incidents within the Loveland Fire Rescue Authority between 1972 and 2015.

Inventory Exposed

We can't accurately predict when or where a HAZMAT incident may occur. Therefore, for the purpose of this plan, all existing and future buildings, facilities, and populations in the Loveland Fire Rescue Authority are considered to be equally exposed and couple potentially be impacted. This includes 97,500people, or 100% of the Authority's population, and all buildings and infrastructure within the Authority.

When hazardous materials are being transported they are particularly vulnerability to transportation related accidents, misuse, or terrorist threats. Most hazardous materials are transported in large quantities in order to reduce costs and security is difficult to maintain around moving vehicles that cross jurisdictional boundaries. When transported close to populated areas or critical infrastructure, HAZMAT releases can have serious consequences. The inventory that is most often exposed to HAZMAT risks are railways, roadways, and fixed facilities that contain hazardous materials, and all assets that lie within a mile of the potential release areas.

Hwy 34 and I-25 run through and near the Loveland Fire Rescue Authority service area and is a designated nuclear and hazardous materials transportation route. All structures, natural resources, and people

located within one mile of these transportation routes (and railways) are exposed to the impacts of a potential HAZMAT event. Structures, people, and natural resources located outside of a one mile buffer of these routes are also at risk of exposure.

Assets and people that are located within one mile of an industrial or commercial fixed site are also at risk of exposure to the impacts of a HAZMAT release.

Potential Losses

HAZMAT related events occur throughout the Loveland Fire Rescue Authority every year. The intensity and magnitude of these incidents depend on weather conditions, the location of the event, the time of day, and the process by which the materials are released. *Was is raining when the event happened? Were the hazardous materials being transported by rail when they were released or were they at a fixed facility? Did the spill happen during rush hour traffic or in the middle of the night?* All of these considerations matter when determining the risk and potential damages associated with a HAZMAT incident.

HAZMAT events have the potential to threaten lives and disrupt business activity. Moreover, HAZMAT incidents can cause serious environmental contamination to non-renewable resources such as air, ground, and water sources.

Probability of Future Occurrences

As with most hazards that have limited spatial predictability or warning time, the probability of future occurrences of HAZMAT events is difficult to predict. However, as development continues to encroach into existing industrial areas and becomes denser along high-risk designated hazardous materials transportation routes, the risk of future occurrences becomes greater. Even if the frequency of HAZMAT spills remains the same over time, population growth will increase the probability of a disaster event.

Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)

Previous Occurrences

According to NOAA's Storm Events Database, the Loveland Fire Rescue Authority has experienced 74 Winter Storms since 1996. On March 17, 2003 there was report of a winter storm causing $15,500,000 in property damage in areas of Larimer County below 6,000 feet and eastern Larimer County. There were no deaths, injuries or damage to crops reported for any of these storms. The Loveland Fire Rescue Authority is at high risk of experiencing Winter Storms during the winter months.

Inventory Exposed

All assets located in the Loveland Fire Rescue Authority can be considered at risk from winter storms. This includes 97,500 people, or 100% of the District's population, and all buildings and infrastructure within the district. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the District's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Potential Losses

Winter storms affect the entire planning area of the Loveland Fire Rescue Authority including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A

timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

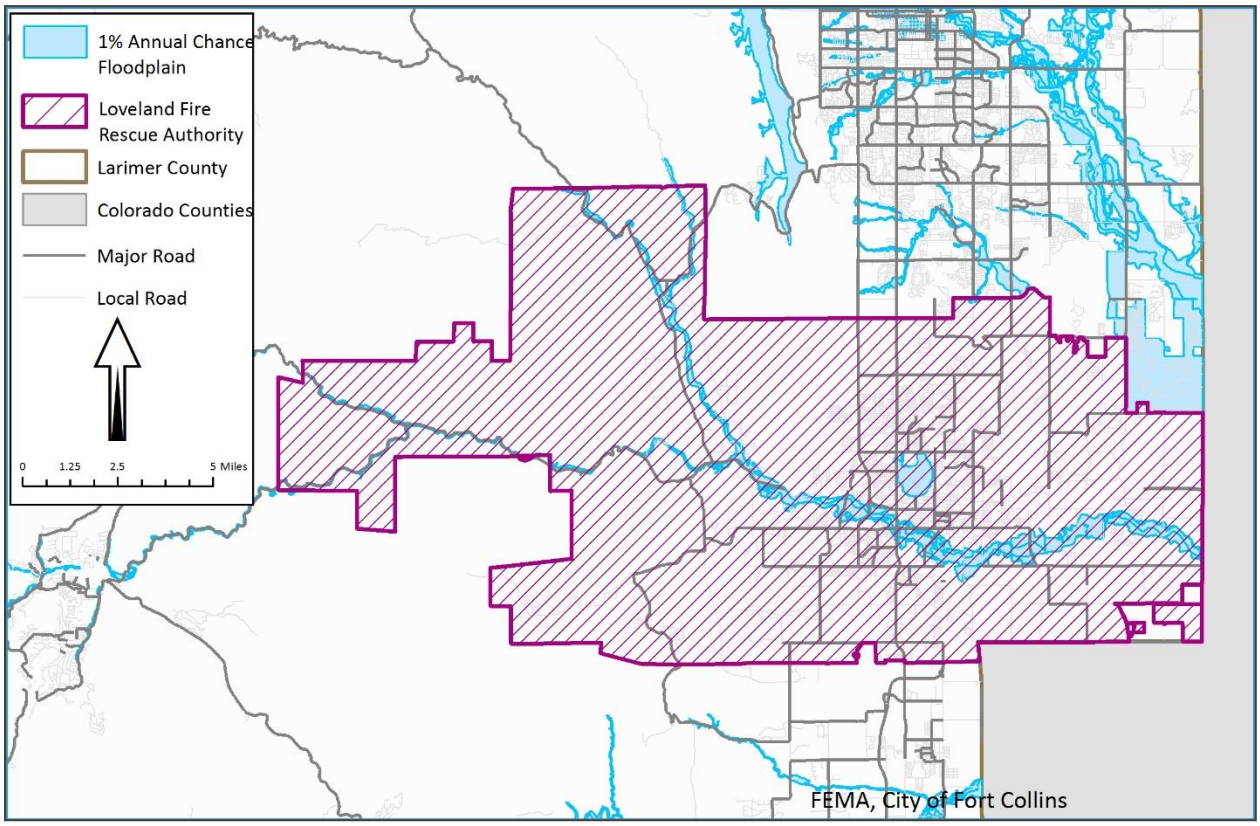
It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Winter storms will remain a highly likely occurrence for the Loveland Fire Rescue Authority.

Probability of Future Occurrences

Severe winter storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past severe winter events provide benchmarks for projecting similar conditions into the future. The probability that the Loveland Fire Rescue Authority service area will experience a severe winter storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the service area at least once every year.

Flood – Flash and Riverine

Loveland Fire Rescue Authority Special Flood Hazard Area[173]

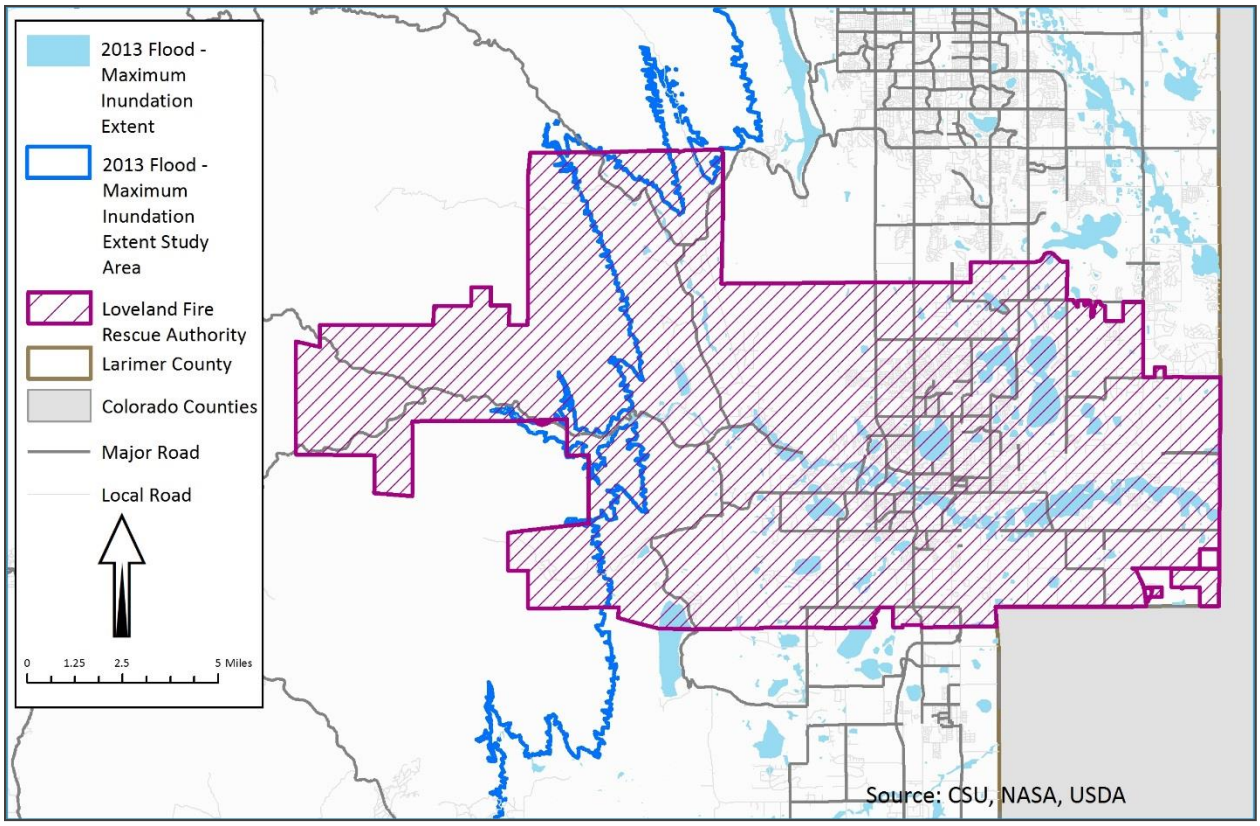


Previous Occurrences

According to NOAA's Storm Events Database there have been no reported injuries, property loss, or crop damage in the Loveland Fire Rescue Authority service area caused by flooding. A flash flood was reported on June 3, 2005. Based on the historic data showing hazardous impacts on Loveland Fire Rescue Authority, there is a great potential for flooding events to occur at any given time.

[173] This layer is compiled utilizing the most recent Special Flood Hazard Areas (SFHA) as defined by FEMA's National Flood Hazard Layer (NFHL) in combination with some recent flood studies performed by the City of Fort Collins. These areas are also referred to as the 1% Annual Chance Floodplain.

Loveland Fire Rescue Authority 2013 Flood Extent[174]



Maximum flood extent—a key data need for disaster response and mitigation—is rarely quantified due to storm-related cloud cover and the low temporal resolution of optical sensors. While change detection approaches can circumvent these issues through the identification of inundated land and soil from post-flood imagery, their accuracy can suffer in the narrow and complex channels of increasingly developed and heterogeneous floodplains. The data depicted above is from a study that explored the utility of the Operational Land Imager (OLI) and Independent Component Analysis (ICA) for addressing these challenges in the unprecedented 2013 Flood along the Colorado Front Range, USA. The approach was able to simultaneously distinguish flood-related water and soil moisture from pre-existing water bodies and other spectrally similar classes within the narrow and braided channels of the study site.

Inventory Exposed

Critical facilities are essential to the health and welfare of the whole population and are especially important both during and after hazard events. Critical structures or areas that overlap or touch the SFHA are considered "flood prone."

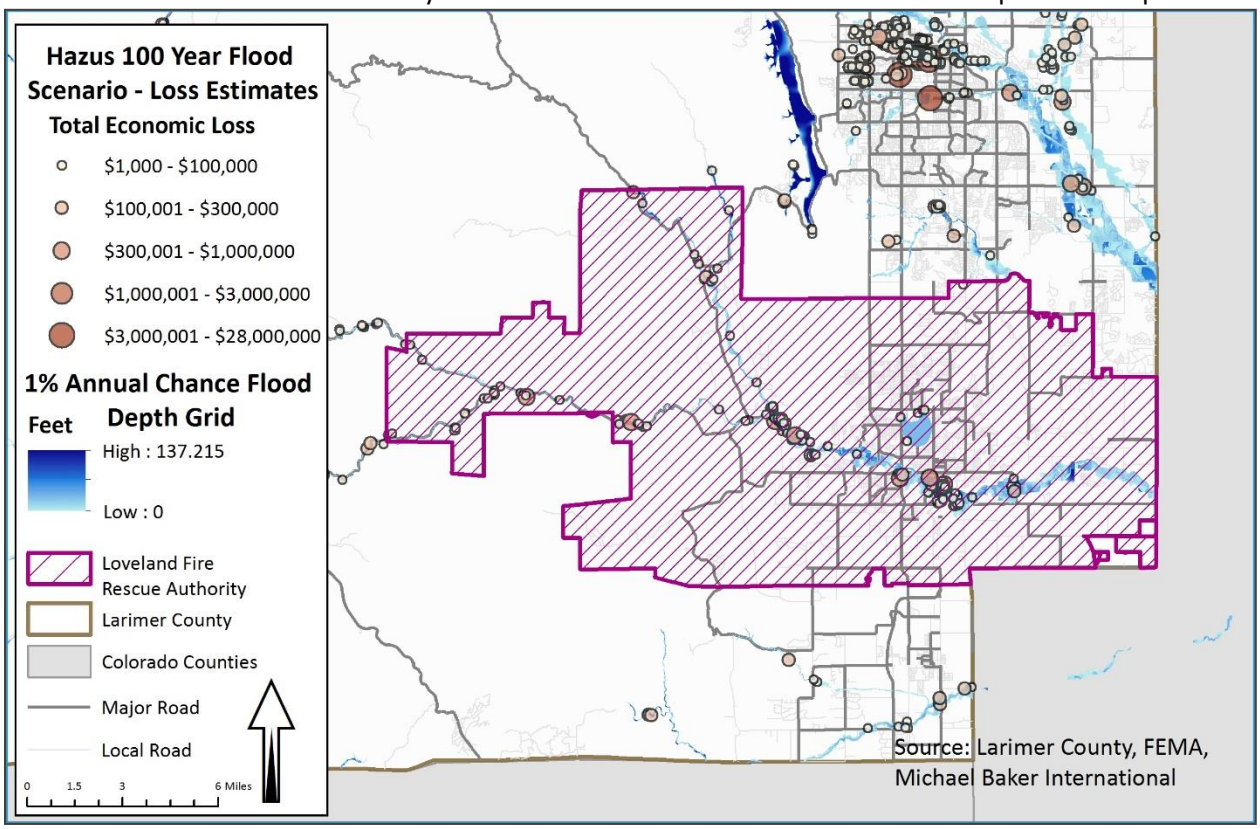
[174] Multi-Temporal Independent Component Analysis and Landsat 8 for Delineating Maximum Extent of the 2013 Colorado Front Range Flood

The critical facility and structure exposure analysis estimates that there are 10 critical facilities and 1,361 parcels/structures in the Loveland Fire Rescue Authority service area that are flood prone (not including the total miles of flood prone infrastructure). The appraised value of these exposed critical facilities is over $19.6 million dollars. The appraised value of these exposed structures is over $247.5 million dollars.

Potential Losses

Hazus estimates for the Loveland Fire Rescue Authority service area that for a 100-year flood event, approximately 3 critical facilities and 222 buildings will experience flood damage. The estimated critical facility total loss is over $984 thousand dollars, building loss of over $147 thousand dollars, content loss over $786 thousand dollars, and over $50 thousand dollars estimated inventory loss. The estimated structure total loss is over $14.7 million dollars, building loss of over $5.7 million dollars, content loss of over $6.1 million dollars, and inventory loss of approximately $2.8 million dollars.

Loveland Fire Rescue Authority 1% Annual Flood Loss Estimation and Flood Depth Grid Map[175]



Probability of Future Occurrences

Frequency of previously reported flood events in the Loveland Fire and Rescue Authority service area provide an acceptable framework for determining the probability of future flood occurrence in the area. The probability that the district will experience a flood event can be difficult to predict or quantify.

Severe flooding has the potential to inflict significant damage to people and property in the service area. Mitigating flood damage requires that communities remain diligent and notify local officials of potential flood (and flash flood) prone areas near infrastructure such as roads, bridges, and buildings.

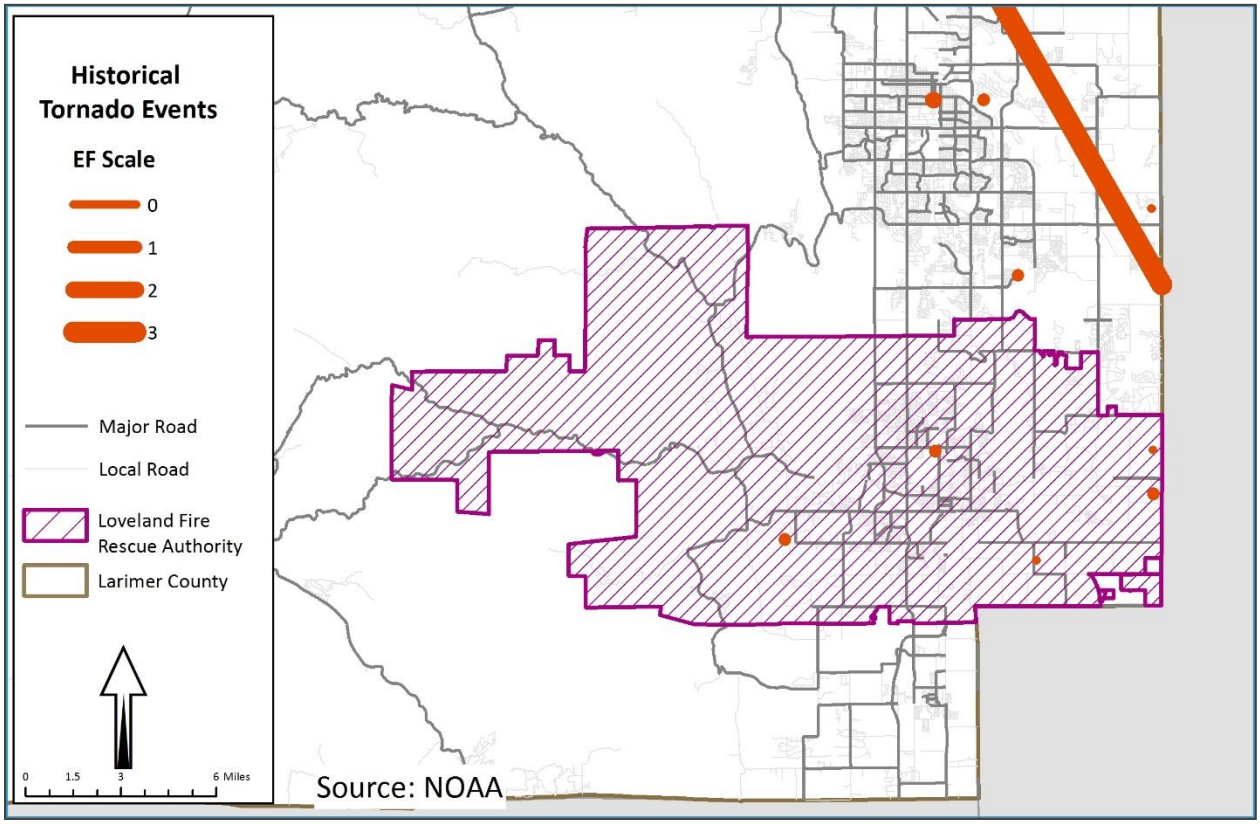
[175] FEMA's loss estimation modeling software, Hazus, was utilized to produce this data set. A 100 year flood scenario was defined and losses were calculated for each point (structure) that intersected the depth grid based on the Hazus depth damage curves for specific structure attributes (such as foundation type, building type, and first flood height). Information derived from Hazus-MH 2.2 flood scenario. Total Losses equals a sum of building losses, content losses, and inventory losses. 1% Annual Chance Flood flooding depth grid, produced from the best available topographic and floodplain data.

Tornado

Previous Occurrences

According to NOAA, no injuries or deaths have been recorded within the Loveland Fire Rescue Authority service area due to tornadoes. There is record of 5 tornados reported within the service area limits between 1954 and 2015. On July 7, 1983 a tornado caused over $1,000 in property loss. Tornadoes will remain a likely occurrence for the Loveland Fire Rescue Authority.

Historic Tornadoes- Loveland Fire Rescue Authority Service Area[176]



Inventory Exposed

All assets located in the Loveland Fire Rescue Authority service area can be considered at risk from severe wind and tornadoes. This includes approximately 97,500people, or 100% of the service area's population and all buildings and infrastructure within the service area.[177] Most structures, including critical facilities,

[176] Historical tornado events. NOAA's National Weather Service Storm Prediction Center, 1950 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

[177] 2010 Census

should be able to withstand and provide adequate protection from tornadoes. Those facilities with back-up generators should be fully equipped to handle tornado events should the power go out.

Potential Losses

Generally, tornadoes destroy private, commercial, and public property. Additional costs stem from debris removal, maintenance, repair, and response. Indirect costs include loss of industrial and commercial productivity as a result of damage to infrastructure, facilities, or interruption of services. Because no specific, countywide loss estimation exists tornado hazards, potential losses are related to historical property damage and injuries/deaths.

Probability of Future Occurrences

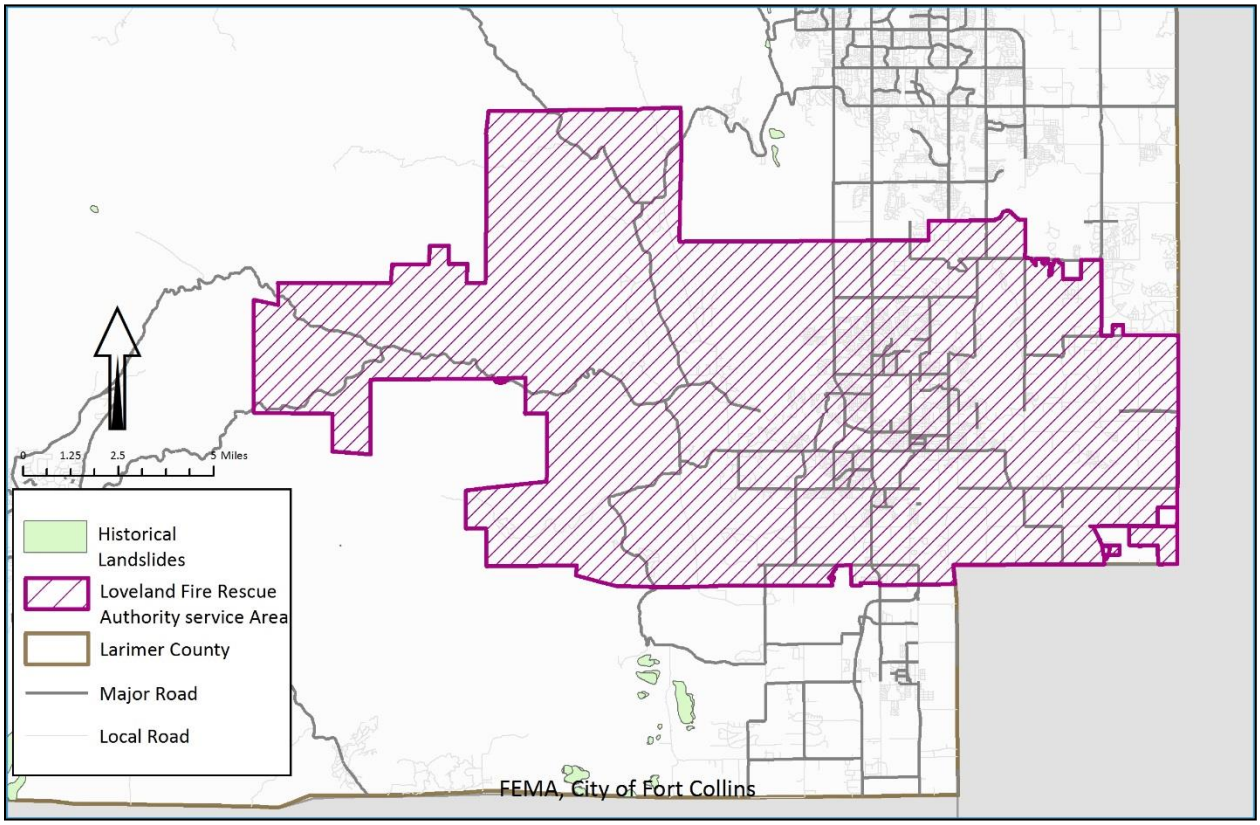
Reported tornadoes over the past 61 years provide an acceptable framework for determining the future occurrence in terms of frequency for such events. The probability of the Loveland Fire Rescue Authority service area experiencing a tornado associated with damages or injuries can be difficult to quantify. Historic tornado frequencies suggest that there is a chance of this type of event occurring somewhere in within the service area boundaries each year.

Landslide / Rockslide

Previous Occurrences

According to the Colorado Geological Survey there have been no historical landslide events within the Loveland Fire Rescue Authority service area.

Historic Landslide Areas – Loveland Fire Rescue Authority Service Area [178]

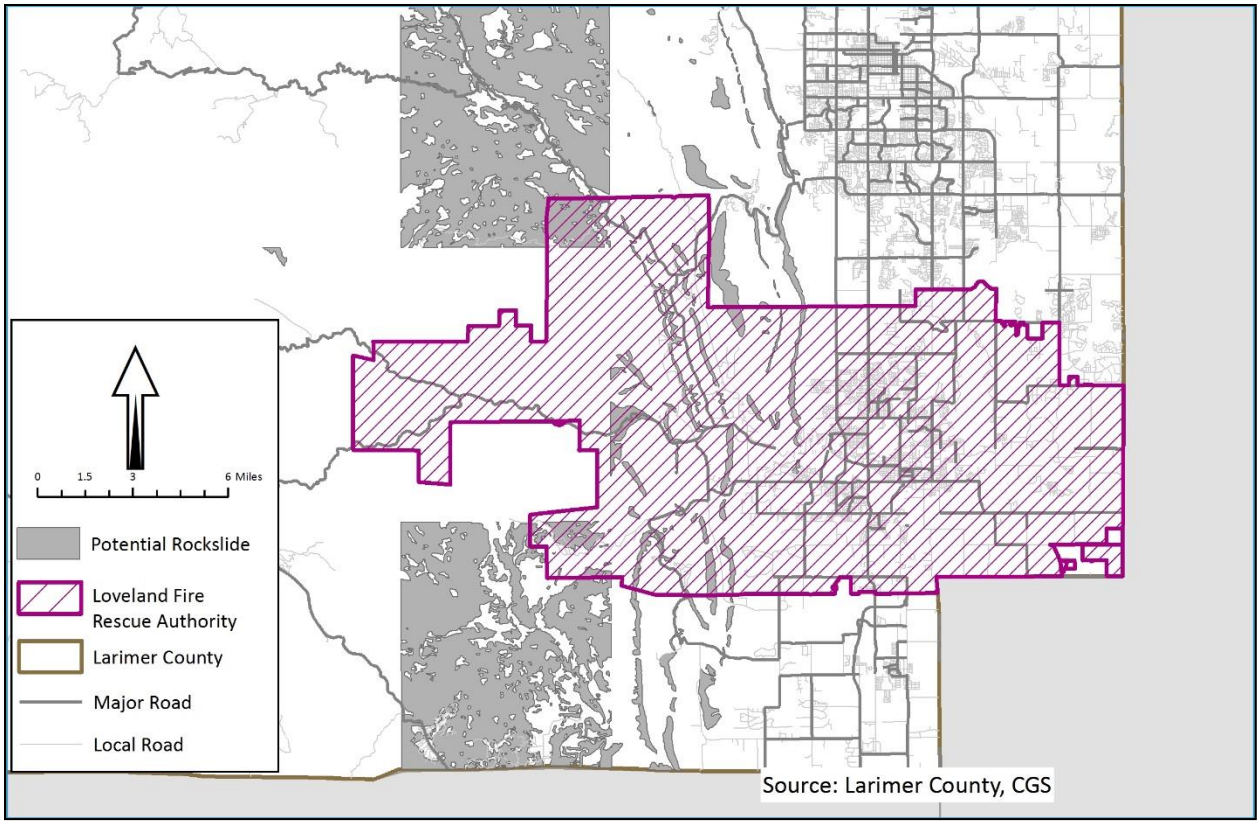


Inventory Exposed

There are no identified potential locations within Loveland Fire Rescue Authority service area that are vulnerable to landslides. There are portions of the western region of the service area that have the potential for rockslide events. As population growth brings new development into available land in the area, more inventory assets may become exposed to landslides and rockslides hazards. The following figures show historical and potential landslide and rockslide areas near the Loveland Fire Rescue Authority service area.

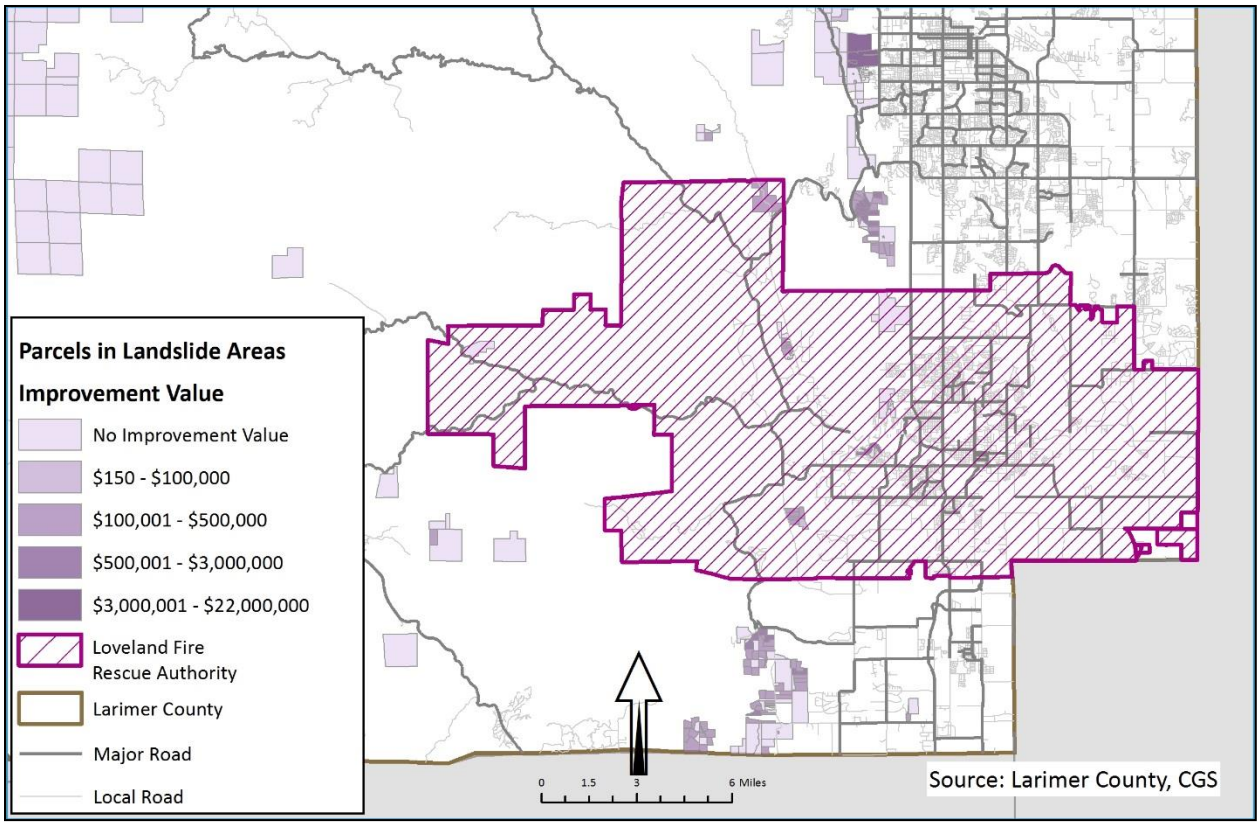
[178] Historical and potential landslide areas presently identified by the Colorado Geological Survey.

Potential Rockslide Areas – Loveland Fire Rescue Authority Service Area [179]



[179] Potential rock fall areas presently identified by the Colorado Geological Survey.

Parcels in Landslide Areas – Loveland Fire Rescue Authority Service Area [180]

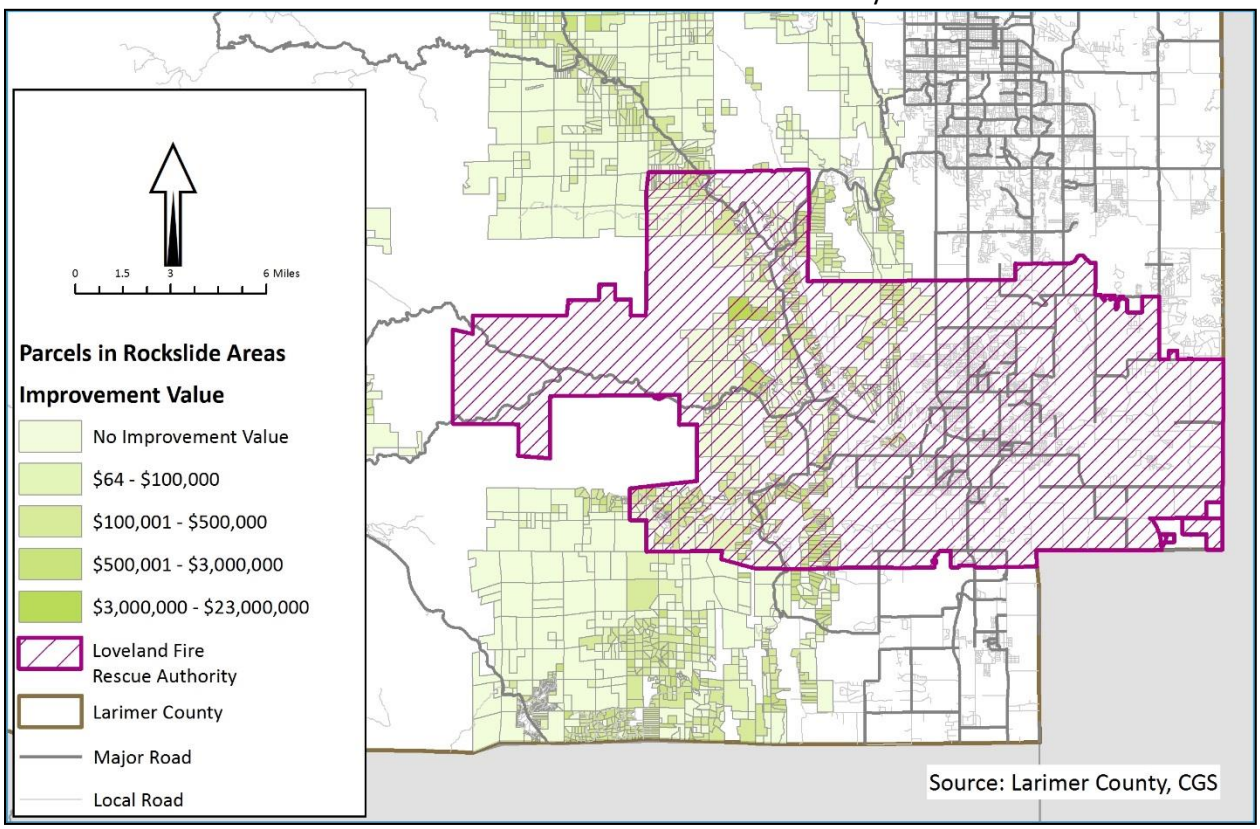


Potential Losses

The critical facility and structure exposure analysis estimates that there are no critical facility and 38 parcels/structures in the Loveland Fire Rescue Authority service area that are prone to landslides (not including the total miles of landslide prone infrastructure). The appraised value of the exposed structures is over $5.4 million dollars.

[180] Parcels intersecting potential & historical landslide areas presently identified by the Colorado Geological Survey.

Parcels in Rockslide Areas – Loveland Fire Rescue Authority Service Area [181]



Probability of Future Occurrences

Due to the uncertainty associated with existing data, it is challenging to accurately calculate probability for future events related to landslide and rockslide hazards. It can be assured however, that these hazards will continue to alter the landscape of the Loveland Fire Rescue Authority service area in the future.

Overall, the probability of future occurrences of rockslide and landslide events in the Loveland Fire Rescue Authority service area is low. Individual assessments of landslide-prone areas are recommended in the future. Moreover, as development and population increase in the service area, increasing numbers of structures (and people) will be exposed to future landslide and rockslide events.

Capabilities Assessment

The capability assessment examines the ability of the Loveland Fire Rescue Authority to implement and manage the comprehensive mitigation strategy laid out in this Plan. The strengths, weaknesses, and resources of the community are identified here as a means for evaluating and maintaining effective and appropriate management of the Authority's hazard mitigation program.

[181] Parcels that intersect potential rockfall areas presently identified by the Colorado Geological Survey.

Local Personnel

The ability of a community to implement a comprehensive mitigation strategy depends, in part, on available resources, including people and staff. The following table outlines the Loveland Fire Rescue Authority's capabilities as they relate to key personnel.

	Full Time	Part Time	None or Not-Identified
Emergency Manager	X		
Floodplain Administrator	X		
Community Planner	X		
GIS Specialist	X		
Grant Writer			X

Land Use Planning and Codes

Local land use plans and building codes are tremendous tools for evaluating local policies related to hazard mitigation and risk reduction. Additionally, comprehensive master plans, capital improvement plans, stormwater plans and zoning ordinances all present opportunities for enhanced local capabilities. The following table outlines Loveland Fire Rescue Authority's current capabilities as they relate to land use planning and codes.

	Yes (Y); No (N)
A zoning ordinance	Y
A hazard-specific ordinance	Y
Local building codes	Y
A Comprehensive Plan / Master Plan	Y
A Capital Improvements Plan	Y
A Stormwater Plan	Y
A Continuity of Operations Plan (COOP)	Y
An Emergency Operations Plan (EOP)	Y
A Long-Term Recovery Plan	Y*
Participates in the NFIP	N

**Under development, to be completed by October 2016.*

Plan Maintenance and Implementation

The Loveland Fire Rescue Authority has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the LFRA will continue public participation in the plan maintenance process.

Jurisdiction	Plan Maintenance and Implementation Strategy
Loveland Fire Rescue Authority	*"Our mitigation actions will be reviewed by OEM on an annual basis."* *"Changes to our mitigation actions and priorities will be made in the document and available for public comment."*

Integrating Hazard Mitigation into Local Planning

Through discussions at planning meetings and the use of an online survey, individual outreach, and phone calls, each participating jurisdiction brainstormed with the planning team to identify processes for integrating hazard mitigation into their local planning mechanisms and policies. The following table lists the specific integration strategy identified by the Loveland Fire Rescue Authority based on the mitigation actions listed in this plan.

Jurisdiction	Strategy
Loveland Fire Rescue Authority	*"We will continue to integrate our mitigation actions into our operations, budgeting, and prioritization planning."*

Mitigation Action Guides

The following Mitigation Action Guide present the Authority's mitigation actions that was developed for the 2016 Plan.

Loveland Fire Rescue Authority: CWPP Development	
PRIORITY: High	HAZARDS ADDRESSED: Fire – Wildland
LOCATION: Unincorporated areas of LRFA	GOALS ADDRESSED: 1, 2, 3, 4, 5
RECOMMENDATION DATE: 04/25/2016	OBJECTIVES ADDRESSED: A, B, C, D, E
TARGET COMPLETION DATE: 03/01/2018	
ISSUE: Unincorporated areas of LFRA do not currently have Community Wildfire Protection Plans (CWPP)	
RECOMMENDATION: Conduct planning process for creation of CWPP(s)	
ACTION: Develop CWPP(s)	
LEAD AGENCY: Loveland Fire Rescue Authority	EXPECTED COST: $30,000
SUPPORT AGENCIES: n/a	POTENTIAL FUNDING SOURCES: LFRA
PROGRESS MILESTONES: - Identification of LFRA project 'champion' - Identification of planning area(s) - Secure plan funding	

- Complete plan development

Loveland Fire Rescue Authority: Sodium Hypo Chlorite for Water Treatment (Loveland FRA – 1)	
PRIORITY: High	HAZARDS ADDRESSED: Tornado, Fire, Public Health, Hazmat
LOCATION: Water Treatment Plant	GOALS ADDRESSED: 1, 2
RECOMMENDATION DATE: 01/01/2013	OBJECTIVES ADDRESSED: E
TARGET COMPLETION DATE: 12/31/2016	
ISSUE: Compressed chlorine gas, stored in multiple 1-ton cylinders, is used to treat municipal water supply. Storing and using chlorine gas on-site pose as a threat for explosions, leaks, or even as targets of opportunity. Breathing in chlorine gas is a deadly to all organic life, including humans. Big T Elementary School is located within the toxic footprint for accidental release plume modeling. This is a high target of opportunity.	
RECOMMENDATION: Replacement of chlorine gas as water treatment product with safer product Sodium Hypo Chlorite	
ACTION: Eliminating chlorine gas as the method to disinfect water during the water treatment process. We would replace chlorine gas disinfection with sodium hypo chlorite which is in liquid form and is much safer than chlorine gas. A chemical building specifically for storage and delivery is part of the project scope.	
LEAD AGENCY: Loveland Fire Rescue Authority, Water Division	EXPECTED COST: $1m
SUPPORT AGENCIES: Building, Risk Management, CDPHE, EPA	POTENTIAL FUNDING SOURCES: city internal budget, bond, loan
PROGRESS MILESTONES: The construction of the chemical building is underway. Funding is secured. Design and engineering are completed.	

Letter of Intent to Participate

Loveland Fire Rescue Authority
410 East 5th Street
Loveland, Colorado 80537
(970) 962-2471 Fax (970) 962-2922 TDD (970) 663-5144
www.cityofloveland.org

LETTER OF INTENT TO PARTICIPATE
Loveland Fire Rescue Authority

November 2, 2015

Lori R. Hodges
Larimer County Emergency Management
200 West Oak Street
Fort Collins, CO 80526

Re: 'Statement of Intent to Participate' as a participating jurisdiction in the Larimer County Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Dear Ms. Hodges,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the Loveland Fire Rescue Authority is submitting this letter of intent to confirm that Loveland Fire Rescue Authority has agreed to participate in the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, Loveland Fire Rescue Authority agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Larimer County OEM to complete the plan in conformance with FEMA requirements.

Loveland Fire Rescue Authority understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by an agreement between the Lead Jurisdiction and the Participating Jurisdiction, I Mark Miller, commit Loveland Fire Rescue Authority to the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 2 day of November, 2015

Mark Miller, Fire Chief – Loveland Fire Rescue Authority

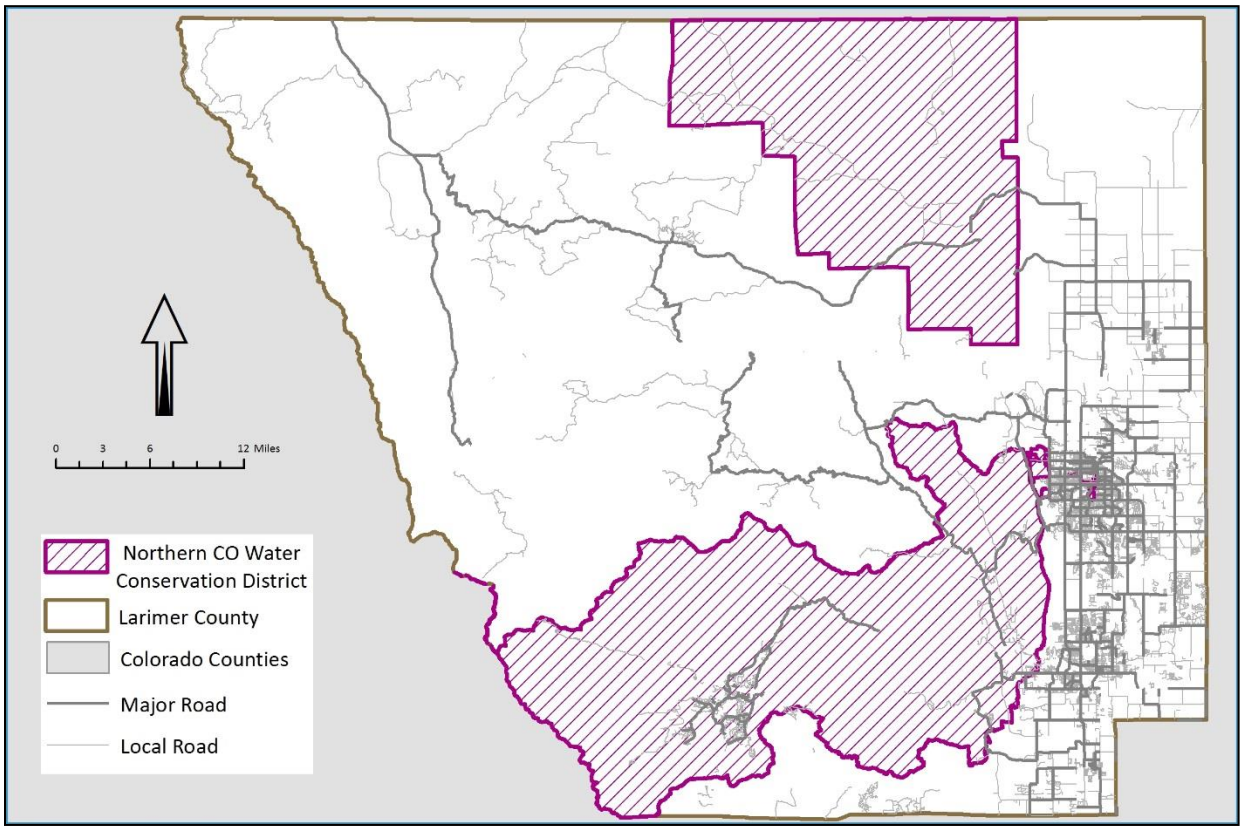
Northern Colorado Water Conservancy District (Northern Water)

"Provide water resources management, project operations, and conservation services for C-BT Project beneficiaries."
—Mission, Northern Water

Community Profile

Northern Water is a public agency created in 1937 to contract with the federal government to build the Colorado-Big Thompson (C-BT) Project. The C-BT collects water west of the Continental Divide and delivers it to Northeastern Colorado for agricultural, municipal, domestic and industrial uses. Northern Water and the U.S. Bureau of Reclamation jointly operate and maintain the C-BT Project.

About 880,000 people live within Northern Water boundaries, which encompass 1.6 million acres in portions of eight counties: Boulder, Broomfield, Larimer, Logan, Morgan, Sedgwick, Washington and Weld. Northern Water provides cities, towns rural-domestic water districts and industries with year-round deliveries. And between April and October, the primary growing season, Northern Water also delivers water to more than 120 ditch, reservoir and irrigation companies serving thousands of farms and more than 640,000 acres.



Hazard Identification and Risk Assessment

The following Hazard Identification and Risk Assessment Summary table is based on jurisdiction-specific responses to the risk factor exercise and differs from the risk factor results that were determined at the county scale.

NATURAL HAZARD	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Fire – Wildland	0.9	0.9	0.6	0.2	0.4	3.0
Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)	1.2	0.3	0.8	0.1	0.3	2.7
Flood – Flash and Riverine	0.9	0.3	0.6	0.3	0.3	2.4
Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)	1.2	0.3	0.4	0.4	0.1	2.4
Tornado	0.6	0.9	0.4	0.4	0.1	2.4
Erosion / Deposition	0.9	0.6	0.2	0.2	0.3	2.2
Hazmat – Fixed and Transport	0.9	0.3	0.4	0.4	0.1	2.1
Earthquake	0.3	0.6	0.6	0.4	0.1	2.0
Utility Disruption	0.9	0.3	0.2	0.4	0.2	2.0
Landslide / Rockslide	0.9	0.3	0.2	0.3	0.1	1.8
Civil Disturbance	0.3	0.6	0.2	0.4	0.2	1.7
Biological Hazards / Contagion	0.6	0.3	0.2	0.1	0.4	1.6
HIGH RISK (2.5 or higher): Fire – Wildland; Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)						
MODERATE RISK HAZARD (2.0 - 2.4): Flood – Flash and Riverine; Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning); Tornado; Erosion / Deposition; Hazmat – Fixed and Transport; Earthquake; Utility Disruption						
Low Risk (1.9 and lower): Landslide / Rockslide; Civil Disturbance; Biological Hazards / Contagion						

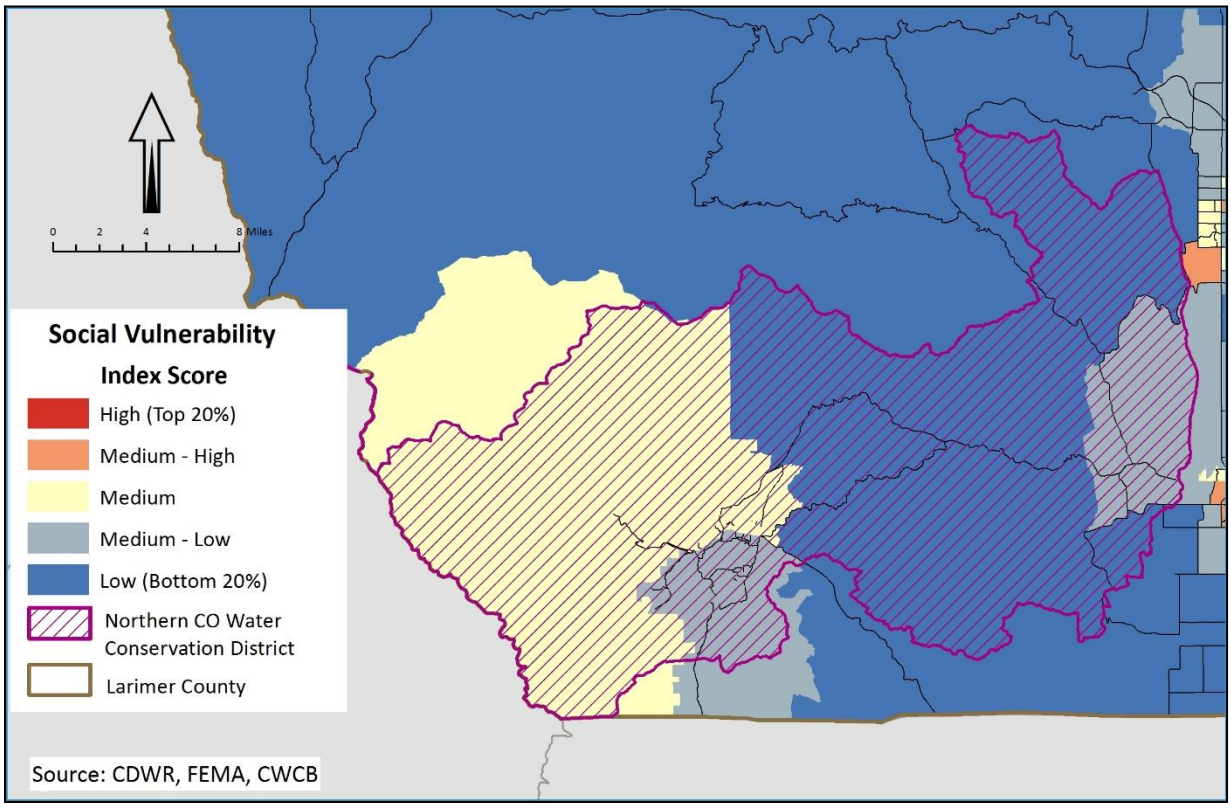
Vulnerability Assessment

This section provides a refined vulnerability assessment, specific to Northern Water, for those hazards that were identified as being rated HIGH in the preceding section. This analysis was conducted separately

from that of the county-wide vulnerability assessment to specifically focus on the population, structures, infrastructure, and other assets unique to the Northern Water.

The results of the social vulnerability assessment are displayed on the map below. On the map, social vulnerability is represented at the census tract level by 5 classes of vulnerability: Low (bottom 20% of the county), Medium-Low, Medium, Medium-High, and High (top 20% of the county). The Northern Water social vulnerability map shows social vulnerability within the district.

Social Vulnerability Map – Northern Water[182]



Social vulnerability is represented as the social, economic, demographic, and housing characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to hazard events. The pre-existing social conditions that contribute to disaster losses can be identified using social vulnerability indicators. Using methods identified in the Social Vulnerability Index (SoVI) developed by Cutter et. al. (2003) this layer shows the social vulnerability index scores for the State of Colorado at the census tract

[182] Source: Colorado Division of Water Resources Dam Safety Branch, FEMA, Colorado Water Conservation Board (CWCB)

level. Social vulnerability is represented at the Census tract level by five classes of vulnerability: Low, Medium-Low, Medium, Medium-High, and High.

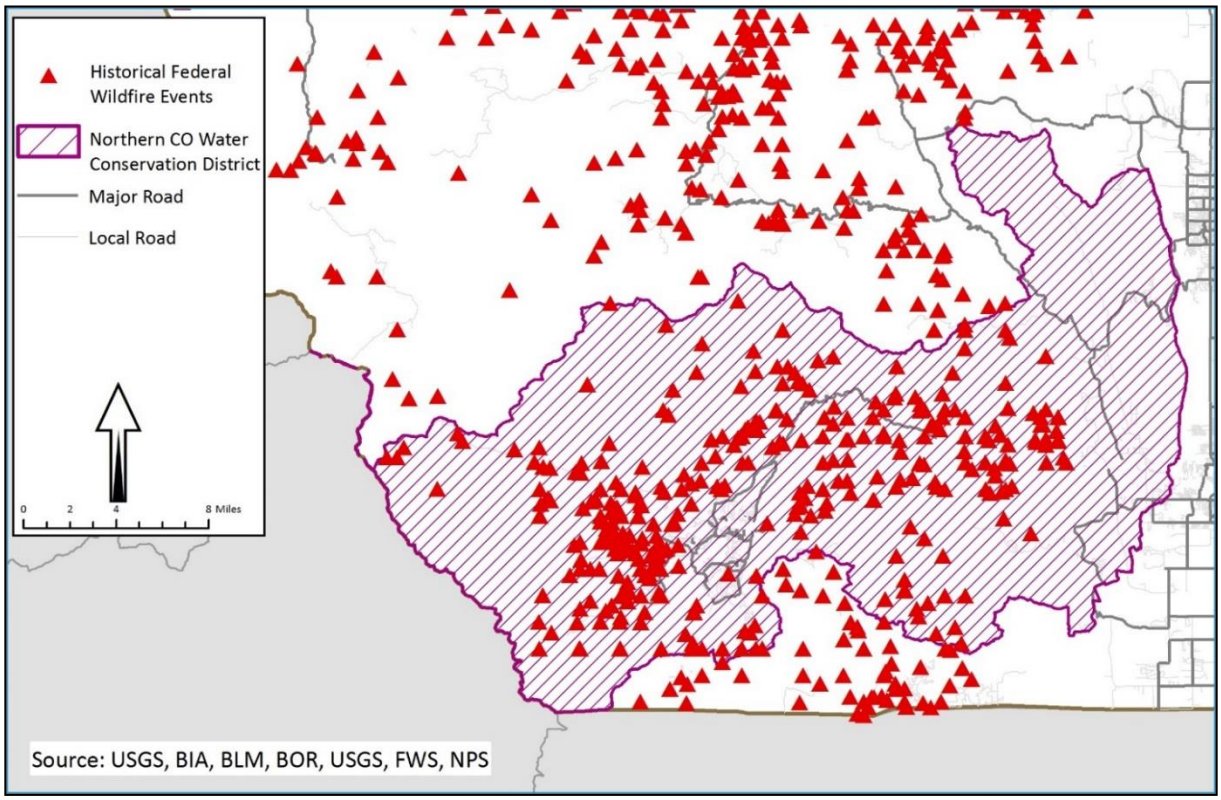
The Northern Water service area is characterized by a mix of low to medium levels of social vulnerability. A deeper-dive into the individual social vulnerability indicators within the district will give local emergency managers, planners, and stakeholders an even clearer picture of which social vulnerability factors have the largest negative effect on the community and its resiliency. It is important that the district continue to monitor social vulnerability levels over time as demographics and economics change in the area.

Fire – Wildland

Previous Occurrences

According to NOAA's Storm Events Database there have been 370 reported wildfire events in the Northern Water service area. Based on the historic data showing hazardous impacts on the district, there is a great potential for wildfire events to occur at any given time.

Northern Water Service Area Historical Federal Wildfire Map[183]

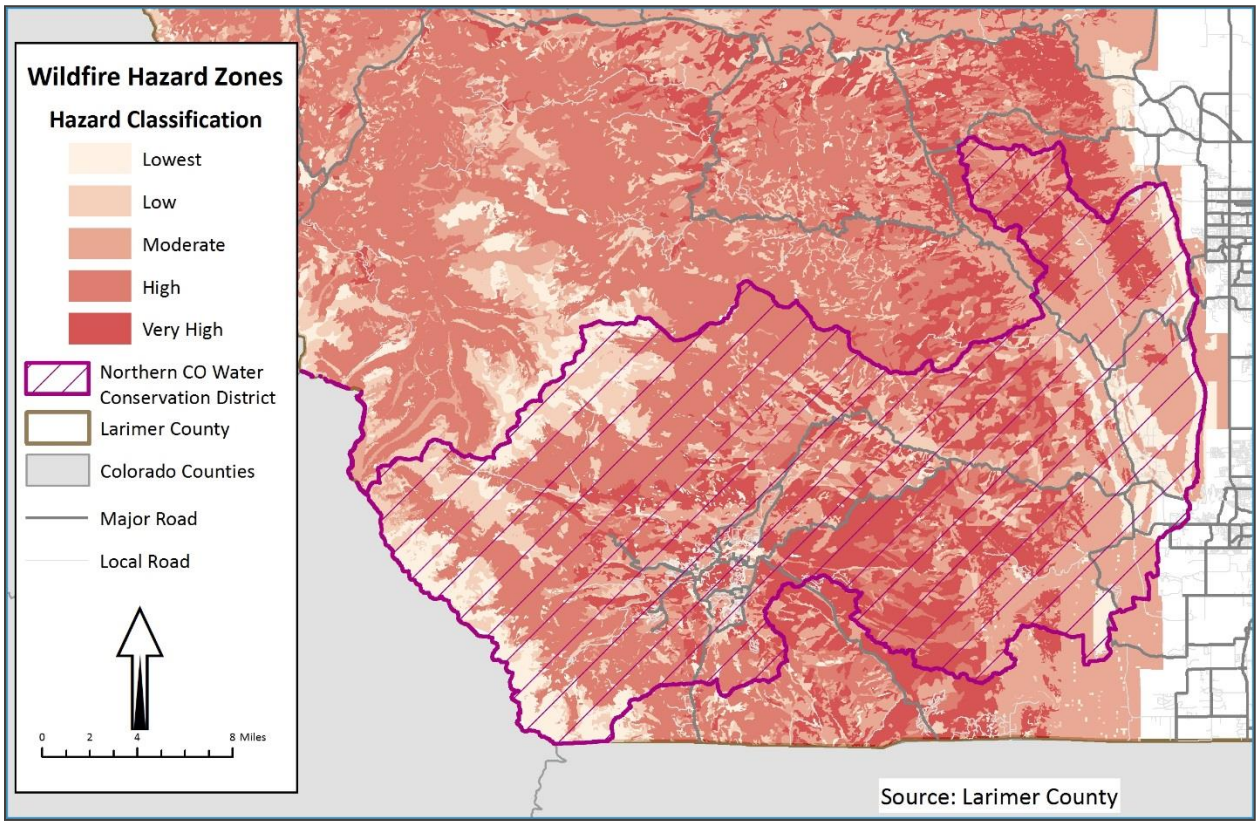


[183] Historical wildland fire occurrence data compiled by USGS from 1980 - 2013, from BIA, BLM, BOR, USGS, FWS, and NPS.

Inventory Exposed

The following Wildfire Hazard Zone map identifies the expected wildfire behavior. The highest wildfire hazard zones are located throughout the district.

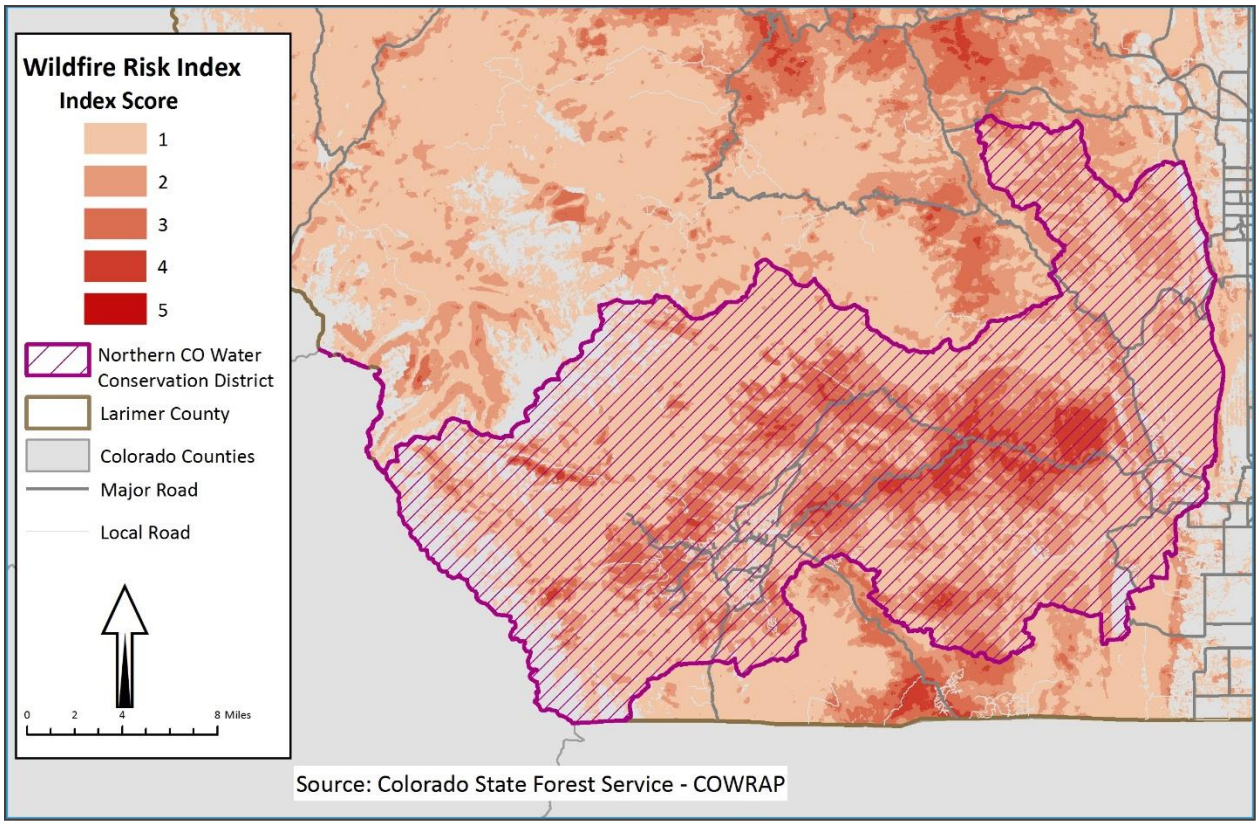
Northern Water Wildfire Hazard Zone Map[184]



The following Wildfire Risk map identifies areas with the greatest potential impacts from a wildfire, in other words, those areas most at risk. The highest wildfire hazard zones are located throughout the district.

[184] To be used to identify wildfire hazards within the Wildfire Mitigation Area. The hazards are determined according to the Wildfire Hazard Area Mapping (WHAM) guidelines.

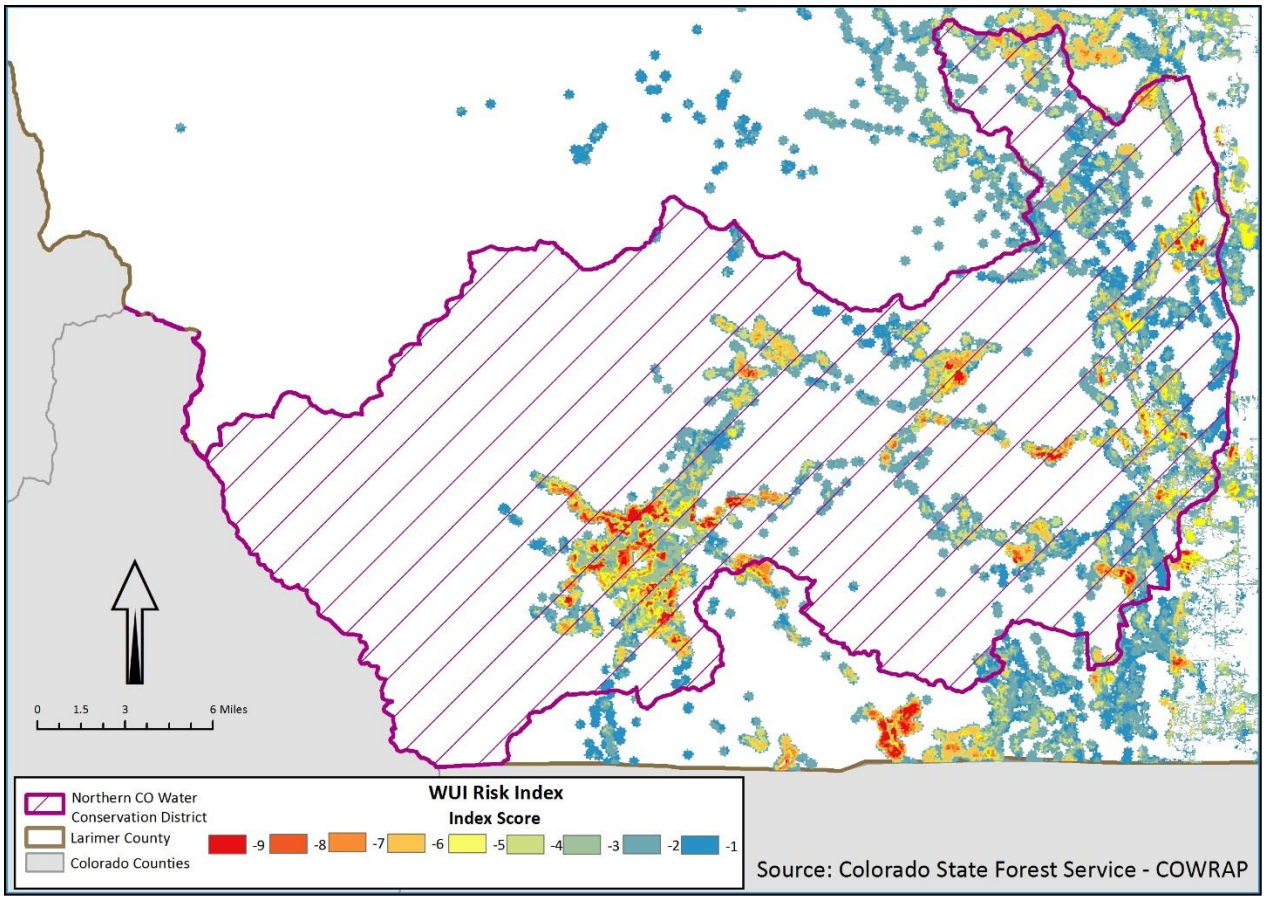
Northern Water Wildfire Risk Index Map[185]



There are a number of areas in the central and eastern region of the district that are within the medium to highest level on the WUI Risk Index Scale. This means that the potential impact on people and homes from a wildfire in those areas is medium to high in relationship to the rest of Larimer County. This level of risk is derived by combining housing density with predicted flame length.

[185] Wildfire Risk represents the possibility of loss or harm occurring from a wildfire. Risk is derived by combining wildfire threat and fire effects. The COWRAP data set was produced statewide and ranks areas on a scale that includes: lowest risk to highest risk. All risk rankings are present in Larimer County.

Northern Water WUI Map[186]



Fires can extensively impact the economy of an affected area, including the agricultural, recreation and tourism industries, water resources, and the critical facilities upon which Northern Water depends. There are areas of high and medium wildfire threat in the central portion of the district according to the WUI Risk Index. There is 1 critical facilities located in areas with the *most negative* and 7 critical facilities located in areas with the *2nd most negative* wildfire threat total. The appraisal value of the critical facilities within these most and 2nd most negative threat areas is over $10 million dollars.

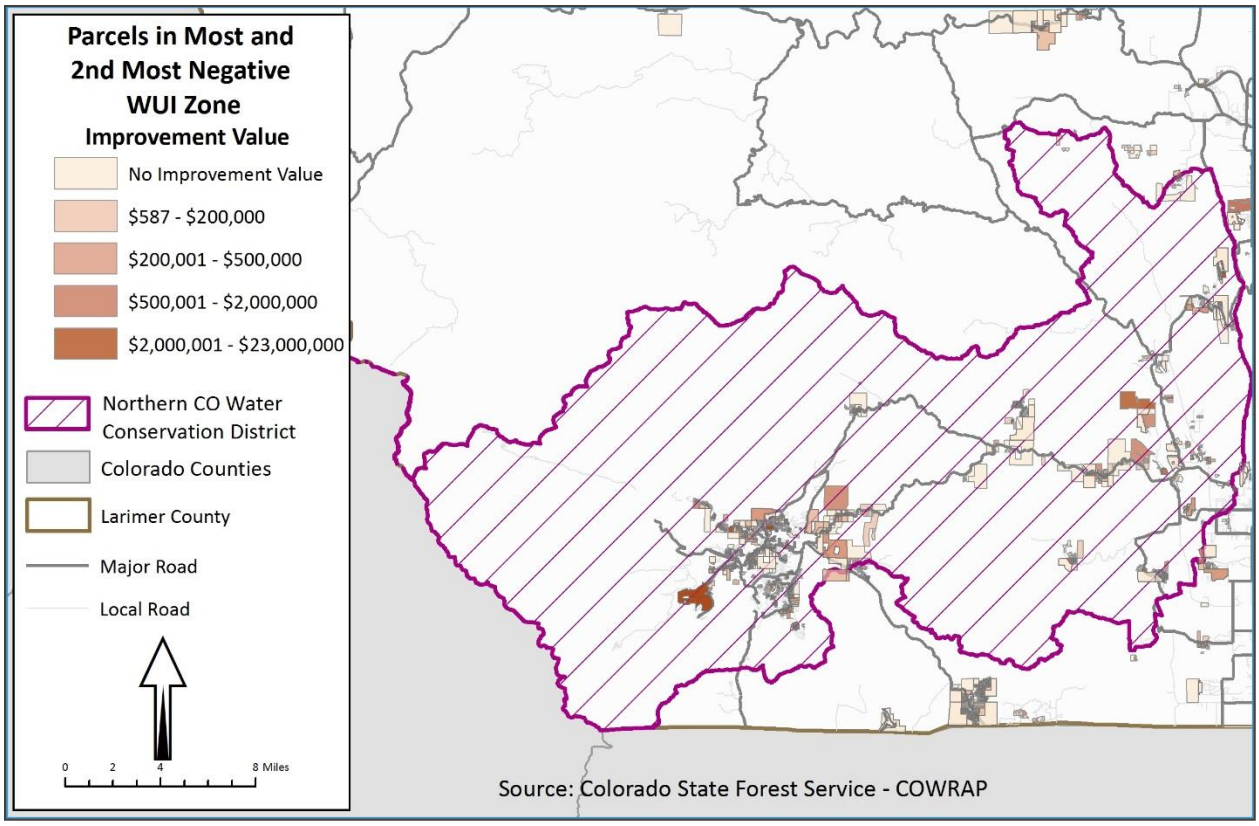
Potential Losses

The exposure data provided in the previous section (Inventory Assets Exposed) provides the clearest picture of potential losses to wildfire in the Northern Water service area. There are 1,888

[186] Wildland Urban Interface (WUI) Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length. The COWRAP data set was produced statewide and ranks areas on a scale that includes: least negative to most negative impacts. This scale stretched from -1 (least) to -9 (most) statewide.

parcels/structures located in areas with the most negative and 1,040 parcels/structures located in areas with the 2nd most negative wildfire threat total. The appraisal value of the parcels/structures within these most and 2nd most negative threat areas is over $872 million dollars. The risk assessment uses worst case scenario loss estimates. For this reason it is important to plan for relative levels of loss rather than specific potential loss dollar amounts.

Northern Water Parcels in the Most Negative and Second Most Negative WUI Zone[187]



Probability of Future Occurrences

The likelihood of wildfires attaining significant size and intensity is unpredictable and highly dependent on environmental conditions and firefighting response. Weather conditions, particularly drought events, increase the likelihood of wildfires occurring. That said, it is important to note that 98% of wildfires are human-caused. Ultimately, the occurrence of future wildfire events will strongly depend on patterns of human activity and events are more likely to occur in wildfire-prone areas experiencing new or additional development.

Wildfires can occur at any time of day and during any month of the year. Moreover, the length of a wildfire season and/or peak months may vary appreciably from year to year. As evidenced by the wildfire risk assessment, areas within the Northern CO Water Conservation District that are characterized by dense development and single family homes along the wildland-urban interface are most vulnerable to wildfire.

[187] Wildland Urban Interface (WUI) Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length.

Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)

Previous Occurrences

According to NOAA's Storm Events Database, Northern Water has experienced 264 Winter Storms since 1996. On March 17, 2003 there was report of a winter storm causing $15,500,000 in property damage in areas of Western Larimer County. There were no deaths, injuries or damage to crops reported for any of these storms. Northern Water is at high risk of experiencing, and being impacted by, winter storms during the winter months.

Inventory Exposed

All assets located in the Northern Water service area can be considered at risk from winter storms. This includes all people, or 100% of the District's population, and all buildings and infrastructure within the district. Damages from winter storm events primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the District's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Potential Losses

Winter storms affect the entire planning area of Northern Water including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Winter storms will remain a highly likely occurrence for Northern Water.

Probability of Future Occurrences

Severe winter storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past severe winter events provide benchmarks for projecting similar conditions into the future. The probability that the Northern Colorado Water Conservancy District will experience a severe winter storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the district at least once every year.

Capabilities Assessment

The capability assessment examines the ability of the Northern Colorado Water Conservancy District to implement and manage the comprehensive mitigation strategy laid out in this Plan. The strengths, weaknesses, and resources of the community are identified here as a means for evaluating and maintaining effective and appropriate management of the district's hazard mitigation program.

Local Personnel

The ability of a community to implement a comprehensive mitigation strategy depends, in part, on available resources, including people and staff. The following table outlines the district's capabilities as they relate to key personnel.

	Full Time	Part Time	None or Not-Identified
Emergency Manager		X	
Floodplain Administrator			X
Community Planner			X
GIS Specialist	X		
Grant Writer		X	

Land Use Planning and Codes

Local land use plans and building codes are tremendous tools for evaluating local policies related to hazard mitigation and risk reduction. Additionally, comprehensive master plans, capital improvement plans, stormwater plans and zoning ordinances all present opportunities for enhanced local capabilities. The following table outlines the district's current capabilities as they relate to land use planning and codes.

	Yes (Y); No (N)
A zoning ordinance	N
A hazard-specific ordinance	N
Local building codes	N
A Comprehensive Plan / Master Plan	N
A Capital Improvements Plan	Y
A Stormwater Plan	N
A Continuity of Operations Plan (COOP)	Y
An Emergency Operations Plan (EOP)	Y
A Long-Term Recovery Plan	Y
Participates in the NFIP	N

Plan Maintenance and Implementation

The Northern Colorado Water Conservancy District has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the district will continue public participation in the plan maintenance process.

Jurisdiction	Plan Maintenance and Implementation Strategy
Northern Colorado Water	*"We participate in the C-BT Headwaters Partnership, a partnership of Northern Water, the U.S. Forest Service, Colorado State Forest Service and the Bureau of Reclamation. Our wildfire mitigation and planning activities will be incorporated*

Conservancy District	*into the 5-year operating plan of this group. Other mitigation activities are incorporated into our annual O&M planning activities, which are monitored by our management team and Board of Directors."* *"Our mitigation actions and priorities are discussed with our Board of Directors during open session of our Planning & Action and Board meetings, which are open to the public. Mitigation activities are also discussed at our Water User's meetings, which happen twice per year, and advertised through our general electronic mailings and other public information activities."*

Integrating Hazard Mitigation into Local Planning

Through discussions at planning meetings and the use of an online survey, individual outreach, and phone calls, each participating jurisdiction brainstormed with the planning team to identify processes for integrating hazard mitigation into their local planning mechanisms and policies. The following table lists the specific integration strategy identified by the Northern Colorado Water Conservancy District based on the mitigation actions listed in this plan.

Jurisdiction	Strategy
Northern Colorado Water Conservancy District	*"Our wildfire mitigation activities will be incorporated into the C-BT Headwaters Partnership 5-year operating plan. Other mitigation activities are incorporated into our annual O&M activities or capital projects activities. Northern Water is implementing a new Asset Management program that will monitor and track these activities."*

Mitigation Action Guides

The following Mitigation Action Guide presents Northern Water's new mitigation action that was developed for the 2016 Plan.

<table>
<tr><th colspan="2">Northern Water: Colorado-Big Thompson Headwaters Partnership (Northern Water – 1)</th></tr>
<tr><td>PRIORITY: High</td><td>HAZARDS ADDRESSED: Flood, Fire, Public Health</td></tr>
<tr><td>LOCATION: Larimer and Grand Counties</td><td>GOALS ADDRESSED: 1, 2, 3</td></tr>
<tr><td>RECOMMENDATION DATE: 12/03/2012</td><td>OBJECTIVES ADDRESSED: D, E</td></tr>
<tr><td>TARGET COMPLETION DATE: 12/03/2017</td><td>(optional extensions likely)</td></tr>
<tr><td colspan="2">ISSUE:
Northern Water jointly owns, operates and maintains the Colorado Big-Thompson Project (C-BT) with the Bureau of Reclamation. C-BT delivers about 215,000 acre-feet of water annually to supplement water supplies for 860,000 people and 640,000 acres of irrigated land in northeastern Colo. Watersheds include the Upper Colorado and Big Thompson rivers in Grand and Larimer counties. C-BT water supplies are nearly entirely dependent upon snowmelt from high elevation watersheds along the Continental Divide in Northern Colorado. Forest health and fires within these watersheds can have dramatic effects on the quality of watershed runoff and the ability of C-BT water supplies to meet municipal, industrial and agricultural water uses. Catastrophic wildfires that occurred in Northern Colorado during 2012-2013 drought conditions highlighted the risk that C-BT water supplies face given deteriorated forest health conditions, drought, and urbanization at the wildland-urban interface. Northern Water, in conjunction with its partner local, State and Federal agencies is taking a pro-active approach to addressing these conditions.</td></tr>
<tr><td colspan="2">RECOMMENDATION:
The C-BT Headwaters Partnership was created in December 2012 through an MOU between the US Forest Service, Colorado State Forest Service, Bureau of Reclamation and Northern Water. The goal of the partnership is to restore health and resiliency of forests and watersheds and preplan wildfire response to protect C-BT infrastructure and water supplies.</td></tr>
<tr><td colspan="2">ACTION:
The following actions will be conducted by Northern Water through the Partnership:
Conduct forest and watershed health treatments, and pre-plan post-wildfire response
Develop a 5-year operating plan specifying treatment zones and activities
Support creation and refinement of watershed assessments
Coordinate to provide education, technical and financial incentives
Engage other partners
Develop a shared communications and media campaign
The C-BT Headwaters Partnership meets on a monthly basis to plan and coordinate activities, review on-going projects, and perform field investigations of new projects. The partnership is currently developing its 5-year operating plan.</td></tr>
<tr><td>LEAD AGENCY: Northern Water – Jerry Gibbens</td><td>EXPECTED COST:
Northern Water: $350,000 per year (budgeted, subject to annual appropriation by the Board of Directors)</td></tr>
<tr><td>SUPPORT AGENCIES: U.S. Forest Service, Colorado State Forest Service, Bureau of</td><td>POTENTIAL FUNDING SOURCES:
Lead and support agencies</td></tr>
</table>

Reclamation, National Park Service, Western Area Power Administration, Larimer County	• Colorado Department of Natural Resources grants • Colorado State Forest Service grants • Other grants

PROGRESS MILESTONES: Major project milestones and reporting of current project status

Completed Actions

- Upper Colorado Watershed Assessment – 2013
- C-BT Watershed Assessment – 2013
- Small Watershed Prioritization Report – 2014
- 5-Year Operating Plan – Anticipated 2015
- 2013 Wildfire Risk Reduction Grant – 367 acres treated (some acreage in Grand County)

On-going Actions

- 2014 Wildfire Risk Reduction Grant – 220 acres treated (in progress)
- 2015 CSFS SFA Grant – 100 acres treated (in progress)
- Kawuneechee Fuels Reduction Project - 153 acres treated (in progress; all in Grand County)
- Other projects funded by Reclamation, USFS, WAPA

Future Actions

- Finalize 5-year plan (2016) and implement plan actions (2016-2017)
  - Pursue fuels reduction goals identified in the plan
  - Implement pre-planning and action requirements for post-wildfire response
- Continue to purse funding opportunities or mitigation projects (2016-2017)
  - Colorado Department of Natural Resources Wildfire Risk Reduction grants
  - Colorado State Forest Service grants
  - Cost-sharing with local, state and federal agencies
- Investigate opportunities to extend MOU and include additional partners (2015-2016)

Reporting

- Develop annual report for C-BT Headwaters Partnership
- Present report to Northern Water Board of Directors annually

Letter of Intent to Participate

Northern Water
Northern Colorado Water Conservancy District
220 Water Avenue · Berthoud, Colorado 80513
Phone 1-800-369-7246 · Fax 1-877-851-0018
www.northernwater.org

June 16, 2015

Lori R. Hodges
Larimer County Emergency Management
200 West Oak Street
Fort Collins, CO 80526

Re: "Statement of Intent to Participate" as a participating jurisdiction in the Larimer County Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Dear Ms. Hodges,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, Northern Colorado Water Conservancy District (Northern Water) is submitting this letter of intent to confirm that Northern Water has agreed to participate in the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, Northern Water agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Larimer County OEM to complete the plan in conformance with FEMA requirements.

Northern Water understands that it must engage in the following planning process, as more fully described in FEMA's Local Mitigation Planning Handbook dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;

LARIMER COUNTY
COMMITTED TO EXCELLENCE

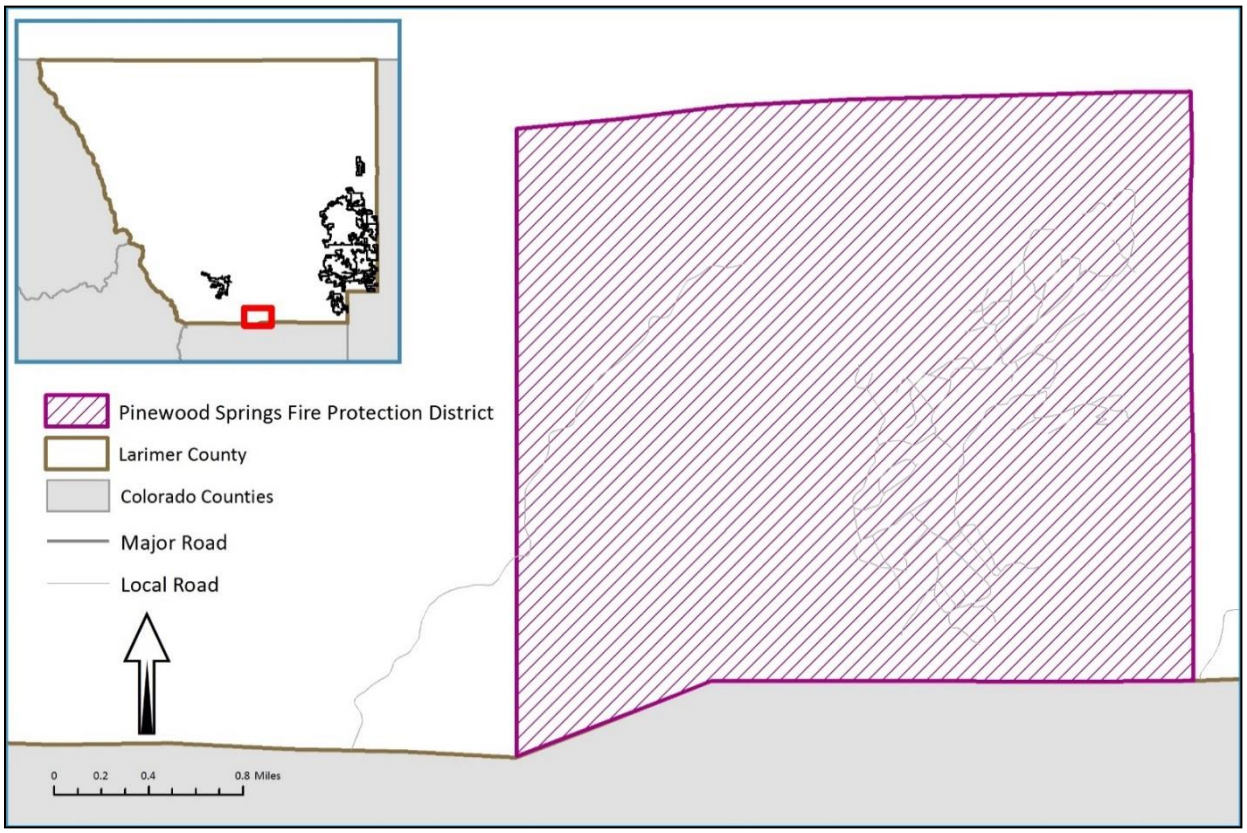
Michael Baker
INTERNATIONAL

Pinewood Springs Fire Protection District

"Professional and Courteous Mountain Community Emergency Services"

Community Profile

The Pinewood Springs Fire Protection District is a volunteer fire protection district located in the mountains between Estes Park and Lyons along highway 36. They provides services to the communities of Pinewood Springs and Estes Park Estates. Pinewood Springs Fire Protection services include structure fire protection, wildland fire suppression, vehicle-fire suppression, basic medical response, motor vehicle accident response, hazardous material containment and mitigation; mutual aid response, and rapid intervention team services. The preceding services are provided with an emphasis on protection of life, limb, and property.



Hazard Identification and Risk Assessment

Pinewood Springs Fire Protection District is situated in both Larimer and Boulder Counties. For the purpose of this plan, spatially analyzed hazard risks have been assessed for the areas of the district that lie specifically within Larimer County.

The following Hazard Identification and Risk Assessment Summary table is based on jurisdiction-specific responses to the risk factor exercise and differs from the risk factor results that were determined at the county scale.

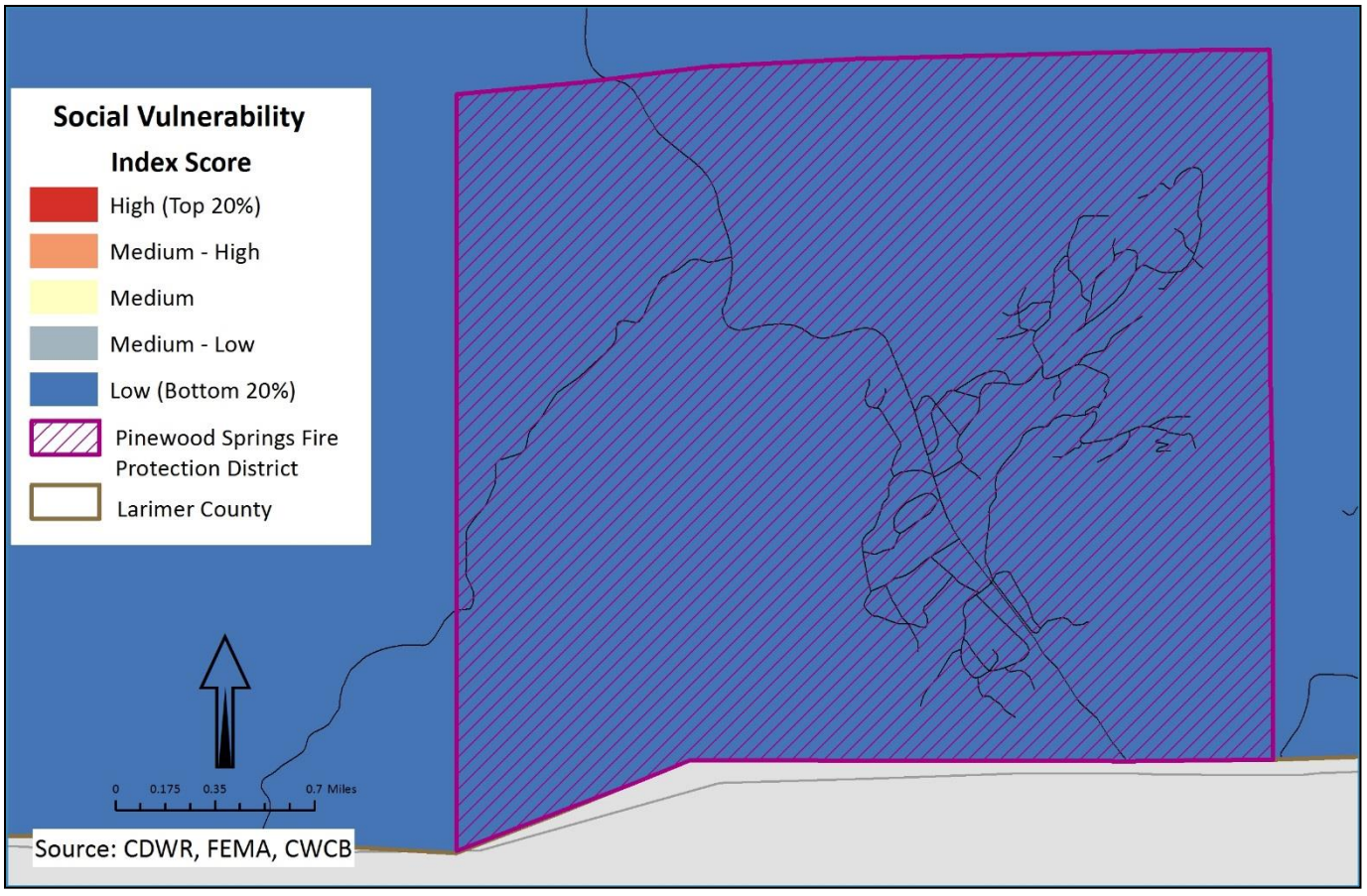
NATURAL HAZARD	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Fire – Wildland	1.2	0.9	0.6	0.3	0.3	3.3
Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)	0.9	0.6	0.6	0.3	0.3	2.7
Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)	0.9	0.6	0.4	0.4	0.1	2.4
Biological Hazards / Contagion	0.6	0.6	0.4	0.4	0.2	2.2
Hazmat – Fixed and Transport	0.6	0.6	0.4	0.4	0.2	2.2
Flood – Flash and Riverine	0.6	0.6	0.4	0.2	0.3	2.1
Landslide / Rockslide	0.6	0.6	0.4	0.3	0.2	2.1
Utility Disruption	0.6	0.3	0.4	0.4	0.3	2.0
Civil Disturbance	0.6	0.3	0.4	0.4	0.2	1.9
Erosion / Deposition	0.6	0.3	0.2	0.4	0.2	1.7
Earthquake	0.3	0.3	0.2	0.4	0.1	1.3
Tornado	0.3	0.3	0.2	0.4	0.1	1.3
HIGH RISK (2.5 or higher): Fire – Wildland; Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)						
MODERATE RISK HAZARD (2.0 - 2.4): Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning); Biological Hazards / Contagion; Hazmat – Fixed and Transport; Flood – Flash and Riverine; Landslide / Rockslide; Utility Disruption						
Low Risk (1.9 and lower): Civil Disturbance; Erosion / Deposition; Earthquake; Tornado						

Vulnerability Assessment

This section provides a refined vulnerability assessment, specific for the Pinewood Springs Fire Protection District, for those hazards that were identified as being rated HIGH in the preceding section. This analysis was conducted separately from that of the county-wide vulnerability assessment to specifically focus on the structures, infrastructure, and other assets unique to the Pinewood Springs Fire Protection District.

The results of the social vulnerability assessment are displayed on the map below. On the map, social vulnerability is represented at the census tract level by 5 classes of vulnerability: Low (bottom 20% of the county), Medium-Low, Medium, Medium-High, and High (top 20% of the county). The Pinewood Springs Fire Protection District's social vulnerability map shows social vulnerability within the district.

Social Vulnerability Map – Pinewood Springs Fire Protection District[188]



Social vulnerability is represented as the social, economic, demographic, and housing characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to hazard events. The pre-existing social conditions that contribute to disaster losses can be identified using social vulnerability

[188] Source: Colorado Division of Water Resources Dam Safety Branch, FEMA, Colorado Water Conservation Board (CWCB)

indicators. Using methods identified in the Social Vulnerability Index (SoVI) developed by Cutter et. al. (2003) this layer shows the social vulnerability index scores for the State of Colorado at the census tract level. Social vulnerability is represented at the Census tract level by five classes of vulnerability: Low, Medium-Low, Medium, Medium-High, and High.

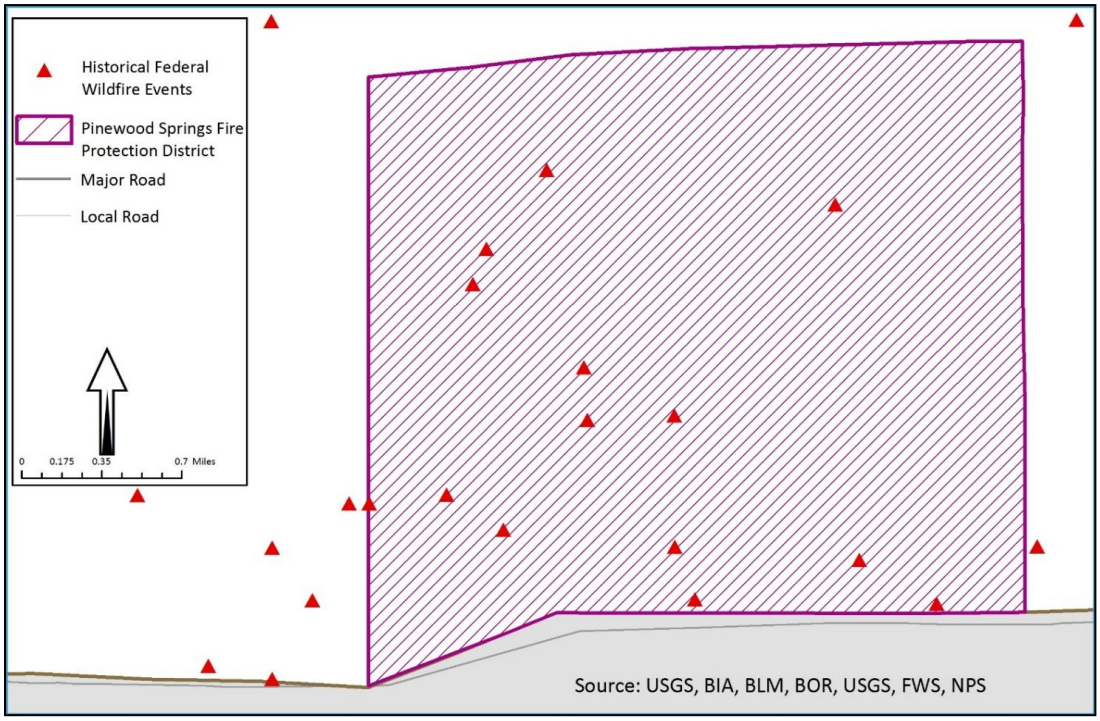
The Pinewood Springs Fire Protection District is characterized by low levels of social vulnerability. This does not mean, however, that there aren't any socially vulnerable residents living in the community or that social vulnerability levels will remain the same over time. Close analysis of the individual social vulnerability indicators within the area will give the district a clearer picture of which social vulnerability factors threaten the community the most and where social and economic resources should be allocated in order to reduce vulnerability. Over time, the district should continue to monitor social vulnerability levels as demographic, economic, and housing related conditions change.

Fire – Wildland

Previous Occurrences

According to NOAA's Storm Events Database there have been 15 reported wildfire events in the Pinewood Springs Fire Protection District. Based on the historic data showing hazardous impacts on the district, there is a great potential for wildfire events to occur at any given time.

Pinewood Springs Fire Protection District Historical Federal Wildfire Map[189]

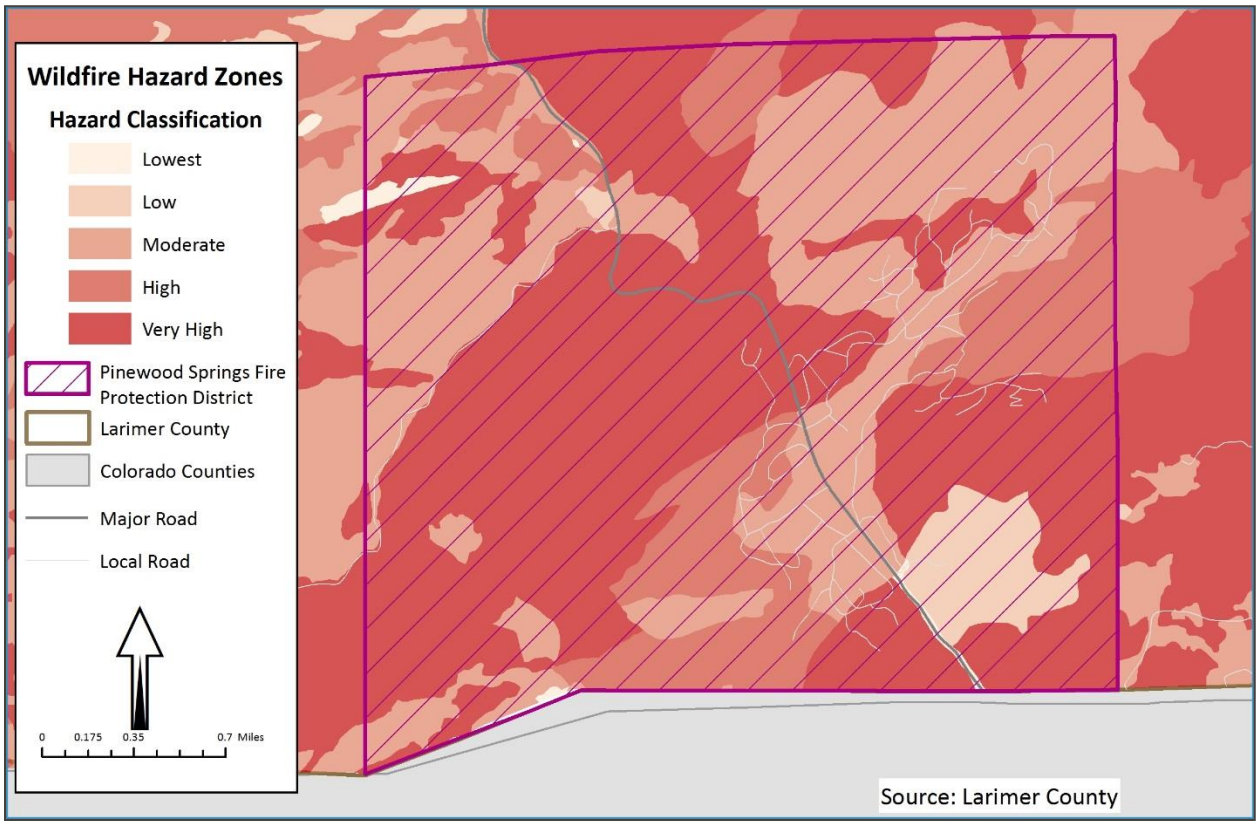


[189] Historical wildland fire occurrence data compiled by USGS from 1980 - 2013, from BIA, BLM, BOR, USGS, FWS, and NPS.

Inventory Exposed

The following Wildfire Hazard Zone map identifies the expected wildfire behavior. The highest wildfire hazard zones are located throughout the district.

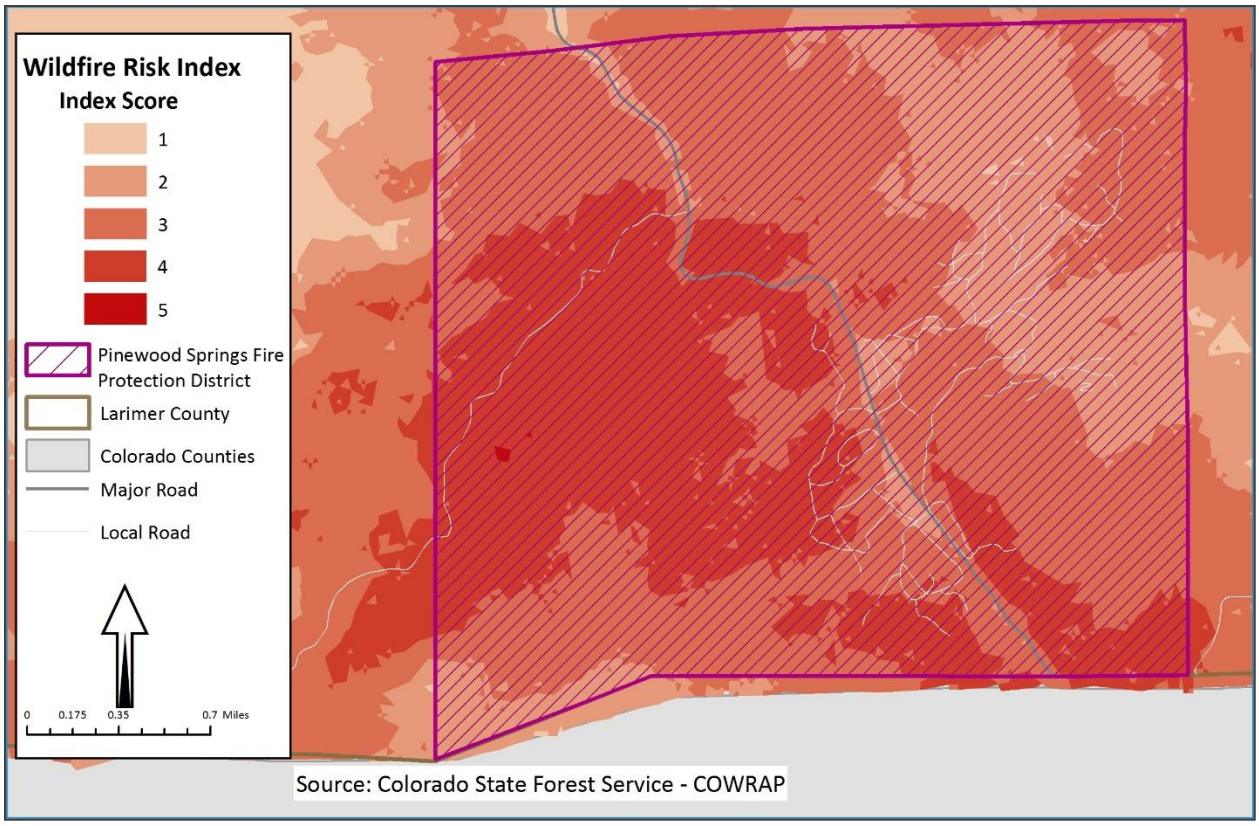
Pinewood Springs Fire Protection District Wildfire Hazard Zone Map[190]



The following Wildfire Risk map identifies areas with the greatest potential impacts from a wildfire, in other words, those areas most at risk. The highest wildfire risk areas in the district are located in the western and central region, in areas where there are lower population densities.

[190] To be used to identify wildfire hazards within the Wildfire Mitigation Area. The hazards are determined based on vegetation cover type, habitat structure stage (cover type, tree size and crown cover percentage), southern facing aspects and 30% and greater slopes according to the Wildfire Hazard Area Mapping (WHAM) guidelines.

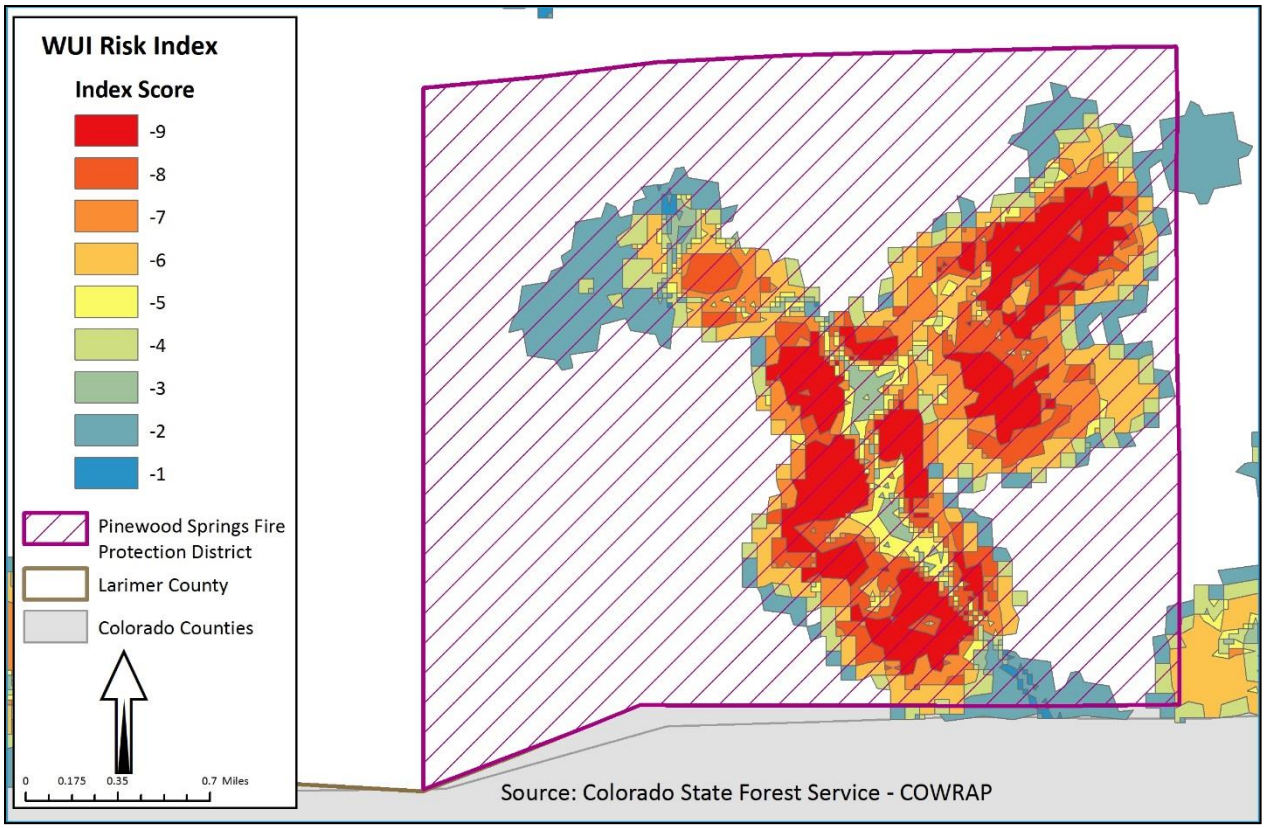
Pinewood Springs Fire Protection District Wildfire Risk Index Map[191]



There are a number of areas in the central and eastern region of the district that are within the medium to highest level on the WUI Risk Index Scale. This means that the potential impact on people and homes from a wildfire in those areas is medium to high in relationship to the rest of Larimer County. This level of risk is derived by combining housing density with predicted flame length.

[191] Wildfire Risk represents the possibility of loss or harm occurring from a wildfire. Risk is derived by combining wildfire threat and fire effects. The COWRAP data set was produced statewide and ranks areas on a scale that includes: lowest risk to highest risk. All risk rankings are present in Larimer County.

Pinewood Springs Fire Protection District WUI Map[192]



Fires can extensively impact the economy of an affected area, including the agricultural, recreation and tourism industries, water resources, and the critical facilities upon which the Pinewood Springs Fire Protection District depends. There are areas of high and medium wildfire threat in the central portion of the district according to the WUI Risk Index. There is 1 critical facilities located in areas with the *most negative* and *2nd most negative* wildfire threat total.

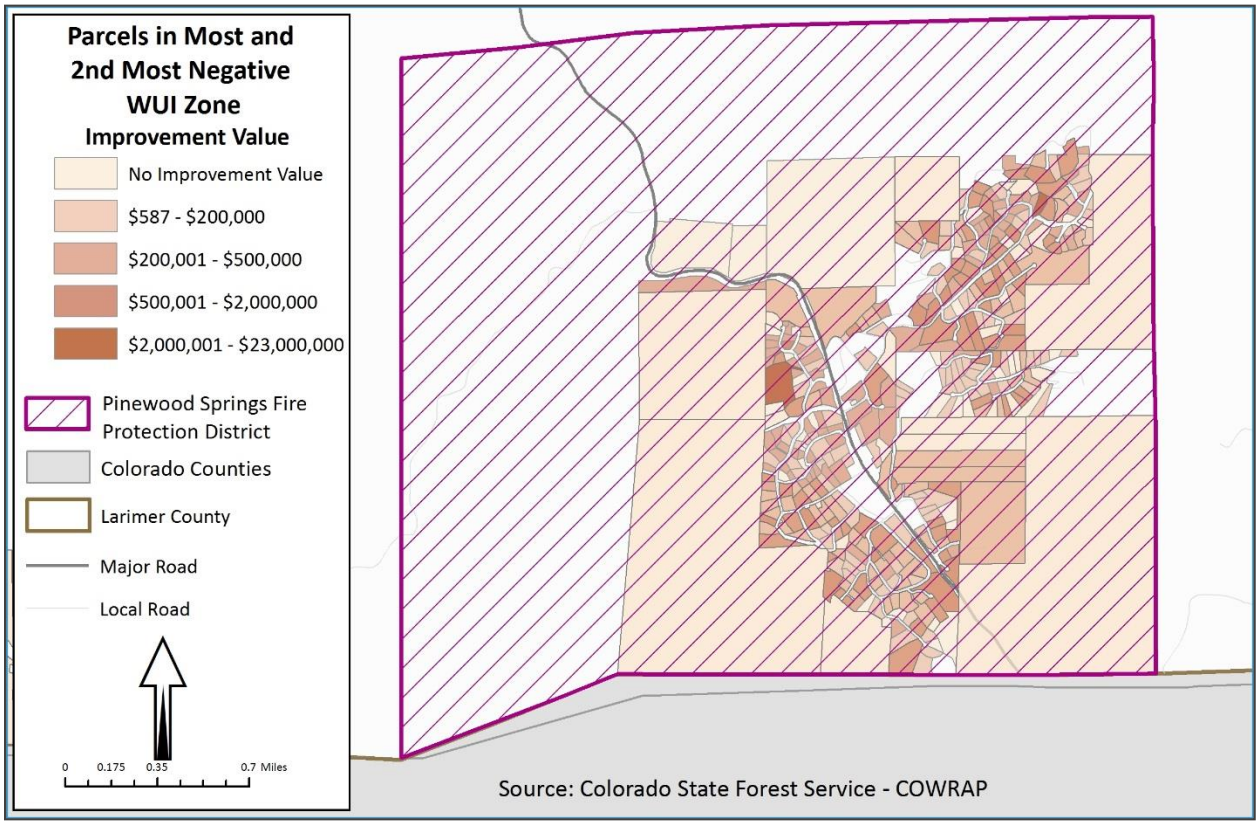
Potential Losses

The exposure data provided in the previous section (Inventory Assets Exposed) provides the clearest picture of potential losses to wildfire in the Pinewood Springs Fire Protection District. The appraisal value of the critical facilities within these most and 2nd most negative threat areas is over $135 thousand

[192] Wildland Urban Interface Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length. The COWRAP data set was produced statewide and ranks areas on a scale that includes: least negative to most negative impacts. This scale stretched from -1 (least) to -9 (most) statewide.

dollars. There are 383 parcels/structures located in areas with the most negative and 229 parcels/structures located in areas with the 2nd most negative wildfire threat total. The appraisal value of the parcels/structures within these most and 2nd most negative threat areas is over $88.6 million dollars. The risk assessment uses worst case scenario loss estimates. For this reason it is important to plan for relative levels of loss rather than specific potential loss dollar amounts.

Pinewood Springs Fire Protection District Parcels in the Most Negative and Second Most Negative WUI Zone[193]



Probability of Future Occurrences

The likelihood of wildfires attaining significant size and intensity is unpredictable and highly dependent on environmental conditions and firefighting response. Weather conditions, particularly drought events, increase the likelihood of wildfires occurring. That said, it is important to note that 98% of wildfires are human-caused. Ultimately, the occurrence of future wildfire events will strongly depend on patterns of human activity and events are more likely to occur in wildfire-prone areas experiencing new or additional development.

Wildfires can occur at any time of day and during any month of the year. Moreover, the length of a wildfire season and/or peak months may vary appreciably from year to year. As evidenced by the wildfire risk assessment, areas within the Pinewood Springs Fire Protection District that are

[193] Wildland Urban Interface Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length.

characterized by dense development and single family homes along the wildland-urban interface are most vulnerable to wildfire.

Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)

Previous Occurrences

According to NOAA's Storm Events Database, the Pinewood Springs Fire Protection District has experienced 175 Winter Storms since 1996. On March 17, 2003 there was report of a winter storm causing $15,500,000 in property damage in areas within western Larimer County above 6,000 feet. There were no deaths, injuries or damage to crops reported for any of these storms. The Pinewood Springs Fire Protection District is at high risk of experiencing Winter Storms during the winter months.

Inventory Exposed

All assets located in the Pinewood Springs Fire Protection District can be considered at risk from winter storms. This includes all people, or 100% of the District's population, and all buildings and infrastructure within the district. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the District's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Potential Losses

Winter storms affect the entire planning area of the Pinewood Springs Fire Protection District including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Winter storms will remain a highly likely occurrence for the Pinewood Springs Fire Protection District.

Probability of Future Occurrences

Severe winter storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past severe winter events provide benchmarks for projecting similar conditions into the future. The probability that the Pinewood Springs Fire Protection District will experience a severe winter storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the District at least once every year.

Capabilities Assessment

The capability assessment examines the ability of the Pinewood Springs Fire Protection District to implement and manage the comprehensive mitigation strategy laid out in this Plan. The strengths,

weaknesses, and resources of the community are identified here as a means for evaluating and maintaining effective and appropriate management of the district's hazard mitigation program.

Local Personnel

The ability of a community to implement a comprehensive mitigation strategy depends, in part, on available resources, including people and staff. The following table outlines the district's capabilities as they relate to key personnel.

	Full Time	Part Time	None or Not-Identified
Emergency Manager			X
Floodplain Administrator			X
Community Planner			X
GIS Specialist			X
Grant Writer		X	

Land Use Planning and Codes

Local land use plans and building codes are tremendous tools for evaluating local policies related to hazard mitigation and risk reduction. Additionally, comprehensive master plans, capital improvement plans, stormwater plans and zoning ordinances all present opportunities for enhanced local capabilities. The following table outlines the district's current capabilities as they relate to land use planning and codes.

	Yes (Y); No (N)
A zoning ordinance	N
A hazard-specific ordinance	N
Local building codes	Y
A Comprehensive Plan / Master Plan	N
A Capital Improvements Plan	N
A Stormwater Plan	N
A Continuity of Operations Plan (COOP)	N
An Emergency Operations Plan (EOP)	N
A Long-Term Recovery Plan	N
Participates in the NFIP	N

Plan Maintenance and Implementation

The Pinewood Springs Fire Protection District has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the district will continue public participation in the plan maintenance process.

Jurisdiction	Plan Maintenance and Implementation Strategy

PSFPD	*"Our mitigation actions will be reviewed annually by the Fire District."* *"Changes, actions and priorities communicated via monthly news information and social media"*

Integrating Hazard Mitigation into Local Planning

Through discussions at planning meetings and the use of an online survey, individual outreach, and phone calls, each participating jurisdiction brainstormed with the planning team to identify processes for integrating hazard mitigation into their local planning mechanisms and policies. The following table lists the specific integration strategy identified by the district based on the mitigation actions listed in this plan.

Jurisdiction	Strategy
PSFPD	*"We will integrate highest risk hazards in our annual operating budget and long term planning process."*

Mitigation Action Guides

The following Mitigation Action Guides present the district's new mitigation actions that were developed for the 2016 Plan.

Pinewood Springs Fire Protection District: Full Adoption of Updated FEMA Floodplains	
PRIORITY: High	HAZARDS ADDRESSED: Flood
LOCATION: Pinewood Springs Fire District	GOALS ADDRESSED: Goals 1, 2, 3, 4, and 5
RECOMMENDATION DATE: 10/18/2015	OBJECTIVES ADDRESSED: Objectives A, B, C, D and E
TARGET COMPLETION DATE: 12/31/2020	
ISSUE: Floodplain mapping is out of date and the 2013 Flood caused extensive changes to current floodplains. The Little Thompson River has never been mapped.	
RECOMMENDATION: Work with FEMA on updating current floodplain mapping in coordination with Larimer County	
ACTION: By 2020, the Little Thompson River through the Pinewood Springs Fire Protection District will be mapped and adopted by FEMA	
LEAD AGENCY: Pinewood Springs	EXPECTED COST: $300,000
SUPPORT AGENCIES: Larimer County Community Development and Office of Emergency Management	POTENTIAL FUNDING SOURCES: Colorado State Flood Hazard Mapping Project
PROGRESS MILESTONES: – Little Thompson Floodplain Mapped – Review and Comment Period / Public Review Process – Community Outreach – Follow the County process for zoning changes per county policy (Flood Review Board, Planning Commission, BCC, etc.)	

Pinewood Springs Fire Protection District: New Fire Station (Pinewood Springs FPD – 1)	
PRIORITY: High	HAZARDS ADDRESSED: Flood, Severe Storm, Wind, Fire
LOCATION: Pinewood Springs	GOALS ADDRESSED: 1, 3, 4
RECOMMENDATION DATE: 01/01/2015	OBJECTIVES ADDRESSED: A, B, E
TARGET COMPLETION DATE: 12/31/2016	
ISSUE: Pinewood Springs does not currently have suitable and usable space for operation of the Fire District, and Community meetings and activities during emergencies. The current building is over 50 years old and needs extensive repair and upgrading. Costs to rebuild the current structure would be as much as building a new, properly sized station that will meet community needs.	
RECOMMENDATION: Replace current fire station facility that is inadequate.	
ACTION: Construct a new Fire Station for the Pinewood Springs area with a community room to meet the needs of the public.	
LEAD AGENCY: Pinewood Springs Fire Protection District	EXPECTED COST: $750,000

SUPPORT AGENCIES: None	POTENTIAL FUNDING SOURCES: Fire District Reserve Funds, Community Fund raisers, DOLA Grant, Donations, Tax Mil Level increase.

PROGRESS MILESTONES:

- Raise funds through community fund raising, grants and tax mill levy increase.
- DOLA Grant application
- Community vote for Mil Levy increase
- Continued donations and fund raisers
- Acquire additional property
- Design new structure
- Design site plan, lighting, septic, drainage and landscape plans.
- Acquire building permits
- Select contractor
- Determine time of year to demo old building and start build of new facility

Develop plan to provide Fire District services during build process, where and how to stage equipment

Pinewood Springs Fire Protection District: Replace the dry hydrant and reestablish access (Pinewood Springs FPD – 2)	
PRIORITY: High	HAZARDS ADDRESSED: Fire
LOCATION: Pinewood Springs	GOALS ADDRESSED: 1, 2
RECOMMENDATION DATE: 01/01/2015	OBJECTIVES ADDRESSED: E
TARGET COMPLETION DATE: 05/30/2016	
ISSUE: The flood of 2012 destroyed Crescent Lake and the dry hydrant that we use for access to water for firefighting for a large portion of our community. The lake is being rebuilt, and the hydrant needs to be replaced.	
RECOMMENDATION: Replace the dry hydrant and reestablish access to it.	
ACTION: Raise funds through grant. Design the new hydrant and vehicle access in order to use it.	
LEAD AGENCY: Pinewood Springs Fire Protection District	EXPECTED COST: $5,000
SUPPORT AGENCIES: None	POTENTIAL FUNDING SOURCES: Lyons Foundation, FEMA reimbursement

PROGRESS MILESTONES:
Obtain Grant
Establish location for hydrant and access to it
Design new hydrant
Contract to build hydrant and access area
Build it

Pinewood Springs Fire Protection District: Mitigation Code Changes	
PRIORITY: Medium	HAZARDS ADDRESSED: Fire
LOCATION: Pinewood Springs Fire Protection District	GOALS ADDRESSED: Goals 1, 2, 4, and 5
RECOMMENDATION DATE: 6/1/2015	OBJECTIVES ADDRESSED: Objectives B, C, and E

TARGET COMPLETION DATE:12/31/2016	
ISSUE: Recent large-scale disasters have caused Pinewood Springs to re-evaluate all Wildfire codes for possible mitigation actions	
RECOMMENDATION: Provide recommendations for code changes to the Pinewood Springs Fire Board for reducing losses and mitigating risk to structural and wildfire	
ACTION: Update fire codes with recommendations approved by the Board to decrease future risk and disaster losses.	
LEAD AGENCY: Pinewood Springs Fire Protection District	EXPECTED COST: $0
SUPPORT AGENCIES: Larimer Community Development Division, Office of Emergency Management	POTENTIAL FUNDING SOURCES: Staff time
PROGRESS MILESTONES: – Develop a review team to go over all codes and provide suggested changes – Compile all recommended changes and present to the Fire Board for consideration – Make changes as appropriate and finalize recommended actions – Participate in the code revision process, including public meetings	

Pinewood Springs Fire Protection District: Install emergency power to critical portions of the fire station. (Pinewood Springs FPD – 3)	
PRIORITY: Medium	HAZARDS ADDRESSED: Fire, Flood, Severe Storm, Wind
LOCATION: Pinewood Springs	GOALS ADDRESSED: 1, 2, 3
RECOMMENDATION DATE: 01/01/2015	OBJECTIVES ADDRESSED: E
TARGET COMPLETION DATE: 12/31/2016	
ISSUE: When electrical power goes out for long periods, usability of the fire station for incident command, radio communications, and medical and other community activities is impacted.	
RECOMMENDATION: Install emergency power to critical portions of the fire station.	
ACTION: Determine what areas of the station need power and design a back power system to fit the requirement/ Raise funds through grant.	
LEAD AGENCY: Pinewood Springs Fire Protection District	EXPECTED COST: $6,500
SUPPORT AGENCIES: None	POTENTIAL FUNDING SOURCES: State Farm Insurance Company Grant, Fire District Reserve money
PROGRESS MILESTONES: Establish requirements Design the system to meet requirements Obtain Grant Determine if work needs to be contracted or can be done in house. Build it.	

Letter of Intent to Participate

LETTER OF INTENT TO PARTICIPATE

Pinewood Springs Fire Protection District

August 15, 2014

Lori Hodges
Larimer County
200 West Oak St, 2nd floor
Fort Collins, CO, 80522-1190

Re: "Statement of Intent to Participate" as a participating jurisdiction in Larimer County CO Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Dear Lori Hodges,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the Pinewood Springs Fire Protection District is submitting this letter of intent to confirm that the Pinewood Springs Fire Protection District has agreed to participate in the Lariner County CO Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, the Pinewood Springs Fire Protection District agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to the Larimer County CO HMP to complete the plan in conformance with FEMA requirements.

The Pinewood Springs Fire Protection District understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by an agreement between the Lead Jurisdiction and the Participating Jurisdiction, I R. L. Wilcox (Chief PSFPD), commit the Pinewood Springs Fire Protection District to the Larimer County CO Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 15 day of August 2014 R. L. Wilcox (Chief PSFPD)

Platte River Power Authority

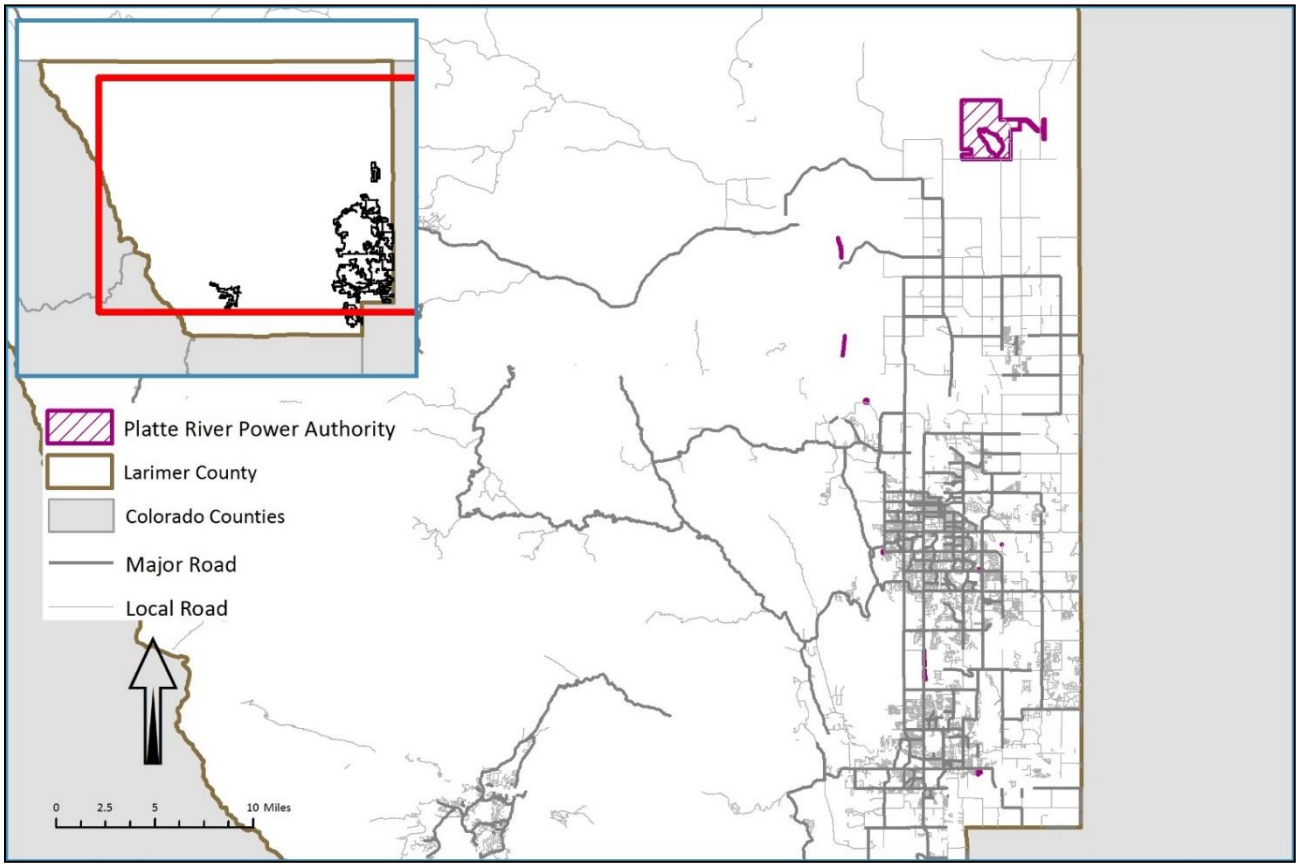
Vision: *As a respected leader and responsible energy partner, improve the quality of life for the citizens served by our owner communities.*

Mission: *Provide safe, reliable, environmentally responsible, and competitively priced energy and services.*

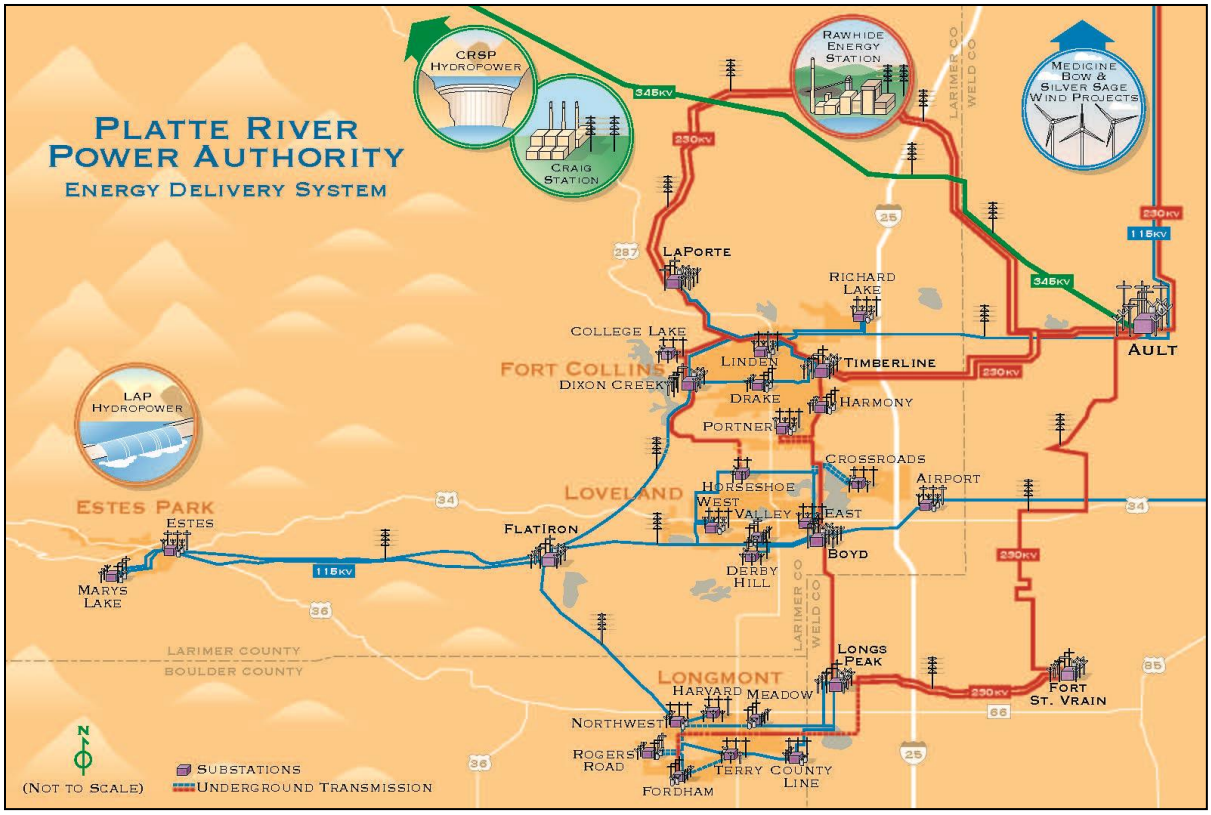
Values: *Safety, Integrity, Customer Service, Respect, Operational Excellence, Innovation, and Sustainability*

Community Profile

Platte River Power Authority is a not-for-profit wholesale electricity generation and transmission provider that delivers energy and services to its owner communities of Estes Park, Fort Collins, Longmont and Loveland, Colorado for delivery to their utility customers. Platte River's Headquarters is located in Fort Collins and its generation and transmission facilities are located along Colorado's Front Range and in northwestern Colorado.



The following map depicts Platte River Power Authority's Energy Delivery System.



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NATURAL HAZARD	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
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Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)	0.9	0.3	0.4	0.2	0.1	1.9
Fire – Wildland	0.6	0.3	0.4	0.4	0.1	1.8
Flood – Flash and Riverine	0.6	0.3	0.4	0.4	0.1	1.8
Utility Disruption	0.3	0.3	0.6	0.4	0.2	1.8
Biological Hazards / Contagion	0.3	0.3	0.2	0.4	0.1	1.3
Civil Disturbance	0.3	0.3	0.2	0.4	0.1	1.3

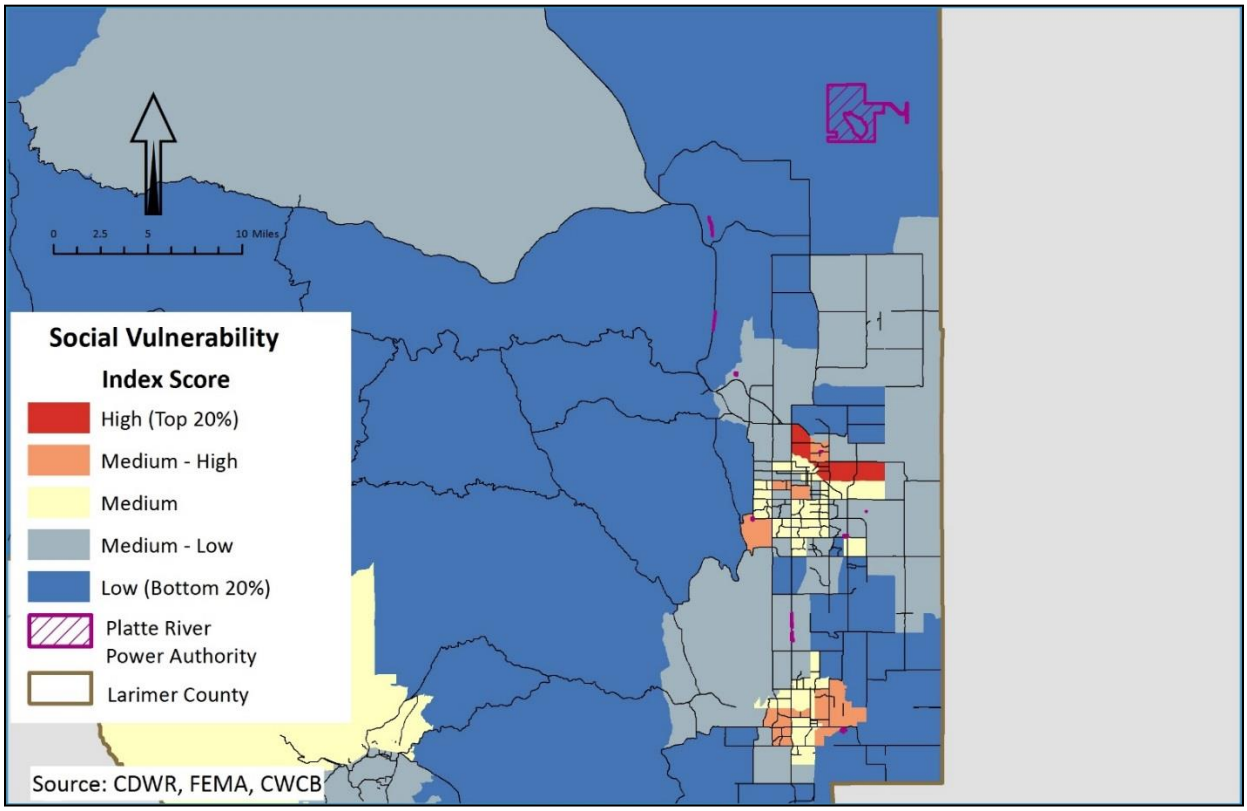
Earthquake	0.3	0.3	0.2	0.4	0.1	1.3
Erosion / Deposition	0.3	0.3	0.2	0.4	0.1	1.3
Hazmat – Fixed and Transport	0.3	0.3	0.2	0.4	0.1	1.3
Landslide / Rockslide	0.3	0.3	0.2	0.4	0.1	1.3
Tornado	0.3	0.3	0.2	0.4	0.1	1.3
HIGH RISK (2.5 or higher): None						
MODERATE RISK HAZARD (2.0 - 2.4): Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)						
Low Risk (1.9 and lower): Winter Storm (Blizzard Conditions, Heavy Snow Accumulation); Fire – Wildland; Flood – Flash and Riverine; Utility Disruption; Biological Hazards / Contagion; Civil Disturbance; Earthquake; Erosion / Deposition; Hazmat – Fixed and Transport; Landslide / Rockslide; Tornado						

Vulnerability Assessment

This section provides a refined vulnerability assessment, specific for the Platte River Power Authority, for those hazards that were identified as being rated HIGH in the preceding section. This analysis was conducted separately from that of the county-wide vulnerability assessment to specifically focus on the structures, infrastructure, and other assets unique to the Platte River Power Authority.

The results of the social vulnerability assessment are displayed on the map below. On the map, social vulnerability is represented at the census tract level by 5 classes of vulnerability: Low (bottom 20% of the county), Medium-Low, Medium, Medium-High, and High (top 20% of the county). The Platte River Power Authority's social vulnerability map shows social vulnerability within the Platte River Power Authority limits.

Social Vulnerability Map – Platte River Power Authority[194]



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The Platte River Power Authority is characterized by a mix of low to medium-High levels of social vulnerability. A closer analysis of the individual social vulnerability indicators within the area will give local stakeholders and decision-makers a clearer picture of which social vulnerability factors have the largest negative effect on the community and its resiliency. It is important that the Platte River Power Authority continue to monitor social vulnerability levels over time as demographics and economics change in the area.

[194] Source: Colorado Division of Water Resources Dam Safety Branch, FEMA, Colorado Water Conservation Board (CWCB)

Capabilities Assessment

The capability assessment examines the ability of the Platte River Power Authority to implement and manage the comprehensive mitigation strategy laid out in this Plan. The strengths, weaknesses, and resources of the community are identified here as a means for evaluating and maintaining effective and appropriate management of the power authority's hazard mitigation program.

Local Personnel

The ability of a community to implement a comprehensive mitigation strategy depends, in part, on available resources, including people and staff. The following table outlines the Platte River Power Authority's capabilities as they relate to key personnel.

	Full Time	Part Time	None or Not-Identified
Emergency Manager			X
Floodplain Administrator			X
Community Planner			X
GIS Specialist			X
Grant Writer			x

Land Use Planning and Codes

Local land use plans and building codes are tremendous tools for evaluating local policies related to hazard mitigation and risk reduction. Additionally, comprehensive master plans, capital improvement plans, stormwater plans and zoning ordinances all present opportunities for enhanced local capabilities. The following table outlines the authority's current capabilities as they relate to land use planning and codes.

	Yes (Y); No (N)
A zoning ordinance	N
A hazard-specific ordinance	N
Local building codes	N
A Comprehensive Plan / Master Plan	Y
A Capital Improvements Plan	N
A Stormwater Plan	N
A Continuity of Operations Plan (COOP)	Y
An Emergency Operations Plan (EOP)	Y
A Long-Term Recovery Plan	-
Participates in the NFIP	N

Plan Maintenance and Implementation

The Platte River Power Authority has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below

also includes a discussion of how the power authority will continue public participation in the plan maintenance process.

Jurisdiction	Plan Maintenance and Implementation Strategy
Platte River Power Authority	*"Our mitigation procedures will be reviewed annually or as needed."* *"We will engage the public through social media as appropriate."*

Integrating Hazard Mitigation into Local Planning

Through discussions at planning meetings and the use of an online survey, individual outreach, and phone calls, each participating jurisdiction brainstormed with the planning team to identify processes for integrating hazard mitigation into their local planning mechanisms and policies. The following table lists the specific integration strategy identified by the Platte River Power Authority based on the mitigation actions listed in this plan.

Jurisdiction	Strategy
Platte River Power Authority	*"The mitigation action guides and mitigation plan, as they pertain to regulatory guidelines, will be reviewed annually and incorporated into our operations."*

Mitigation Action Guides

The following Mitigation Action Guides present the Authority's mitigation actions that were developed for the 2016 Plan.

Platte River Power Authority: Transmission Vegetative Management (Platte River PA – 1)	
PRIORITY: [to be ranked in future meeting]	HAZARDS ADDRESSED: Severe Storm, Wind & Tornado, Fire
LOCATION: Larimer County	GOALS ADDRESSED: 1
RECOMMENDATION DATE: 10/18/2015	OBJECTIVES ADDRESSED: C
TARGET COMPLETION DATE: Annually	
ISSUE: Transmission Vegetation Management	
RECOMMENDATION: The need for vegetation management is primarily determined during inspections. Any vegetation found to be in violation of clearances during inspections or estimated to grow into clearances between inspections, shall be pruned or removed as part of the annual work plan.	
ACTION: To maintain a reliable electric transmission system by the control of vegetation within and adjacent to Platte River Power Authority's (Platte River) transmission right of ways thus providing safe, reliable electrical service while maintaining, and, where possible, improving the current and future use of the right-of-way (ROW) for the existing landowners.	
LEAD AGENCY: Platte River Power Authority	EXPECTED COST:

SUPPORT AGENCIES: N/A	POTENTIAL FUNDING SOURCES: Annual Budget Costs, PRPA Funding
PROGRESS MILESTONES: - Review the program annually and make changes as needed - Determine the need for vegetative management during inspections	

Platte River Power Authority: Physical Security Policy (Platte River PA – 2)	
PRIORITY: [to be ranked in future meeting]	HAZARDS ADDRESSED: Physical security to Platte River owned facilities.
LOCATION: Fort Collins, Loveland	GOALS ADDRESSED: [1]
RECOMMENDATION DATE: 10/20/2015	OBJECTIVES ADDRESSED: [C]
TARGET COMPLETION DATE: On Going	
ISSUE: Addressing security vulnerabilities that could impact delivery of safe, reliable affordable energy to Platte River's Owner Cities.	
RECOMMENDATION: All Platte River locations will be equipped with systems to deter, and detect unauthorized access attempts, and to respond to such attempts.	
ACTION: Installing cameras barriers, to restrict physical access to Platte River Facilities.	
LEAD AGENCY: Platte River	EXPECTED COST: Unknown at this time
SUPPORT AGENCIES: None	POTENTIAL FUNDING: Funding will come from internal sources through the budgetary process.
PROGRESS MILESTONES: • Completion of the Timberline Substation (Ft. Collins) wall • Construction on Harmony Substation (Ft. Collins) wall.	

Letter of Intent to Participate

PLATTE RIVER
POWER AUTHORITY
Estes Park • Fort Collins • Longmont • Loveland

July 15, 2015

Lori R. Hodges
Larimer County Emergency Management
200 West Oak Street
Fort Collins, CO 80525

Re: "Statement of Intent to Participate" as a participating jurisdiction in the Larimer County Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Dear Ms. Hodges,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the Platte River Power Authority is submitting this letter of intent to confirm that Platte River Power Authority has agreed to participate in the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, Platte River Power Authority agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Larimer County OEM to complete the plan in conformance with FEMA requirements.

Platte River Power Authority understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by an agreement between the Lead Jurisdiction and the Participating Jurisdiction, I Karin Hollohan, commit Platte River Power Authority to the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 15 day of July Karin Hollohan
Karin Hollohan, Corporate Service Director

2000 East Horsetooth Road • Fort Collins, Colorado 80525-5721
970/226-4000 • www.ppa.org

LARIMER COUNTY
COMMITTED TO EXCELLENCE

Michael Baker
INTERNATIONAL

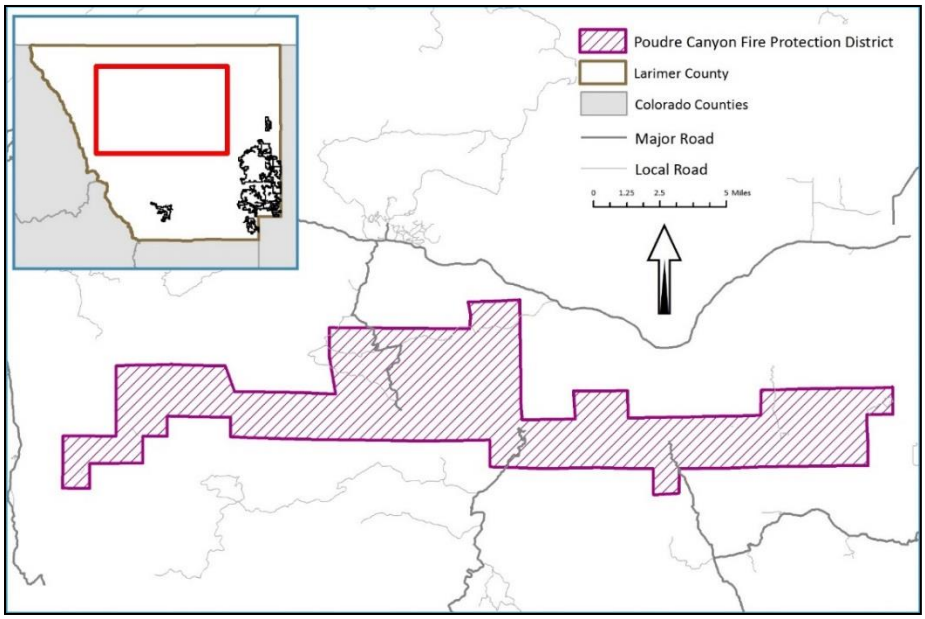
Poudre Canyon Fire Protection District

"Fire and Emergency Medical Services for people who live and play in the Poudre Canyon!"

Poudre Canyon Fire Protection District Fire Station 1

Community Profile

Poudre Canyon Fire Protection District is volunteer fire department providing services for fire, emergency medical care, ice rescue, river rescue, traffic accidents, and information to residence and visitors to the Poudre Canyon. Poudre Canyon is located in the community of Bellevue, Colorado and the surrounding areas in the mountains west of Fort Collins. The district provides service to over 100 square miles along Colorado State Highway 14 from Gateway Park to Cameron Pass, along County Road 69 and County Road 68C as well as the Shambhala Mountain Center. The following map may not represent all areas of the district, but was used as best available data. Missing areas include the north half of Sections 14-18 of Range 73W, Township 9N.



Poudre Canyon has approximately 500 full time residence with a summertime population of around 1,500. Many visitors engage in activities within the canyon including fishing, boating, and hiking, mountain biking, sightseeing, motorcycling, and exploring the back country.

Hazard Identification and Risk Assessment

The following Hazard Identification and Risk Assessment Summary table is based on jurisdiction-specific responses to the risk factor exercise and differs from the risk factor results that were determined at the county scale.

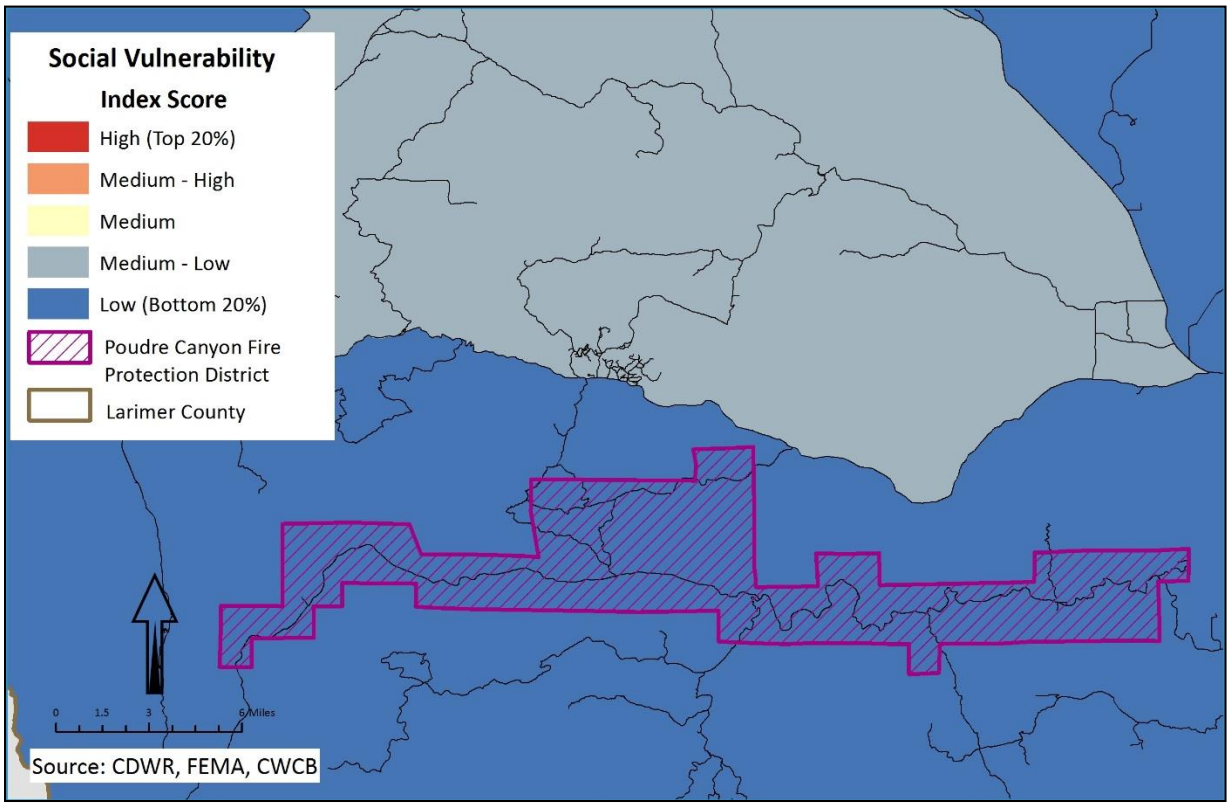
NATURAL HAZARD	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)	1.2	0.6	0.6	0.3	0.2	2.9
Fire – Wildland	0.9	0.6	0.6	0.2	0.4	2.7
Utility Disruption	0.9	0.6	0.4	0.4	0.2	2.5
Flood – Flash and Riverine	0.9	0.6	0.4	0.2	0.3	2.4
Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)	1.2	0.3	0.4	0.3	0.2	2.4
Landslide / Rockslide	1.2	0.3	0.2	0.4	0.2	2.3
Erosion / Deposition	0.9	0.3	0.4	0.3	0.2	2.1
Hazmat – Fixed and Transport	0.6	0.3	0.2	0.4	0.1	1.6
Earthquake	0.3	0.3	0.2	0.4	0.3	1.5
Tornado	0.3	0.3	0.2	0.4	0.2	1.4
Biological Hazards / Contagion	0.3	0.3	0.2	0.4	0.2	1.4
Civil Disturbance	0.3	0.3	0.2	0.4	0.1	1.3
HIGH RISK (2.5 or higher): Winter Storm (Blizzard Conditions, Heavy Snow Accumulation); Fire – Wildland; Utility Disruption						
MODERATE RISK HAZARD (2.0 - 2.4): Flood – Flash and Riverine; Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning); Landslide / Rockslide; Erosion / Deposition						
Low Risk (1.9 and lower): Hazmat – Fixed and Transport; Earthquake; Tornado; Biological Hazards / Contagion; Civil Disturbance						

Vulnerability Assessment

This section provides a refined vulnerability assessment, specific for the Poudre Canyon Fire Protection District, for those hazards that were identified as being rated HIGH in the preceding section. This analysis was conducted separately from that of the county-wide vulnerability assessment to specifically focus on the population, structures, infrastructure, and other assets unique to the Poudre Canyon Fire Protection District.

The results of the social vulnerability assessment are displayed on the map below. On the map, social vulnerability is represented at the census tract level by 5 classes of vulnerability: Low (bottom 20% of the county), Medium-Low, Medium, Medium-High, and High (top 20% of the county). The Poudre Canyon Fire Protection District's social vulnerability map shows social vulnerability within the community.

Social Vulnerability Map – Poudre Canyon Fire Protection District[195]



Social vulnerability is represented as the social, economic, demographic, and housing characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to hazard events. The

[195] Source: Colorado Division of Water Resources Dam Safety Branch, FEMA, Colorado Water Conservation Board (CWCB)

pre-existing social conditions that contribute to disaster losses can be identified using social vulnerability indicators. Using methods identified in the Social Vulnerability Index (SoVI) developed by Cutter et. al. (2003) this layer shows the social vulnerability index scores for the State of Colorado at the census tract level. Social vulnerability is represented at the Census tract level by five classes of vulnerability: Low, Medium-Low, Medium, Medium-High, and High.

Poudre Canyon Fire Protection District is characterized by low levels of social vulnerability (bottom 20% of the county). This does not mean, however, that there aren't any socially vulnerable residents living in the area or that social vulnerability levels will remain the same over time. Close analysis of the individual social vulnerability indicators within the District will give local emergency managers, planners, and stakeholders a clearer picture of which social vulnerability factors threaten the local community the most and where social and economic resources should be allocated in order to reduce vulnerability. Over time, the Poudre Canyon Fire Protection District should continue to monitor their progress as demographic, economic, and housing related conditions change over time.

Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)

Previous Occurrences

According to NOAA's Storm Events Database, the Poudre Canyon Fire Protection District has experienced 175 Winter Storms since 1996. On March 17, 2003 there was report of a winter storm causing $15,500,000 in property damage in areas within western Larimer County above 6,000 feet. There were no deaths, injuries or damage to crops reported for any of these storms. The Poudre Canyon Fire Protection District is at high risk of experiencing Winter Storms during the winter months.

Inventory Exposed

All assets located in the Poudre Canyon Fire Protection District can be considered at risk from winter storms. This includes all people, or 100% of the District's population, and all buildings and infrastructure within the district. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the District's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Potential Losses

Winter storms affect the entire planning area of the Poudre Canyon Fire Protection District including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Winter storms will remain a highly likely occurrence for the Poudre Canyon Fire Protection District.

Probability of Future Occurrences

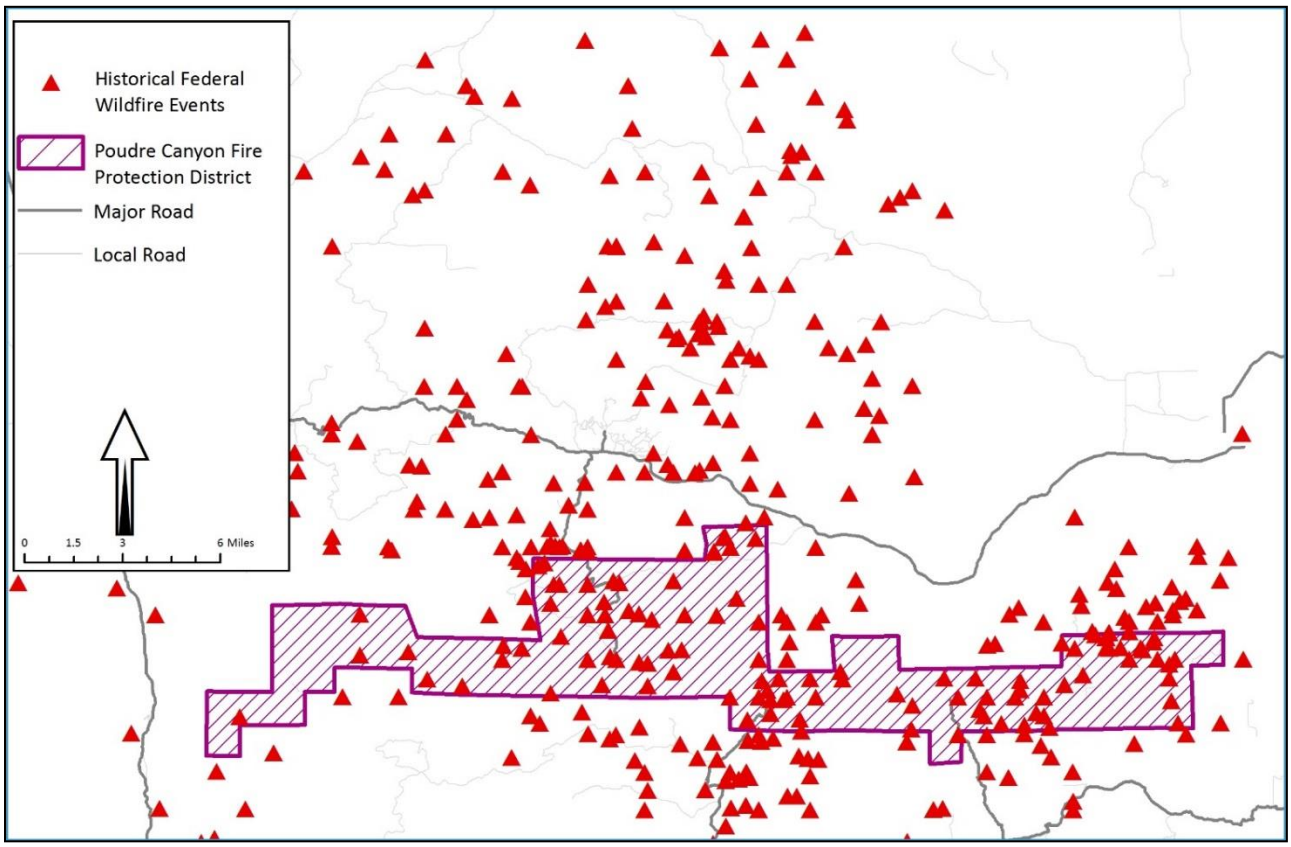
Severe winter storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past severe winter events provide benchmarks for projecting similar conditions into the future. The probability that the Poudre Canyon Fire Protection District will experience a severe winter storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the district at least once every year.

Fire – Wildland

Previous Occurrences

According to NOAA's Storm Events Database there have been 113 reported wildfire event in the Poudre Canyon Fire Protection District. Based on the historic data showing hazardous impacts on district, there is a great potential for wildfire events to occur at any given time.

Poudre Canyon Fire Protection District Historical Federal Wildfire Map[196]

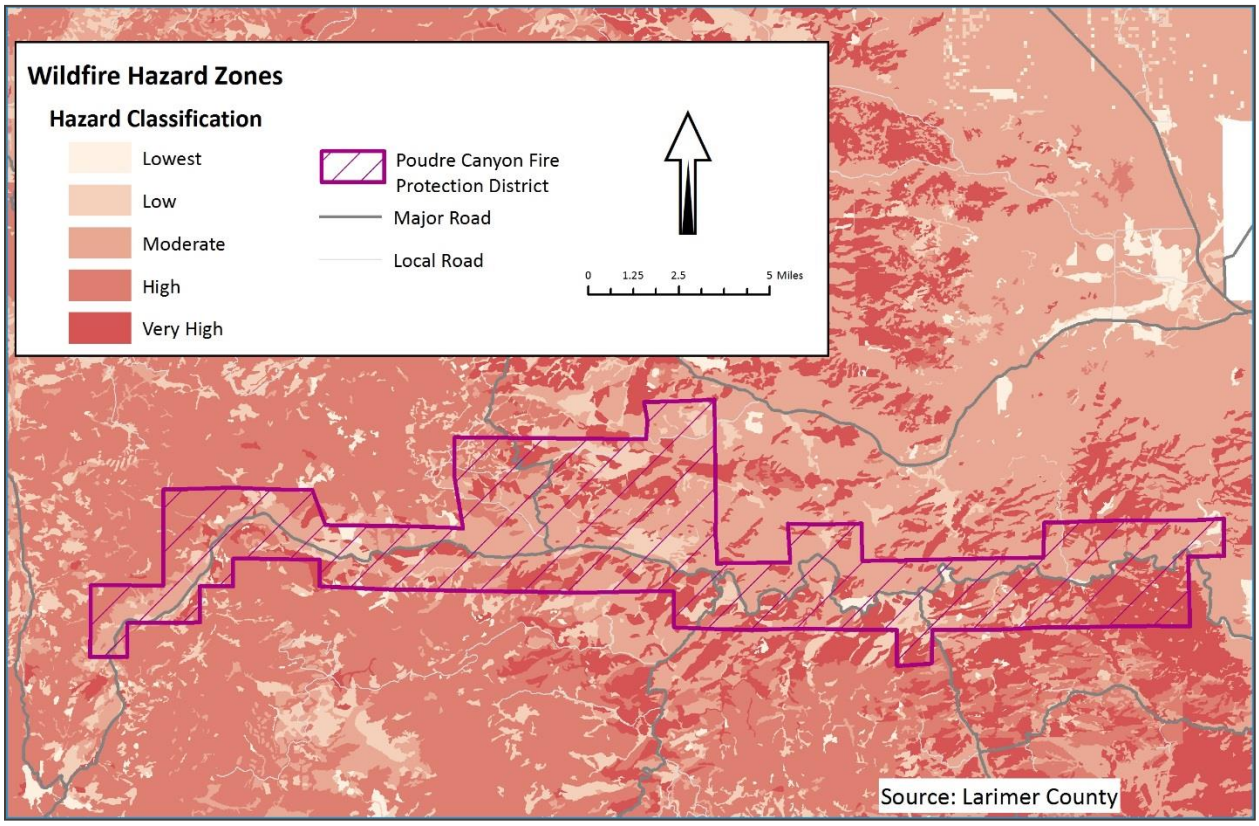


[196] Historical wildland fire occurrence data compiled by USGS from 1980 - 2013, from BIA, BLM, BOR, USGS, FWS, and NPS.

Inventory Exposed

The following Wildfire Hazard Zone map identifies the expected wildfire behavior. The highest wildfire hazard zones are located throughout the district.

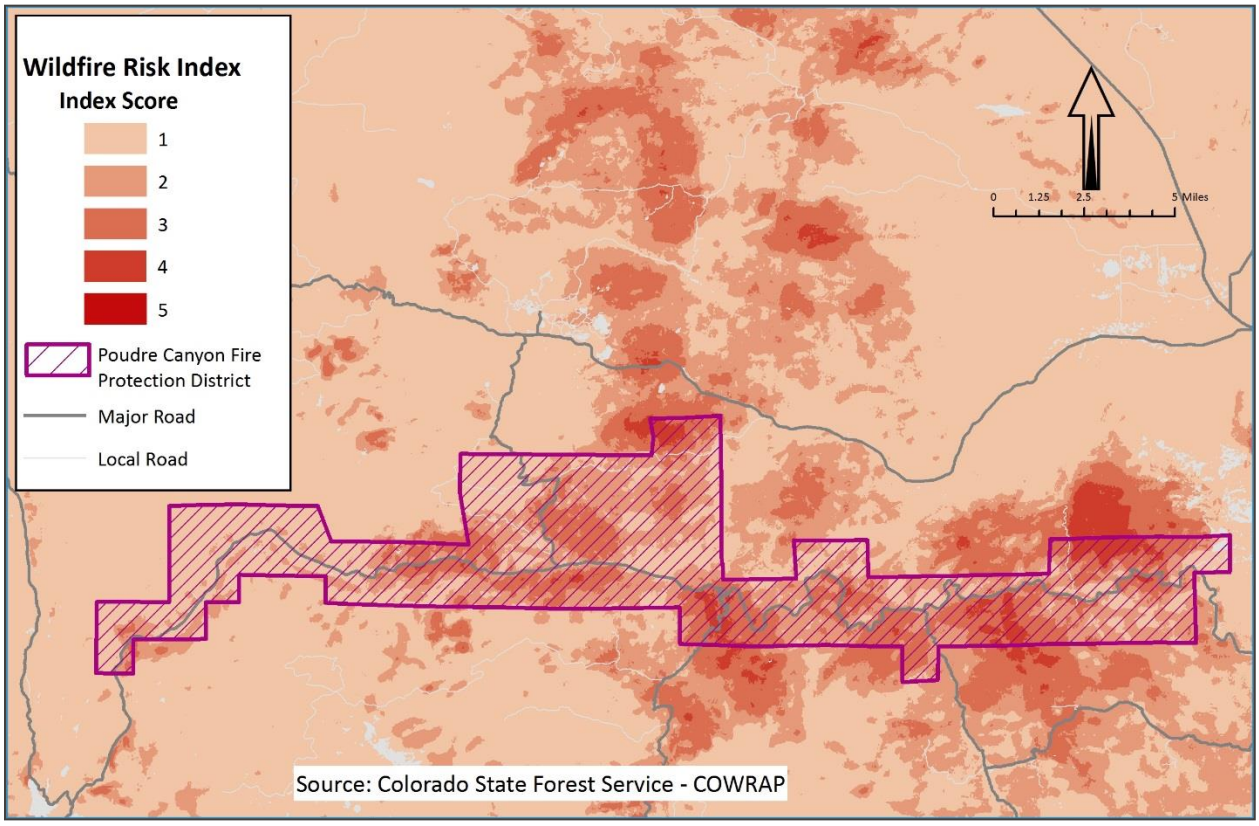
Poudre Canyon Fire Protection District Wildfire Hazard Zone Map[197]



The following Wildfire Risk map identifies areas with the greatest potential impacts from a wildfire, in other words, those areas most at risk. There are areas with the highest wildfire risk throughout the district.

[197] To be used to identify wildfire hazards within the Wildfire Mitigation Area. The hazards are determined based on vegetation cover type, habitat structure stage (cover type, tree size and crown cover percentage), southern facing aspects and 30% and greater slopes according to the Wildfire Hazard Area Mapping (WHAM) guidelines.

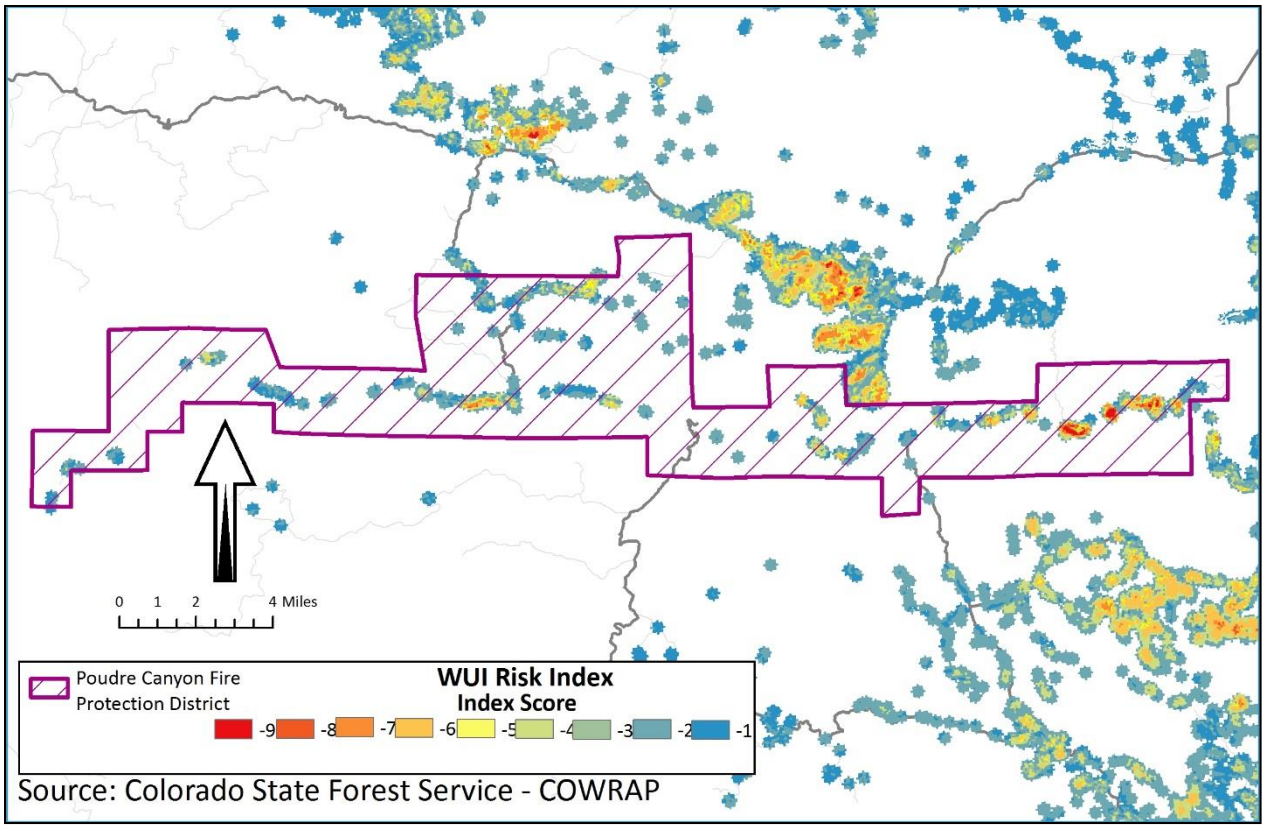
Poudre Canyon Fire Protection District Wildfire Risk Index Map[198]



There are a number of areas in the eastern region of the district that are within the medium to highest level on the WUI Risk Index Scale. This means that the potential impact on people and homes from a wildfire in those areas is medium to high in relationship to the rest of Larimer County. This level of risk is derived by combining housing density with predicted flame length.

[198] Wildfire Risk represents the possibility of loss or harm occurring from a wildfire. Risk is derived by combining wildfire threat and fire effects. The COWRAP data set was produced statewide and ranks areas on a scale that includes: lowest risk to highest risk.

Poudre Canyon Fire Protection District WUI Map[199]



Fires can extensively impact the economy of an affected area, including the agricultural, recreation and tourism industries, water resources, and the critical facilities upon which the Poudre Canyon Fire Protection District depends. There are areas of high and medium wildfire threat in the central portion of the district according to the WUI Risk Index. There are no critical facilities located in areas with the *most negative* and 2 critical facilities located in areas with the *2nd most negative* wildfire threat total.

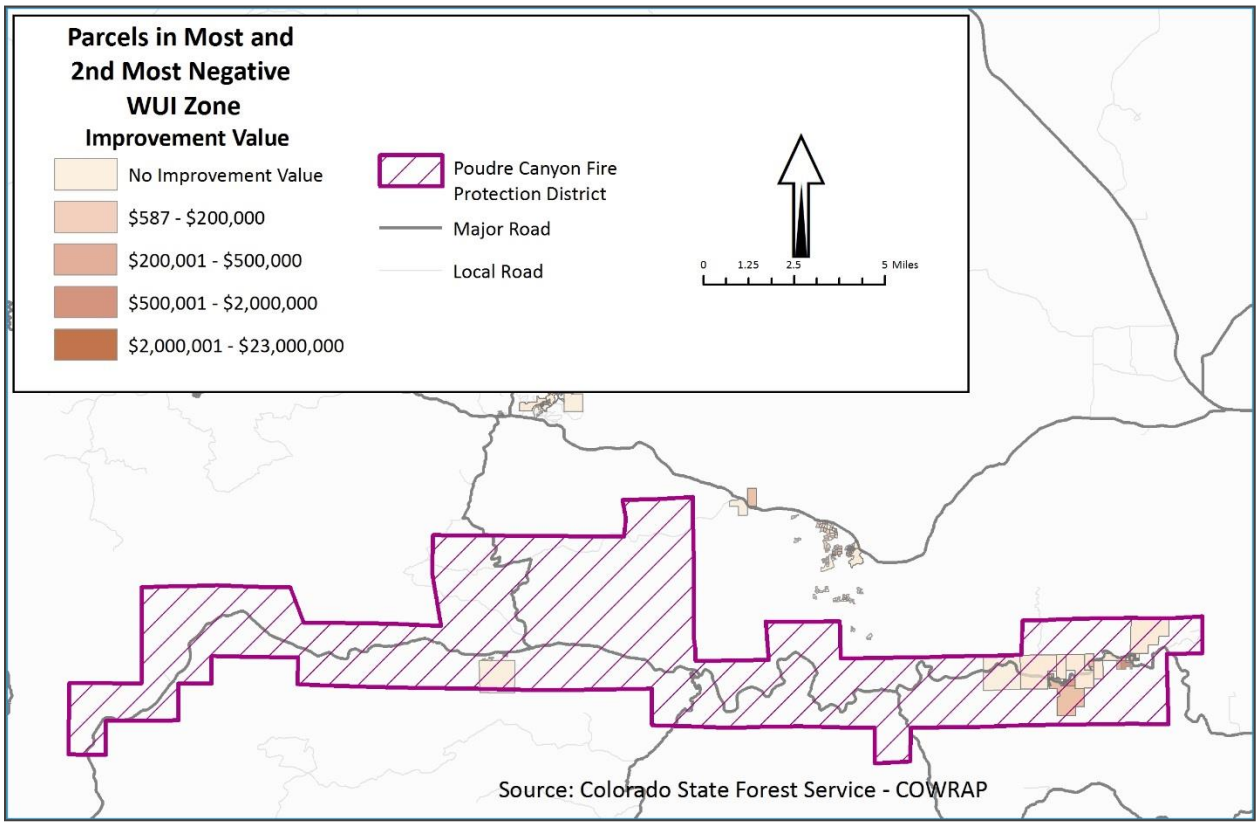
Potential Losses

The exposure data provided in the previous section (Inventory Assets Exposed) provides the clearest picture of potential losses to wildfire in the Poudre Canyon Fire Protection District. The appraisal value of the critical facilities within the 2nd most negative threat areas is over $458 thousand dollars. There are 71 parcels/structures located in areas with the most negative and 128 parcels/structures located in areas with the 2nd most negative wildfire threat total. The appraisal value of the parcels/structures within these

[199] Wildland Urban Interface (WUI) Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length. The COWRAP data set was produced statewide and ranks areas on a scale that includes: least negative to most negative impacts. This scale stretched from -1 (least) to -9 (most) statewide.

most and 2nd most negative threat areas is over $20.7 million dollars. The risk assessment uses worst case scenario loss estimates. For this reason it is important to plan for relative levels of loss rather than specific potential loss dollar amounts.

Poudre Canyon Fire Protection District Parcels in the Most Negative and Second Most Negative WUI Zone[200]



Probability of Future Occurrences

The likelihood of wildfires attaining significant size and intensity is unpredictable and highly dependent on environmental conditions and firefighting response. Weather conditions, particularly drought events, increase the likelihood of wildfires occurring. That said, it is important to note that 98% of wildfires are human-caused. Ultimately, the occurrence of future wildfire events will strongly depend on patterns of human activity and events are more likely to occur in wildfire-prone areas experiencing new or additional development.

Wildfires can occur at any time of day and during any month of the year. Moreover, the length of a wildfire season and/or peak months may vary appreciably from year to year. As evidenced by the

[200] Wildland Urban Interface (WUI) Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length.

wildfire risk assessment, areas within the Poudre Canyon Fire Protection District that are characterized by dense development and single family homes along the wildland-urban interface are most vulnerable to wildfire.

Utility Disruption

Previous Occurrences

The Poudre Canyon Fire Protection District does not currently track incidences of utility disruption within the service area.

Inventory Exposed

All assets located in the Poudre Canyon Fire Protection District are considered at risk from the impacts of utility disruption events. This includes all people, or 100% of the County's population, and all buildings and infrastructure within the County.

Potential Losses

Utility disruption events have the potential to threaten lives and disrupt business activity. However, monetary losses and casualty estimates are largely unknown.

Probability of Future Occurrences

In general, utility outages result from failures in the distribution system as opposed to shortages of supply. Distribution systems are most susceptible to failure during extreme hot and cold temperatures as well as during violent weather conditions. Regional utility failures can threaten human life, particularly when outages affect hospitals, nursing homes, or other healthcare facilities. As both population and climate variability increase across the State of Colorado, and put more pressure on aging distribution systems, it is likely that utility disturbance events will become more frequent in and around the Poudre Canyon Fire Protection District.

Capabilities Assessment

The capability assessment examines the ability of the Poudre Canyon Fire Protection District to implement and manage the comprehensive mitigation strategy laid out in this Plan. The strengths, weaknesses, and resources of the community are identified here as a means for evaluating and maintaining effective and appropriate management of the district's hazard mitigation program.

Local Personnel

The ability of a community to implement a comprehensive mitigation strategy depends, in part, on available resources, including people and staff. The following table outlines the district's capabilities as they relate to key personnel.

	Full Time	Part Time	None or Not-Identified
Emergency Manager			X
Floodplain Administrator			X
Community Planner			X

GIS Specialist			X
Grant Writer		X	

Land Use Planning and Codes

Local land use plans and building codes are tremendous tools for evaluating local policies related to hazard mitigation and risk reduction. Additionally, comprehensive master plans, capital improvement plans, stormwater plans and zoning ordinances all present opportunities for enhanced local capabilities. The following table outlines the district's current capabilities as they relate to land use planning and codes.

	Yes (Y); No (N)
A zoning ordinance	N
A hazard-specific ordinance	N
Local building codes	N
A Comprehensive Plan / Master Plan	N
A Capital Improvements Plan	N
A Stormwater Plan	N
A Continuity of Operations Plan (COOP)	N
An Emergency Operations Plan (EOP)	N
A Long-Term Recovery Plan	N
Participates in the NFIP	N

Plan Maintenance and Implementation

The Poudre Canyon Fire Protection District has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the district will continue public participation in the plan maintenance process.

Jurisdiction	Plan Maintenance and Implementation Strategy
Poudre Canyon Fire Protection District	*"Our hazard mitigation actions will be reviewed by the Fire Board annually."* *"Our hazard awareness plan will be discussed at community meetings at least annually."*

Integrating Hazard Mitigation into Local Planning

Through discussions at planning meetings and the use of an online survey, individual outreach, and phone calls, each participating jurisdiction brainstormed with the planning team to identify processes for integrating hazard mitigation into their local planning mechanisms and policies. The following table lists the specific integration strategy identified by the Poudre Canyon Fire Protection District based on the mitigation actions listed in this plan.

Jurisdiction	Strategy
Poudre Canyon Fire Protection District	*"We have no planning or regulatory authority. We will seek grants that will allow the district to provide mitigation assistance."*

Mitigation Action Guides

The following Mitigation Action Guide presents the district's mitigation action that was developed for the 2016 Plan.

Poudre Canyon FPD: Homeowner Wildfire Hazard Awareness (Poudre Canyon FPD – 1)	
PRIORITY: High	HAZARDS ADDRESSED: Wildfire
LOCATION: Poudre Canyon	GOALS ADDRESSED: 1, 2, 4
RECOMMENDATION DATE: 08/28/2015	OBJECTIVES ADDRESSED: E
TARGET COMPLETION DATE: 08/31/2020	
ISSUE: Numerous properties in the district need to be better mitigated against wildfire hazards.	
RECOMMENDATION: Inform home owners of best practices in mitigating properties against wildfire	
ACTION: Make presentations at community meetings, include information in newsletter to property owners, include topic in monthly newsletters to canyon association groups, one on one consultation with property owners as requested	
LEAD AGENCY: Poudre Canyon Fire Rescue	EXPECTED COST: $2,500
SUPPORT AGENCIES: None	POTENTIAL FUNDING SOURCES: Fire District budget
PROGRESS MILESTONES: Presentations at community meetings, topic covered in newsletter to property owners, topic included in monthly canyon association newsletter.	

Letter of Intent to Participate

POUDRE CANYON
Fire Protection District

December 11, 2014

Lori R. Hodges
Larimer County
Emergency Management
200 West Oak Street
Fort Collins, CO 80526

Re: "Statement of Intent to Participate" as a participating jurisdiction in the Larimer County Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Dear Ms. Hodges,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the Poudre Canyon Fire Protection District is submitting this letter of intent to confirm that Poudre Canyon Fire Protection District has agreed to participate in the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, Poudre Canyon Fire Protection District agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Larimer County OEM to complete the plan in conformance with FEMA requirements.

Poudre Canyon Fire Protection District understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by an agreement between the Lead Jurisdiction and the Participating Jurisdiction, I, Hugh Collins, commit Poudre Canyon Fire Protection District to the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 11th day of December 2014

H L Collins

CHIEF

LARIMER COUNTY
COMMITTED TO EXCELLENCE

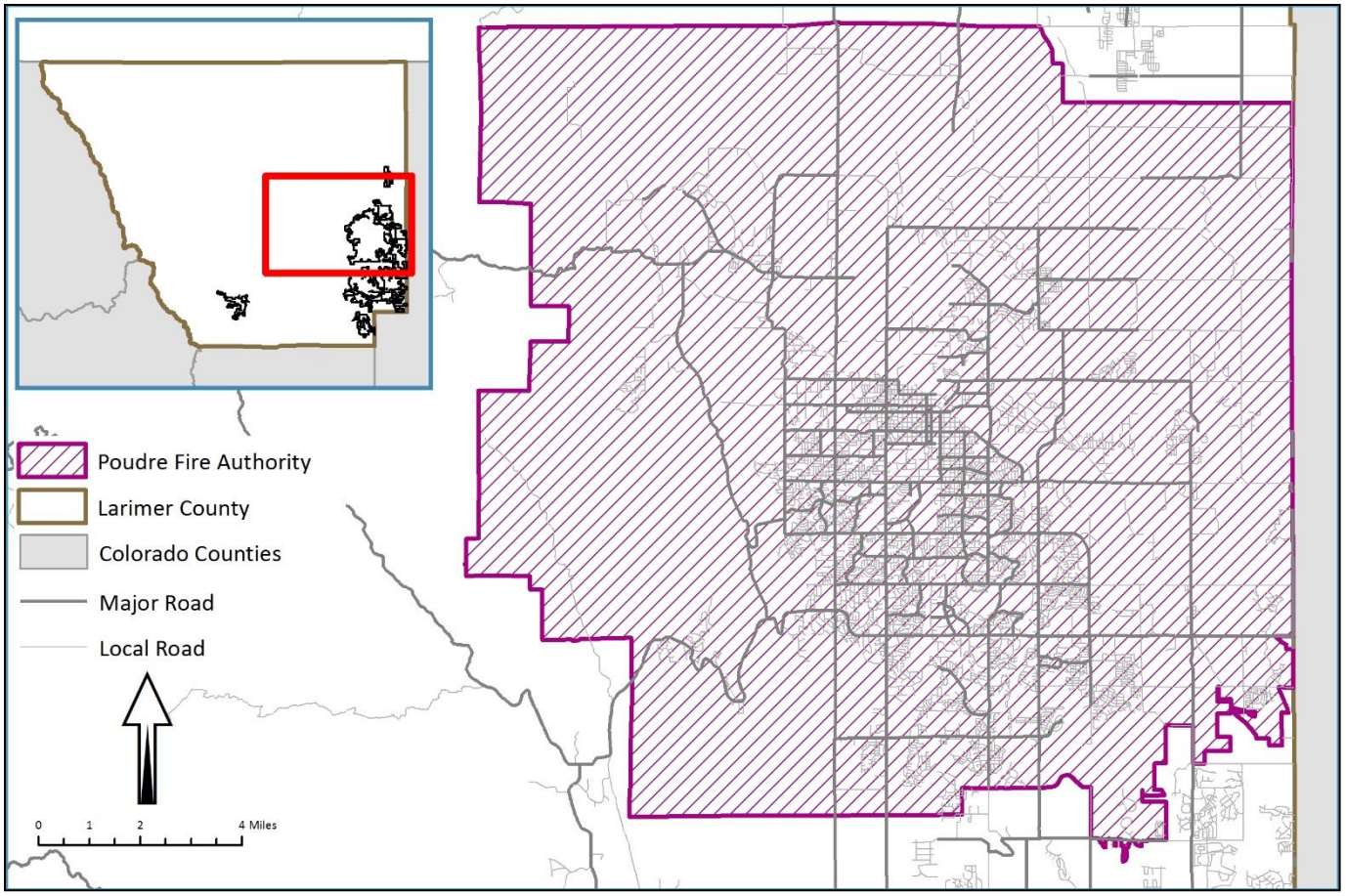
Michael Baker
INTERNATIONAL

Poudre Fire Authority

"To protect life and property by being prompt, skillful, and caring. Our actions are anchored in the core values of courage, leadership, and duty."
— Mission, Poudre Fire Authority

Community Profile

The Poudre Fire Authority (PFA) is a Fire and Rescue service agency serving the City of Fort Collins and the Poudre Valley Fire Protection District. The PFA district service area is approximately 235 square miles and has a population of approximately 189,635 people. The PFA was established in 1981 with the merging of the City of Fort Collins and Poudre Valley Fire Departments to improve fire and rescue services.



Hazard Identification and Risk Assessment

The following Hazard Identification and Risk Assessment Summary table is based on jurisdiction-specific responses to the risk factor exercise and differs from the risk factor results that were determined at the county scale.

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Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)	1.2	0.6	0.6	0.2	0.3	2.9
Hazmat – Fixed and Transport	1.2	0.6	0.4	0.4	0.2	2.8
Biological Hazards / Contagion	0.6	0.9	0.4	0.4	0.4	2.7
Tornado	0.6	0.9	0.6	0.4	0.1	2.6
Civil Disturbance	0.9	0.6	0.4	0.4	0.1	2.4
Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)	0.9	0.6	0.4	0.3	0.2	2.4
Landslide / Rockslide	0.9	0.6	0.2	0.4	0.1	2.2
Utility Disruption	0.6	0.6	0.4	0.4	0.1	2.1
Erosion / Deposition	0.6	0.3	0.2	0.1	0.4	1.6
Earthquake	0.3	0.3	0.2	0.4	0.1	1.3
HIGH RISK (2.5 or higher): Fire – Wildland; Flood – Flash and Riverine; Winter Storm (Blizzard Conditions, Heavy Snow Accumulation); Hazmat – Fixed and Transport; Biological Hazards / Contagion; Tornado						
MODERATE RISK HAZARD (2.0 - 2.4): Civil Disturbance; Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning); Landslide / Rockslide; Utility Disruption						
Low Risk (1.9 and lower): Erosion / Deposition; Earthquake						

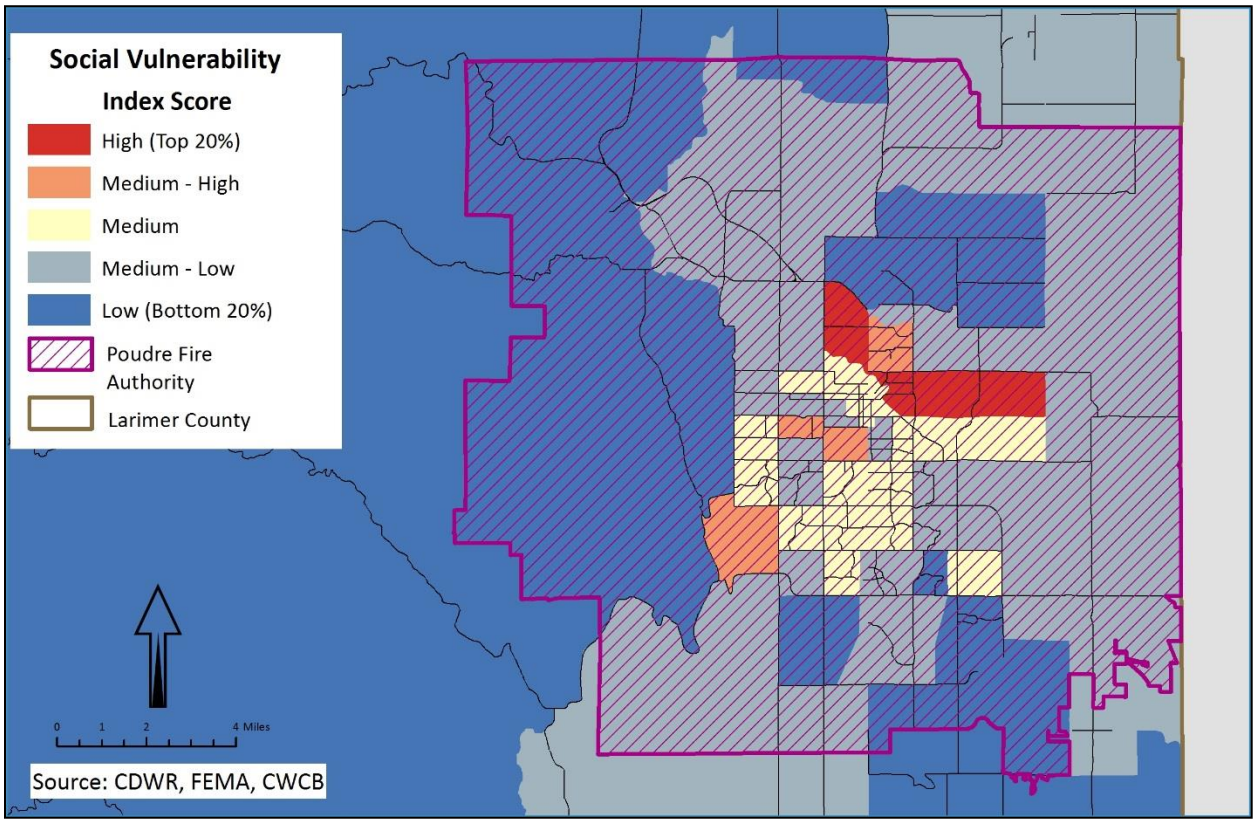
Vulnerability Assessment

This section provides a refined vulnerability assessment, specific for the Poudre Fire Authority, for those hazards that were identified as being rated HIGH in the preceding section. This analysis was conducted separately from that of the county-wide vulnerability assessment to specifically focus on the population, structures, infrastructure, and other assets unique to the Poudre Fire Authority.

The results of the social vulnerability assessment are displayed on the map below. On the map, social vulnerability is represented at the census tract level by 5 classes of vulnerability: Low (bottom 20% of the

county), Medium-Low, Medium, Medium-High, and High (top 20% of the county). The Poudre Fire Authority's social vulnerability map shows social vulnerability within the community.

Social Vulnerability Map – Poudre Fire Authority Service Area [201]



Social vulnerability is represented as the social, economic, demographic, and housing characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to hazard events. The pre-existing social conditions that contribute to disaster losses can be identified using social vulnerability indicators. Using methods identified in the Social Vulnerability Index (SoVI) developed by Cutter et. al. (2003) this layer shows the social vulnerability index scores for the State of Colorado at the census tract level. Social vulnerability is represented at the Census tract level by five classes of vulnerability: Low, Medium-Low, Medium, Medium-High, and High.

The Poudre Fire Authority service area consists of areas that range from low social vulnerability (the bottom 20% of the county) and high social vulnerability (the top 20% of the county). The highly socially vulnerable areas are clustered in the central part of the service area. Resources and measures to reduce the social determinates of disasters may be most effectively allocated to these areas. Moreover, it is critical that the fire authority analyze the individual social vulnerability indicators that make the central

[201] Source: Colorado Division of Water Resources Dam Safety Branch, FEMA, Colorado Water Conservation Board (CWCB)

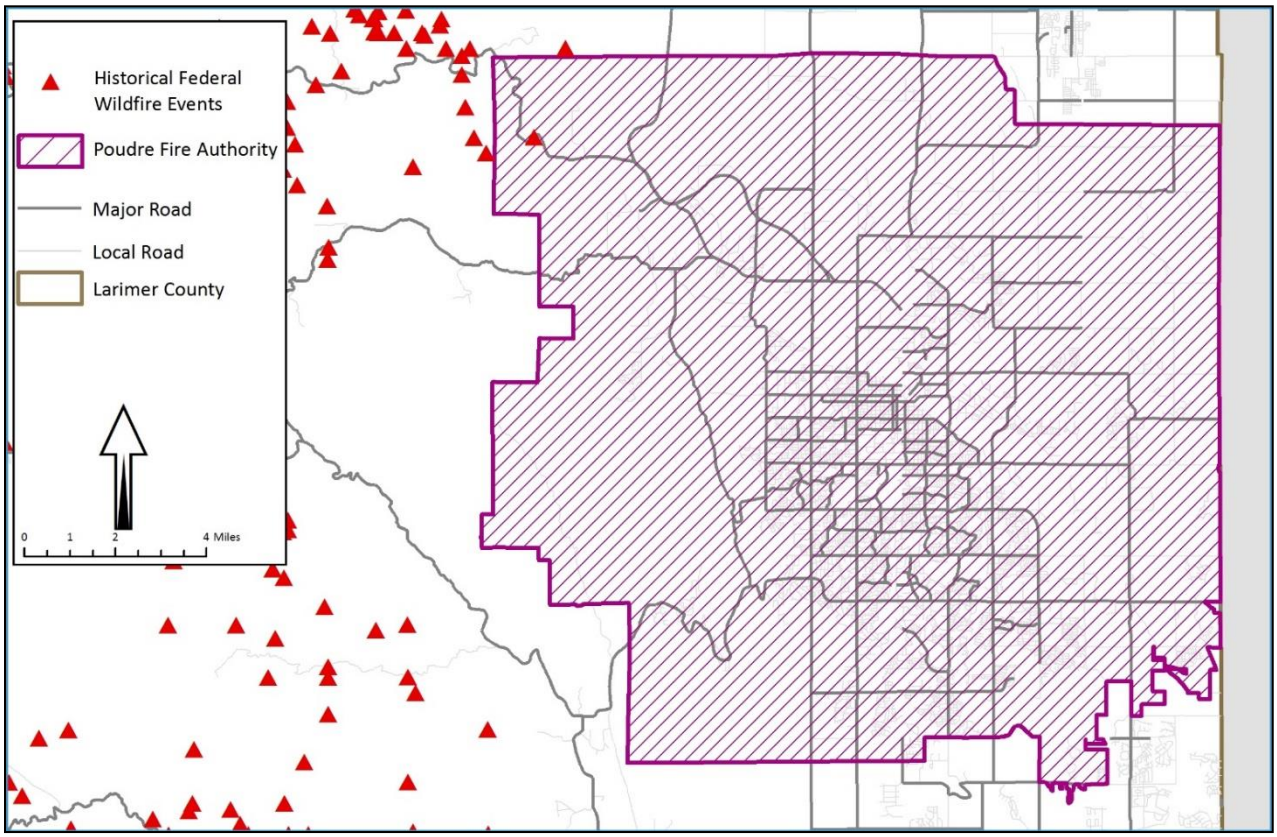
portion of their service area stand out. Through ongoing evaluation, the Poudre Fire Authority will be able to more effectively reduce local social vulnerability and increase their resilience to hazard events.

Fire – Wildland

Previous Occurrences

According to NOAA's Storm Events Database there has been 1 reported wildfire events in the Poudre Fire Authority service area. Based on the historic data showing hazardous impacts on the service area, there is potential for wildfire events to occur at any given time.

Poudre Fire Authority Service Area Historical Federal Wildfire Map[202]

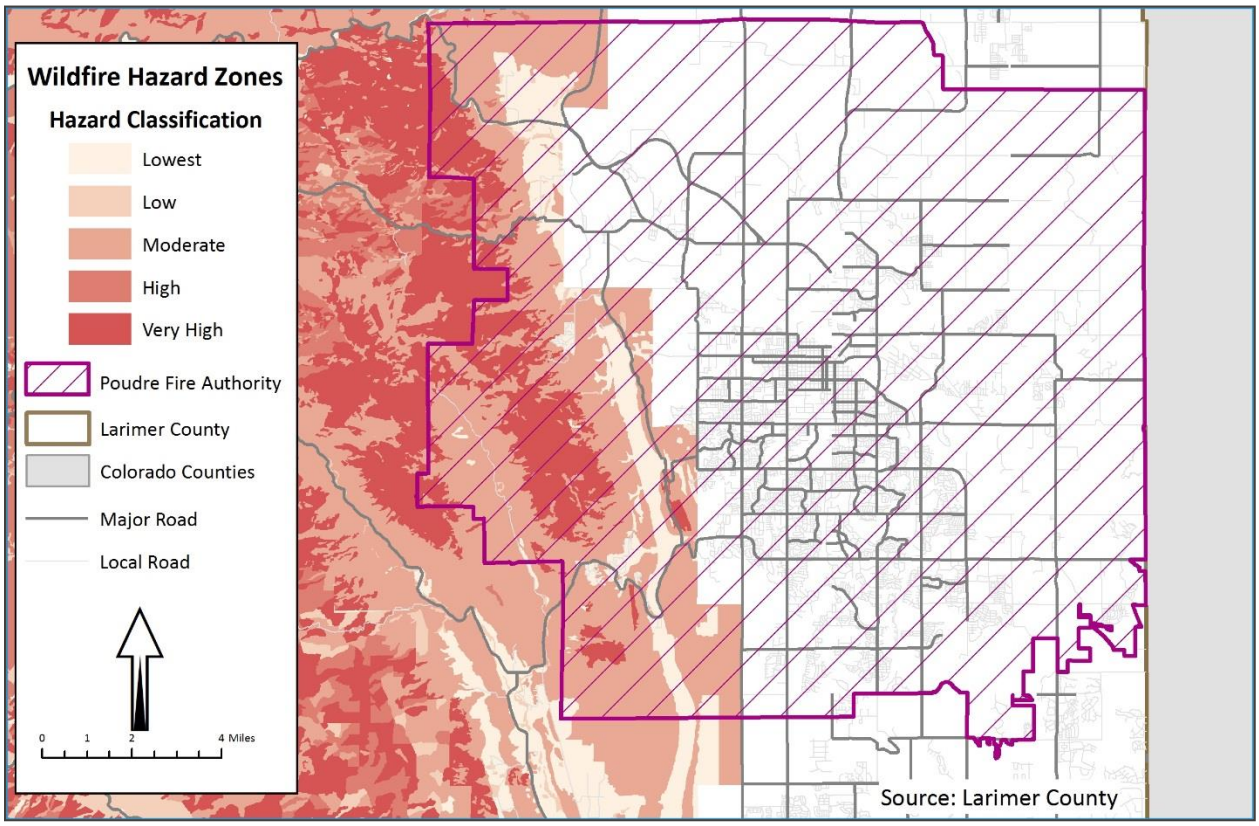


[202] Historical wildland fire occurrence data compiled by USGS from 1980 - 2013, from BIA, BLM, BOR, USGS, FWS, and NPS.

Inventory Exposed

The following Wildfire Hazard Zone map identifies the expected wildfire behavior. The highest wildfire hazard zones in the district are located in the western region, in areas where there are lower population densities.

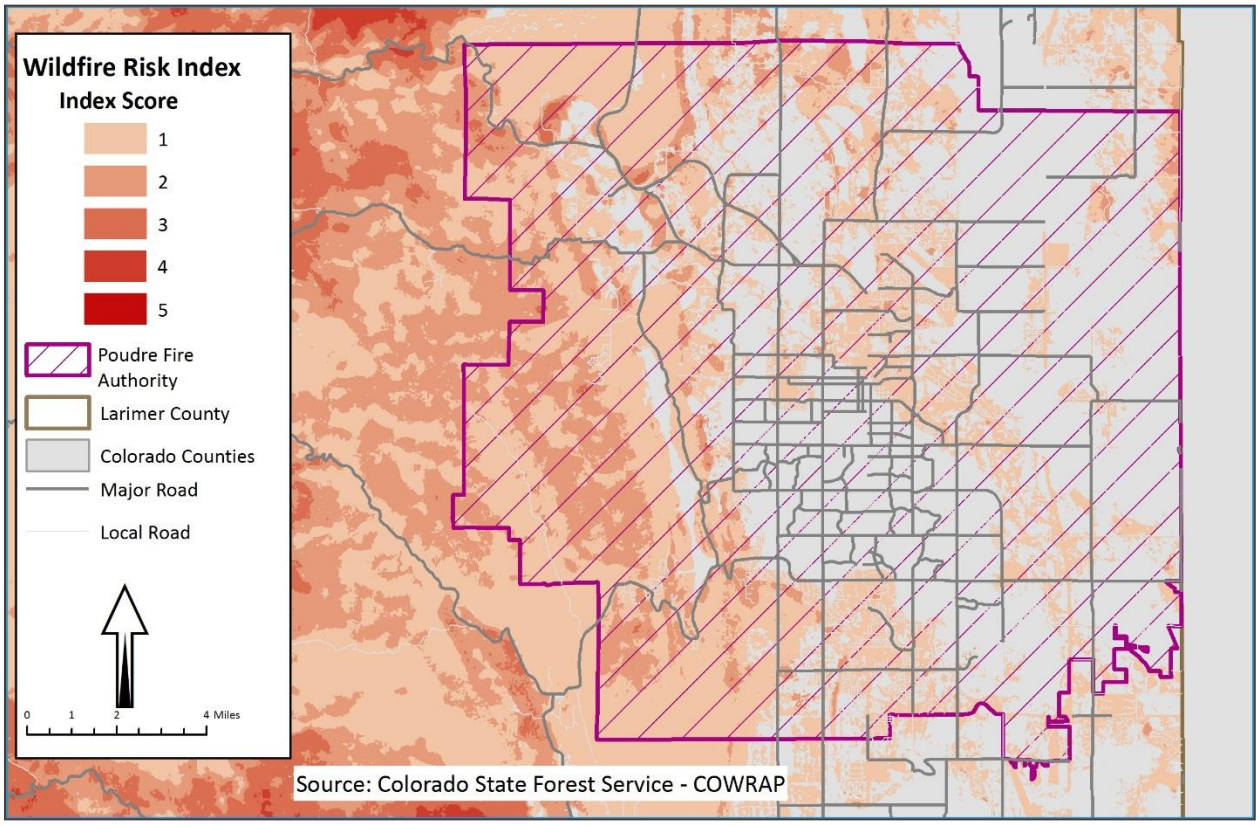
Poudre Fire Authority Service Area Wildfire Hazard Zone Map[203]



The following Wildfire Risk map identifies areas with the greatest potential impacts from a wildfire, in other words, those areas most at risk. The highest wildfire risk areas in the district are located in the western region, in areas where there are lower population densities.

[203] To be used to identify wildfire hazards within the Wildfire Mitigation Area. The hazards are determined based on vegetation cover type, habitat structure stage (cover type, tree size and crown cover percentage), southern facing aspects and 30% and greater slopes according to the Wildfire Hazard Area Mapping (WHAM) guidelines.

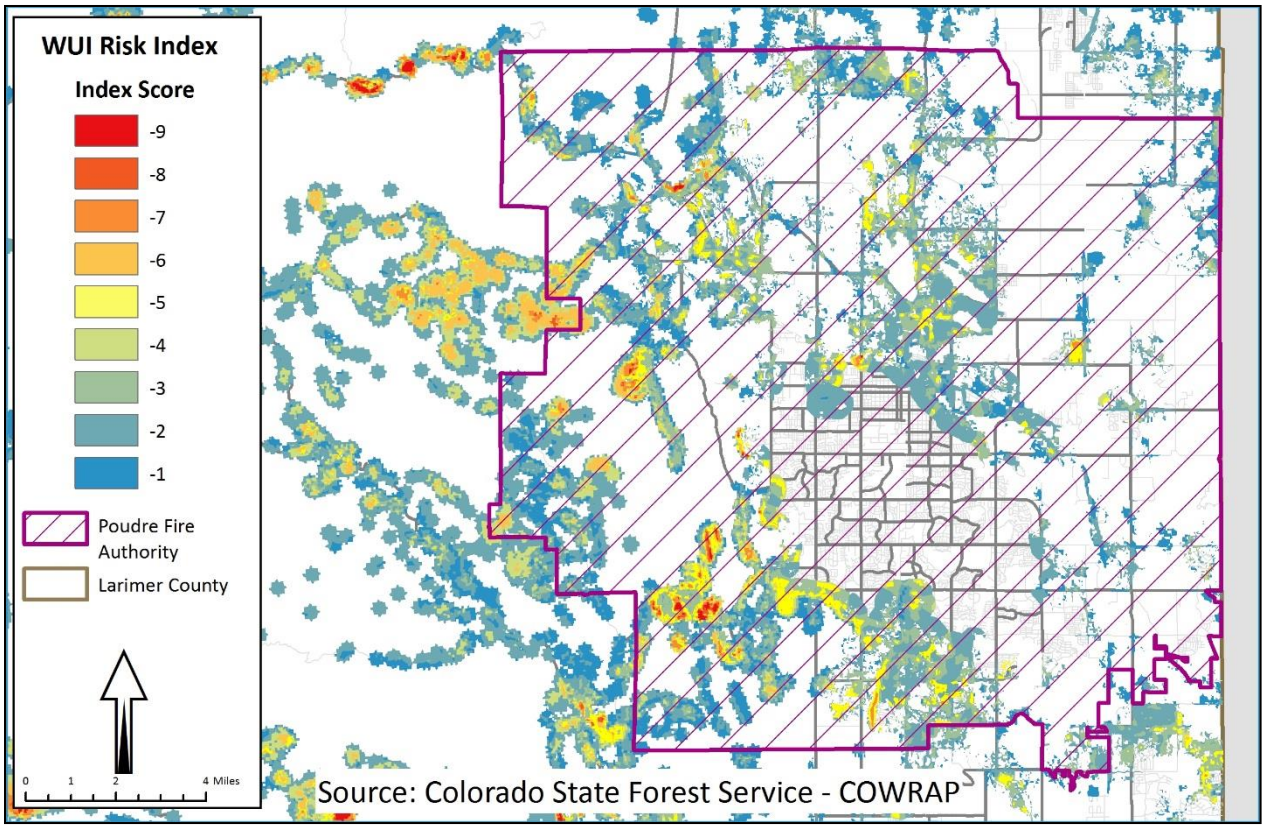
Poudre Fire Authority Service Area Wildfire Risk Index Map[204]



There are a number of areas in the western region of the Poudre Fire Authority service area that are within the medium to highest level on the WUI Risk Index Scale. This means that the potential impact on people and homes from a wildfire in those areas is medium to high in relationship to the rest of Larimer County. This level of risk is derived by combining housing density with predicted flame length.

[204] Wildfire Risk represents the possibility of loss or harm occurring from a wildfire. Risk is derived by combining wildfire threat and fire effects. The COWRAP data set was produced statewide and ranks areas on a scale that includes: lowest risk to highest risk.

Poudre Fire Authority Service Area WUI Map[205]



Fires can extensively impact the economy of an affected area, including the agricultural, recreation and tourism industries, water resources, and the critical facilities upon which the Poudre Fire Authority depends. There are areas of high and medium wildfire threat in the southern and western portions of the district according to the WUI Risk Index. There are no critical facilities located in areas with the *most negative* and 2 critical facilities located in areas with the *2nd most negative* wildfire threat total.

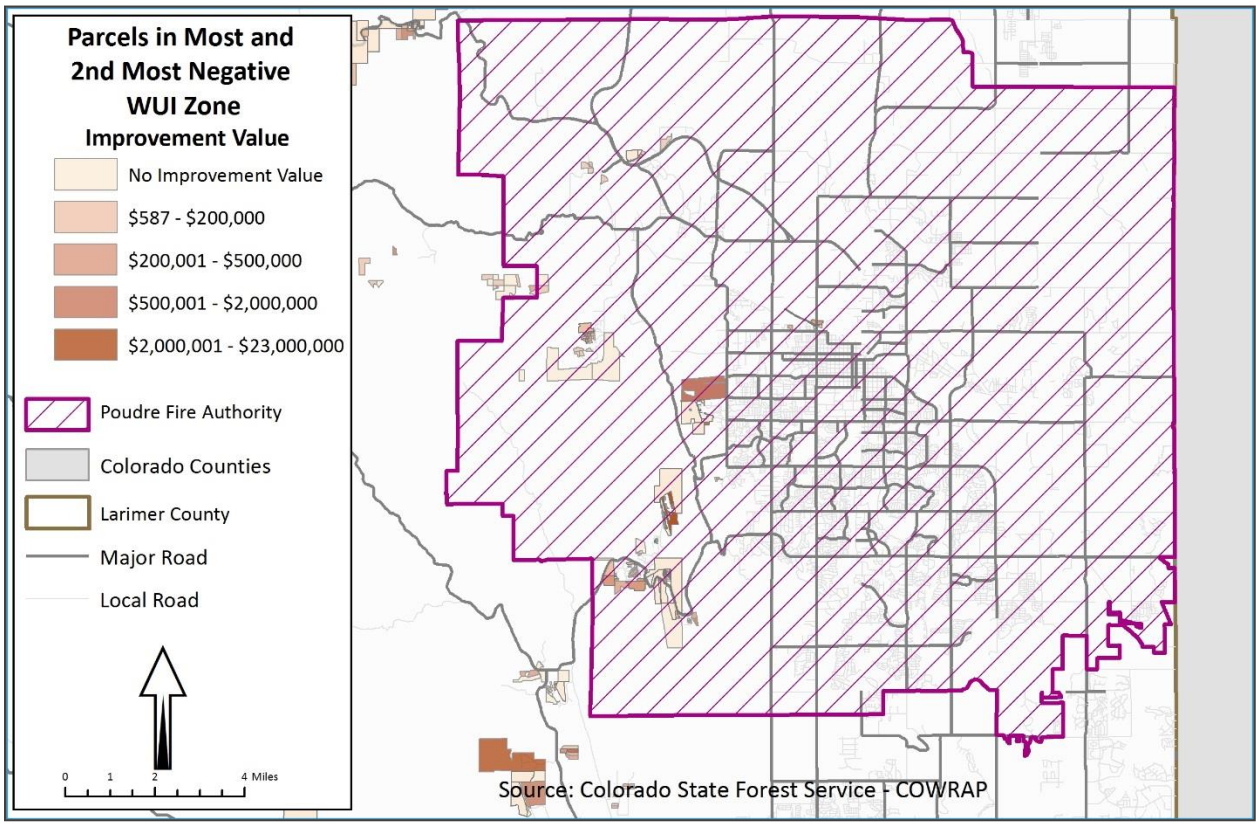
Potential Losses

The exposure data provided in the previous section (Inventory Assets Exposed) provides the clearest picture of potential losses to wildfire in the Poudre Fire Authority service area. The appraisal value of the 2 critical facilities within the 2nd most negative threat areas is over $21.9 million dollars. There are 106 parcels/structures located in areas with the most negative and 203 parcels/structures located in

[205] Wildland Urban Interface Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length. The COWRAP data set was produced statewide and ranks areas on a scale that includes: least negative to most negative impacts. This scale stretched from -1 (least) to -9 (most) statewide.

areas with the 2nd most negative wildfire threat total. The appraisal value of the parcels/structures within these most and 2nd most negative threat areas is over $95.8 million dollars. The risk assessment uses worst case scenario loss estimates. For this reason it is important to plan for relative levels of loss rather than specific potential loss dollar amounts.

Poudre Fire Authority Parcels in the Most Negative and Second Most Negative WUI Zone[206]



Probability of Future Occurrences

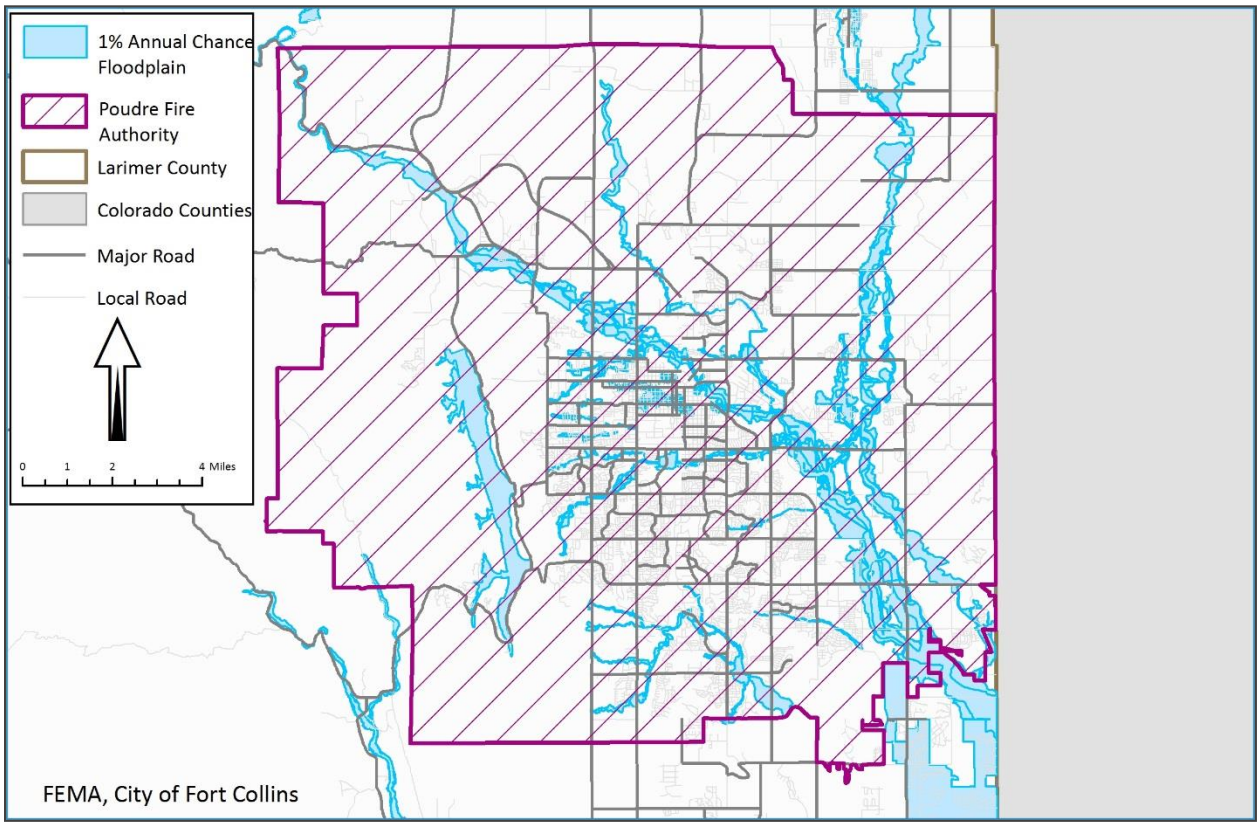
The likelihood of wildfires attaining significant size and intensity is unpredictable and highly dependent on environmental conditions and firefighting response. Weather conditions, particularly drought events, increase the likelihood of wildfires occurring. That said, it is important to note that 98% of wildfires are human-caused. Ultimately, the occurrence of future wildfire events will strongly depend on patterns of human activity and events are more likely to occur in wildfire-prone areas experiencing new or additional development.

[206] Wildland Urban Interface (WUI) Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length.

Wildfires can occur at any time of day and during any month of the year. Moreover, the length of a wildfire season and/or peak months may vary appreciably from year to year. As evidenced by the wildfire risk assessment, areas within the Poudre Fire Authority service area that are characterized by dense development and single family homes along the wildland-urban interface are most vulnerable to wildfire.

Flood – Flash and Riverine

Poudre Fire Authority Service Area Special Flood Hazard Area[207]



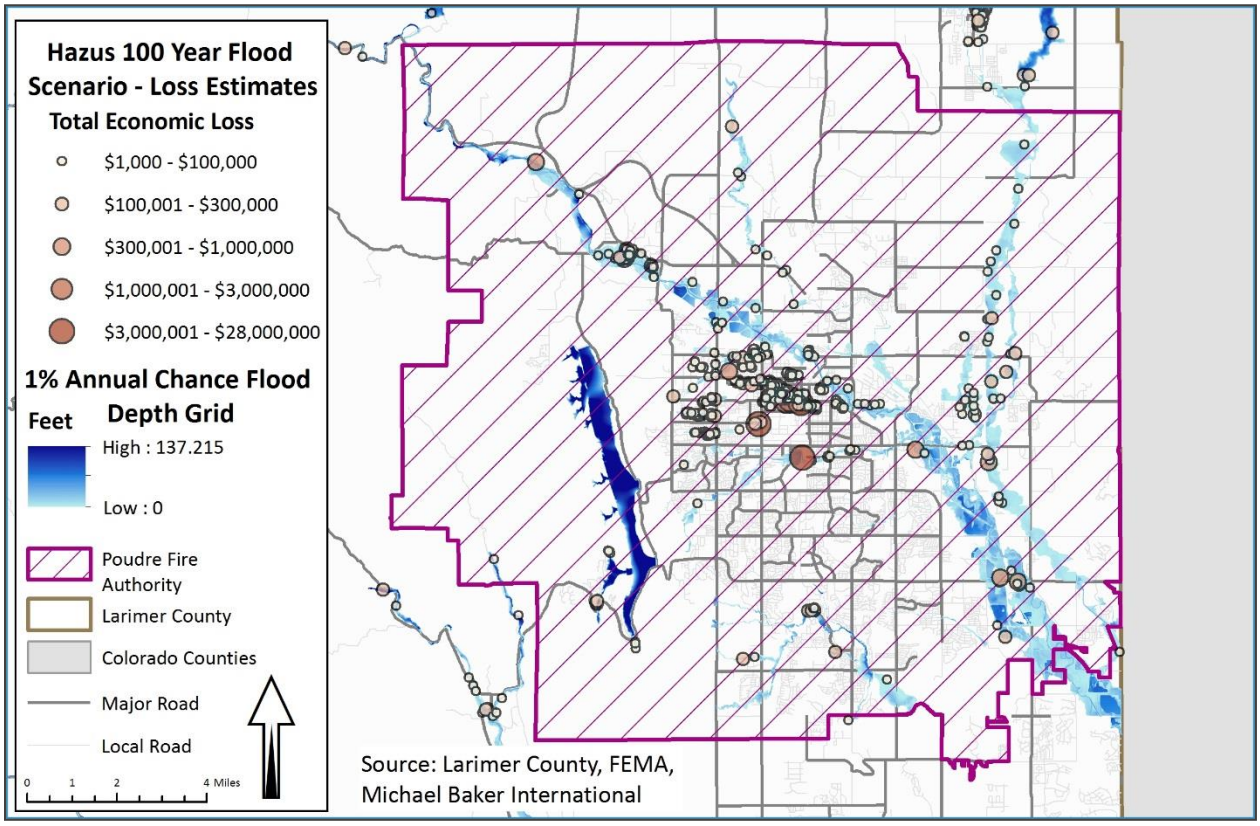
Previous Occurrences

According to NOAA's Storm Events Database there have been 40 reported injuries, 5 deaths, over $190.5 million dollars in property loss, and over $50,000 crop damage in the Poudre Fire Authority Service Area caused by flooding from 1996 to 2014. On July 28, 2007 more than 8 inches of rain fell is southwest Fort Collins. Debris blocked a culvert along Spring Creek causing a 10-15 foot wall of water to surge through a

[207] This layer is compiled utilizing the most recent Special Flood Hazard Areas (SFHA) as defined by FEMA's National Flood Hazard Layer (NFHL) in combination with some recent flood studies performed by the City of Fort Collins. These areas are also referred to as the 1% Annual Chance Floodplain.

mobile home park destroying some homes and damaging others. Based on the historic occurrence of floods, the Poudre Fire Authority Service Area is extremely vulnerable to flood events at any given time.

Poudre Fire Authority service area 2013 Flood Extent[208]



Maximum flood extent—a key data need for disaster response and mitigation—is rarely quantified due to storm-related cloud cover and the low temporal resolution of optical sensors. While change detection approaches can circumvent these issues through the identification of inundated land and soil from post-flood imagery, their accuracy can suffer in the narrow and complex channels of increasingly developed and heterogeneous floodplains. The data depicted above is from a study that explored the utility of the Operational Land Imager (OLI) and Independent Component Analysis (ICA) for addressing these challenges in the unprecedented 2013 Flood along the Colorado Front Range, USA. The approach was able to simultaneously distinguish flood-related water and soil moisture from pre-existing water bodies and other spectrally similar classes within the narrow and braided channels of the study site.

[208] Multi-Temporal Independent Component Analysis and Landsat 8 for Delineating Maximum Extent of the 2013 Colorado Front Range Flood

Inventory Exposed

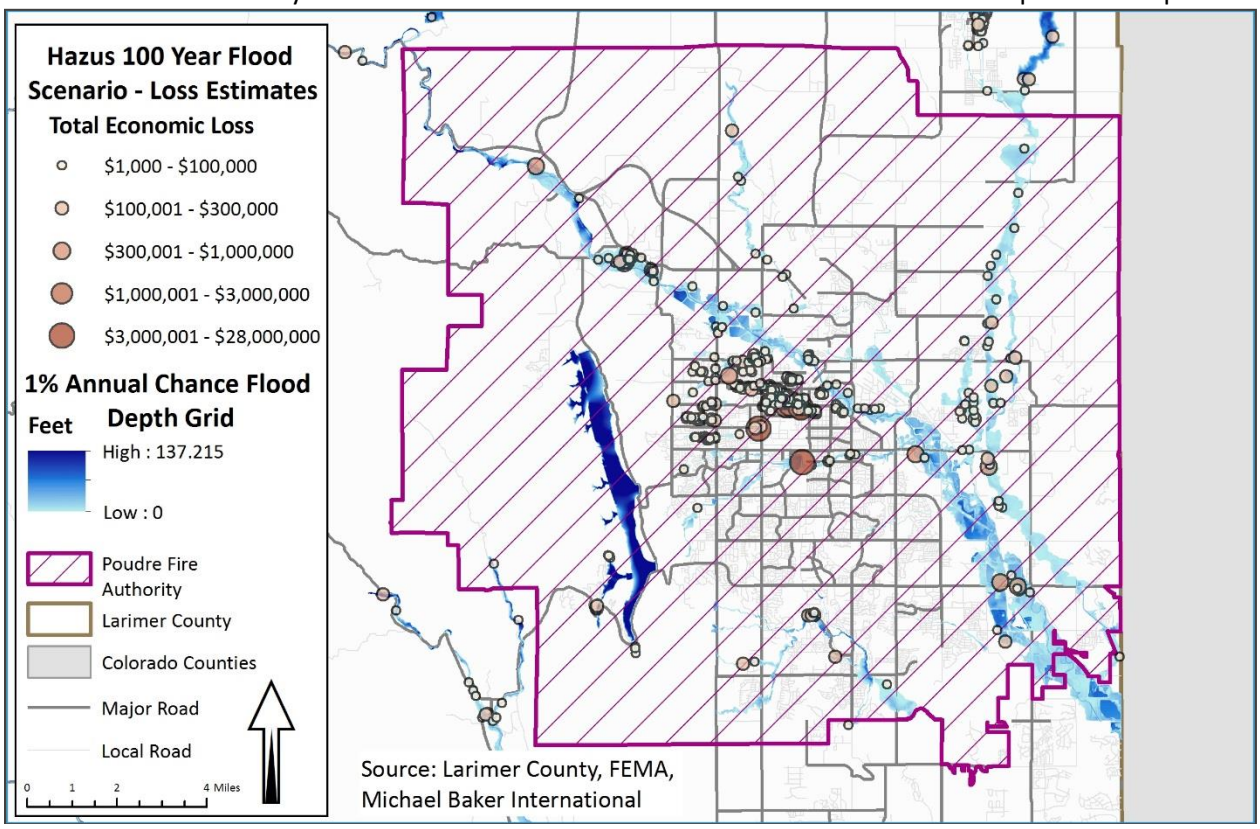
Critical facilities are essential to the health and welfare of the whole population and are especially important both during and after hazard events. Critical structures or areas that overlap or touch the SFHA are considered "flood prone."

The critical facility and structure exposure analysis estimates that there are 55 critical facilities and 5,276 parcels/structures in the Livermore Fire Protection District that are flood prone (not including the total miles of flood prone infrastructure). The appraised value of these exposed critical facilities is over $181.6 million dollars. The appraised value of these exposed structures is over $9.8 billion dollars.

Potential Losses

Hazus estimates for the Livermore Fire Protection District that for a 100-year flood event, approximately 10 critical facilities and 1,347 buildings will experience flood damage. The estimated critical facility building loss is over $203 thousand dollars, content loss over $509 thousand dollars, and inventory loss $146.5 thousand dollars. The estimated building loss is over $41.6 million dollars, content loss over $35.1 million dollars, and inventory loss $16.4 million dollars.

Poudre Fire Authority Service Area 1% Annual Flood Loss Estimation and Flood Depth Grid Map[209]



Probability of Future Occurrences

Frequency of previously reported flood events in the Poudre Fire Authority service area provide an acceptable framework for determining the probability of future flood occurrence in the area. The probability that the district will experience a flood event can be difficult to predict or quantify.

Severe flooding has the potential to inflict significant damage to people and property in the service area. Mitigating flood damage requires that communities remain diligent and notify local officials of potential flood (and flash flood) prone areas near infrastructure such as roads, bridges, and buildings.

[209] FEMA's loss estimation modeling software, Hazus, was utilized to produce this data set. A 100 year flood scenario was defined and losses were calculated for each point (structure) that intersected the depth grid based on the Hazus depth damage curves for specific structure attributes (such as foundation type, building type, and first flood height). Information derived from Hazus-MH 2.2 flood scenario. Total Losses equals a sum of building losses, content losses, and inventory losses. 1% Annual Chance Flood flooding depth grid, produced from the best available topographic and floodplain data.

Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)

Previous Occurrences

According to NOAA's Storm Events Database, the Poudre Fire Authority service area has experienced 74 Winter Storms since 1996. On March 17, 2003 there was report of a winter storm causing $15,500,000 in property damage in areas of Larimer County below 6,000 feet and eastern Larimer County. There were no deaths, injuries or damage to crops reported for any of these storms. The Poudre Fire Authority service area is at high risk of experiencing Winter Storms during the winter months.

Inventory Exposed

All assets located in the Poudre Fire Authority service area can be considered at risk from winter storms. This includes 189,635 people, or 100% of the District's population, and all buildings and infrastructure within the district. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the District's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Potential Losses

Winter storms affect the entire planning area of the Poudre Fire Authority service area including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Winter storms will remain a highly likely occurrence for the Poudre Fire Authority.

Probability of Future Occurrences

Severe winter storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past severe winter events provide benchmarks for projecting similar conditions into the future. The probability that the Poudre Fire Authority service area will experience a severe winter storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the service area at least once every year.

Hazmat – Fixed and Transport

Previous Occurrences

Based on data supplied by the Pipeline and Hazardous Materials Safety Administration's (PHMSA) Incident Reports Database there have been 89 reported HAZMAT incidents within the Poudre Fire Authority service area between 1972 and 2015.

Inventory Exposed

We can't accurately predict when or where a HAZMAT incident may occur. Therefore, for the purpose of this plan, all existing and future buildings, facilities, and populations in the Poudre Fire Authority service area are considered to be equally exposed and couple potentially be impacted. This includes 189,635 people, or 100% of the service areas population, and all buildings and infrastructure within the service area.

When hazardous materials are being transported they are particularly vulnerability to transportation related accidents, misuse, or terrorist threats. Most hazardous materials are transported in large quantities in order to reduce costs and security is difficult to maintain around moving vehicles that cross jurisdictional boundaries. When transported close to populated areas or critical infrastructure, HAZMAT releases can have serious consequences. The inventory that is most often exposed to HAZMAT risks are railways, roadways, and fixed facilities that contain hazardous materials, and all assets that lie within a mile of the potential release areas.

I-25 runs through the Poudre Fire Authority Service area and is a designated nuclear and hazardous materials transportation route. All structures, natural resources, and people located within one mile of these transportation routes (and railways) are exposed to the impacts of a potential HAZMAT event. Structures, people, and natural resources located outside of a one mile buffer of these routes are also at risk of exposure.

Assets and people that are located within one mile of an industrial or commercial fixed site are also at risk of exposure to the impacts of a HAZMAT release.

Potential Losses

HAZMAT related events occur throughout the Poudre Fire Authority every year. The intensity and magnitude of these incidents depend on weather conditions, the location of the event, the time of day, and the process by which the materials are released. *Was is raining when the event happened? Were the hazardous materials being transported by rail when they were released or were they at a fixed facility? Did the spill happen during rush hour traffic or in the middle of the night?* All of these considerations matter when determining the risk and potential damages associated with a HAZMAT incident.

HAZMAT events have the potential to threaten lives and disrupt business activity. Moreover, HAZMAT incidents can cause serious environmental contamination to non-renewable resources such as air, ground, and water sources.

Probability of Future Occurrences

As with most hazards that have limited spatial predictability or warning time, the probability of future occurrences of HAZMAT events is difficult to predict. However, as development continues to encroach into existing industrial areas and becomes more dense along high-risk designated hazardous materials

transportation routes, the risk of future occurrences becomes greater. Even if the frequency of HAZMAT spills remains the same over time, population growth will increase the probability of a disaster event.

Biological Hazards / Contagion

Biological hazards, including epidemics and pandemics, have the potential to cause serious illness and death, especially among those who have compromised immune systems due to age or underlying medical conditions. During the 2015 planning process, pandemic flu was identified as the key public health hazard in the county.

Previous Occurrences

There is no available data for historic occurrences of biological hazards specifically within the Poudre Fire Authority service area.

Inventory Exposed

Due to the regional nature of public health hazards, jurisdictions with higher numbers of socially vulnerable residents are expected to experience magnified impacts of public health hazards. This includes places with high numbers of elderly residents, young children, low income families, and homeless individuals/outdoor laborers. Future mitigation efforts related to biological hazards should focus on reaching those residents who are elderly, young children, and live in poverty or are homeless.

Potential Losses

Because there is no defined geographic boundary for public health hazards, all of the people and infrastructure within the Poudre Fire Authority service area are exposed to public health hazards. Those with elevated risk and potential loss are the homeless, infirm, elderly, young and low income families. Placing a dollar amount on the cost of a human life are beyond the scope of the Plan, annualized economic losses for the Poudre Fire Authority due to public health hazards can be best quantified in terms of number of days of work lost due to sick staff.

Probability of Future Occurrences

Based on the Colorado Department of Public Health and Environment annual reportable disease summary of 2,308 Reportable Diseases within Larimer County, there is great potential for biological hazards to occur at any given time in the Poudre Fire Authority service area.

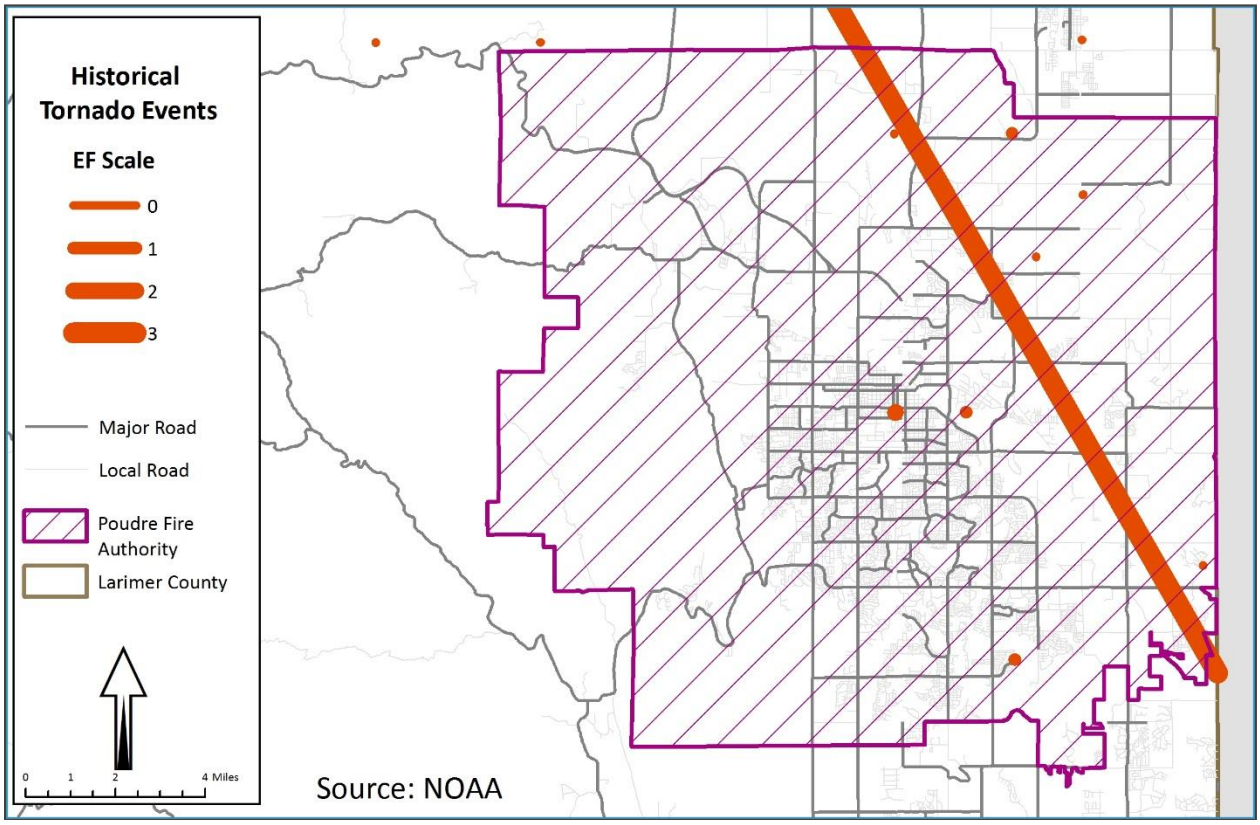
Tornado

Previous Occurrences

According to NOAA, 78 injuries, 1 death, and approximately $149 million dollars in damages have been recorded within and near the Poudre Fire Authority service area due to tornadoes. There is record of 10 tornadoes reported within the service area limits between 1954 and 2015. The most severe event occurred on May 22, 2008. This EF3 tornado traveled in a north westerly direction and reached speeds of over 165 miles per hour. This tornado event consisted of a formation of several combined tornadoes forming a wedge that was between a half and three quarters of a mile wide. The tornado caused damage to not only the Town of Windsor but also the towns of Milliken, Platteville, Gilchrest, and the City of Greeley. One person was killed at the Missile Silo Campground near Greeley. The tornado impacted area was designated a national disaster. The Rocky Mountain Insurance Information Association (RMIIA) reported that there was an estimated $193.5 million in insured damages and approximately 24,000 auto

and homeowners claims. Tornadoes will remain a highly likely occurrence for the Poudre Fire Authority service area.

Poudre Fire Authority Service Area Historic Tornadoes[210]



Inventory Exposed

All assets located in the Poudre Fire Authority service area can be considered at risk from severe wind and tornadoes. This includes 189,635 people, or 100% of the County's population and all buildings and infrastructure within the service area.[211] Most structures, including critical facilities, should be able to withstand and provide adequate protection from tornadoes. Those facilities with back-up generators should be fully equipped to handle tornado events should the power go out.

Potential Losses

Generally, tornadoes destroy private, commercial, and public property. Additional costs stem from debris removal, maintenance, repair, and response. Indirect costs include loss of industrial and commercial productivity as a result of damage to infrastructure, facilities, or interruption of services. Because no

[210] Historical tornado events. NOAA's National Weather Service Storm Prediction Center, 1950 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

[211] 2010 Census

specific, countywide loss estimation exists tornado hazards, potential losses are related to historical property damage and injuries/deaths.

Probability of Future Occurrences

Reported tornadoes over the past 61 years provide an acceptable framework for determining the future occurrence in terms of frequency for such events. The probability of the Poudre Fire Authority service area experiencing a tornado associated with damages or injuries can be difficult to quantify. Historic tornado frequencies suggest that there is a chance of this type of event occurring somewhere in within the service area boundaries each year.

Capabilities Assessment

The capability assessment examines the ability of the Poudre Fire Authority to implement and manage the comprehensive mitigation strategy laid out in this Plan. The strengths, weaknesses, and resources of the community are identified here as a means for evaluating and maintaining effective and appropriate management of the Fire Authority's hazard mitigation program.

Local Personnel

The ability of a community to implement a comprehensive mitigation strategy depends, in part, on available resources, including people and staff. The following table outlines the Fire Authority's capabilities as they relate to key personnel.

	Full Time	Part Time	None or Not-Identified
Emergency Manager	X		
Floodplain Administrator			X
Community Planner	X		
GIS Specialist	X		
Grant Writer		X	

Land Use Planning and Codes

Local land use plans and building codes are tremendous tools for evaluating local policies related to hazard mitigation and risk reduction. Additionally, comprehensive master plans, capital improvement plans, stormwater plans and zoning ordinances all present opportunities for enhanced local capabilities. The following table outlines the Fire Authority's current capabilities as they relate to land use planning and codes.

	Yes (Y); No (N)
A zoning ordinance	--
A hazard-specific ordinance	Y
Local building codes	--
A Comprehensive Plan / Master Plan	Y
A Capital Improvements Plan	Y
A Stormwater Plan	--

A Continuity of Operations Plan (COOP)	Y
An Emergency Operations Plan (EOP)	Y
A Long-Term Recovery Plan	N
Participates in the NFIP	N

Plan Maintenance and Implementation

The Poudre Fire Authority has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the organization will continue public participation in the plan maintenance process.

Jurisdiction	Plan Maintenance and Implementation Strategy
Poudre Fire Authority	*"Annual updates and quarterly monitoring of the action items within the plan"* *"PFA holds monthly board meetings with the opportunity for public comment. Quarterly reports are in the board packet which covers updates of mitigation actions and priorities. These reports that cover maintenance and progress are made public and posted on the PFA website"*

Integrating Hazard Mitigation into Local Planning

Through discussions at planning meetings and the use of an online survey, individual outreach, and phone calls, each participating jurisdiction brainstormed with the planning team to identify processes for integrating hazard mitigation into their local planning mechanisms and policies. The following table lists the specific integration strategy identified by the Poudre Fire Authority based on the mitigation actions listed in this plan.

Jurisdiction	Strategy
Poudre Fire Authority	*"Items in the Hazard Mitigation plan that impact PFA will be incorporated into other plans including our strategic plan. For example: We will update our local policies and procedures to include hazard specific sections that address the highest risks within the fire service. Training and exercises that cover these hazards will also be incorporated into our training and exercise program."*

Mitigation Action Guides

The following Mitigation Action Guide presents the Authority's mitigation action that was developed for the 2016 Plan.

Poudre Fire Authority: Training in Disaster Management Large Scale Incidents (Poudre FA – 1)	
PRIORITY: High	HAZARDS ADDRESSED: All: Drought, Earthquake, Land Subsidence, Extreme Temperatures, Flood, Severe Storm, Wind & Tornado, Fire, Public Health, Hazmat
LOCATION: Poudre Fire Authority, Training Center	GOALS ADDRESSED: 1,2,3
RECOMMENDATION DATE: 1/1/2016	OBJECTIVES ADDRESSED: B C D
TARGET COMPLETION DATE: On Going	Continual Training
ISSUE: Poudre Fire Authority needs to expand their disaster management training from fire and wildland to all hazards. As an emergency response and rescue organization, expanding their scope in areas other than response will increase the community's capability to be more resilient.	
RECOMMENDATION: Increase training and knowledge in disaster management	
ACTION: • Additional training in ICS • Additional training in EOC Operations • Additional training in Disaster Management Operations	
LEAD AGENCY: PFA Training Division	EXPECTED COST: $2000
SUPPORT AGENCIES: Fort Collins OEM	POTENTIAL FUNDING SOURCES: Annual Budget, EMPG
PROGRESS MILESTONES: Project is dependent on scheduling courses. All training will be captured and documented.	

Poudre Fire Authority: Implementation of Capital Improvement Plans to Enhance Mitigation	
PRIORITY: High	HAZARDS ADDRESSED: All
LOCATION: Poudre Fire Authority	GOALS ADDRESSED: Goals 1, 2, 4, and 5
RECOMMENDATION DATE: 6/1/2015	OBJECTIVES ADDRESSED: Objectives B, C, and E
TARGET COMPLETION DATE: 12/31/2016	
ISSUE: Recent large-scale disasters have caused Poudre Fire Authority and the City of Fort Collins to re-evaluate existing regulatory documents and programs for possible mitigation changes and actions, which has led to the development of a Capital Improvement Plan.	
RECOMMENDATION: Integrate the Mitigation Plan adopted by the Poudre Fire Authority into current Capital Improvement Plans to ensure that development does not encroach on known hazard areas. Partner with other organizations and agencies with similar goals to promote Building, Fire and Life Safety Codes that are more disaster resilient.	
ACTION: Integrate the Mitigation Plan adopted by the Poudre Fire Authority into current Capital Improvement Plans to ensure that development does not encroach on known hazard areas. Partner with other organizations and agencies with similar goals to promote Building, Fire and Life Safety Codes that are more disaster resilient.	
LEAD AGENCY: Poudre Fire Authority	EXPECTED COST: Project specific

SUPPORT AGENCIES: City of Fort Collins, Larimer Community Development Division, Fort Collins and Larimer Offices of Emergency Management	POTENTIAL FUNDING SOURCES: Staff time, Poudre Fire Authority, City of Fort Collins, grant funding
PROGRESS MILESTONES: – Develop a review team to go over all regulations and codes and provide suggested changes – Compile all recommended changes and present to the Fire Board for consideration – Make changes as appropriate and finalize recommended actions – Participate in the code revision process, including public meetings	

Poudre Fire Authority: Critical Infrastructure Project	
PRIORITY: Medium	HAZARDS ADDRESSED: All
LOCATION: Poudre Fire Authority	GOALS ADDRESSED: Goals 1, 2, 4, and 5
RECOMMENDATION DATE: 6/1/2015	OBJECTIVES ADDRESSED: Objectives B, C, and E
TARGET COMPLETION DATE:12/31/2016	
ISSUE: The Larimer Resiliency Framework and recent meetings regarding critical infrastructure have illustrated the need to ensure redundant power supplies to critical facilities in the Poudre Fire Authority and to provide for lightning mitigation measures.	
RECOMMENDATION: Facilitate development and installation of uninterruptible/back up power supply for Poudre Fire Authority facilities.	
ACTION: Complete the installation of uninterruptible power supply (UPS) for all Poudre Fire Authority maintained computers. The UPS system will improve the safety and communication of responders. Establish plans and begin development of the build out and installation of backup power supplies (generators) for all Poudre Fire Authority facilities. These will be installed based upon the priorities on the system, with the most critical facilities ranked the highest.	
LEAD AGENCY: Poudre Fire Authority	EXPECTED COST: $200,000
SUPPORT AGENCIES: City of Fort Collins, Fort Collins and Larimer Offices of Emergency Management	POTENTIAL FUNDING SOURCES: City Resources, PFA resources, grant funding
PROGRESS MILESTONES: – Through the current RRAP planning process, determine priority PFA facilities and current capabilities – Perform a gap analysis to determine needs – Determine available funding mechanisms for areas of greatest need – Secure funding – Complete the installation of UPS and generators for all PFA facilities	

Letter of Intent to Participate

Poudre fire Authority
102 Remington Street
Fort Collins, CO 80524
Phone: 970-416-2892
Fax: 970-221-6635
Internet: www.poudre-fire.org

August 14, 2014

Lori Hodges
Larimer County
200 West Oak
Fort Collins, CO. 80524

Re: "Statement of Intent to Participate" as a participating jurisdiction in Larimer County Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Dear Lori Hodges,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the Poudre Fire Authority is submitting this letter of intent to confirm that the Poudre Fire Authority has agreed to participate in the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, the Poudre Fire Authority agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to the Larimer County to complete the plan in conformance with FEMA requirements.

The Poudre Fire Authority understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by an agreement between the Lead Jurisdiction and the Participating Jurisdiction, I, Tom Demint commit the Poudre Fire Authority to the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 14th day of August.

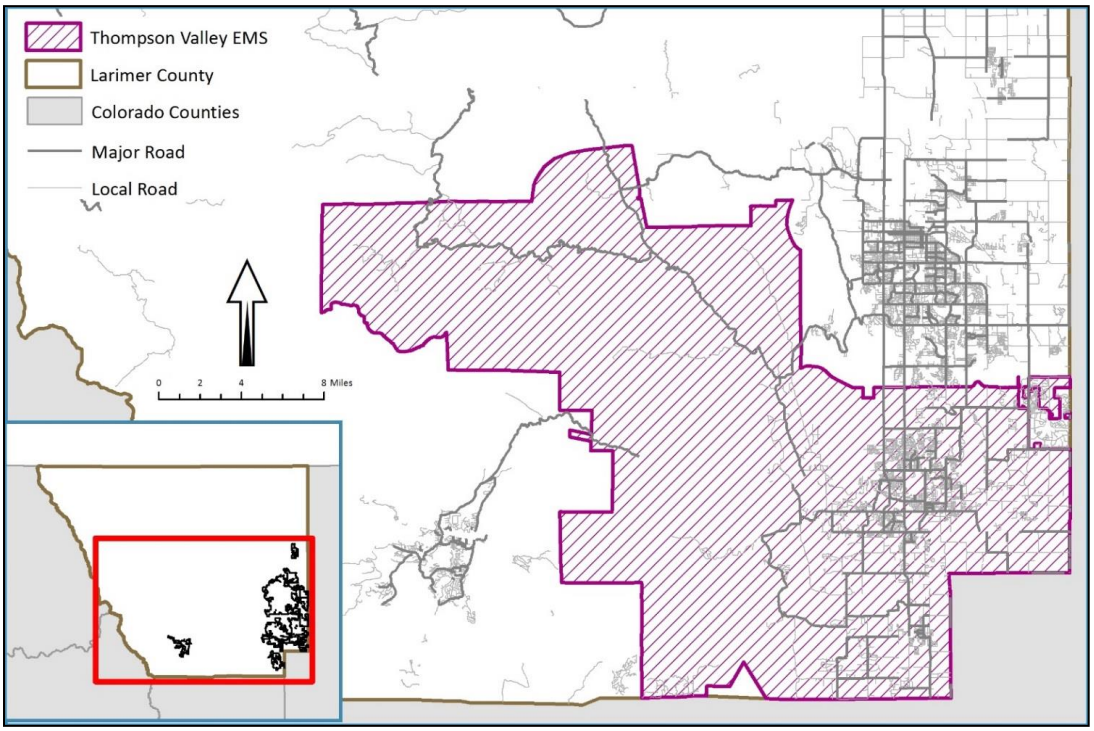
Tom DeMint
Fire Chief

Thompson Valley EMS

Thompson Valley EMS East Station Source: Thompson Valley EMS

Community Profile

The Thompson Valley EMS service covers approximately 450 square miles of southeastern Larimer County. It includes the Towns of Berthoud and Johnstown, the City of Loveland, and portions of the Windsor/Severance Fire Districts with a total estimated population of 100,000. The Thompson Valley EMS is a full service 911 ALS provider. Some of the services include providing emergency medical services, EMS education and training, EMT training, and job safety training. Thompson Valley EMS was established in 1983.



Hazard Identification and Risk Assessment

The following Hazard Identification and Risk Assessment Summary table is based on jurisdiction-specific responses to the risk factor exercise and differs from the risk factor results that were determined at the county scale.

NATURAL HAZARD	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Tornado	0.9	0.9	0.6	0.4	0.4	3.2
Fire – Wildland	1.2	0.6	0.6	0.4	0.3	3.1
Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)	1.2	0.6	0.6	0.4	0.3	3.1
Flood – Flash and Riverine	0.9	0.6	0.6	0.4	0.4	2.9
Hazmat – Fixed and Transport	0.9	0.6	0.6	0.4	0.3	2.8
Utility Disruption	0.9	0.6	0.6	0.4	0.3	2.8
Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)	1.2	0.6	0.6	0.1	0.3	2.8
Earthquake	0.3	0.6	0.6	0.4	0.4	2.3
Erosion / Deposition	0.6	0.6	0.4	0.4	0.3	2.3
Biological Hazards / Contagion	0.9	0.3	0.2	0.4	0.3	2.1
Landslide / Rockslide	0.9	0.3	0.2	0.4	0.3	2.1
Civil Disturbance	0.6	0.3	0.2	0.4	0.2	1.7
HIGH RISK (2.5 or higher): Tornado; Fire – Wildland; Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning); Flood – Flash and Riverine; Hazmat – Fixed and Transport; Utility Disruption; Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)						
MODERATE RISK HAZARD (2.0 - 2.4): Earthquake; Erosion / Deposition; Biological Hazards / Contagion; Landslide / Rockslide						
Low Risk (1.9 and lower): Civil Disturbance						

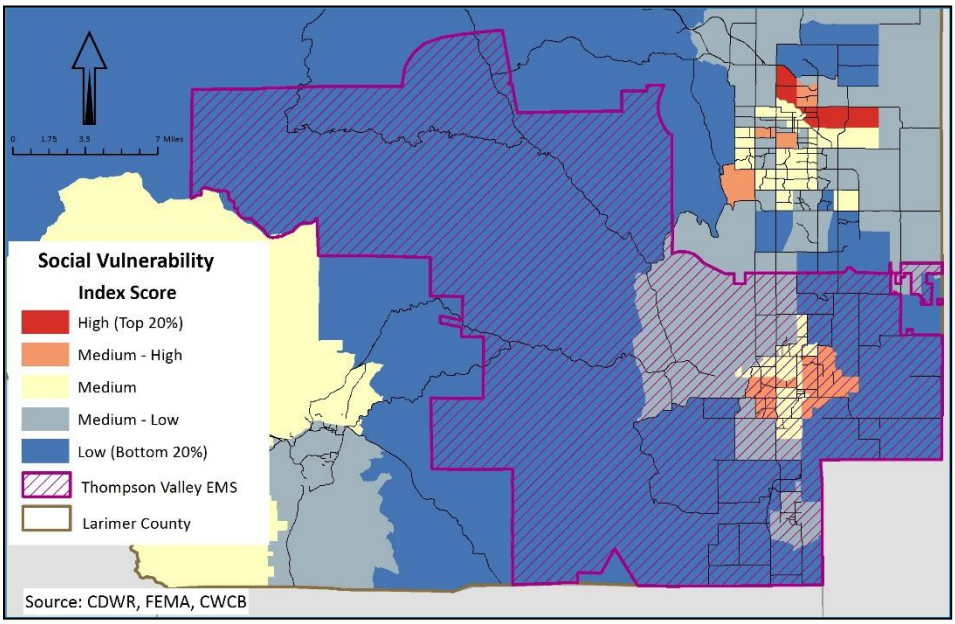
Vulnerability Assessment

This section provides a refined vulnerability assessment, specific for the Thompson Valley EMS, for those hazards that were identified as being rated HIGH in the preceding section. This analysis was conducted

separately from that of the county-wide vulnerability assessment to specifically focus on the population, structures, infrastructure, and other assets unique to the Thompson Valley EMS.

The results of the social vulnerability assessment are displayed on the map below. On the map, social vulnerability is represented at the census tract level by 5 classes of vulnerability: Low (bottom 20% of the county), Medium-Low, Medium, Medium-High, and High (top 20% of the county). The Thompson Valley EMS's social vulnerability map shows social vulnerability within the community.

Social Vulnerability Map – Thompson Valley EMS[212]



Social vulnerability is represented as the social, economic, demographic, and housing characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to hazard events. The pre-existing social conditions that contribute to disaster losses can be identified using social vulnerability indicators. Using methods identified in the Social Vulnerability Index (SoVI) developed by Cutter et. al. (2003) this layer shows the social vulnerability index scores for the State of Colorado at the census tract level. Social vulnerability is represented at the Census tract level by five classes of vulnerability: Low, Medium-Low, Medium, Medium-High, and High.

The Thompson Valley EMS service area is characterized by a mix of low to medium-high levels of social vulnerability. A closer analysis into the individual social vulnerability indicators within the service area will give local emergency managers, planners, and stakeholders an even clearer picture of which social vulnerability factors have the largest negative effect on the area and its resiliency. It is important that Thompson Valley EMS continue to monitor social vulnerability levels within their service area over time as demographics and economic conditions change.

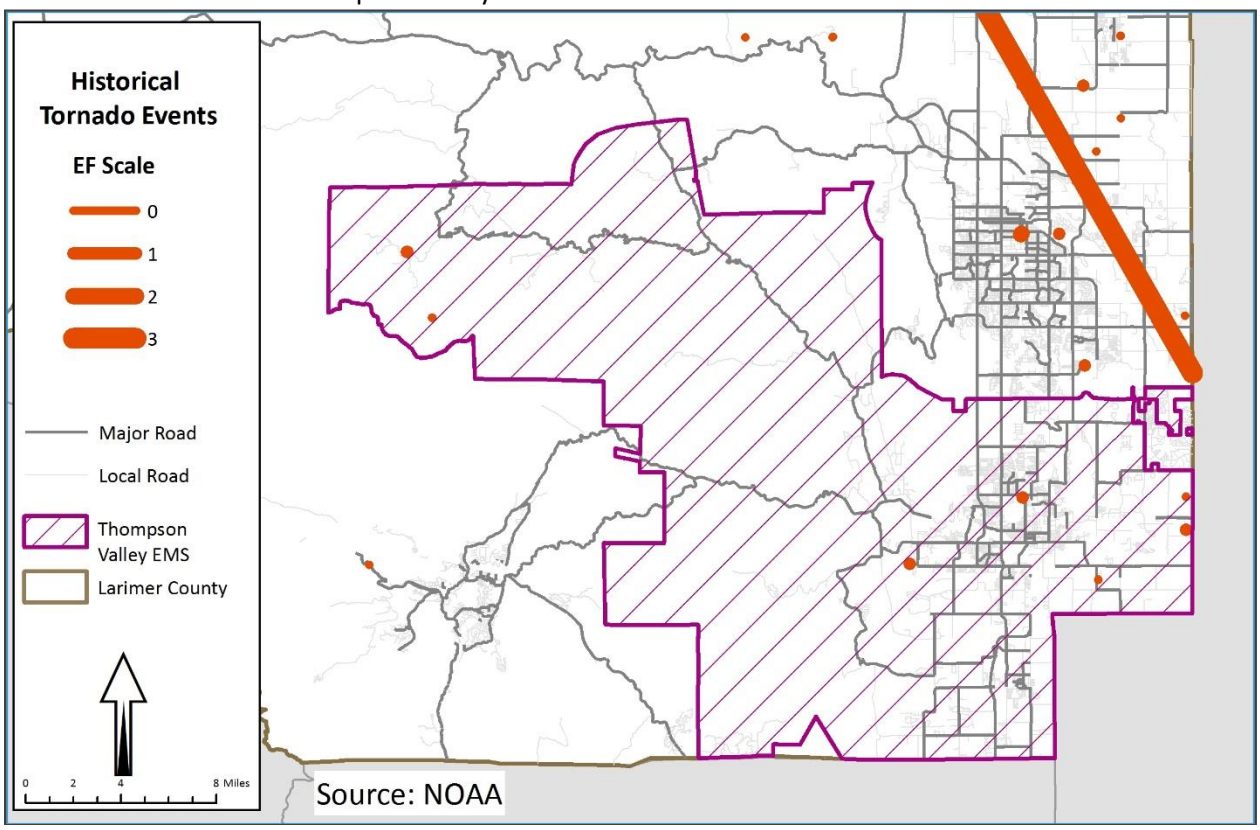
[212] Source: Colorado Division of Water Resources Dam Safety Branch, FEMA, Colorado Water Conservation Board (CWCB)

Tornado

Previous Occurrences

According to NOAA, no injuries, no deaths, and between $5,100 and $50,000 in loss have been recorded within the Thompson Valley EMS service area due to tornadoes. There is record of 7 tornadoes reported within the service area between 1954 and 2015. Tornadoes will remain a highly likely occurrence for the Thompson Valley EMS service area.

Thompson Valley EMS Service Area Historic Tornadoes[213]



Inventory Exposed

All assets located in Thompson Valley EMS service area can be considered at risk from severe wind and tornadoes. This includes approximately 100,000 people, or 100% of the population and all buildings and infrastructure within the service area.[214] Most structures, including critical facilities, should be able to

[213] Historical tornado events. NOAA's National Weather Service Storm Prediction Center, 1950 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

[214] 2010 Census

withstand and provide adequate protection from tornadoes. Those facilities with back-up generators should be fully equipped to handle tornado events should the power go out.

Potential Losses

Generally, tornadoes destroy private, commercial, and public property. Additional costs stem from debris removal, maintenance, repair, and response. Indirect costs include loss of industrial and commercial productivity as a result of damage to infrastructure, facilities, or interruption of services. Because no specific, countywide loss estimation exists tornado hazards, potential losses are related to historical property damage and injuries/deaths.

Probability of Future Occurrences

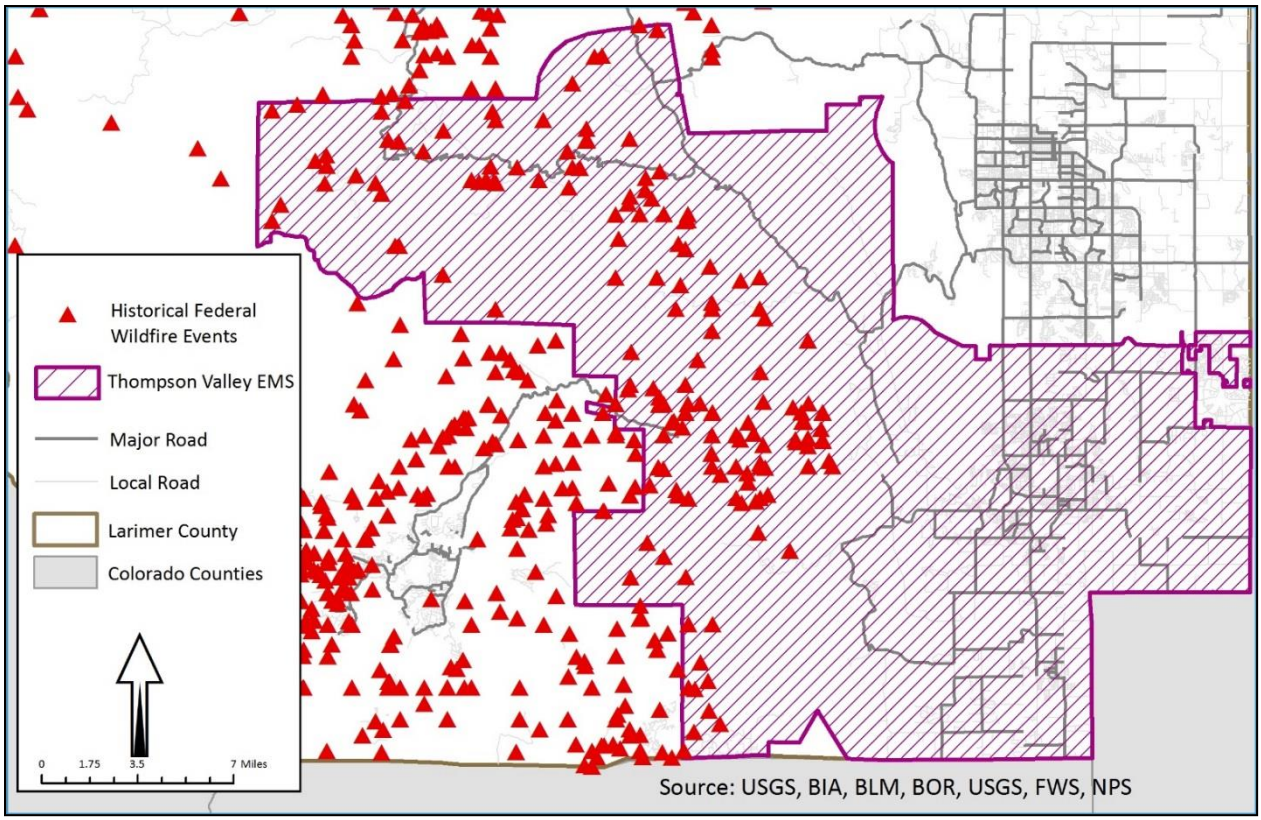
Reported tornadoes over the past 61 years provide an acceptable framework for determining the future occurrence in terms of frequency for such events. The probability of the Thompson Valley EMS service area experiencing a tornado associated with damages or injuries can be difficult to quantify. Historic tornado frequencies suggest that there is a chance of this type of event occurring somewhere in within the service area boundaries each year.

Fire – Wildland

Previous Occurrences

According to NOAA's Storm Events Database there have been 169 reported wildfire events in the Thompson Valley EMS service area. Based on the historic data showing hazardous impacts on service area, there is a great potential for wildfire events to occur at any given time.

Thompson Valley EMS Service Area Historical Federal Wildfire Map[215]

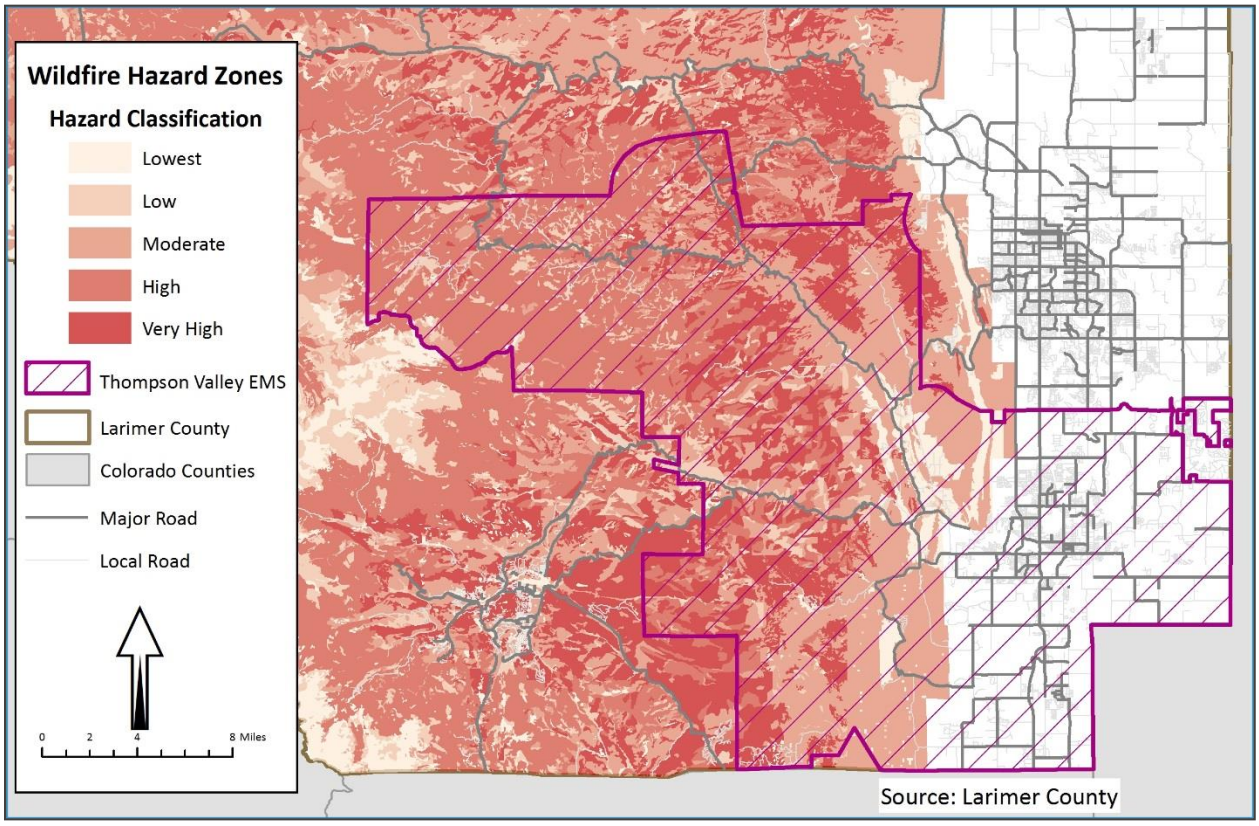


Inventory Exposed

The following Wildfire Hazard Zone map identifies the expected wildfire behavior. The highest wildfire hazard zones in the district are located in the western region, in areas where there are lower population densities.

[215] Historical wildland fire occurrence data compiled by USGS from 1980 - 2013, from BIA, BLM, BOR, USGS, FWS, and NPS.

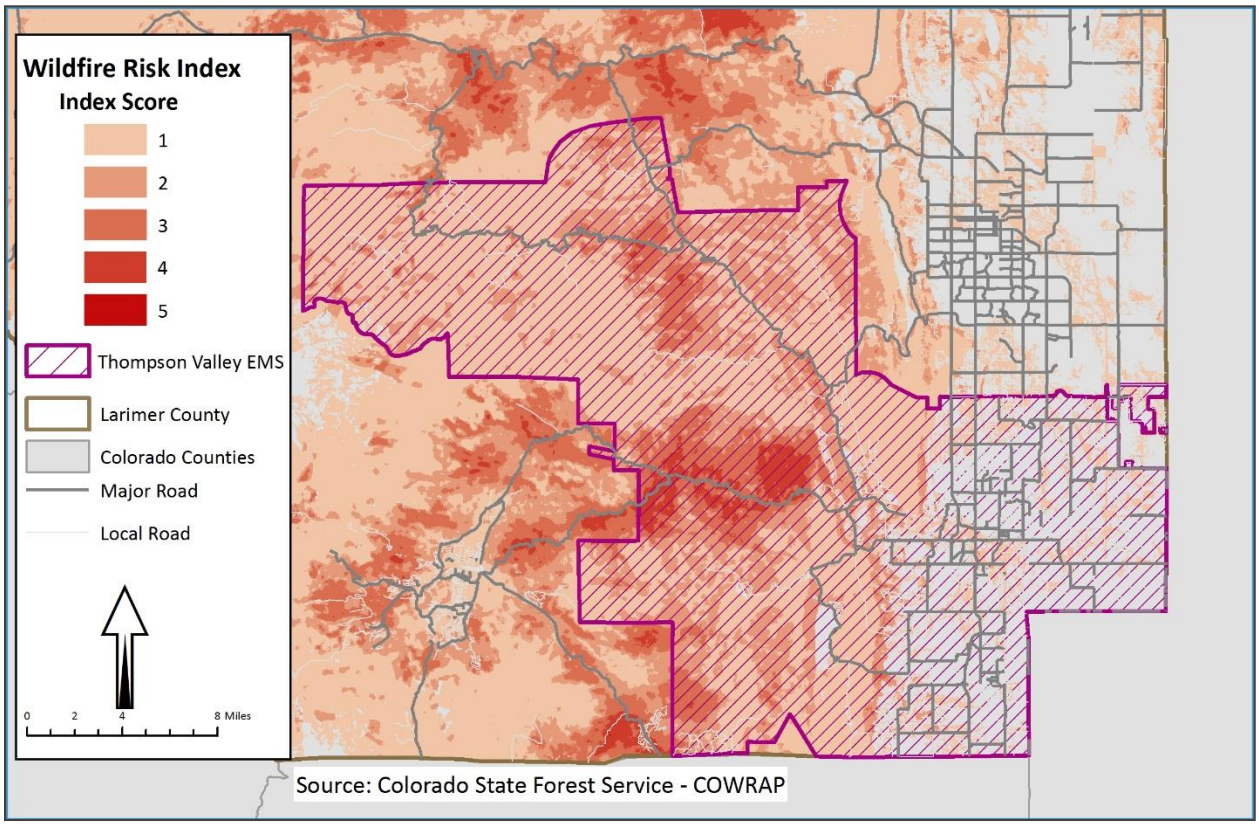
Thompson Valley EMS Service Area Wildfire Hazard Zone Map[216]



The following Wildfire Risk map identifies areas with the greatest potential impacts from a wildfire, in other words, those areas most at risk. The highest wildfire risk areas in the district are located in the western and central region, in areas where there are lower population densities.

[216] To be used to identify wildfire hazards within the Wildfire Mitigation Area. The hazards are determined based on vegetation cover type, habitat structure stage (cover type, tree size and crown cover percentage), southern facing aspects and 30% and greater slopes according to the Wildfire Hazard Area Mapping (WHAM) guidelines.

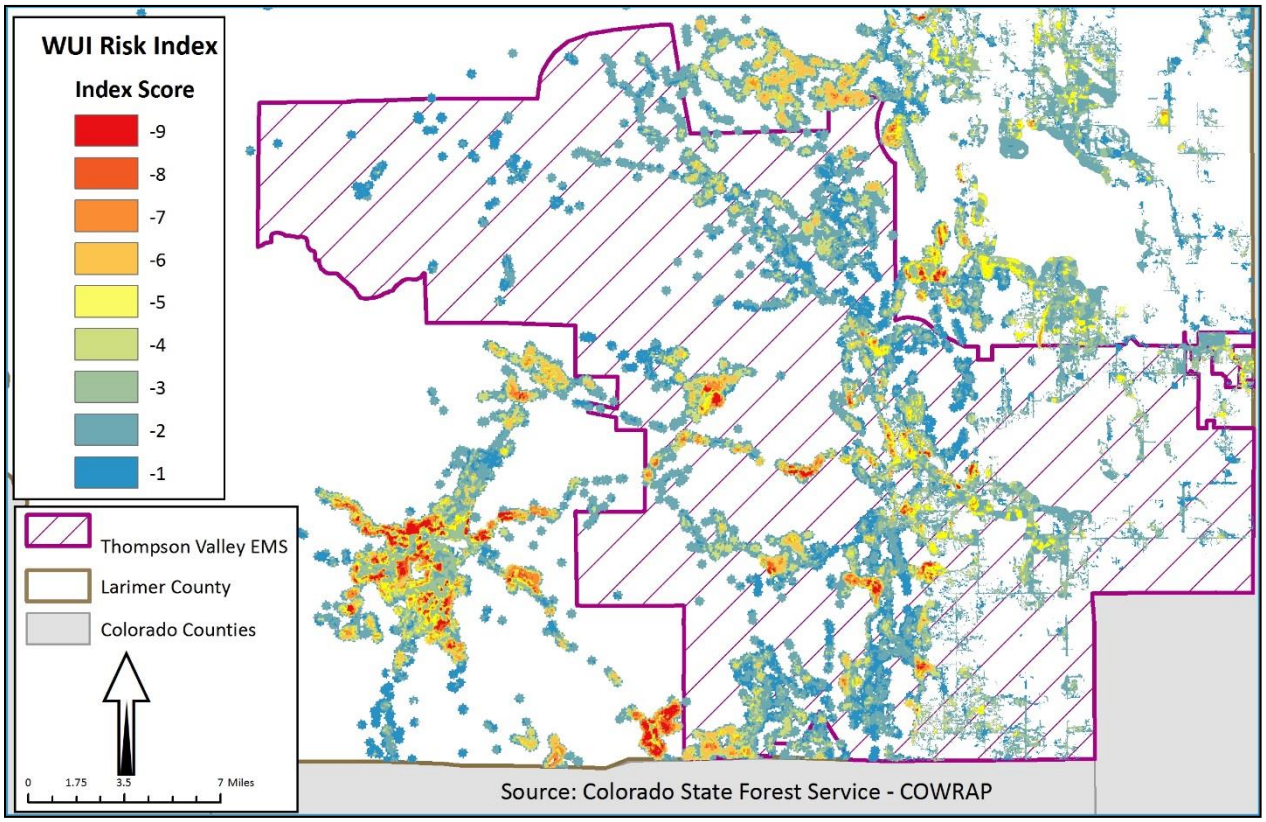
Thompson Valley EMS Service Area Wildfire Risk Index Map[217]



There are a number of areas in the central and western regions of the service area that are within the medium to highest level on the WUI Risk Index Scale. This means that the potential impact on people and homes from a wildfire in those areas is medium to high in relationship to the rest of Larimer County. This level of risk is derived by combining housing density with predicted flame length.

[217] Wildfire Risk represents the possibility of loss or harm occurring from a wildfire. Risk is derived by combining wildfire threat and fire effects. The COWRAP data set was produced statewide and ranks areas on a scale that includes: lowest risk to highest risk. All risk rankings are present in Larimer County.

Thompson Valley EMS Service Area WUI Map[218]



Fires can extensively impact the economy of an affected area, including the agricultural, recreation and tourism industries, water resources, and the critical facilities upon which the Thompson Valley EMS depends. There are areas of high and medium wildfire threat in the central portion of the district according to the WUI Risk Index. There are no critical facilities located in areas with the *most negative* and 1 critical facility located in an area with the *2nd most negative* wildfire threat total.

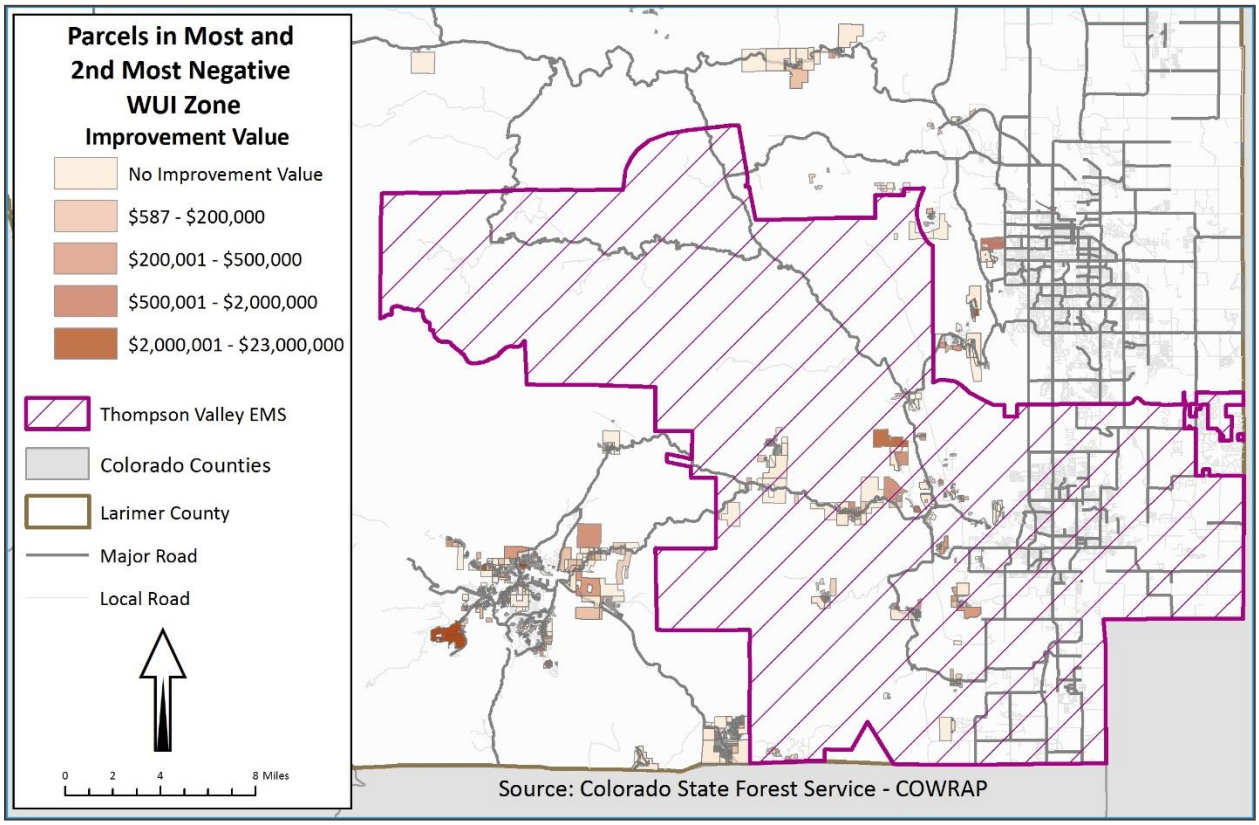
Potential Losses

The exposure data provided in the previous section (Inventory Assets Exposed) provides the clearest picture of potential losses to wildfire in the Thompson Valley EMS service area. The appraisal value of the

[218] Wildland Urban Interface Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length. The COWRAP data set was produced statewide and ranks areas on a scale that includes: least negative to most negative impacts. This scale stretched from -1 (least) to -9 (most) statewide.

critical facility within the 2nd most negative threat areas is over $58 thousand dollars. There are 400 parcels/structures located in areas with the most negative and 601 parcels/structures located in areas with the 2nd most negative wildfire threat total. The appraisal value of the parcels/structures within these most and 2nd most negative threat areas is over $190.2 million dollars. The risk assessment uses worst case scenario loss estimates. For this reason it is important to plan for relative levels of loss rather than specific potential loss dollar amounts.

Thompson Valley EMS Service Area Parcels in the Most Negative and Second Most Negative WUI Zone[219]



Probability of Future Occurrences

The likelihood of wildfires attaining significant size and intensity is unpredictable and highly dependent on environmental conditions and firefighting response. Weather conditions, particularly drought events, increase the likelihood of wildfires occurring. That said, it is important to note that 98% of wildfires are human-caused. Ultimately, the occurrence of future wildfire events will strongly depend on patterns of

[219] Wildland Urban Interface (WUI) Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length.

human activity and events are more likely to occur in wildfire-prone areas experiencing new or additional development.

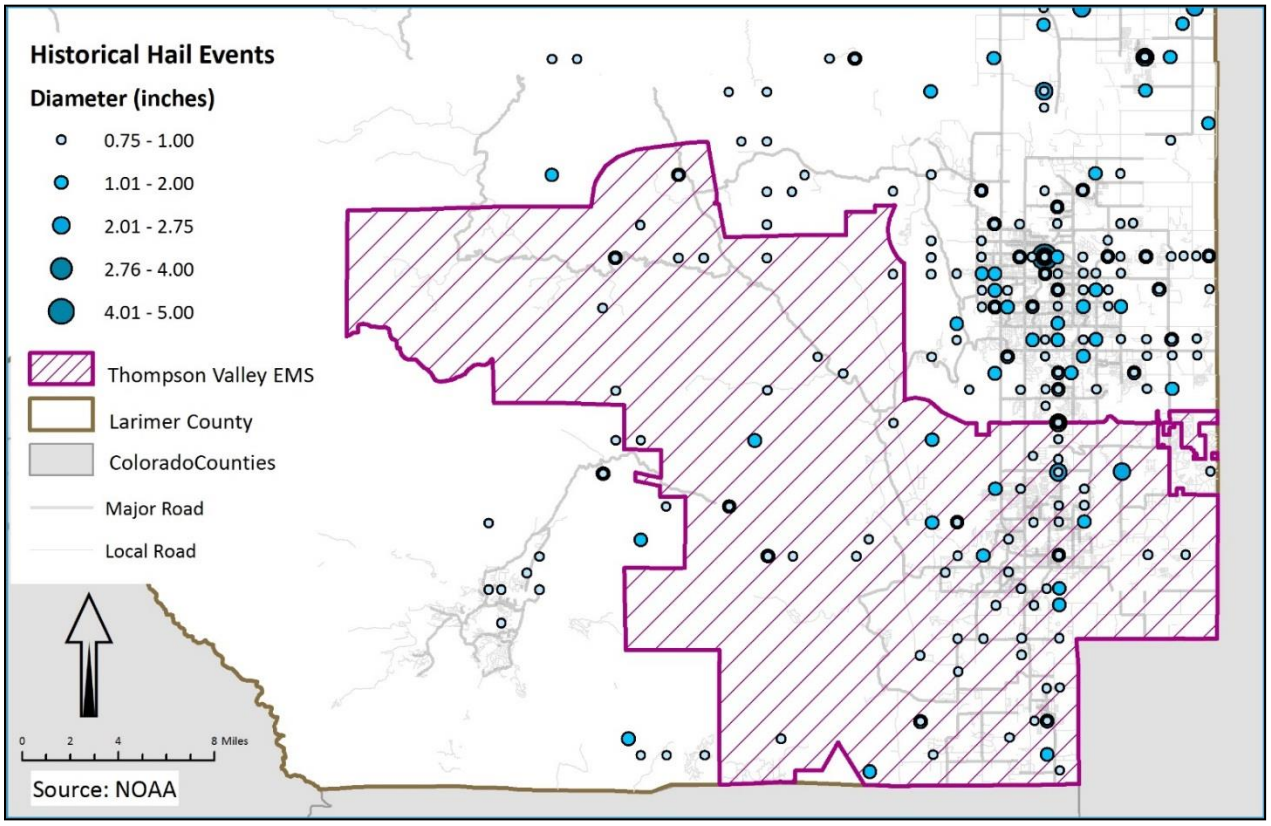
Wildfires can occur at any time of day and during any month of the year. Moreover, the length of a wildfire season and/or peak months may vary appreciably from year to year. As evidenced by the wildfire risk assessment, areas within the Thompson Valley EMS service area that are characterized by dense development and single family homes along the wildland-urban interface are most vulnerable to wildfire.

Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)

Previous Occurrences

According to NOAA's Storm Events Database there are no reported deaths and 1 injuries in the Thompson Valley EMS service area due to hail. There have been 114 hail events reported in the Thompson Valley EMS service area between 1955 and 2014. Of the 114 incidents, 5 reported losses totaling $21 thousand dollars. Based on the historic data showing hazardous impacts on the service area, there is a great potential for hail events to occur at any given time.

Historical Hail Events in Thompson Valley EMS[220]



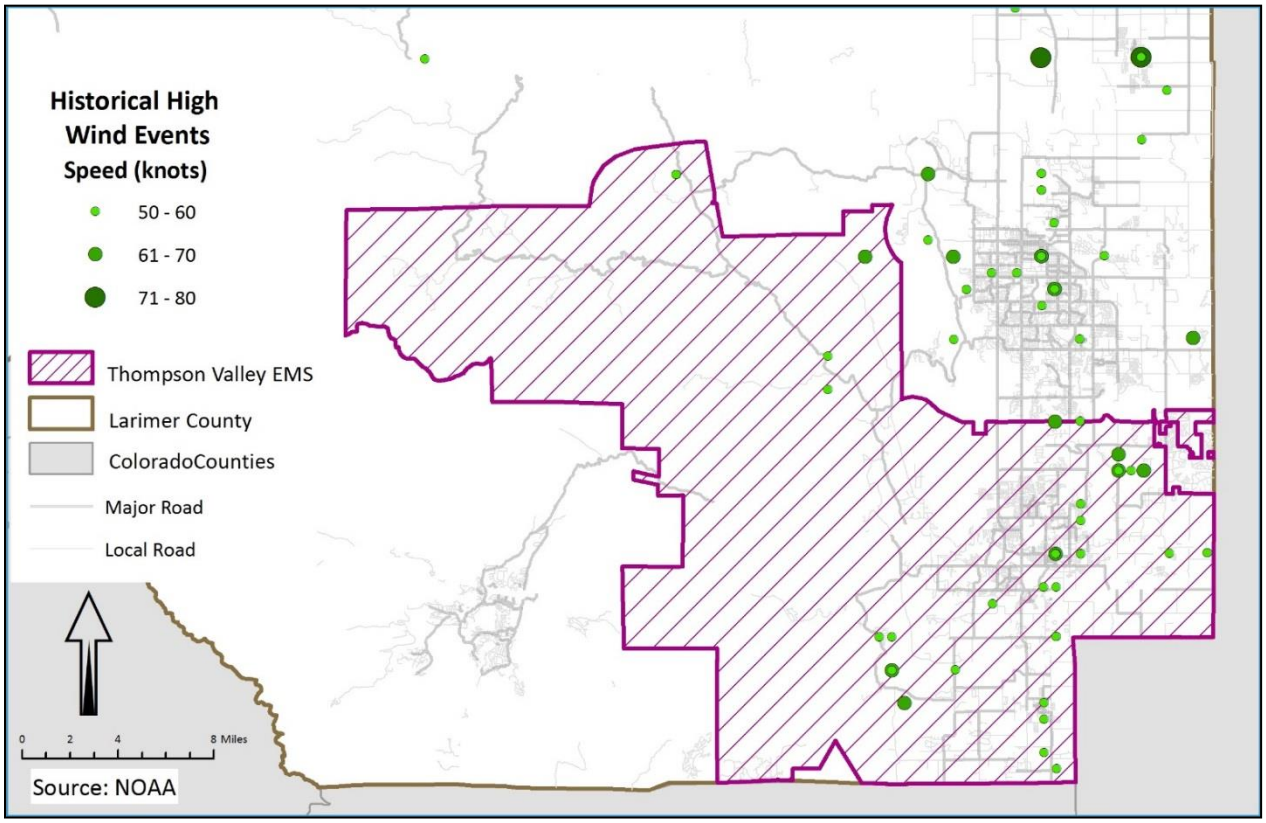
According to NOAA's Storm Events Database there have been 7 injuries and 2 deaths in Thompson Valley EMS service area due to thunderstorm wind. There have been 30 thunderstorm wind events reported in Thompson Valley EMS service area between 1955 and 2014. Of the 30 incidents, 4 reported property losses totaling $76,000 and no crop losses. Based on the historic data showing hazardous impacts on the area, there is a great potential for hail events to occur at any given time.

According to NOAA's Storm Events Database there have been 11 lightning events in Thompson Valley EMS service area between 1996 and 2014. There have been 12 reported injuries, 2 deaths, $104,000 worth of property damage, and $10,000 worth of crop damage. Based on the historic data showing hazardous impacts on the area, there is a great potential for lightning events to occur at any given time.

According to NOAA's Storm Events Database there have been 47 Windstorm events in Thompson Valley EMS between 1996 and 2014. There have been 15 reported injuries, 2 deaths, and $16 thousand dollars in damage. Based on the historic data showing hazardous impacts on the area, there is a great potential for high wind events to occur at any given time.

[220] Source: NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

Historical High Wind Events in Thompson Valley EMS Service Area[221]



Inventory Exposed

All assets located in the Thompson Valley EMS service area can be considered at risk from spring and summer storms. This includes all people, or 100% of the population, and all buildings and infrastructure within the district. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the service areas critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Inventory assets exposed to severe wind is dependent on the age of the building, type, construction material used, and condition of the structure. Possible losses to critical infrastructure include:

- Electric power disruption
- Communication disruption
- Water and fuel shortages

[221] Source: NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

- Road closures
- Damaged infrastructure components, such as sewer lift stations and treatment plants
- Damage to homes, structures, and shelters

Potential Losses

Spring and summer storms affect the entire planning area of the Thompson Valley EMS service area including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Severe storms will remain a highly likely occurrence for the Thompson Valley EMS service area. It is likely that lightning and hail will also be experienced in the area due to such storms.

Generally, straight-line wind events destroy private, commercial, and public property. Additional costs stem from debris removal, maintenance, repair, and response. Indirect costs include loss of industrial and commercial productivity as a result of damage to infrastructure, facilities, or interruption of services. Because no specific, countywide loss estimation exists for wind, potential losses are related to historical property damage and injuries/deaths.

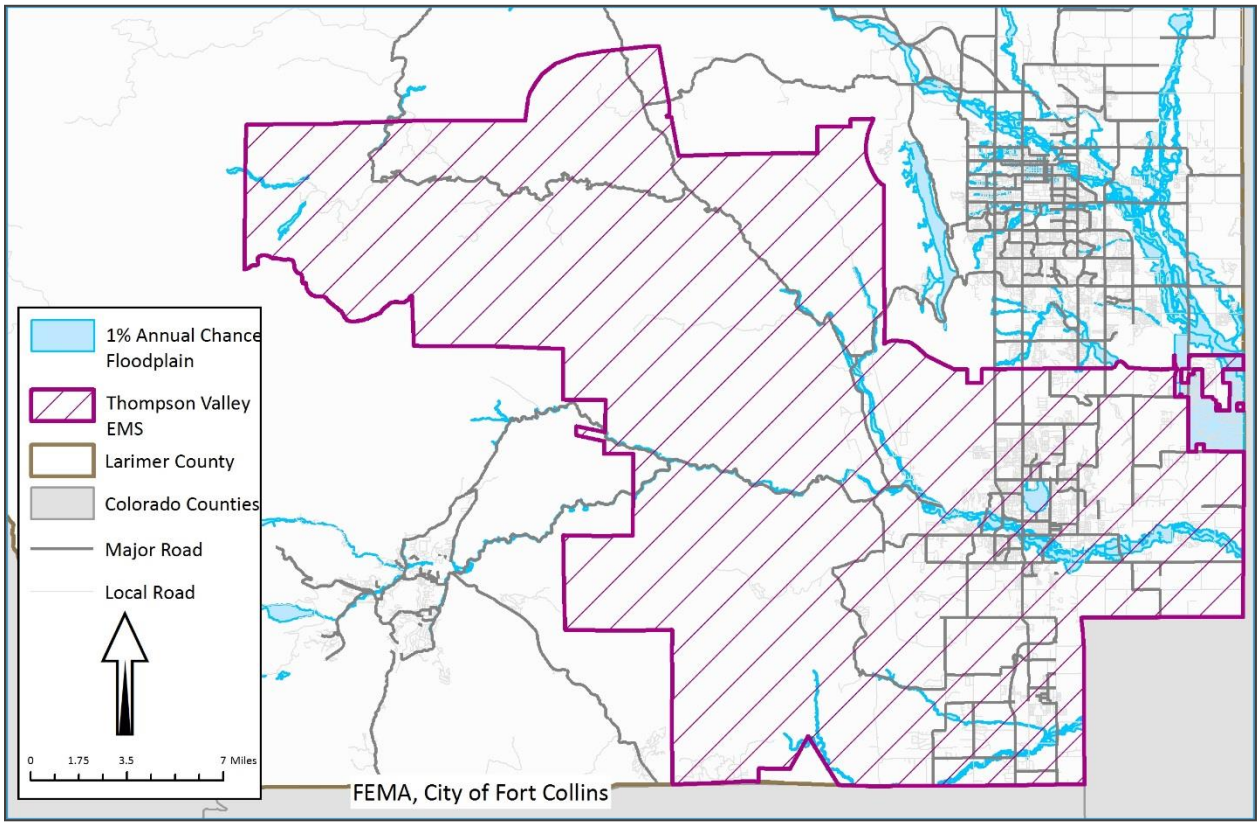
Probability of Future Occurrences

Spring and summer storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past spring and summer events provide benchmarks for projecting similar conditions into the future. The probability that Thompson Valley EMS service area will experience a spring or summer storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the Thompson Valley EMS service area at least once every year.

Reported straight-line wind events over the past nineteen years provide an acceptable framework for determining the future occurrence in terms of event. The probability of the Thompson Valley EMS service area experiencing a severe wind event associated with damages or injuries can be difficult to quantify, but based on historical record of 47 severe wind events since 1996, there is a high chance of this type of event occurring each year.

Flood – Flash and Riverine

Thompson Valley EMS Service Area Special Flood Hazard Area[222]

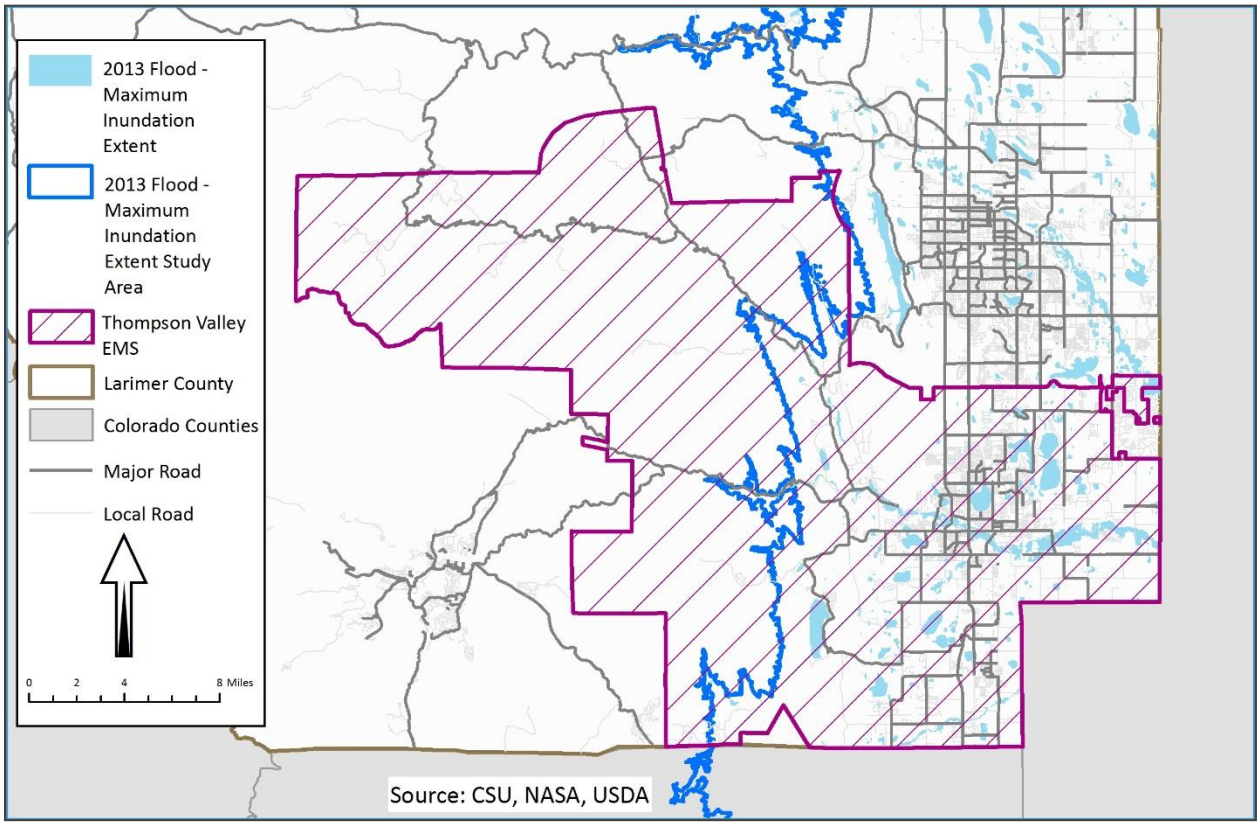


Previous Occurrences

According to NOAA's Storm Events Database there have been no reported injuries, over $109 million dollars in property loss, and approximately $1000 thousand dollars in crop damage in the Thompson Valley EMS service area caused by flooding. On September 12, 2013 there were two reported deaths caused by flooding. From September 12-16, 2013 nearly 6-18 inches of rain fell across Colorado's front range and I-25 corridor. Based on the historic data showing hazardous impacts on the service area, there is a great potential for flooding events to occur at any given time.

[222] This layer is compiled utilizing the most recent Special Flood Hazard Areas (SFHA) as defined by FEMA's National Flood Hazard Layer (NFHL) in combination with some recent flood studies performed by the City of Fort Collins. These areas are also referred to as the 1% Annual Chance Floodplain.

Thompson Valley EMS Service Area 2013 Flood Extent[223]



Maximum flood extent—a key data need for disaster response and mitigation—is rarely quantified due to storm-related cloud cover and the low temporal resolution of optical sensors. While change detection approaches can circumvent these issues through the identification of inundated land and soil from post-flood imagery, their accuracy can suffer in the narrow and complex channels of increasingly developed and heterogeneous floodplains. The data depicted above is from a study that explored the utility of the Operational Land Imager (OLI) and Independent Component Analysis (ICA) for addressing these challenges in the unprecedented 2013 Flood along the Colorado Front Range, USA. The approach was able to simultaneously distinguish flood-related water and soil moisture from pre-existing water bodies and other spectrally similar classes within the narrow and braided channels of the study site.

Inventory Exposed

Critical facilities are essential to the health and welfare of the whole population and are especially important both during and after hazard events. Critical structures or areas that overlap or touch the SFHA are considered "flood prone."

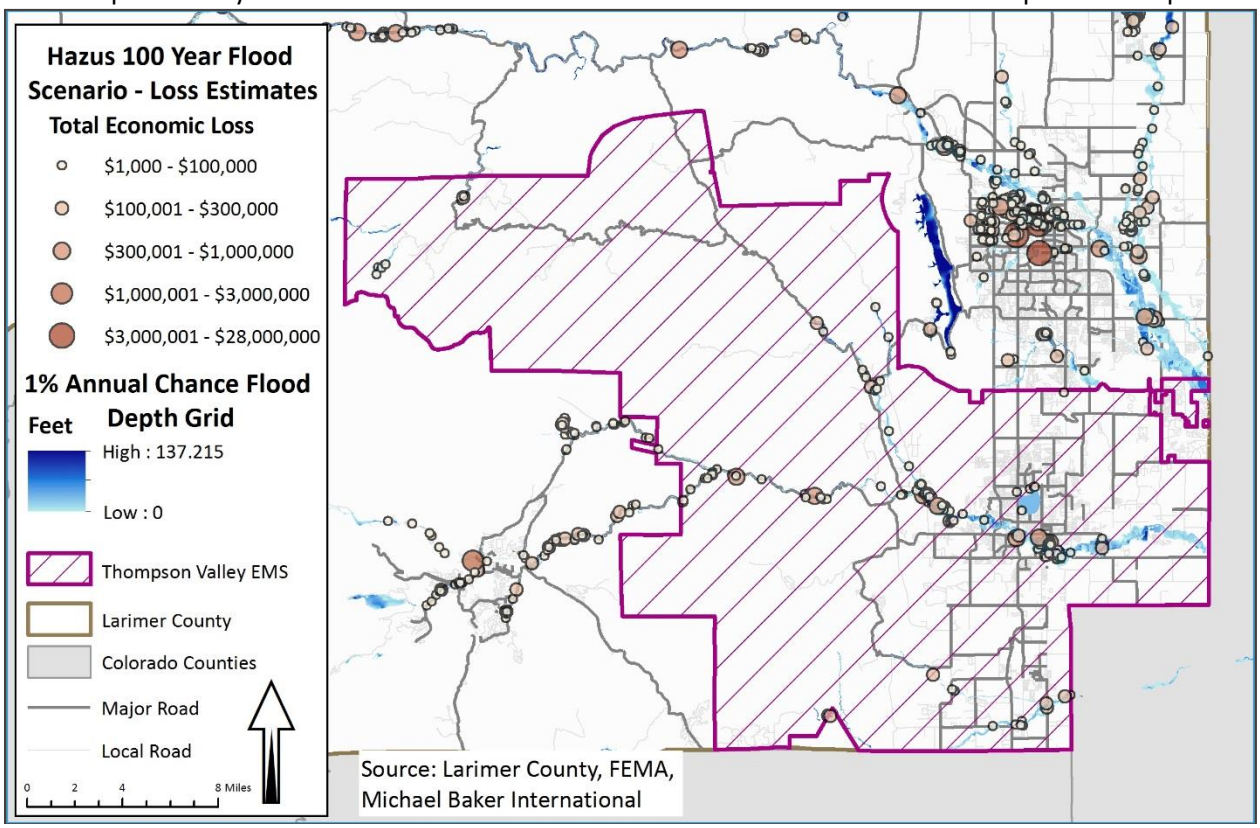
[223] Multi-Temporal Independent Component Analysis and Landsat 8 for Delineating Maximum Extent of the 2013 Colorado Front Range Flood

The critical facility and structure exposure analysis estimates that there are 10 critical facilities and 1,630 parcels/structures in the Thompson Valley EMS service area that are flood prone (not including the total miles of flood prone infrastructure). The appraised value of these exposed critical facilities is over $19.6 million dollars. The appraised value of these exposed structures is over $309.7 million dollars.

Potential Losses

Hazus estimates for the Livermore Fire Protection District that for a 100-year flood event, approximately 3 critical facilities and 242 buildings will experience flood damage. The estimated critical facility building loss is over $147 thousand dollars, content loss over $786 thousand dollars, and inventory loss of over $50 thousand dollars. The estimated building loss is over $6.3 million dollars, content loss over $6.6 million dollars, and inventory loss of over $3 million dollars.

Thompson Valley EMS Service Area 1% Annual Flood Loss Estimation and Flood Depth Grid Map[224]



[224] FEMA's loss estimation modeling software, Hazus, was utilized to produce this data set. A 100 year flood scenario was defined and losses were calculated for each point (structure) that intersected the depth grid based on the Hazus depth damage curves for specific structure attributes (such as foundation type, building type, and first flood height). Information derived from Hazus-MH 2.2 flood scenario. Total Losses equals a sum of building losses, content losses,

Probability of Future Occurrences

Frequency of previously reported flood events in the Thompson Valley EMS service area provide an acceptable framework for determining the probability of future flood occurrence in the area. The probability that the district will experience a flood event can be difficult to predict or quantify.

Severe flooding has the potential to inflict significant damage to people and property in the service area. Mitigating flood damage requires that communities remain diligent and notify local officials of potential flood (and flash flood) prone areas near infrastructure such as roads, bridges, and buildings.

Hazmat – Fixed and Transport

Previous Occurrences

Based on data supplied by the Pipeline and Hazardous Materials Safety Administration's (PHMSA) Incident Reports Database there have been 102 reported HAZMAT incidents within the Thompson Valley EMS service area between 1972 and 2015.

Inventory Exposed

We can't accurately predict when or where a HAZMAT incident may occur. Therefore, for the purpose of this plan, all existing and future buildings, facilities, and populations in the Thompson Valley EMS service area are considered to be equally exposed and couple potentially be impacted. This includes approximately 100,000 people, or 100% of the service area's population, and all buildings and infrastructure within the service area.

When hazardous materials are being transported they are particularly vulnerability to transportation related accidents, misuse, or terrorist threats. Most hazardous materials are transported in large quantities in order to reduce costs and security is difficult to maintain around moving vehicles that cross jurisdictional boundaries. When transported close to populated areas or critical infrastructure, HAZMAT releases can have serious consequences. The inventory that is most often exposed to HAZMAT risks are railways, roadways, and fixed facilities that contain hazardous materials, and all assets that lie within a mile of the potential release areas.

I-25, US Hwy 34, and State Hwy 14 runs through the Thompson Valley EMS service area and is a designated nuclear and hazardous materials transportation route. All structures, natural resources, and people located within one mile of these transportation routes (and railways) are exposed to the impacts of a potential HAZMAT event. Structures, people, and natural resources located outside of a one mile buffer of these routes are also at risk of exposure.

Assets and people that are located within one mile of an industrial or commercial fixed site are also at risk of exposure to the impacts of a HAZMAT release.

Potential Losses

HAZMAT related events occur throughout the Thompson Valley EMS every year. The intensity and magnitude of these incidents depend on weather conditions, the location of the event, the time of day,

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and inventory losses. 1% Annual Chance Flood flooding depth grid, produced from the best available topographic and floodplain data.

and the process by which the materials are released. *Was is raining when the event happened? Were the hazardous materials being transported by rail when they were released or were they at a fixed facility? Did the spill happen during rush hour traffic or in the middle of the night?* All of these considerations matter when determining the risk and potential damages associated with a HAZMAT incident.

HAZMAT events have the potential to threaten lives and disrupt business activity. Moreover, HAZMAT incidents can cause serious environmental contamination to non-renewable resources such as air, ground, and water sources.

Probability of Future Occurrences

As with most hazards that have limited spatial predictability or warning time, the probability of future occurrences of HAZMAT events is difficult to predict. However, as development continues to encroach into existing industrial areas and becomes more dense along high-risk designated hazardous materials transportation routes, the risk of future occurrences becomes greater. Even if the frequency of HAZMAT spills remains the same over time, population growth will increase the probability of a disaster event.

Utility Disruption

Previous Occurrences

The Thompson Valley EMS does not currently track incidences of utility disruption.

Inventory Exposed

All assets located in Thompson Valley EMS service area are considered at risk from the impacts of utility disruption events. This includes approximately 100,000 people, or 100% of the County's population, and all buildings and infrastructure within the County.

Potential Losses

Utility disruption events have the potential to threaten lives and disrupt business activity. However, monetary losses and casualty estimates are largely unknown.

Probability of Future Occurrences

In general, utility outages result from failures in the distribution system as opposed to shortages of supply. Distribution systems are most susceptible to failure during extreme hot and cold temperatures as well as during violent weather conditions. Regional utility failures can threaten human life, particularly when outages affect hospitals, nursing homes, or other healthcare facilities. As both population and climate variability increase across the State of Colorado, and put more pressure on aging distribution systems, it is likely that utility disturbance events will become more frequent in and around the Thompson Valley EMS service area.

Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)

Previous Occurrences

According to NOAA's Storm Events Database, the Thompson Valley EMS has experienced 74 Winter Storms since 1996. On March 17, 2003 there was report of a winter storm causing $15,500,000 in property damage in areas of Larimer County below 6,000 feet and eastern Larimer County. There were no deaths, injuries or damage to crops reported for any of these storms. The Thompson Valley EMS is at high risk of experiencing Winter Storms during the winter months.

Inventory Exposed

All assets located in the Thompson Valley EMS can be considered at risk from winter storms. This includes all people, or 100% of the Community's population, and all buildings and infrastructure within the community. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the Community's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Potential Losses

Winter storms affect the entire planning area of the Thompson Valley EMS including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Winter storms will remain a highly likely occurrence for the Thompson Valley EMS.

Probability of Future Occurrences

Severe winter storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past severe winter events provide benchmarks for projecting similar conditions into the future. The probability that the Thompson Valley EMS service area will experience a severe winter storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the service area at least once every year.

Capabilities Assessment

The capability assessment examines the ability of Thompson Valley EMS to implement and manage the comprehensive mitigation strategy laid out in this Plan. The strengths, weaknesses, and resources of the community are identified here as a means for evaluating and maintaining effective and appropriate management of the organization's hazard mitigation program.

Local Personnel

The ability of a community to implement a comprehensive mitigation strategy depends, in part, on available resources, including people and staff. The following table outlines Thompson Valley EMS' capabilities as they relate to key personnel.

	Full Time	Part Time	None or Not-Identified
Emergency Manager	X		

Floodplain Administrator	X		
Community Planner	X		
GIS Specialist	X		
Grant Writer			X

Land Use Planning and Codes

Local land use plans and building codes are tremendous tools for evaluating local policies related to hazard mitigation and risk reduction. Additionally, comprehensive master plans, capital improvement plans, stormwater plans and zoning ordinances all present opportunities for enhanced local capabilities. The following table outlines Thompson Valley EMS' current capabilities as they relate to land use planning and codes.

	Yes (Y); No (N)
A zoning ordinance	Y
A hazard-specific ordinance	Y
Local building codes	Y
A Comprehensive Plan / Master Plan	Y
A Capital Improvements Plan	Y
A Stormwater Plan	Y
A Continuity of Operations Plan (COOP)	Y
An Emergency Operations Plan (EOP)	Y
A Long-Term Recovery Plan	Y
Participates in the NFIP	N

Plan Maintenance and Implementation

Thompson Valley EMS has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the organization will continue public participation in the plan maintenance process.

Jurisdiction	Plan Maintenance and Implementation Strategy
Thompson Valley EMS	*"Our mitigation actions will be added to the capital budget each year and evaluated annually."* *"Through our accreditation process, mitigation actions will be listed as a line item for public review."*

Integrating Hazard Mitigation into Local Planning

Through discussions at planning meetings and the use of an online survey, individual outreach, and phone calls, each participating jurisdiction brainstormed with the planning team to identify processes for integrating hazard mitigation into their local planning mechanisms and policies. The following table lists the specific integration strategy identified by Thompson Valley EMS based on the mitigation actions listed in this plan.

Jurisdiction	Strategy
Thompson Valley EMS	*"We will integrate the plan into our annual SWOT analysis."*

Mitigation Action Guides

The following Mitigation Action Guide presents the organization's mitigation action that was developed for the 2016 Plan.

Thompson Valley EMS: Wildfire Mitigation Project	
PRIORITY: High	HAZARDS ADDRESSED: Wildfire
LOCATION: Thompson Valley EMS	GOALS ADDRESSED: Goals 1, 2, 4, and 5
RECOMMENDATION DATE: 6/1/2015	OBJECTIVES ADDRESSED: Objectives B, C, and E
TARGET COMPLETION DATE:12/31/2016	
ISSUE: The Larimer Resiliency Framework and recent meetings regarding critical infrastructure have illustrated the need to ensure the functionality of all critical systems during and after disaster.	
RECOMMENDATION: Mitigate against wildfire at all Thompson Valley EMS facilities.	
ACTION: Create defensible space around all district-owned facilities and infrastructure, including creating buffer zones, replacing flammable vegetation with less flammable species and creating defensible space around power lines, oil and gas lines, and other infrastructure systems.	
LEAD AGENCY: Thompson Valley EMS	EXPECTED COST: $200,000
SUPPORT AGENCIES: Loveland and Larimer Offices of Emergency Management	POTENTIAL FUNDING SOURCES: City Resources, Thompson Valley EMS resources, grant funding
PROGRESS MILESTONES: - Creating buffers around residential and non-residential structures through the removal or reduction of flammable vegetation, including vertical clearance of tree branches. - Replacing flammable vegetation with less flammable species. - Creating defensible zones around power lines, oil and gas lines, and other infrastructure systems. - Assess construction materials of roof coverings, attic vents, and gutters and replace deficient materials with ignition-resistant construction standards - Protect propane tanks and other external fuel sources	

Thompson Valley EMS: Emergency Generators (Thompson Valley EMS –1)	
PRIORITY: Low-medium	HAZARDS ADDRESSED: Emergency generators in all EMS stations
LOCATION: All TVEMS stations in Loveland and Berthoud	GOALS ADDRESSED: 1. Protect people, property and natural resources
RECOMMENDATION DATE: 10/30/2015	OBJECTIVES ADDRESSED: C. Incorporate risk reduction principles into policy documents and initiatives; other institutional plans
TARGET COMPLETION DATE: 01/01/2022	
ISSUE: In the event of a large scale power outage that effects the power at an EMS station, an emergency generator would allow for the garage door openers to operate thus allowing the crew to be able to respond to emergency calls.	
RECOMMENDATION: Budget and equip at least one EMS station with an emergency generator per year.	

ACTION: Budgeting of one emergency generator and partner with contractor who is licensed to install generator. Conduct monthly inspection and testing of generators to assure their capability.	
LEAD AGENCY: Thompson Valley EMS	EXPECTED COST: $500,000-$1,000,000
SUPPORT AGENCIES: None	POTENTIAL FUNDING SOURCES: General operating funds and/or potential grants.

PROGRESS MILESTONES:

- Determine generator needs at each location
- Budget for one generator at a time
- Partner with a contractor who is licensed to install the generator
- Conduct monthly inspections and testing of the generator
- Repeat process with the next until every station has a generator

Thompson Valley EMS: Mitigation Assessment (Thompson Valley EMS – 2)	
PRIORITY: Medium	HAZARDS ADDRESSED: All
LOCATION: All TVEMS stations in Loveland and Berthoud	GOALS ADDRESSED: 1. Protect people, property and natural resources
RECOMMENDATION DATE: 10/30/2015	OBJECTIVES ADDRESSED: C. Incorporate risk reduction principles into policy documents and initiatives; other institutional plans
TARGET COMPLETION DATE: 01/01/2018	
ISSUE: Thompson Valley EMS covers a large portion of southern Larimer County. Many of the highest natural hazards exist in this area, including flooding along the Little Thompson River and WUI areas.	
RECOMMENDATION: A determination of mitigation actions to protect Thompson EMS assets is needed.	
ACTION: Conduct a mitigation assessment of Thompson Valley EMS infrastructure and Assets to determine key protection and mitigation actions.	
LEAD AGENCY: Thompson Valley EMS	EXPECTED COST: $0
SUPPORT AGENCIES: None	POTENTIAL FUNDING SOURCES: General operating funds and/or potential grants.

PROGRESS MILESTONES:

- Conduct an asset and infrastructure inventory to determine critical infrastructure in the district
- Assess each area for hazard vulnerability and risk
- Determine key mitigation actions for each areas in the future

Letter of Intent to Participate

THOMPSON VALLEY
EMERGENCY MEDICAL SERVICES

4480 Clydesdale Parkway
Loveland, CO 80538
970-663-6025

July 30, 2015

Lori R. Hodges
Larimer County Emergency Management
200 West Oak Street
Fort Collins, CO 80526

Re: 'Statement of Intent to Participate' as a participating jurisdiction in the Larimer County Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Dear Ms. Hodges,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements under 44 CFR §201.6 which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the Thompson Valley Health Services District DBA Thompson Valley Emergency Medical Services (TVEMS) is submitting this letter of intent to confirm that (TVEMS) has agreed to participate in the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning (TVEMS) agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Larimer County OEM to complete the plan in conformance with FEMA requirements

(TVEMS) understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant

Town of Timnath

Twenty-five years from now, the Town of Timnath will be:

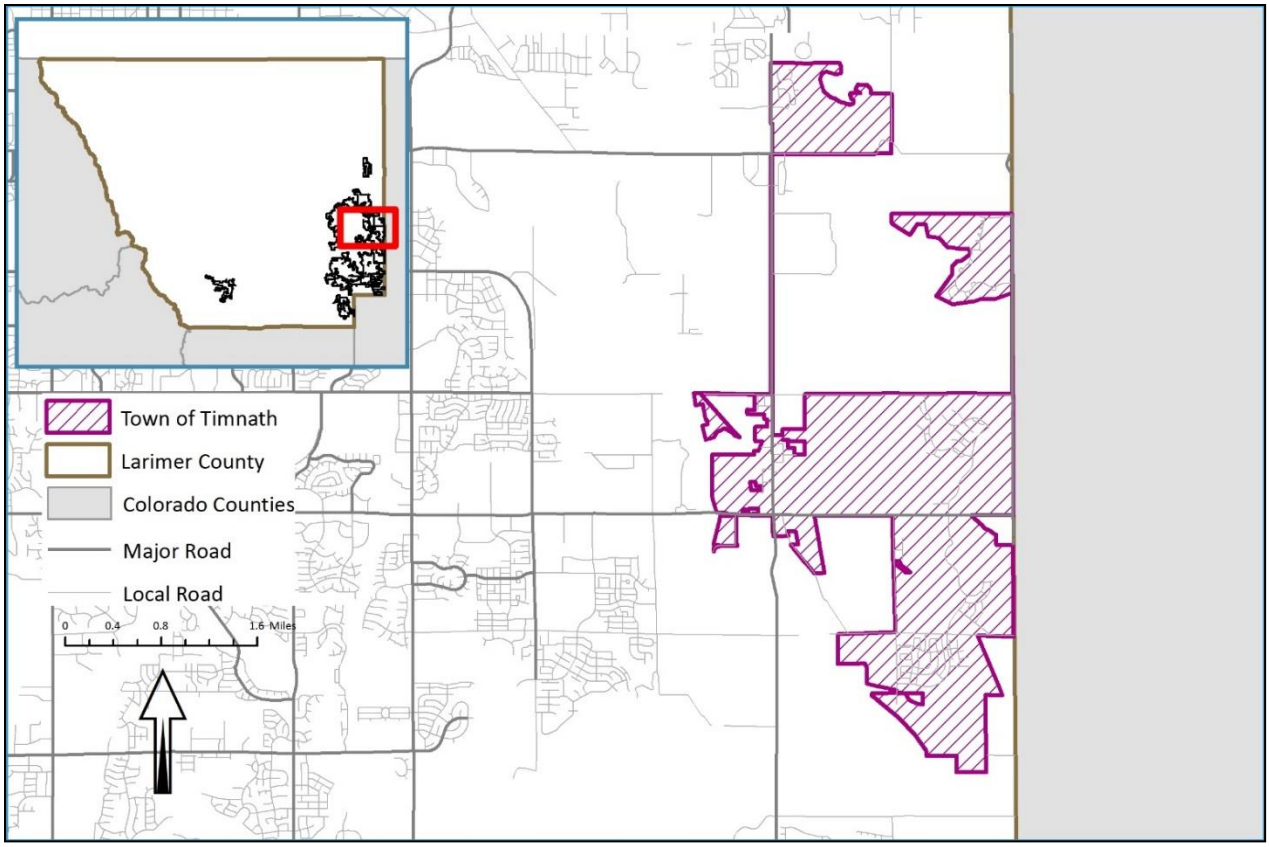
- *A well-planned and branded community that provides full services and amenities to its residents.*
- *An integrated and safe community with multiple physical connections and mobility options.*
- *Self-sustaining with a stable balance of commercial and residential growth.*
- *Artfully reflective of Town's history, ambience, and historical agrarian uses.*
- *Well-managed with intelligent use of financial resources.*
- *Pro-business with meaningful primary employment opportunities for the residents.*
- *Connected with an integrated system of parks, trails, open space and natural protected areas.*
- *An influential player among the regional partnerships in Northern Colorado.*
- *A destination community that is clean, green, and serene.*

-- Town of Timnath Vision Statement

Community Profile

The Town of Timnath is located east of Interstate 25 and the cities of Fort Collins and Loveland, and northwest of Windsor. Timnath is also within short travel distance to Denver, just 56 miles to the south, and Cheyenne, 46 miles to the north. The proximity of Timnath to 1-25, makes it a prime location for development. Fort Collins and Windsor presently provide the majority of employment, service, and retail opportunities to the town and its residents.

The incorporated area of Timnath currently consists of over 3,200 acres of land. The town's Growth Management Area encompasses over 13,600 acres or 21.4 square miles. Residential development is predominantly concentrated in the eastern portion of the town both north and south of Harmony Road in the Harmony and Timnath Ranch subdivisions, north of downtown in the Serratoga Falls subdivision, and in the downtown area along Main Street between County Road 38 and County Road 40. New development is also occurring in the Wild Wing subdivision located north of Harmony west of County Line Road. Larger lot single-family residential development has occurred on agricultural lands both in the Town and in unincorporated Larimer County, a trend that is expected to continue as the town grows. Commercial activity is centered primarily within the downtown area along Main Street, and at the Interstate 25 and Harmony Road interchange. New commercial development has been approved along Harmony Road just east of the Cache la Poudre River.



The following table summarizes key demographic and development related characteristics of the Town of Timnath.

Town of Timnath Statistics		
	Town of Timnath	Colorado
Population, 2010	625	5,029,196
2000-2010 Population Change, %	64%	14.5%
% Population under 5 years, 2010	11.4%	6.8%
% Population under 19 years, 2010	34.3%	20.3
% Population 65 years and over, 2010	7.3%	10.9%
Language other than English spoken at home, % age 5+, 2009-2013	2.1%	15.9%
Homeownership Rate 2010	86.4%	65.5%
Persons Per Household 2010	2.92	2.57
Persons below poverty level, %, 2013	1.5%	13.2%
Median Household Income, 2013	$113,144	$58,433

Hazard Identification and Risk Assessment

The following Hazard Identification and Risk Assessment Summary table is based on jurisdiction-specific responses to the risk factor exercise and differs from the risk factor results that were determined at the county scale.

NATURAL HAZARD	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)	0.9	0.6	0.8	0.3	0.3	2.9
Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)	0.9	0.6	0.8	0.1	0.3	2.7
Tornado	0.9	0.6	0.8	0.3	0.1	2.7
Flood – Flash and Riverine	0.9	0.3	0.4	0.3	0.2	2.1
Fire – Wildland	0.6	0.3	0.4	0.4	0.2	1.9
Hazmat – Fixed and Transport	0.9	0.3	0.2	0.4	0.1	1.9
Utility Disruption	0.6	0.3	0.6	0.2	0.1	1.8
Civil Disturbance	0.3	0.3	0.2	0.4	0.1	1.3
Earthquake	0.3	0.3	0.2	0.4	0.1	1.3
Landslide / Rockslide	0.3	0.3	0.2	0.4	0.1	1.3
Biological Hazards / Contagion	0.3	0.3	0.2	0.1	0.1	1.0
Erosion / Deposition	0.3	0.3	0.2	0.1	0.1	1.0
HIGH RISK (2.5 or higher): Winter Storm (Blizzard Conditions, Heavy Snow Accumulation); Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning); Tornado						
MODERATE RISK HAZARD (2.0 - 2.4): Flood – Flash and Riverine						
Low Risk (1.9 and lower): Hazmat – Fixed and Transport; Utility Disruption; Civil Disturbance; Earthquake; Landslide / Rockslide; Biological Hazards / Contagion; Erosion / Deposition						

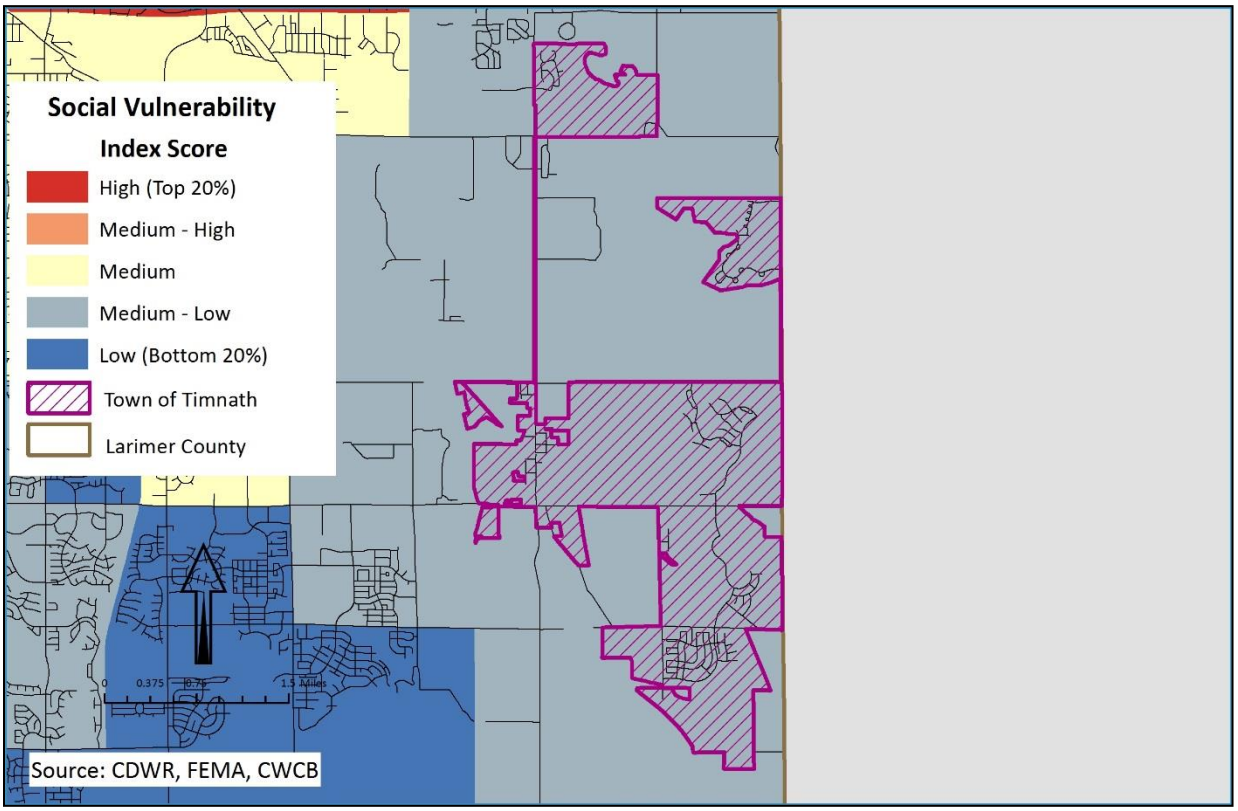
Vulnerability Assessment

This section provides a refined vulnerability assessment, specific for the Town of Timnath, for those hazards that were identified as being rated HIGH in the preceding section. This analysis was conducted

separately from that of the county-wide vulnerability assessment to specifically focus on the population, structures, infrastructure, and other assets unique to the Town of Timnath.

The results of the social vulnerability assessment are displayed on the map below. On the map, social vulnerability is represented at the census tract level by 5 classes of vulnerability: Low (bottom 20% of the county), Medium-Low, Medium, Medium-High, and High (top 20% of the county). The Town of Timnath's social vulnerability map shows social vulnerability within the community.

Social Vulnerability Map – Town of Timnath[225]



Social vulnerability is represented as the social, economic, demographic, and housing characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to hazard events. The pre-existing social conditions that contribute to disaster losses can be identified using social vulnerability indicators. Using methods identified in the Social Vulnerability Index (SoVI) developed by Cutter et. al. (2003) this layer shows the social vulnerability index scores for the State of Colorado at the census tract level. Social vulnerability is represented at the Census tract level by five classes of vulnerability: Low, Medium-Low, Medium, Medium-High, and High.

Timnath is characterized by medium-low levels of social vulnerability. This does not mean, however, that there aren't any socially vulnerable residents living in the community or that social vulnerability levels will

[225] Source: Colorado Division of Water Resources Dam Safety Branch, FEMA, Colorado Water Conservation Board (CWCB)

remain the same over time. Close analysis of the individual social vulnerability indicators within the community will give local emergency managers, planners, and stakeholders a clearer picture of which social vulnerability factors threaten the community the most and where social and economic resources should be allocated in order to reduce vulnerability. Over time, the town should continue to monitor their local social vulnerability as demographic, economic, and housing related conditions change.

Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)

Previous Occurrences

According to NOAA's Storm Events Database, the Town of Timnath has experienced 74 Winter Storms since 1996. On March 17, 2003 there was report of a winter storm causing $15,500,000 in property damage in areas of Larimer County below 6,000 feet and eastern Larimer County. There were no deaths, injuries or damage to crops reported for any of these storms. The Town of Timnath is at high risk of experiencing Winter Storms during the winter months.

Inventory Exposed

All assets located in the Town of Timnath can be considered at risk from winter storms. This includes 625 people, or 100% of the Town's population, and all buildings and infrastructure within the town. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the Town's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Potential Losses

Winter storms affect the entire planning area of the Town of Timnath including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Winter storms will remain a highly likely occurrence for the Town of Timnath.

Probability of Future Occurrences

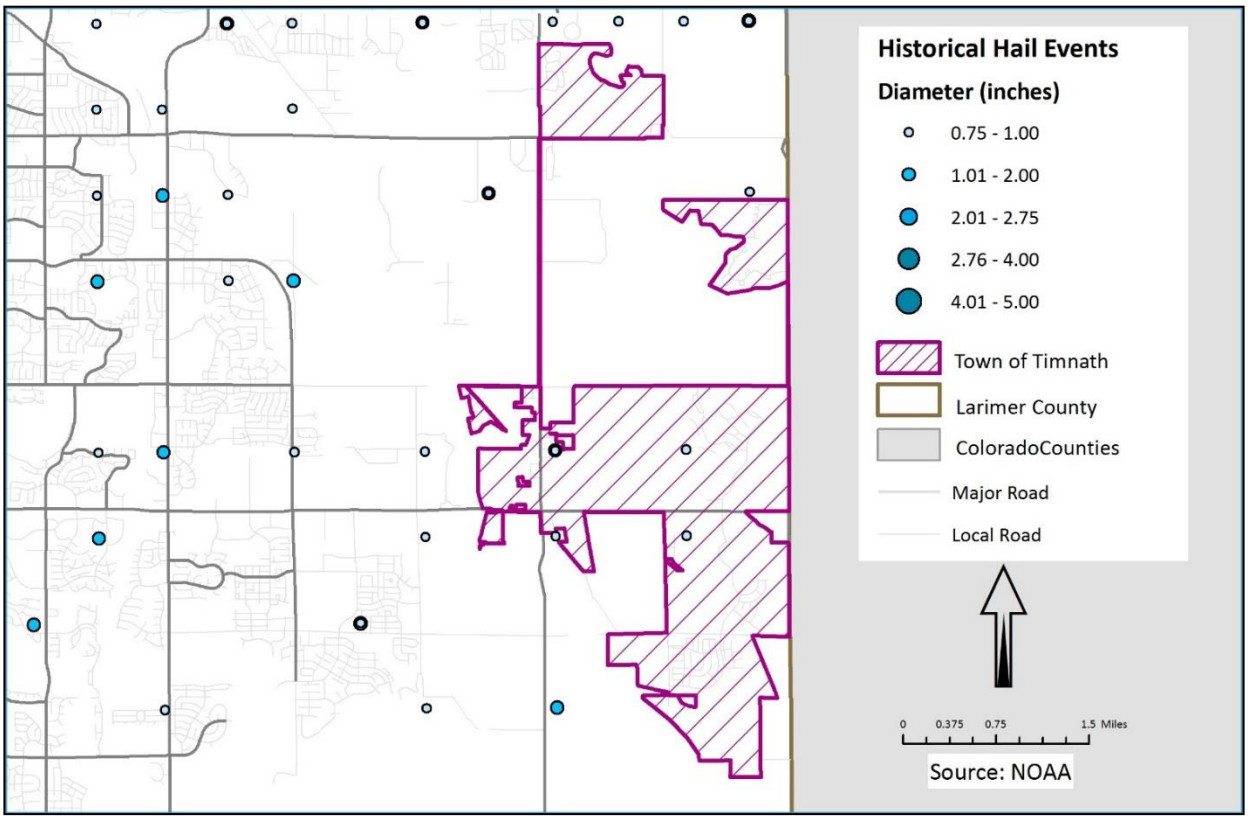
Severe winter storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past severe winter events provide benchmarks for projecting similar conditions into the future. The probability that the Town of Timnath will experience a severe winter storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the town at least once every year.

Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)

Previous Occurrences

According to NOAA's Storm Events Database there are no reported injuries, deaths, or damages in the Town of Timnath due to hail. There have been 5 hail events reported in the town between 1955 and 2014. Based on the historic data showing hazardous impacts on the town, there is a great potential for hail events to occur at any given time.

Historical Hail Events in the Town of Timnath[226]



According to NOAA's Storm Events Database there have been no injuries, deaths, or damages in the Town of Timnath due to thunderstorm wind. There has been 1 thunderstorm wind event reported in the town between 1955 and 2014. Based on the historic data showing hazardous impacts on the town, there is potential for Thunderstorm Wind events to occur at any given time.

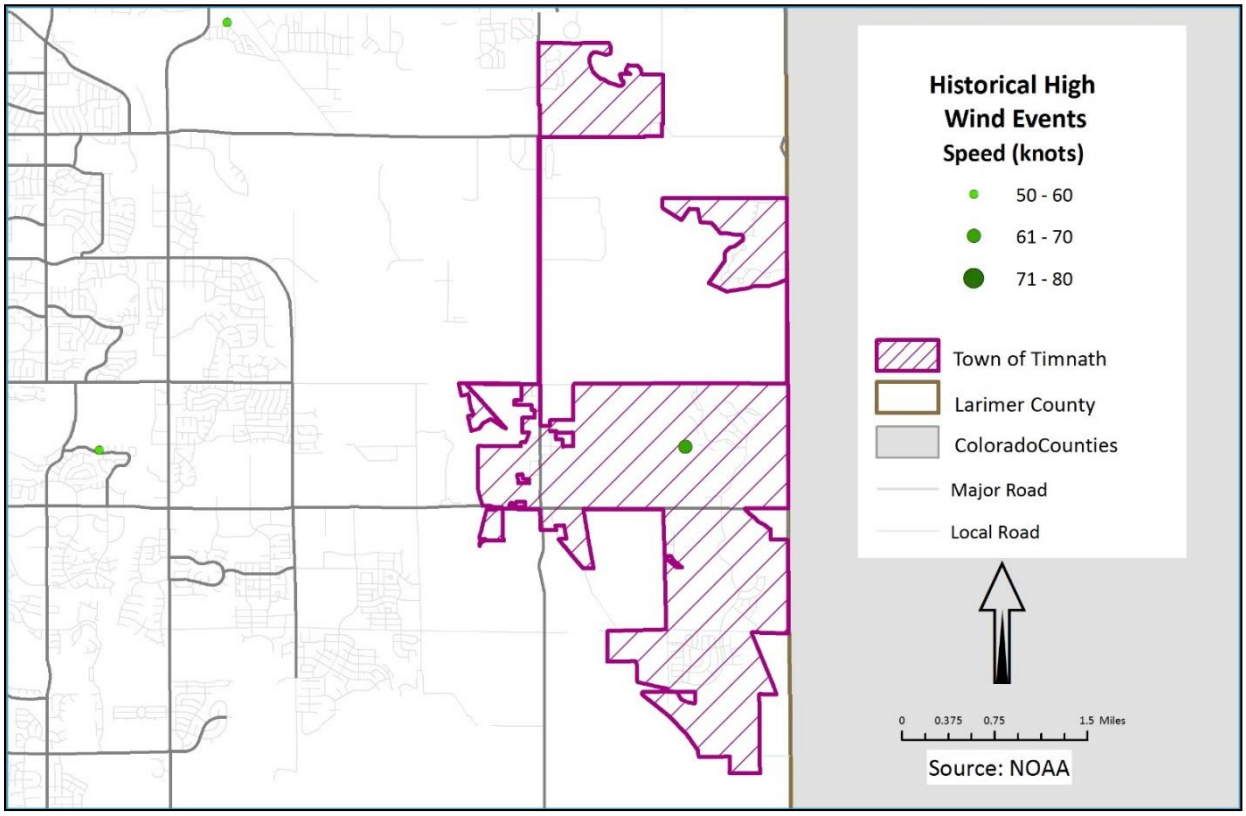
According to NOAA's Storm Events Database there have been no lightning events in the Town of Timnath between 1996 and 2014. Based on the historic data showing hazardous impacts on the county, there is potential for lightning events to occur at any given time.

According to NOAA's Storm Events Database there has been 1 Windstorm events in the Town of Timnath between 1996 and 2014. There have been no reported injuries, deaths, or damages. Based on the historic

[226] NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

data showing hazardous impacts on the town, there is potential for high wind events to occur at any given time.

Historical High Wind Events in the Town of Timnath[227]



Inventory Exposed

All assets located in the Town of Timnath can be considered at risk from spring and summer storms. This includes 625 people, or 100% of the Town's population, and all buildings and infrastructure within the district. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the Town's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Inventory assets exposed to severe wind is dependent on the age of the building, type, construction material used, and condition of the structure. Possible losses to critical infrastructure include:

- Electric power disruption
- Communication disruption

[227] NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

- Water and fuel shortages
- Road closures
- Damaged infrastructure components, such as sewer lift stations and treatment plants
- Damage to homes, structures, and shelters

Potential Losses

Spring and summer storms affect the entire planning area of the Town of Timnath including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Severe storms will remain a highly likely occurrence for the Town of Timnath. It is likely that lightning and hail will also be experienced in the area due to such storms.

Generally, straight-line wind events destroy private, commercial, and public property. Additional costs stem from debris removal, maintenance, repair, and response. Indirect costs include loss of industrial and commercial productivity as a result of damage to infrastructure, facilities, or interruption of services. Because no specific, countywide loss estimation exists for wind, potential losses are related to historical property damage and injuries/deaths.

Probability of Future Occurrences

Spring and summer storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past spring and summer events provide benchmarks for projecting similar conditions into the future. The probability that Town of Timnath will experience a spring or summer storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the Town of Timnath at least once every year.

Reported straight-line wind events over the past nineteen years provide an acceptable framework for determining the future occurrence in terms of event. The probability of the Town of Timnath experiencing a severe wind event associated with damages or injuries can be difficult to quantify, but based on historical record of 1 severe wind events since 1996, there is a chance of this type of event occurring each year.

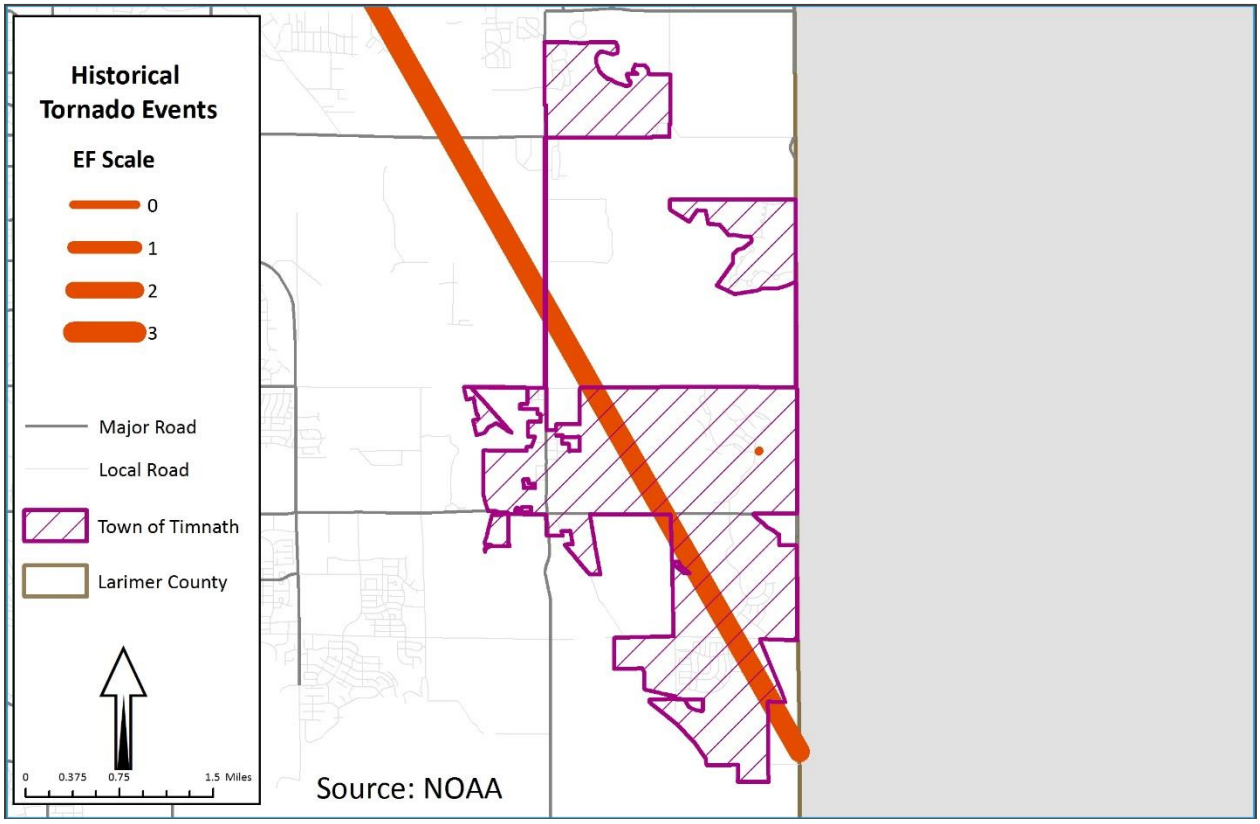
Tornado

Previous Occurrences

According to NOAA, 78 injuries, 1 death, and $147 million in damages have been recorded within and near the Town of Timnath due to tornadoes. There is record of 2 tornadoes reported within the town limits

between 1954 and 2015. The most severe event occurred on May 22, 2008. This EF3 tornado traveled in a north westerly direction and reached speeds of over 165 miles per hour. This tornado event consisted of a formation of several combined tornadoes forming a wedge that was between a half and three quarters of a mile wide. The tornado caused damage to not only the Town of Windsor but also the towns of Milliken, Platteville, Gilchrest, and the City of Greeley. One person was killed at the Missile Silo Campground near Greeley. The tornado impacted area was designated a national disaster. The Rocky Mountain Insurance Information Association (RMIIA) reported that there was an estimated $193.5 million in insured damages and approximately 24,000 auto and homeowners claims. Tornadoes will remain a highly likely occurrence for the Town of Timnath.

Town of Timnath Area Historic Tornadoes[228]



Inventory Exposed

All assets located in the Town of Timnath can be considered at risk from severe wind and tornadoes. This includes 625 people, or 100% of the Town's population and all buildings and infrastructure within the

[228] Historical tornado events. NOAA's National Weather Service Storm Prediction Center, 1950 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

County.[229] Most structures, including the Town's critical facilities, should be able to withstand and provide adequate protection from tornadoes. Those facilities with back-up generators should be fully equipped to handle tornado events should the power go out.

Potential Losses

Generally, tornadoes destroy private, commercial, and public property. Additional costs stem from debris removal, maintenance, repair, and response. Indirect costs include loss of industrial and commercial productivity as a result of damage to infrastructure, facilities, or interruption of services. Because no specific, countywide loss estimation exists tornado hazards, potential losses are related to historical property damage and injuries/deaths.

Probability of Future Occurrences

Reported tornadoes over the past 61 years provide an acceptable framework for determining the future occurrence in terms of frequency for such events. The probability of the Town of Timnath experiencing a tornado associated with damages or injuries can be difficult to quantify. Historic tornado frequencies suggest that there is a chance of this type of event occurring somewhere in within the town boundaries each year.

Capabilities Assessment

The capability assessment examines the ability of the Town of Timnath to implement and manage the comprehensive mitigation strategy laid out in this Plan. The strengths, weaknesses, and resources of the community are identified here as a means for evaluating and maintaining effective and appropriate management of the Town's hazard mitigation program.

Local Personnel

The ability of a community to implement a comprehensive mitigation strategy depends, in part, on available resources, including people and staff. The following table outlines the town's capabilities as they relate to key personnel.

	Full Time	Part Time	None or Not-Identified
Emergency Manager		X	
Floodplain Administrator		X	
Community Planner	X		
GIS Specialist		X	
Grant Writer			X

Land Use Planning and Codes

Local land use plans and building codes are tremendous tools for evaluating local policies related to hazard mitigation and risk reduction. Additionally, comprehensive master plans, capital improvement plans,

[229] 2010 Census

stormwater plans and zoning ordinances all present opportunities for enhanced local capabilities. The following table outlines the town's current capabilities as they relate to land use planning and codes.

	Yes (Y); No (N)
A zoning ordinance	Y
A hazard-specific ordinance	N
Local building codes	Y
A Comprehensive Plan / Master Plan	Y
A Capital Improvements Plan	Y
A Stormwater Plan	Y
A Continuity of Operations Plan (COOP)	N
An Emergency Operations Plan (EOP)	N
A Long-Term Recovery Plan	N
Participates in the NFIP	Y

Building codes are one tool that communities use to enhance public safety. For example, they can increase structural integrity, mitigate structure fires, and provide benefits in relation to natural hazard avoidance. In Colorado, land use regulations and building codes are typically implemented at the local level. Even without a statewide mandate, most counties and many municipalities have enacted regulations and codes. The Town of Timnath has adopted a local building code requirement, demonstrating their understanding of the benefits codes provide, including reduced exposure to hazards.

Plan Maintenance and Implementation

The Town of Timnath has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the town will continue public participation in the plan maintenance process.

Jurisdiction	Plan Maintenance and Implementation Strategy
Town of Timnath	*"We will schedule annual review by staff and adoption by the Town Council"* *"We have a robust website and will post comment pages, surveys and the plan on the site."*

Integrating Hazard Mitigation into Local Planning

Through discussions at planning meetings and the use of an online survey, individual outreach, and phone calls, each participating jurisdiction brainstormed with the planning team to identify processes for integrating hazard mitigation into their local planning mechanisms and policies. The following table lists the specific integration strategy identified by the Town of Timnath based on the mitigation actions listed in this plan.

Jurisdiction	Strategy
Town of Timnath	*"Upon the update of our comprehensive plan, we will include discussion of hazard mitigation as well as any recommended action items such as necessary amendments to our zoning or building codes."*

Mitigation Action Guides

The following Mitigation Action Guide presents the town's mitigation action that was developed for the 2016 Plan.

Town of Timnath: Full Adoption of Updated FEMA Floodplains	
PRIORITY: High	HAZARDS ADDRESSED: Flood
LOCATION: Town of Timnath	GOALS ADDRESSED: Goals 1, 2, 3, 4, and 5
RECOMMENDATION DATE: 10/18/2015	OBJECTIVES ADDRESSED: Objectives A, B, C, D and E
TARGET COMPLETION DATE: 12/31/2020	
ISSUE: Floodplain mapping is out of date and the 2013 Flood caused extensive changes to current floodplains	
RECOMMENDATION: Work with FEMA on updating current floodplain mapping in coordination with Larimer County	
ACTION: By 2020, the Cache la Poudre River through Timnath will be mapped and adopted by FEMA	
LEAD AGENCY: Town of Timnath Planning Department	EXPECTED COST: $300,000
SUPPORT AGENCIES: Larimer County Community Development and Office of Emergency Management	POTENTIAL FUNDING SOURCES: Colorado State Flood Hazard Mapping Project
PROGRESS MILESTONES: – Floodplain maps updated – Review and Comment Period / Public Review Process – Community Outreach – Follow the County process for zoning changes per county policy (Flood Review Board, Planning Commission, BCC, etc.)	

Town of Timnath: Community Outreach Project (Timnath – 1)	
PRIORITY: Medium	HAZARDS ADDRESSED: Extreme Temperatures, Severe Storm, Hazmat
LOCATION: Town of Timnath	GOALS ADDRESSED: 1,4
RECOMMENDATION DATE: 10/23/2015	OBJECTIVES ADDRESSED: A
TARGET COMPLETION DATE: 9/1/2016	
ISSUE: We are a very small but rapidly growing community. We have recently updated our website and other social media, but need to do more public outreach, specifically related to public awareness and preparedness around risk and hazards that affect our community.	
RECOMMENDATION: Create a public outreach program for the Town of Timnath	
ACTION: We will use existing educational materials as well as develop materials specific to the Town of Timnath to increase hazard and risk preparedness, response to educate our citizens.	
LEAD AGENCY: Town Manager's Office	EXPECTED COST: $5,000

SUPPORT AGENCIES: Larimer County OEM, Poudre Fire Authority/City of Fort Collins OEM.	POTENTIAL FUNDING SOURCES: Town general fund.
PROGRESS MILESTONES: - We will have a "check in" date of 7/1/2016 to assess the materials and distribution methodology.	

Town of Timnath: Mitigation Assessment (Timnath – 2)	
PRIORITY: Medium	HAZARDS ADDRESSED: All
LOCATION: Town of Timnath	GOALS ADDRESSED: 1. Protect people, property and natural resources
RECOMMENDATION DATE: 10/30/2015	OBJECTIVES ADDRESSED: C. Incorporate risk reduction principles into policy documents and initiatives; other institutional plans
TARGET COMPLETION DATE: 01/01/2018	
ISSUE: Timnath is currently updating all of their emergency management plans and programs. An assessment of risk has not been done before this plan. With this data, Timnath needs to conduct an assessment to determine future mitigation opportunities within the Town.	
RECOMMENDATION: A determination of mitigation actions to protect the Town of Timnath is needed.	
ACTION: Conduct a mitigation assessment of Timnath to determine key protection and mitigation actions.	
LEAD AGENCY: Town of Timnath	EXPECTED COST: Unknown
SUPPORT AGENCIES: None	POTENTIAL FUNDING SOURCES: General operating funds and/or potential grants.
PROGRESS MILESTONES: - Conduct an asset and infrastructure inventory to determine critical infrastructure in the Town - Assess each area for hazard vulnerability and risk - Determine key mitigation actions for each area in the future	

Letter of Intent to Participate

Town of TIMNATH

LETTER OF INTENT TO PARTICIPATE

November 14, 2014

Lori Hodges
Larimer County
200 West Oak
Fort Collins, CO. 80521

Re: "Statement of Intent to Participate" as a participating jurisdiction in Larimer County Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Dear Lori Hodges,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the Town of Timnath is submitting this letter of intent to confirm that Town of Timnath has agreed to participate in the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, Town of Timnath agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to the Larimer County to complete the plan in conformance with FEMA requirements.

Town of Timnath understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document.
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area.
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by an agreement between the Lead Jurisdiction and the Participating Jurisdiction, I Jill Grossman-Bellale commit the Town of Timnath to the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 14th day of November

X _____

Mayor

Phone: (970) 224-3211 FAX: (970) 224-3217 www.timnathgov.com
4800 Goodman St. Timnath, CO 80547

LARIMER COUNTY
COMMITTED TO EXCELLENCE

Michael Baker
INTERNATIONAL

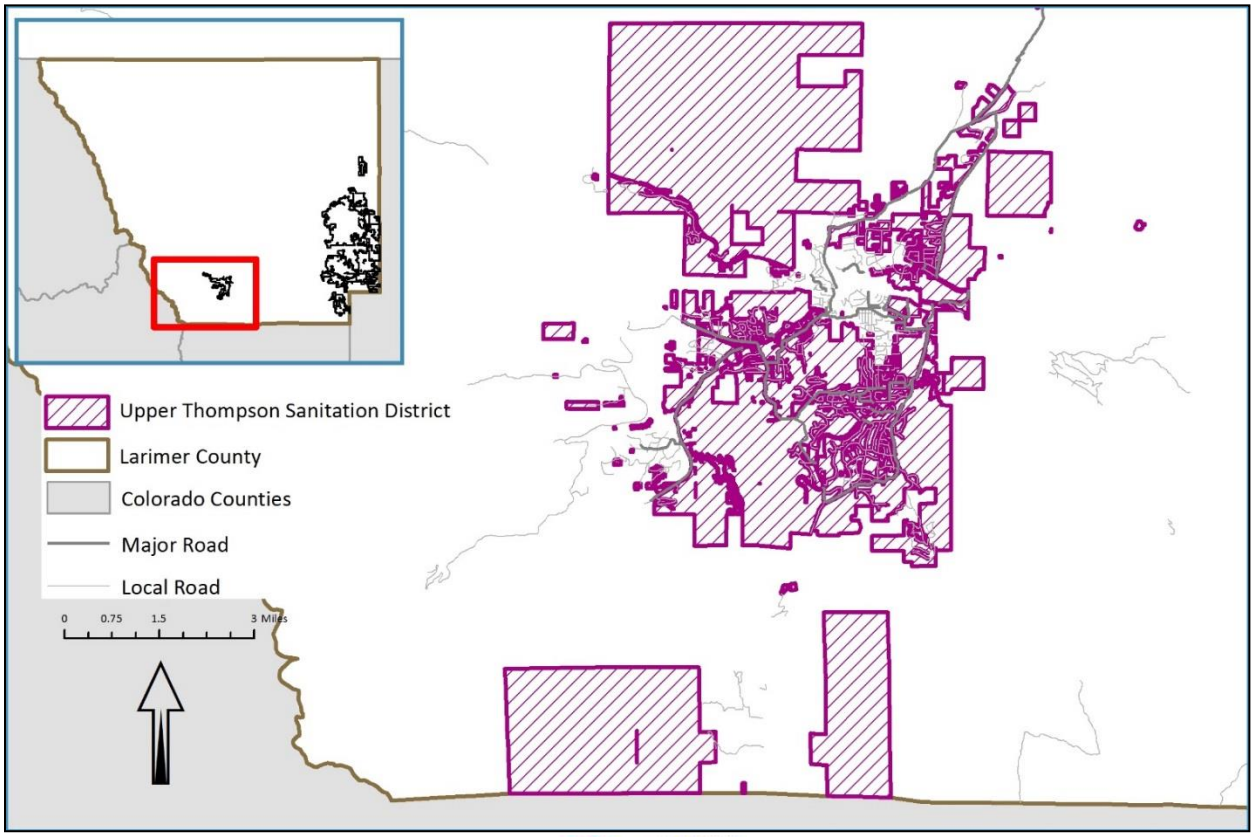
Upper Thompson Sanitation District

The Upper Thompson Sanitation District is fully committed to managing the natural resources with which the District is entrusted; to provide reliable, high quality, cost effective wastewater collection and treatment services; to promote a quality of life that all citizens in the Estes valley may benefit from. Our staff strives to deliver prompt and friendly customer service, while ensuring the preservation, protection, and enhancement of our environment for future generations.
– Mission Statement, Upper Thompson Sanitation District

Community Profile

The Upper Thompson Sanitation District was formed in 1971 to provide wastewater treatment service to the areas surrounding the Town of Estes Park and to improve the water quality of the Big Thompson River. The plant and collection lines were built with Federal, State and local funding and the plant was brought on-line in 1976, providing service to areas of the Estes Valley which were previously without adequate sewage treatment. The District policies and operations are overseen by a Board of Directors elected by the voters within the District.

The Upper Thompson Sanitation District Treatment Facility (or Plant) is a Tertiary (or three stage), Advanced Treatment Facility. This facility was built to handle a flow of 1.5 Million Gallons per Day (MGD), and a peak hydraulic flow of 3.75 MGD. This corresponds to an equivalent population of 15,000 people. Over 99% of the solids and pollutants in the wastewater are removed and disposed of. In the fall of 2000, Phase 1 (of a 3 Phase expansion) was completed, raising the plant capacity to 2.0 MGD by adding a new secondary clarifier.



Hazard Identification and Risk Assessment

The following Hazard Identification and Risk Assessment Summary table is based on jurisdiction-specific responses to the risk factor exercise and differs from the risk factor results that were determined at the county scale.

NATURAL HAZARD	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Flood – Flash and Riverine	0.9	0.9	0.6	0.2	0.3	2.9
Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)	1.2	0.6	0.6	0.2	0.2	2.8
Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)	1.2	0.6	0.4	0.2	0.3	2.7
Fire – Wildland	0.9	0.9	0.2	0.1	0.3	2.4
Utility Disruption	1.2	0.3	0.4	0.3	0.2	2.4
Erosion / Deposition	0.9	0.6	0.4	0.1	0.3	2.3
Landslide / Rockslide	0.9	0.6	0.4	0.3	0.1	2.3
Earthquake	0.3	0.6	0.8	0.1	0.1	1.9
Hazmat – Fixed and Transport	0.6	0.6	0.4	0.1	0.1	1.8
Biological Hazards / Contagion	0.6	0.3	0.4	0.1	0.1	1.5
Tornado	0.3	0.3	0.2	0.3	0.1	1.2
Civil Disturbance	0.3	0.3	0.2	0.1	0.2	1.1
HIGH RISK (2.5 or higher): Flood – Flash and Riverine; Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning); Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)						
MODERATE RISK HAZARD (2.0 - 2.4): Fire – Wildland; Utility Disruption; Erosion / Deposition; Landslide / Rockslide						
Low Risk (1.9 and lower): Earthquake; Hazmat – Fixed and Transport; Biological Hazards / Contagion; Tornado; Civil Disturbance						

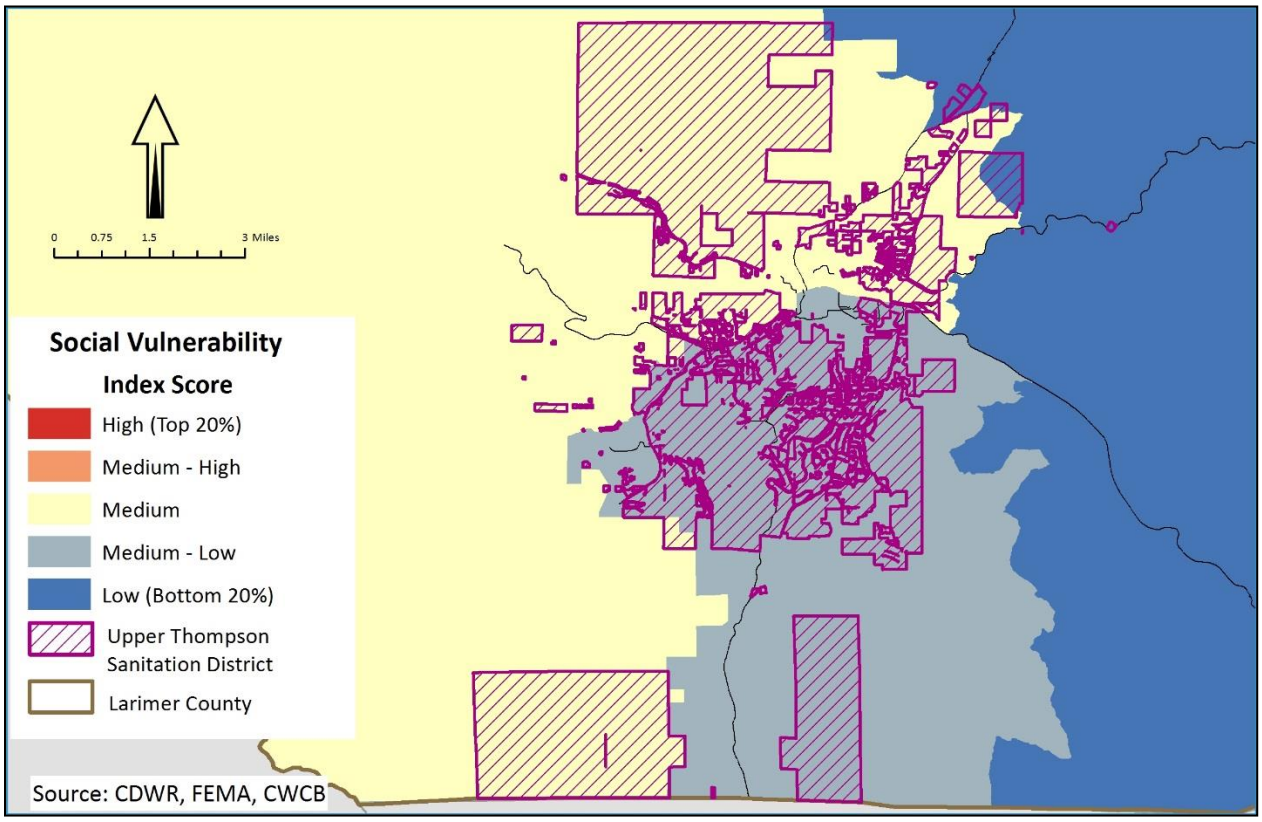
Vulnerability Assessment

This section provides a refined vulnerability assessment, specific for the Upper Thompson Sanitation District, for those hazards that were identified as being rated HIGH in the preceding section. This analysis

was conducted separately from that of the county-wide vulnerability assessment to specifically focus on the population, structures, infrastructure, and other assets unique to the district.

The results of the social vulnerability assessment are displayed on the map below. On the map, social vulnerability is represented at the census tract level by 5 classes of vulnerability: Low (bottom 20% of the county), Medium-Low, Medium, Medium-High, and High (top 20% of the county). The Town of Berthoud's social vulnerability map shows social vulnerability within the district.

Social Vulnerability Map – Upper Thompson Sanitation District[230]



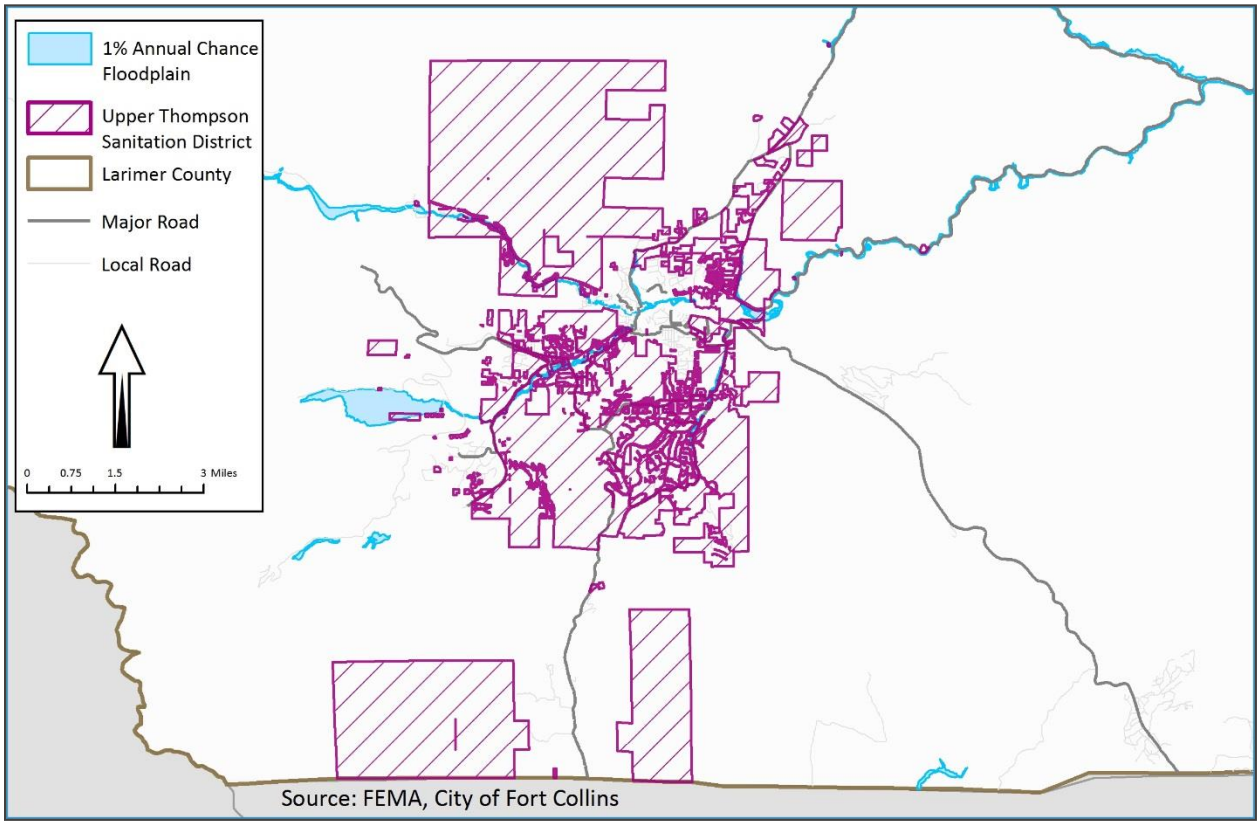
Social vulnerability is represented as the social, economic, demographic, and housing characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to hazard events. The pre-existing social conditions that contribute to disaster losses can be identified using social vulnerability indicators. Using methods identified in the Social Vulnerability Index (SoVI) developed by Cutter et. al. (2003) this layer shows the social vulnerability index scores for the State of Colorado at the census tract level. Social vulnerability is represented at the Census tract level by five classes of vulnerability: Low, Medium-Low, Medium, Medium-High, and High.

[230] Source: Colorado Division of Water Resources Dam Safety Branch, FEMA, Colorado Water Conservation Board (CWCB)

The Upper Thompson Sanitation District is characterized by a mix of medium-low to low levels of social vulnerability. A deeper-dive into the individual social vulnerability indicators in and around the district's boundaries will give local staff a clearer picture of which social vulnerability factors have the largest negative effect on the community and its resiliency. It is important that the district continue to monitor social vulnerability levels over time as demographics and economics change in the area.

Flood – Flash and Riverine

Upper Thompson Sanitation District Special Flood Hazard Area[231]



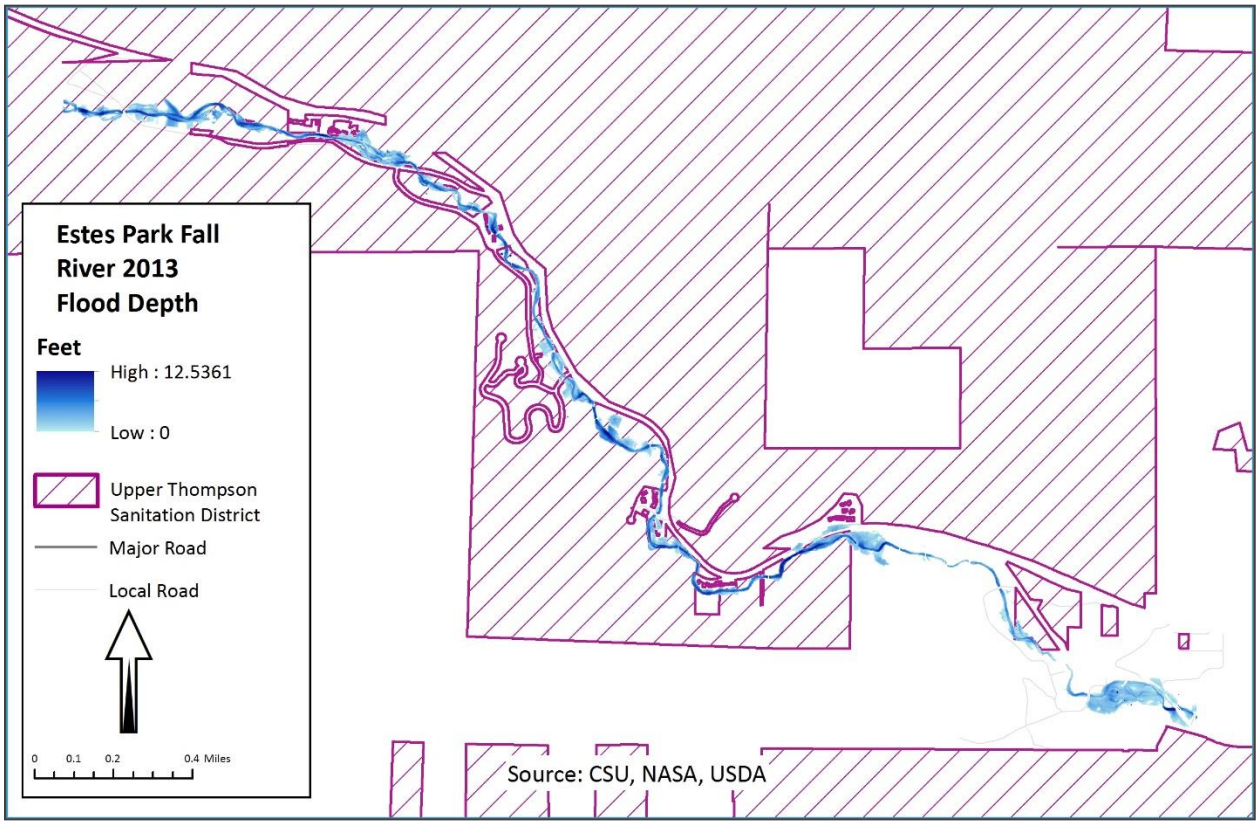
Previous Occurrences

Estes Park sustained severe damages during the September 2013 Colorado flood event. Evacuations began on September 12, 2013, at approximately 3:00AM and 2,428 contacts were made to warn and evacuate neighborhoods through the LETA911 emergency notification system. The information below was provided by the Town of Estes Park and provides a snapshot of just home many residents were impacted by the flood.

[231] This layer is compiled utilizing the most recent Special Flood Hazard Areas (SFHA) as defined by FEMA's National Flood Hazard Layer (NFHL) in combination with some recent flood studies performed by the City of Fort Collins. These areas are also referred to as the 1% Annual Chance Floodplain.

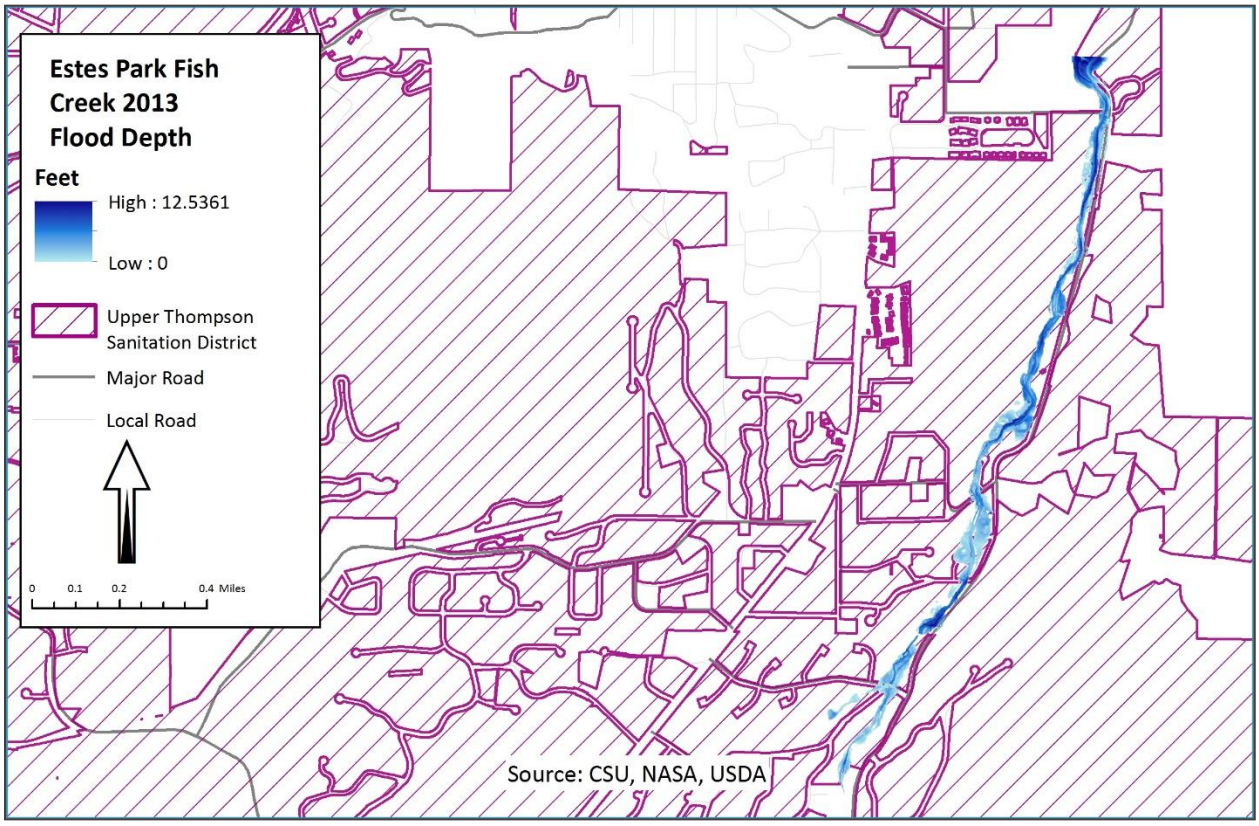
Red Cross Shelter Support:	606 people signed in
	167 people sheltered in the cents
	316 people outsourced to local hotels for varying amounts of time
Salvation Army Support:	3571 meals were served
	7000 snacks/drinks were served
	9000 gallons of water distributed
Utilities Outages and Restoration	Estimated $35-40 million in public infrastructure damage in the Estes Valley
	3.25 miles of Fish Creek Road are destroyed or damaged
	Caused outages for electric, water, gas, cable and phones
	Approximately 4,000 sewer taps were non-functional under “No Flush” orders within the Upper Thompson Sanitation District.
Structural Damage Assessments (incorporated Estes Park)	Rapid assessments completed for approximately 3,000 structures in the Estes Valley this week. Approximately 12 red tags were issued for properties that were determined to be unsafe for occupancy due to structural damage or electrical safety.
	2,383 estimated residences affected by water, mud, sewer access, road access
	183 estimated businesses affected by water, mud, sewer access, road access

Upper Thompson Sanitation District Fall River 2013 Flood Extent[232]



[232] Based on high water marks collected by the Town of Estes Park.

Upper Thompson Sanitation District Fish Creek 2013 Flood Extent[233]



In addition to the September 2013 flood two additional floods were reported according to the NOAA's Storm Events Database. On August 2, 2007 a flash flood occurred resulting in $20,000 in property damage. Another flash flood occurred on July 18, 2013 resulting in $10,000 in property damage and $5,000 in crop damage. There were no reported injuries or deaths from these two floods.

Inventory Exposed

Critical facilities are essential to the health and welfare of the whole population and are especially important both during and after hazard events. Critical structures or areas that overlap or touch the SFHA are considered "flood prone."

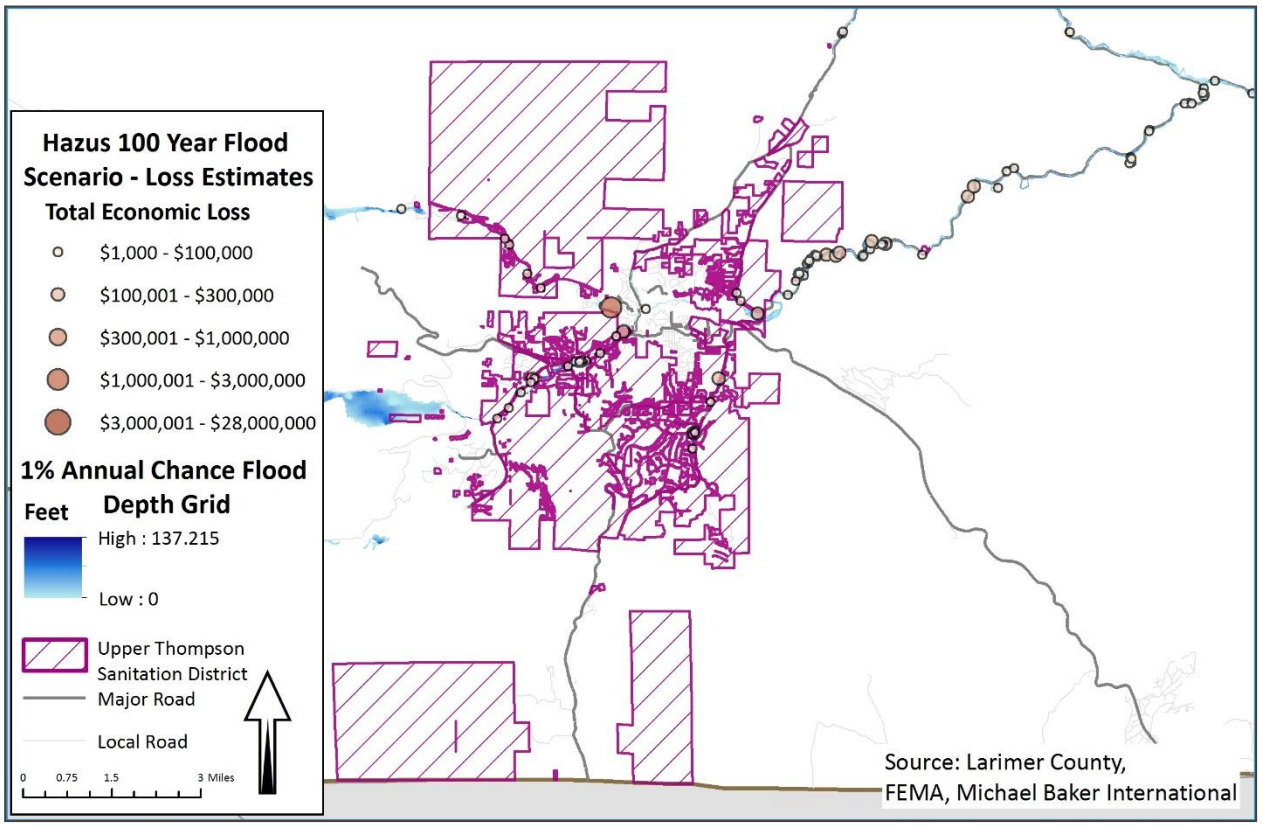
The critical facility and structure exposure analysis estimates that there are 3 critical facilities and 383 parcels/structures in the Upper Thompson Sanitation District that are flood prone (not including the total miles of flood prone infrastructure). The appraised value of these exposed critical facilities is over $1.3 million dollars. The appraised value of these exposed structures is over $123.9 million dollars.

[233] Based on high water marks collected by the Town of Estes Park.

Potential Losses

Hazus estimates for the Upper Thompson Sanitation District that for a 100-year flood event, no critical facilities and approximately 56 buildings will experience flood damage. The estimated building loss is over $1.4 million dollars, content loss over $1 million dollars, and inventory loss $14 thousand dollars.

Upper Thompson Sanitation District 1% Annual Flood Loss Estimation and Flood Depth Grid Map[234]



Probability of Future Occurrences

Frequency of previously reported flood events in the Upper Thompson Sanitation District provide an acceptable framework for determining the probability of future flood occurrence in the area. The probability that the district will experience a flood event can be difficult to predict or quantify.

[234] FEMA's loss estimation modeling software, Hazus, was utilized to produce this data set. A 100 year flood scenario was defined and losses were calculated for each point (structure) that intersected the depth grid based on the Hazus depth damage curves for specific structure attributes (such as foundation type, building type, and first flood height). Information derived from Hazus-MH 2.2 flood scenario. Total Losses equals a sum of building losses, content losses,

Severe flooding has the potential to inflict significant damage to people and property in the district. Mitigating flood damage requires that communities remain diligent and notify local officials of potential flood (and flash flood) prone areas near infrastructure such as roads, bridges, and buildings.

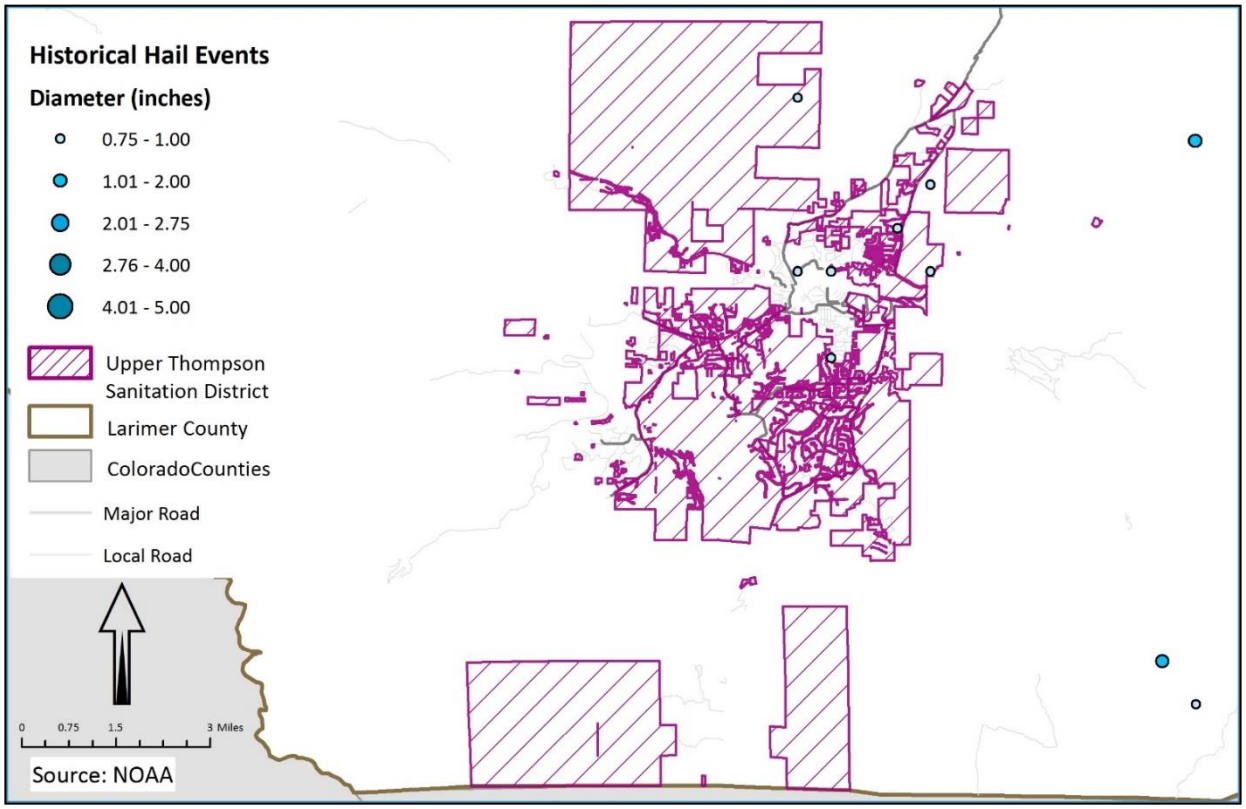
Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)

Previous Occurrences

According to NOAA's Storm Events Database there are no reported injuries, deaths, or damages in the Upper Thompson Sanitation District due to hail. There have been 4 hail events reported in the district between 1955 and 2014. Based on the historic data showing hazardous impacts on the district, there is a great potential for hail events to occur at any given time.

and inventory losses. 1% Annual Chance Flood flooding depth grid, produced from the best available topographic and floodplain data.

Historical Hail Events in the Upper Thompson Sanitation District[235]



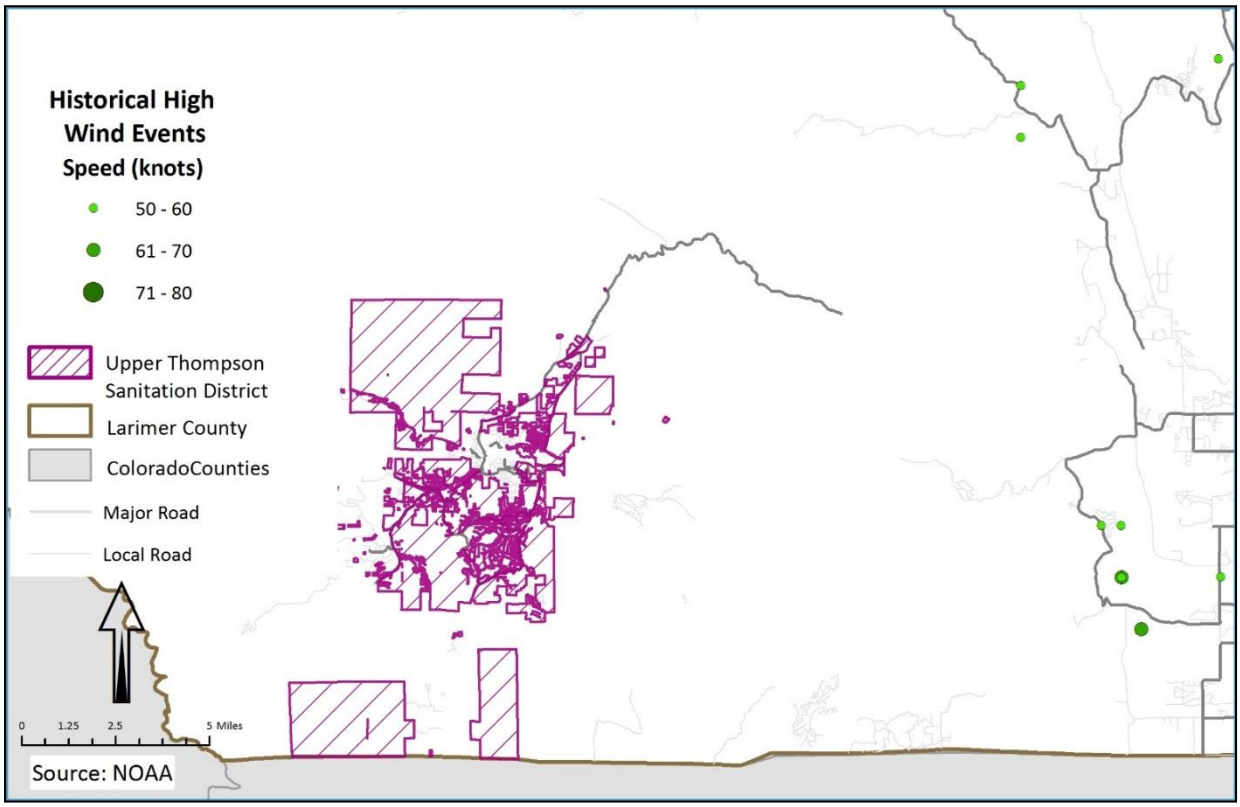
According to NOAA's Storm Events Database there is no historic data for thunderstorm wind events in the Upper Thompson Sanitation District. Based on the historic data showing hazardous impacts on the county, there is a great potential for thunderstorm wind events to occur at any given time.

According to NOAA's Storm Events Database there have been 9 lightning events in the Upper Thompson Sanitation District between 1996 and 2014. There have been 27 reported injuries, 4 deaths, $5,000 worth of property damage, and no reported crop damage. Based on the historic data showing hazardous impacts on the district, there is a great potential for lightning events to occur at any given time.

[235] Source: NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

According to NOAA's Storm Events Database there have been no Windstorm events in the Upper Thompson Sanitation District between 1996 and 2014. Based on the historic data showing hazardous impacts on the surrounding areas, there is a great potential for hail events to occur at any given time.

Historical High Wind Events in the Upper Thompson Sanitation District[236]



Inventory Exposed

All assets located in the Upper Thompson Sanitation District can be considered at risk from spring and summer storms. This includes all people, or 100% of the District's population, and all buildings and infrastructure within the district. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the District's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Inventory assets exposed to severe wind is dependent on the age of the building, type, construction material used, and condition of the structure. Possible losses to critical infrastructure include:

[236] Source: NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

- Electric power disruption
- Communication disruption
- Water and fuel shortages
- Road closures
- Damaged infrastructure components, such as sewer lift stations and treatment plants
- Damage to homes, structures, and shelters

Potential Losses

Spring and summer storms affect the entire planning area of the Upper Thompson Sanitation District including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Severe storms will remain a highly likely occurrence for the Upper Thompson Sanitation District. It is likely that lightning and hail will also be experienced in the area due to such storms.

Generally, straight-line wind events destroy private, commercial, and public property. Additional costs stem from debris removal, maintenance, repair, and response. Indirect costs include loss of industrial and commercial productivity as a result of damage to infrastructure, facilities, or interruption of services. Because no specific, countywide loss estimation exists for wind, potential losses are related to historical property damage and injuries/deaths.

Probability of Future Occurrences

Spring and summer storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past spring and summer events provide benchmarks for projecting similar conditions into the future. The probability that Upper Thompson Sanitation District will experience a spring or summer storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the Upper Thompson Sanitation District at least once every year.

Reported straight-line wind events over the past nineteen years provide an acceptable framework for determining the future occurrence in terms of event. The probability of the Upper Thompson Sanitation District experiencing a severe wind event associated with damages or injuries can be difficult to quantify, but based on historical record of severe wind events in Larimer County, there is a high chance of this type of event occurring each year.

Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)

Previous Occurrences

According to NOAA's Storm Events Database, the Upper Thompson Sanitation District has experienced 264 Winter Storms since 1996. On March 17, 2003 there was report of a winter storm causing $15,500,000 in property damage in areas of Western Larimer County. There were no deaths, injuries or damage to crops reported for any of these storms. The Upper Thompson Sanitation District is at high risk of experiencing Winter Storms during the winter months.

Inventory Exposed

All assets located in the Upper Thompson Sanitation District can be considered at risk from winter storms. This includes all people, or 100% of the District's population, and all buildings and infrastructure within the district. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the District's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Potential Losses

Winter storms affect the entire planning area of the Upper Thompson Sanitation District including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Winter storms will remain a highly likely occurrence for the Upper Thompson Sanitation District.

Probability of Future Occurrences

Severe winter storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past severe winter events provide benchmarks for projecting similar conditions into the future. The probability that the Upper Thompson Sanitation District will experience a severe winter storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the District at least once every year.

Capabilities Assessment

The capability assessment examines the ability of the Upper Thompson Sanitation District to implement and manage the comprehensive mitigation strategy laid out in this Plan. The strengths, weaknesses, and resources of the community are identified here as a means for evaluating and maintaining effective and appropriate management of the district's hazard mitigation program.

Local Personnel

The ability of a community to implement a comprehensive mitigation strategy depends, in part, on available resources, including people and staff. The following table outlines the district's capabilities as they relate to key personnel.

	Full Time	Part Time	None or Not-Identified
Emergency Manager		X	
Floodplain Administrator	X		
Community Planner	X		
GIS Specialist	X		
Grant Writer		X	

Land Use Planning and Codes

Local land use plans and building codes are tremendous tools for evaluating local policies related to hazard mitigation and risk reduction. Additionally, comprehensive master plans, capital improvement plans, stormwater plans and zoning ordinances all present opportunities for enhanced local capabilities. The following table outlines the district's current capabilities as they relate to land use planning and codes.

	Yes (Y); No (N)
A zoning ordinance	--
A hazard-specific ordinance	--
Local building codes	Y
A Comprehensive Plan / Master Plan	Y
A Capital Improvements Plan	Y
A Stormwater Plan	Y
A Continuity of Operations Plan (COOP)	--
An Emergency Operations Plan (EOP)	Y
A Long-Term Recovery Plan	N
Participates in the NFIP	N

Plan Maintenance and Implementation

The Upper Thompson Sanitation District has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the district will continue public participation in the plan maintenance process.

Jurisdiction	Plan Maintenance and Implementation Strategy
Upper Thompson Sanitation District	*"District staff will actively monitor and manage the plan, with Board of Directors review at least quarterly."*

	"Status updates and changes to the plan will be posted on District social media outlets/website - and will be topics of public discussion."

Integrating Hazard Mitigation into Local Planning

Through discussions at planning meetings and the use of an online survey, individual outreach, and phone calls, each participating jurisdiction brainstormed with the planning team to identify processes for integrating hazard mitigation into their local planning mechanisms and policies. The following table lists the specific integration strategy identified by the Upper Thompson Sanitation District based on the mitigation actions listed in this plan.

Jurisdiction	Strategy
Upper Thompson Sanitation District	*"We will integrate mitigation actions into our Capital Improvement Plan."*

Mitigation Action Guides

The following Mitigation Action Guides present the district's mitigation actions that were developed for the 2016 Plan.

Upper Thompson Sanitation District: District and Inter-Jurisdictional Communications Improvement (Upper Thompson SD – 1)	
PRIORITY: Medium	HAZARDS ADDRESSED: Earthquake, Land Subsidence, Extreme Temperatures, Flood, Severe Storm, Wind & Tornado, Fire, Public Health, Hazmat
LOCATION: Estes Valley	GOALS ADDRESSED: 1, 2, 3, 5.
RECOMMENDATION DATE: 09/01/2015	OBJECTIVES ADDRESSED: B, D, E.
TARGET COMPLETION DATE: 2016 – On Going	
ISSUE: The September 2013 flooding exposed a serious weakness in the District staff's ability to communicate with each other and other organizations in times of major disaster. While email, land lines, and cell phones are normally operating, these resources were all temporarily unusable during the flood disaster. This required, for safety reasons, staff to physically report to the District office every two hours to report and communicate field conditions during the event. This was in itself unsafe as road conditions in the entire Estes Valley were unknown and constantly changing. This also had a negative impact on the staff's ability to assess, and react to, damages in the field. Improvements to District communications, as well as inter-jurisdictional communications, must be made to improve efficiency in the field during disaster events both large and small.	
RECOMMENDATION: Purchase of handheld radios for use by field, administrative, and treatment plant personnel, with possible future purchase of vehicle mounted radio units. Establish open lines of communication, utilizing this method, with other Estes Valley organizations and agencies.	

ACTION: The District will apply for inclusion in the Consolidated Communications Network of Colorado (CCNC). The location of existing repeaters on this network, located on Prospect Mountain in Estes Park, are optimal for radio reception within District boundaries. Reception within these boundaries would be insufficient if the District were to utilize radio repeaters independently, with no real "line of sight" applications possible on the District's property. If the application for participation is accepted, the District will purchase network compatible units and coordinate with governing agencies and committees to ensure all parameters and required training are met.	
LEAD AGENCY: Upper Thompson Sanitation District	EXPECTED COST: Approximately $15,000
SUPPORT AGENCIES: Town of Estes Park	POTENTIAL FUNDING SOURCES: Annual Upper Thompson Sanitation District Budget. Safety Grant funding (matching). The District
PROGRESS MILESTONES: Starting application process for inclusion in the CCNC.	

Upper Thompson Sanitation District: FLCS Force Main Evaluation and Rehabilitation (Upper Thompson SD – 2)	
PRIORITY: High	HAZARDS ADDRESSED: Land Subsidence, Extreme Temperatures, Flood, Severe Storm, Public Health, and Utility Disruption.
LOCATION: CO HWY 36 and Fish Creek Road extending northeast into Mall Road.	GOALS ADDRESSED: 1, 2, 5.
RECOMMENDATION DATE: 07/21/2015	OBJECTIVES ADDRESSED: B, C, D, E.
TARGET COMPLETION DATE: 2016	
ISSUE: The Fish Creek Lift Station's existing 14 inch CIP force main was constructed in the early 1970s. This aging force main is the only lifeline for sanitary sewer flow received in the lift station to be properly conveyed through the system and ultimately reach the treatment plant. The topography of land surrounding the lift station, as well as the entire route of the force main, is such that an overflow of sanitary sewer resulting from a possible catastrophic system failure would certainly reach Colorado State receiving waters. This type of event would seriously threaten public and lake/stream health to not only the immediate area and residing aquatic life, but also to any public downstream users within the Big Thompson Watershed. Many types of natural disasters and events would greatly increase these risks, being a possible catalyst to an event. Mitigation efforts would be a proactive measure to reduce the threat to public health and receiving waters.	
RECOMMENDATION: Clean and inspect existing force main. Construct a parallel force main for redundancy and reduction in risks associated with a catastrophic failure of critical infrastructure.	
ACTION: The first step in this project would be inspection and evaluation of the existing 14 inch cast iron force main. This includes bypassing and hauling live flow from the lift station to isolate the existing force main, setup and implementation of pigging/cleaning of the force main, and finally inspection of the force main.	

The existing force main would be left in place and a parallel force main would be constructed from the lift station, continuing northeast to the intersection of Colorado Highway 36 and Mall Road, then across HWY 36, connecting to existing District gravity manhole approximately 300 feet north of HWY 36/Mall Road intersection. Would acquire all pertinent permits to complete the project.	
LEAD AGENCY: Upper Thompson Sanitation District	EXPECTED COST: $1,250,000
SUPPORT AGENCIES:	POTENTIAL FUNDING SOURCES: Project currently planned in Capital Improvement Plan for 2016 and 2017. Possible Grants, State and Federal.
PROGRESS MILESTONES: Project currently in planning phase.	

Upper Thompson Sanitation District: Sewer Main Cleaning and Inspection (Upper Thompson SD – 3)	
PRIORITY: High	HAZARDS ADDRESSED: Extreme Temperatures, Flood, Severe Storm, Public Health, Hazmat
LOCATION: District Wide	GOALS ADDRESSED: 1, 2, 3, 4, 5.
RECOMMENDATION DATE: On Going	OBJECTIVES ADDRESSED: B, C, D, E.
TARGET COMPLETION DATE: On Going	
ISSUE: The most common threat to the District's sanitary sewer system are sanitary sewer overflows resulting from a blockage in the pipe. Blockages can be caused by many things including tree root intrusion, grease build-up, grit/debris, and broken or collapsed pipe. Sanitary sewer overflows always have the potential to reach surface water, storm sewer systems, and State receiving waters, posing a threat to public health and stream health. A large portion of the District's system is located in "off road" and "back yard" easements. Access to sewer lines and manholes is often blocked by trees, fences, structures, and other landscaping. The ability to gain entry to these system components is crucial to both preventive maintenance, as well as emergency response.	
RECOMMENDATION: Routine cleaning and CCTV inspection of the District's sanitary sewer lines and manholes. Maintain, and keep current, relations with mutual aid organizations and contractors. Continue repairing and rehabilitating system components.	
ACTION: Known problem areas will be cleaned and inspected at least once a year. The rest of the District's system will continue to be routinely cleaned and inspected with the goal of completing these tasks on at least 10 percent of the District's system yearly. During this maintenance cycle, identified problem areas will be noted and incorporated into the District's capital improvement plan for repair or rehabilitation to reduce the risk of a sanitary sewer overflow or loss of proper utility function due to natural and man-made disasters. Continue to evaluate, mitigate, and reinforce system components located within the floodplain, next to rivers, and in drainage areas. Continue to assess and enforce District easements and access; keeping these easements clear of obstructions, ensuring staff and equipment can gain entry to manholes and sewer lines in the event of an emergency or for routine maintenance. Continue public outreach efforts to increase awareness and stress the importance of access of these critical locations.	

Continue cooperative efforts with other agencies and organizations overseeing new development. Ensuring optimum placement of new sewer mains and manholes to reduce risk or damage caused by potential disasters.	
LEAD AGENCY: Upper Thompson Sanitation District	EXPECTED COST: Tasks covered by annual District Operations Budget.
SUPPORT AGENCIES: Town of Estes Park, Larimer County, Estes Park Sanitation District, COWARN.	POTENTIAL FUNDING SOURCES: District's annual budget.
PROGRESS MILESTONES: On Going	

Letter of Intent to Participate

P.O. Box 568 • Estes Park, CO 80517
Ph: 970-586-4544 • Fax: 970-586-1049
www.utsd.org

July 24, 2015

Lori R. Hodges
Larimer County Emergency Management
200 West Oak Street
Fort Collins, CO 80526

Re: "Statement of Intent to Participate" as a participating jurisdiction in the Larimer County Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Dear Ms. Hodges,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the Upper Thompson Sanitation District is submitting this letter of intent to confirm that Upper Thompson Sanitation District has agreed to participate in the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, Upper Thompson Sanitation District agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Larimer County OEM to complete the plan in conformance with FEMA requirements.

Upper Thompson Sanitation District understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);

Environmental Protection Through Wastewater Collection and Treatment

Town of Wellington

"The citizens of Wellington choose to deal with the issue of growth proactively in order to maintain the quality of life in the community. Over the past fifteen years, the Town has witnessed a significant amount of residential growth. Wellington residents want to continue to investigate the development of innovative land uses that provide a sound tax base, preserve the quality of life, and balance residential and commercial development.

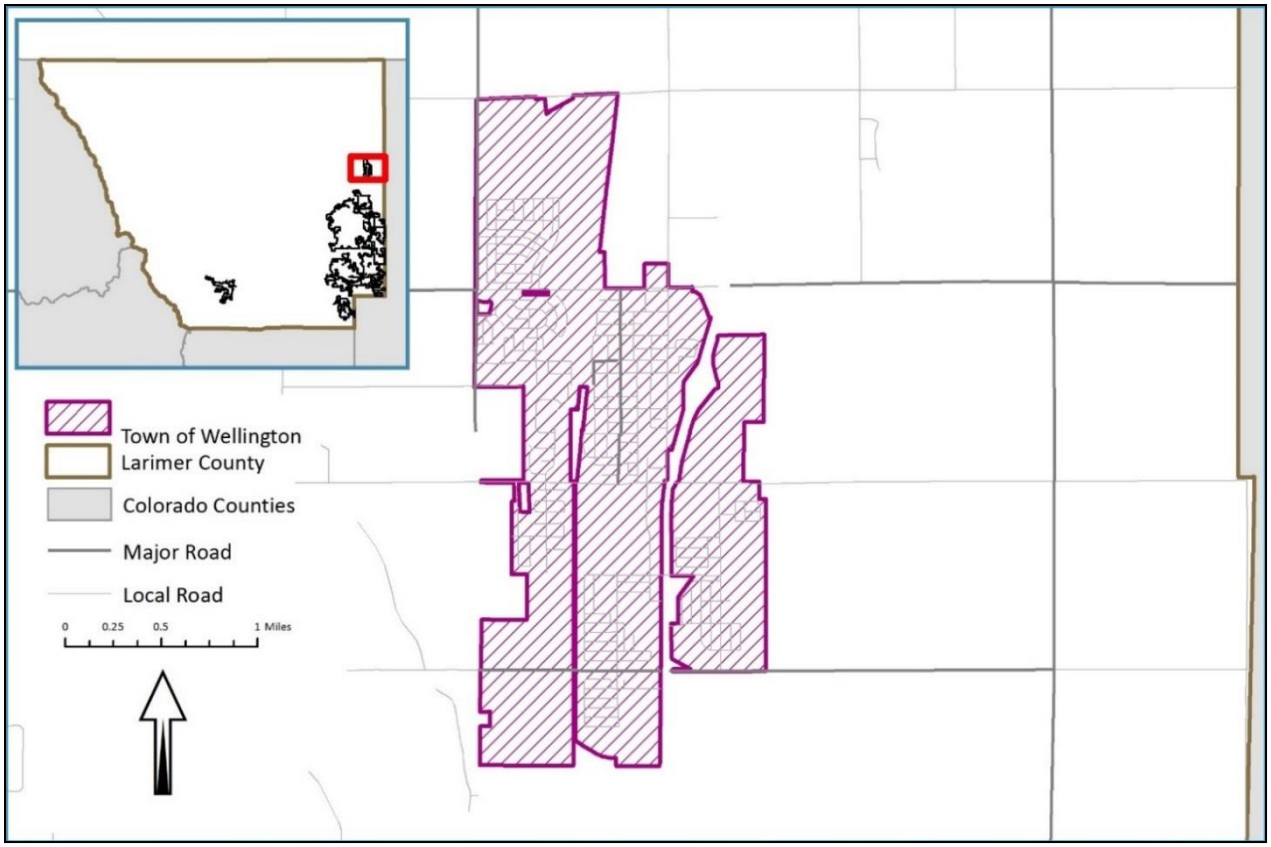
Citizens want to ensure that new development does not overburden existing infrastructure and services and does not detract from the community's existing character. The valued aspects of the Town's character include: friendly and accessible downtown, seeing familiar faces around town, a safe and relaxed environment, and diverse community programs and activities."

– Community Vision Statement, Town of Wellington Comprehensive Plan, 2014

Community Profile

Wellington, also referred to as "Colorado's Northern Gateway," is located along the northern Front Range, 11 miles north of Fort Collins and 34 miles south of Cheyenne on I-25. The town's location has long made it a crossroads of those travelling both north/south from Colorado to Wyoming and east/west from the farming and ranching communities east to Fort Collins and the Rocky Mountains.

Wellington was founded in 1905, spurred by agricultural development, the Union Pacific Railroad and the presence of the North Poudre Land & Reservoir Co. The town boomed in the early 20th century but its population did not reach 1,000 until 1980. From 2000 until 2010 the town grew rapidly from 2,672 residents to 6,289 residents. With new developments and a booming population in the early 21st century, anchor businesses downtown are beginning to thrive once again, and a community vision for a vibrant downtown commercial district along Cleveland Avenue has become a community priority



The following table summarizes key demographic and development related characteristics of the Town of Wellington.

Town of Wellington Statistics		
	Town of Wellington	Colorado
Population, 2010	6,289	5,029,196
2000-2010 Population Change, %	58%	14.5%
% Population under 5 years, 2010	10.6%	6.8%
% Population under 19 years, 2010	33.7%	20.3
% Population 65 years and over, 2010	2.4%	10.9%
Language other than English spoken at home, % age 5+, 2009-2013	3.6%	15.9%
Homeownership Rate 2010	80.2%	65.5%
Persons Per Household 2010	2.88	2.57
Persons below poverty level, %, 2013	9.2%	13.2%
Median Household Income, 2013	$72,621	$58,433

Hazard Identification and Risk Assessment

The following Hazard Identification and Risk Assessment Summary table is based on jurisdiction-specific responses to the risk factor exercise and differs from the risk factor results that were determined at the county scale.

NATURAL HAZARD	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)	1.2	0.6	0.8	0.3	0.2	3.1
Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)	1.2	0.3	0.8	0.3	0.2	2.8
Fire – Wildland	0.9	0.6	0.6	0.4	0.2	2.7
Utility Disruption	0.9	0.3	0.8	0.4	0.3	2.7
Tornado	0.6	0.9	0.6	0.4	0.1	2.6
Flood – Flash and Riverine	0.6	0.6	0.6	0.4	0.2	2.4
Hazmat – Fixed and Transport	0.6	0.6	0.6	0.4	0.2	2.4
Biological Hazards / Contagion	0.6	0.3	0.4	0.4	0.3	2.0
Earthquake	0.6	0.3	0.6	0.4	0.1	2.0
Erosion / Deposition	0.6	0.3	0.4	0.4	0.1	1.8
Landslide / Rockslide	0.3	0.3	0.4	0.4	0.1	1.5
Civil Disturbance	0.3	0.3	0.2	0.4	0.1	1.3
HIGH RISK (2.5 or higher): Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning) Winter Storm (Blizzard Conditions, Heavy Snow Accumulation); Fire – Wildland; Utility Disruption; Tornado						
MODERATE RISK HAZARD (2.0 - 2.4): Flood – Flash and Riverine; Hazmat – Fixed and Transport Biological Hazards / Contagion; Earthquake						
Low Risk (1.9 and lower): Erosion / Deposition; Landslide / Rockslide; Civil Disturbance						

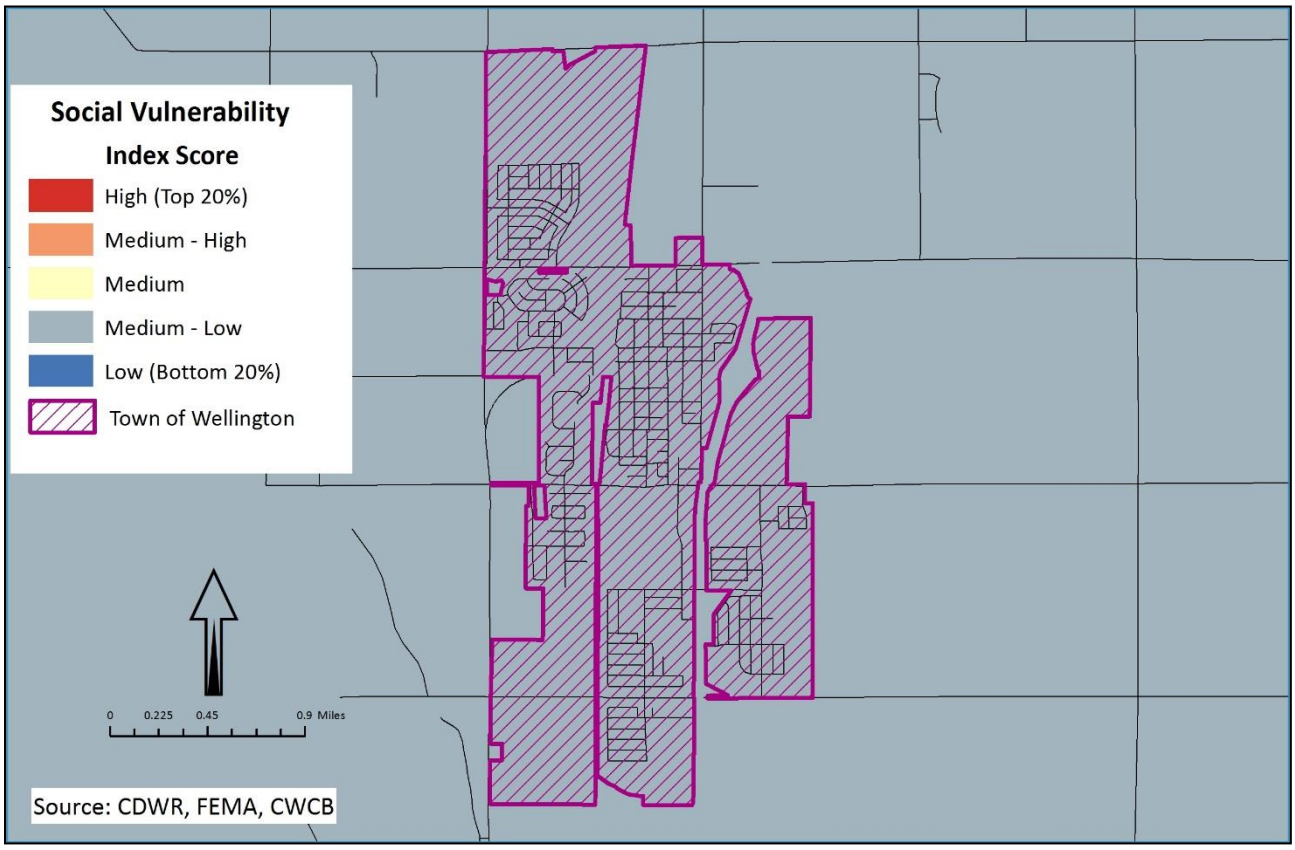
Vulnerability Assessment

This section provides a refined vulnerability assessment, specific for the Town of Wellington, for those hazards that were identified as being rated HIGH in the preceding section. This analysis was conducted

separately from that of the county-wide vulnerability assessment to specifically focus on the population, structures, infrastructure, and other assets unique to the Town of Wellington.

The results of the social vulnerability assessment are displayed on the map below. On the map, social vulnerability is represented at the census tract level by 5 classes of vulnerability: Low (bottom 20% of the county), Medium-Low, Medium, Medium-High, and High (top 20% of the county). The Town of Wellington's social vulnerability map shows social vulnerability within the community.

Social Vulnerability Map – Town of Wellington[237]



Social vulnerability is represented as the social, economic, demographic, and housing characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to hazard events. The pre-existing social conditions that contribute to disaster losses can be identified using social vulnerability indicators. Using methods identified in the Social Vulnerability Index (SoVI) developed by Cutter et. al. (2003) this layer shows the social vulnerability index scores for the State of Colorado at the census tract level. Social vulnerability is represented at the Census tract level by five classes of vulnerability: Low, Medium-Low, Medium, Medium-High, and High.

[237] Source: Colorado Division of Water Resources Dam Safety Branch, FEMA, Colorado Water Conservation Board (CWCB)

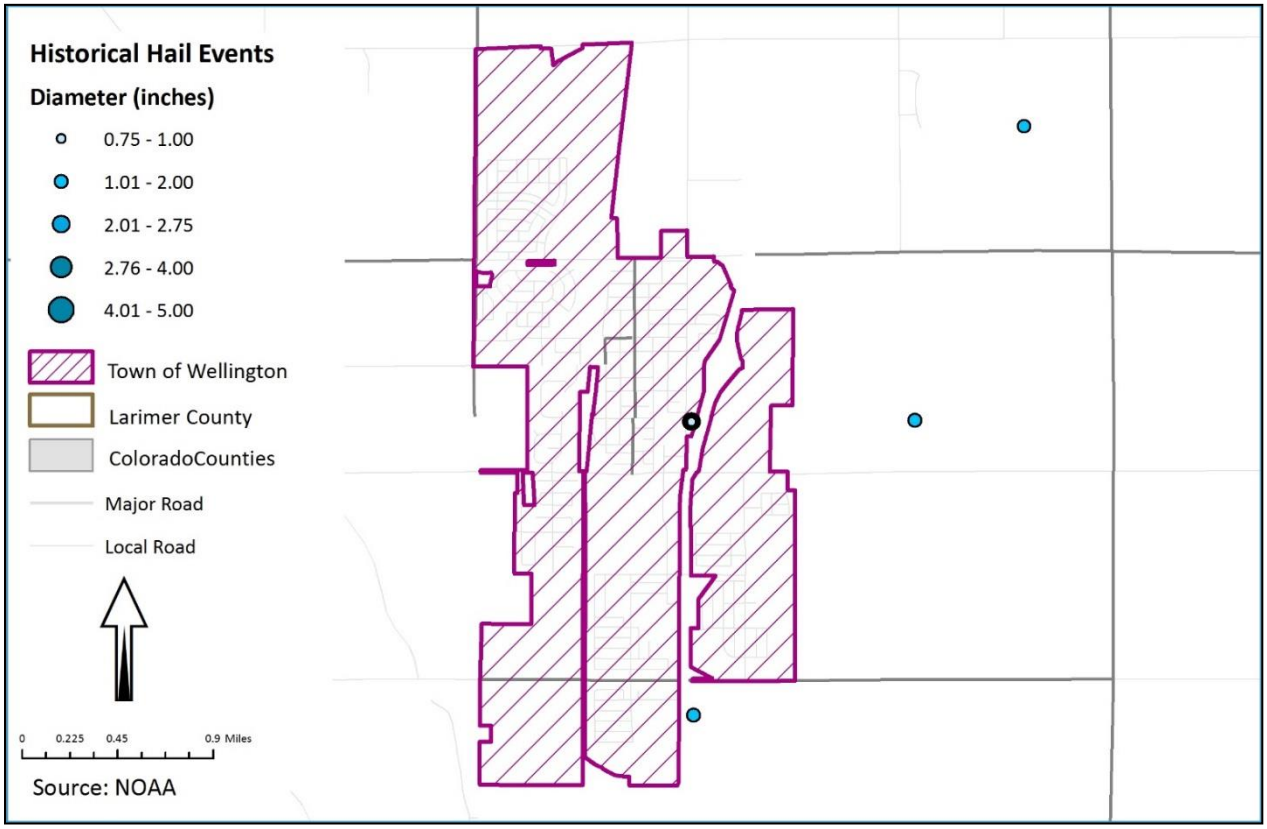
Wellington is characterized by medium-low levels of social vulnerability. This does not mean, however, that there aren't any socially vulnerable residents living in the community or that social vulnerability levels will remain the same over time. Close analysis of the individual social vulnerability indicators within the community will give local emergency managers, planners, and stakeholders a clearer picture of which social vulnerability factors threaten the community the most and where social and economic resources should be allocated in order to reduce vulnerability. Over time, the town should continue to monitor their local social vulnerability as demographic, economic, and housing related conditions change.

Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)

Previous Occurrences

According to NOAA's Storm Events Database there are no reported injuries, deaths, and $5,000 in damages in the Town of Wellington due to hail. There have been 15 hail event reported in the Town of Wellington between 1955 and 2014. Based on the historic data showing hazardous impacts on the town, there is potential for hail events to occur at any given time.

Historical Hail Events in the Town of Wellington[238]



[238] Source: NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

According to NOAA's Storm Events Database there have been no injuries, deaths, or damages in the Town of Wellington due to thunderstorm wind. There have been 3 thunderstorm wind events reported in the Town of Wellington between 1955 and 2014. Based on the historic data showing hazardous impacts on the town, there is a great potential for thunderstorm wind events to occur at any given time.

According to NOAA's Storm Events Database there has been 1 lightning event in the Town of Wellington between 1996 and 2014. There have been 9 reported injuries, no deaths, and no damages. Based on the historic data showing hazardous impacts on the town, there is a great potential for lightning events to occur at any given time.

According to NOAA's Storm Events Database there have been 4 Windstorm events in the Town of Wellington between 1996 and 2014. There have been no reported injuries, deaths, $or damages. Based on the historic data showing hazardous impacts on the town, there is a great potential for high wind events to occur at any given time.

Historical High Wind Events in the Town of Wellington[239]

[239] Source: NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

Inventory Exposed

All assets located in the Town of Wellington can be considered at risk from spring and summer storms. This includes 6,289 people, or 100% of the town's population, and all buildings and infrastructure within the district. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the town's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Inventory assets exposed to severe wind is dependent on the age of the building, type, construction material used, and condition of the structure. Possible losses to critical infrastructure include:

- Electric power disruption
- Communication disruption
- Water and fuel shortages
- Road closures
- Damaged infrastructure components, such as sewer lift stations and treatment plants
- Damage to homes, structures, and shelters

Potential Losses

Spring and summer storms affect the entire planning area of the Town of Wellington including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Severe storms will remain a highly likely occurrence for the Town of Wellington. It is likely that lightning and hail will also be experienced in the area due to such storms.

Generally, straight-line wind events destroy private, commercial, and public property. Additional costs stem from debris removal, maintenance, repair, and response. Indirect costs include loss of industrial and commercial productivity as a result of damage to infrastructure, facilities, or interruption of services. Because no specific, countywide loss estimation exists for wind, potential losses are related to historical property damage and injuries/deaths.

Probability of Future Occurrences

Spring and summer storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past spring and summer events provide benchmarks for projecting similar conditions into the future. The probability that Town of Wellington will experience a spring or summer storm event can be difficult to quantify. However, based on historical records and

frequencies there is nearly a 100% chance of this type of event will occur somewhere in the Town of Wellington at least once every year.

Reported straight-line wind events over the past nineteen years provide an acceptable framework for determining the future occurrence in terms of event. The probability of the Town of Wellington experiencing a severe wind event associated with damages or injuries can be difficult to quantify, but based on historical record of 4 severe wind events since 1996, there is a chance of this type of event occurring each year.

Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)

Previous Occurrences

According to NOAA's Storm Events Database, the Town of Wellington has experienced 74 Winter Storms since 1996. On March 17, 2003 there was report of a winter storm causing $15,500,000 in property damage in areas of Larimer County below 6,000 feet and eastern Larimer County. There were no deaths, injuries or damage to crops reported for any of these storms. The Town of Wellington is at high risk of experiencing Winter Storms during the winter months.

Inventory Exposed

All assets located in the can be considered at risk from winter storms. This includes 6,289 people, or 100% of the Town's population, and all buildings and infrastructure within the town. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the Town's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Potential Losses

Winter storms affect the entire planning area of the Town of Wellington including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Winter storms will remain a highly likely occurrence for the Town of Wellington.

Probability of Future Occurrences

Severe winter storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past severe winter events provide benchmarks for projecting similar conditions into the future. The probability that the Town of Wellington will experience a severe winter storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the town at least once every year.

Fire – Wildland

Previous Occurrences

According to NOAA's Storm Events Database there have been no reported wildfire events in the Town of Wellington. Based on the historic data showing hazardous impacts on Larimer County, there is potential for wildfire events to occur at any given time in the Town of Wellington.

Inventory Exposed

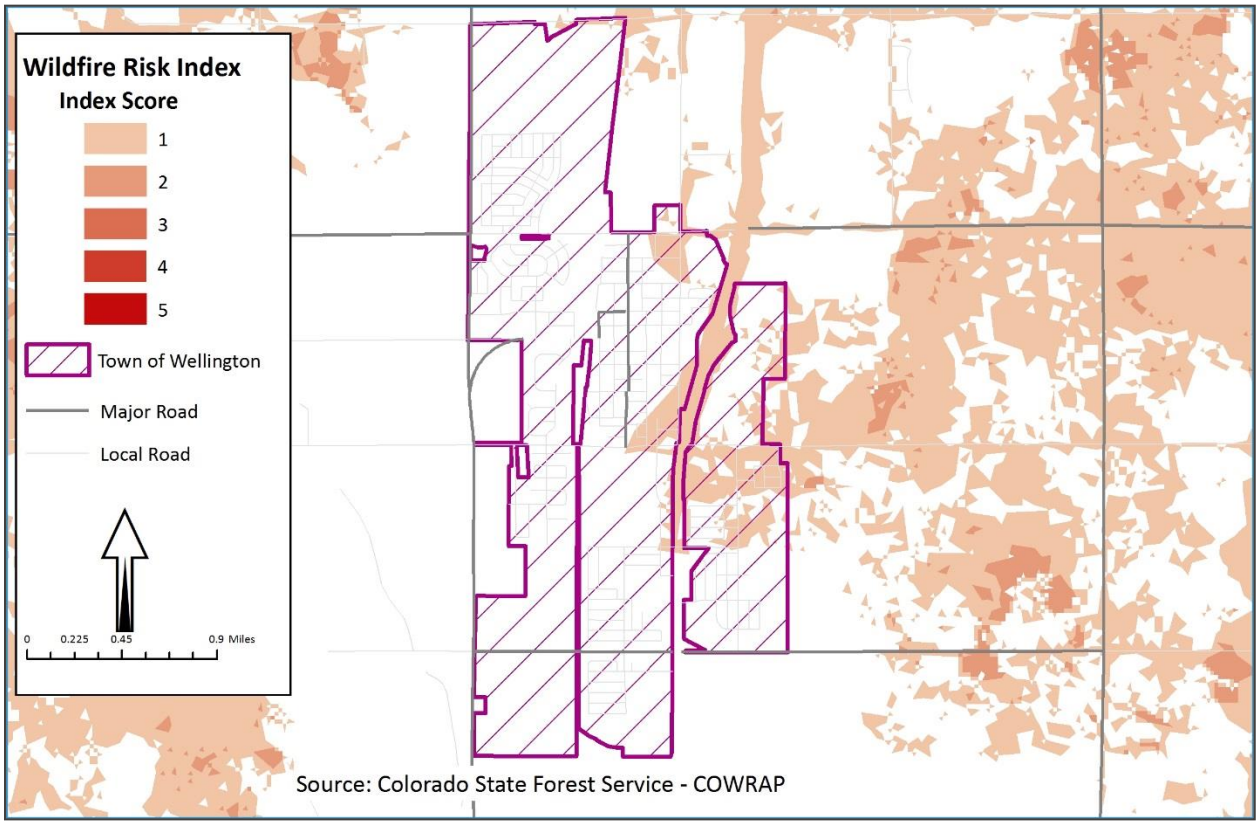
The following Wildfire Hazard Zone map identifies the expected wildfire behavior. There are no wildfire hazard zones identified in the district.

Town of Wellington Wildfire Hazard Zone Map[240]

The following Wildfire Risk map identifies areas with the greatest potential impacts from a wildfire, in other words, those areas most at risk. The highest wildfire risk areas in the district are located in the eastern region.

[240] To be used to identify wildfire hazards within the Wildfire Mitigation Area. The hazards are determined based on vegetation cover type, habitat structure stage (cover type, tree size and crown cover percentage), southern facing aspects and 30% and greater slopes according to the Wildfire Hazard Area Mapping (WHAM) guidelines.

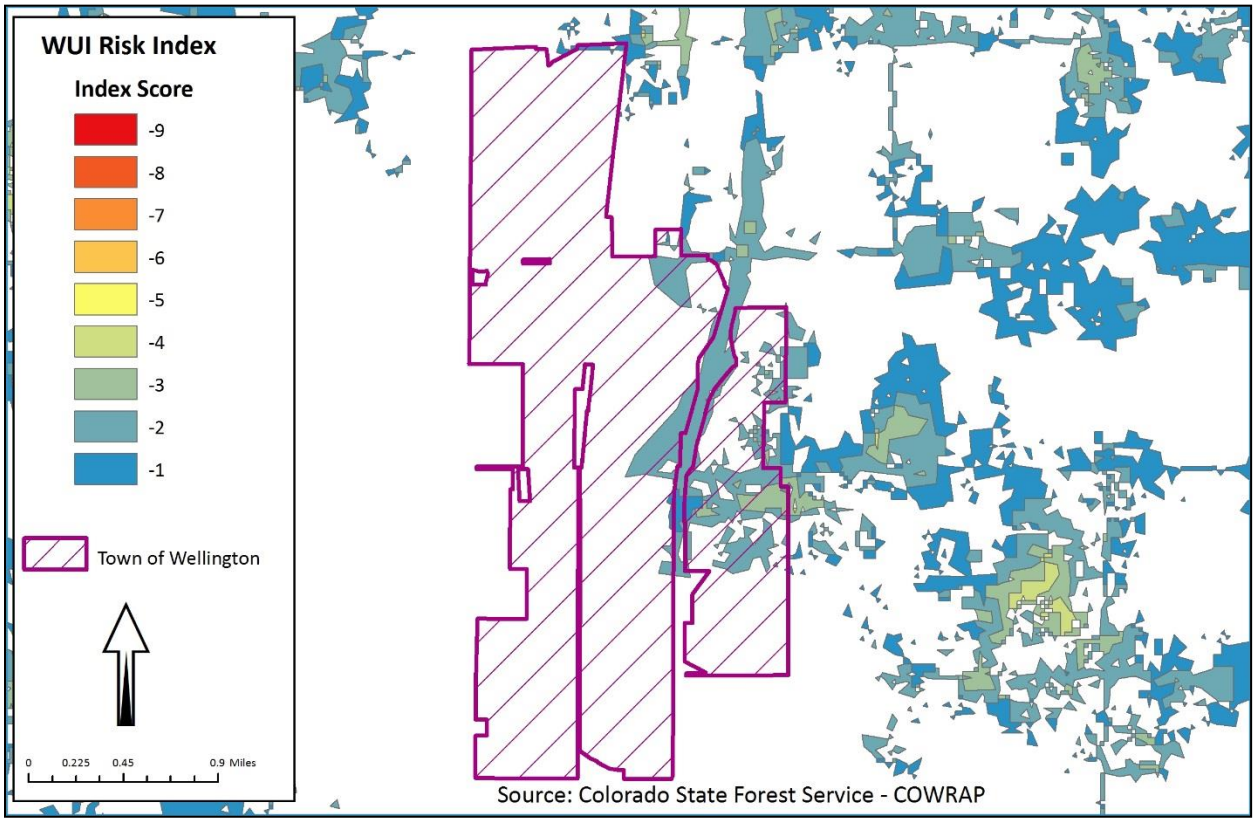
Town of Wellington Wildfire Risk Index Map[241]



There are a number of areas in the eastern region of the town that are within the lower level on the WUI Risk Index Scale. This means that the potential impact on people and homes from a wildfire in those areas is low in relationship to the rest of Larimer County. This level of risk is derived by combining housing density with predicted flame length.

[241] Wildfire Risk represents the possibility of loss or harm occurring from a wildfire. Risk is derived by combining wildfire threat and fire effects. The COWRAP data set was produced statewide and ranks areas on a scale that includes: lowest risk to highest risk.

Town of Wellington WUI Map[242]



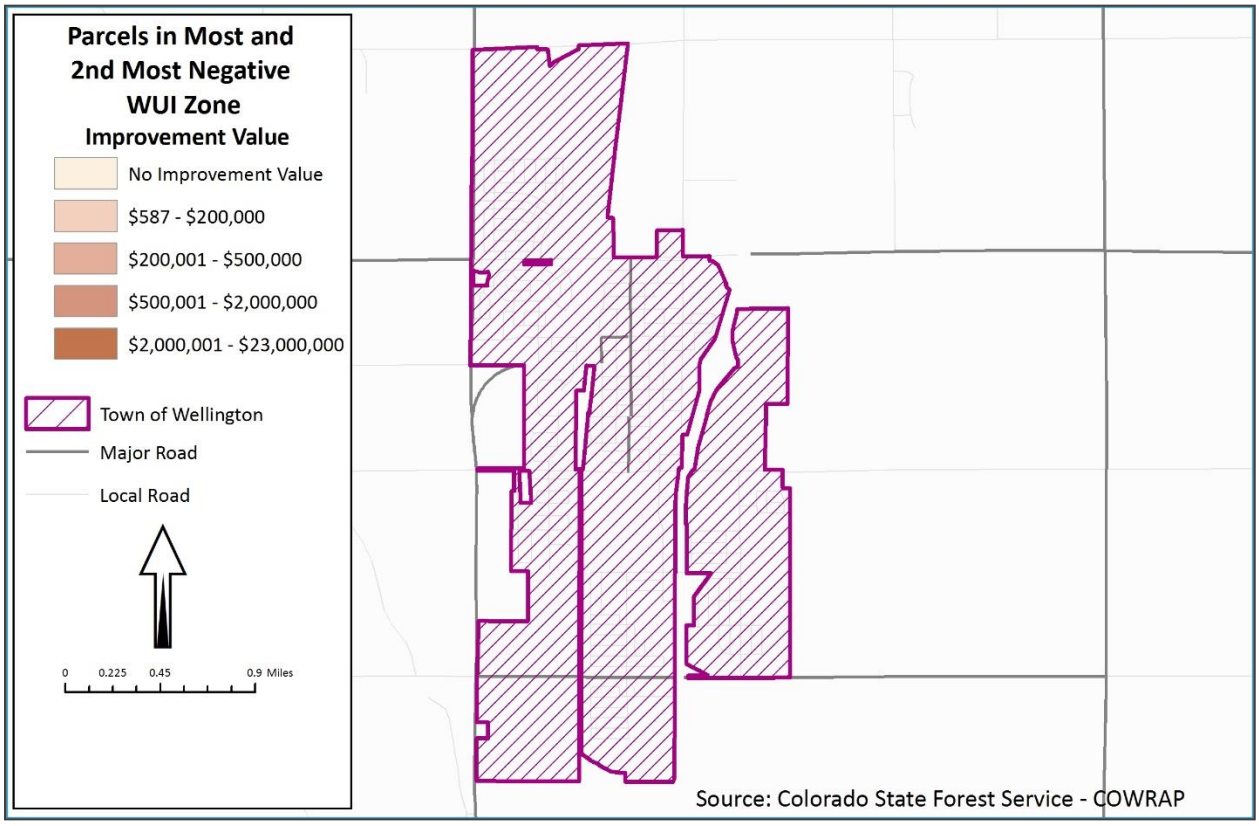
Fires can extensively impact the economy of an affected area, including the agricultural, recreation and tourism industries, water resources, and the critical facilities upon which the Town of Wellington depends. There are no areas of *most negative* and *2nd most negative* wildfire threat in the district according to the WUI Risk Index.

Potential Losses

The exposure data provided in the previous section (Inventory Assets Exposed) provides the clearest picture of potential losses to wildfire in the Town of Wellington. The risk assessment uses worst case scenario loss estimates. For this reason it is important to plan for relative levels of loss rather than specific potential loss dollar amounts.

[242] Wildland Urban Interface Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length. The COWRAP data set was produced statewide and ranks areas on a scale that includes: least negative to most negative impacts. This scale stretched from -1 (least) to -9 (most) statewide.

Town of Wellington Parcels in the Most Negative and Second Most Negative WUI Zone[243]



Probability of Future Occurrences

The likelihood of wildfires attaining significant size and intensity is unpredictable and highly dependent on environmental conditions and firefighting response. Weather conditions, particularly drought events, increase the likelihood of wildfires occurring. That said, it is important to note that 98% of wildfires are human-caused. Ultimately, the occurrence of future wildfire events will strongly depend on patterns of human activity and events are more likely to occur in wildfire-prone areas experiencing new or additional development.

Wildfires can occur at any time of day and during any month of the year. Moreover, the length of a wildfire season and/or peak months may vary appreciably from year to year. As evidenced by the wildfire risk assessment, areas within the Town of Wellington that are characterized by dense development and single family homes along the wildland-urban interface are most vulnerable to wildfire.

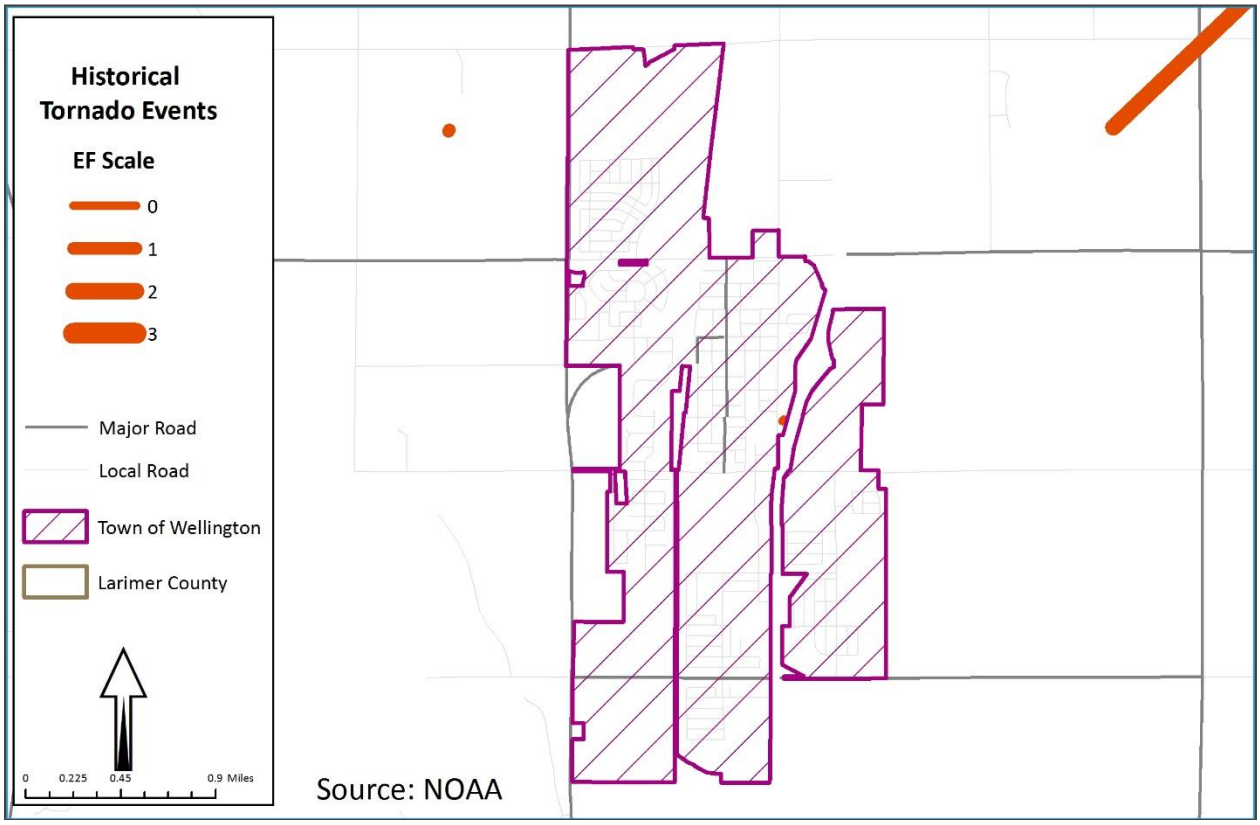
[243] Wildland Urban Interface Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length.

Tornado

Previous Occurrences

According to NOAA, no injuries, deaths, or damages have been recorded within the Town of Wellington due to tornadoes. There is record of 1 tornado reported within the town limits on May 31, 1989. Tornadoes will remain a highly likely occurrence for the Town of LaSalle.

Town of Wellington Historic Tornadoes[244]



Inventory Exposed

All assets located in the Town of Wellington can be considered at risk from severe wind and tornadoes. This includes 6,289 people, or 100% of the Town's population and all buildings and infrastructure within the Town.[245] Most structures, including the town's critical facilities, should be able to withstand and

[244] Historical tornado events. NOAA's National Weather Service Storm Prediction Center, 1950 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

[245] 2010 Census

provide adequate protection from tornadoes. Those facilities with back-up generators should be fully equipped to handle tornado events should the power go out.

Potential Losses

Generally, tornadoes destroy private, commercial, and public property. Additional costs stem from debris removal, maintenance, repair, and response. Indirect costs include loss of industrial and commercial productivity as a result of damage to infrastructure, facilities, or interruption of services. Because no specific, countywide loss estimation exists tornado hazards, potential losses are related to historical property damage and injuries/deaths.

Probability of Future Occurrences

Reported tornadoes over the past 61 years provide an acceptable framework for determining the future occurrence in terms of frequency for such events. The probability of the Town of Wellington experiencing a tornado associated with damages or injuries can be difficult to quantify. Historic tornado frequencies suggest that there is a chance of this type of event occurring somewhere in within the town boundaries each year.

Capabilities Assessment

The capability assessment examines the ability of the Town of Wellington to implement and manage the comprehensive mitigation strategy laid out in this Plan. The strengths, weaknesses, and resources of the community are identified here as a means for evaluating and maintaining effective and appropriate management of the town's hazard mitigation program.

Local Personnel

The ability of a community to implement a comprehensive mitigation strategy depends, in part, on available resources, including people and staff. The following table outlines the town's capabilities as they relate to key personnel.

	Full Time	Part Time	None or Not-Identified
Emergency Manager			X
Floodplain Administrator			X
Community Planner		X	
GIS Specialist			X
Grant Writer			X

Land Use Planning and Codes

Local land use plans and building codes are tremendous tools for evaluating local policies related to hazard mitigation and risk reduction. Additionally, comprehensive master plans, capital improvement plans, stormwater plans and zoning ordinances all present opportunities for enhanced local capabilities. The following table outlines the town's current capabilities as they relate to land use planning and codes.

	Yes (Y); No (N)
A zoning ordinance	Y

	Yes (Y); No (N)
A hazard-specific ordinance	Y
Local building codes	Y
A Comprehensive Plan / Master Plan	Y
A Capital Improvements Plan	Y
A Stormwater Plan	Y
A Continuity of Operations Plan (COOP)	N
An Emergency Operations Plan (EOP)	N
A Long-Term Recovery Plan	N
Participates in the NFIP	Y

Building codes are one tool that communities use to enhance public safety. For example, they can increase structural integrity, mitigate structure fires, and provide benefits in relation to natural hazard avoidance. In Colorado, land use regulations and building codes are typically implemented at the local level. Even without a statewide mandate, most counties and many municipalities have enacted regulations and codes. The Town of Wellington has adopted a local building code requirement, demonstrating their understanding of the benefits codes provide, including reduced exposure to hazards.

Plan Maintenance and Implementation

The Town of Wellington has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the town will continue public participation in the plan maintenance process.

Jurisdiction	Plan Maintenance and Implementation Strategy
Town of Wellington	*"The Town Board will review the plan annually in a work session"* *"We will post mitigation plan on town website and update when mitigation actions are completed"*

Integrating Hazard Mitigation into Local Planning

Through discussions at planning meetings and the use of an online survey, individual outreach, and phone calls, each participating jurisdiction brainstormed with the planning team to identify processes for integrating hazard mitigation into their local planning mechanisms and policies. The following table lists the specific integration strategy identified by the Town of Wellington based on the mitigation actions listed in this plan.

Jurisdiction	Strategy
Town of Wellington	*"We will integrate mitigation actions into our capital improvements plan"*

Mitigation Action Guides

The following Mitigation Action Guides present the town's mitigation actions that were developed for the 2016 Plan.

Town of Wellington: Tornado Warning System (Wellington – 1)	
PRIORITY: High	HAZARDS ADDRESSED: Tornado
LOCATION: Town Wide	GOALS ADDRESSED: posted on website
RECOMMENDATION DATE: 1/1/2014	OBJECTIVES ADDRESSED: posted on website
TARGET COMPLETION DATE: 12/31/17	
ISSUE: Town of Wellington has no Tornado Warning System	
RECOMMENDATION: Provide Tornado Warning System	
ACTION: Tornado Sirens or Reverse 911 type phone notification	
LEAD AGENCY: Town of Wellington	EXPECTED COST: TBD
SUPPORT AGENCIES: Wellington Fire District, Larimer County Sheriff	POTENTIAL FUNDING SOURCES: Grants, Annual Budget
PROGRESS MILESTONES:	

Town of Wellington : North Old Town Drainage Improvements (Wellington – 2)	
PRIORITY: High	HAZARDS ADDRESSED: Flood
LOCATION: Old Town Wellington, North of Cleveland	GOALS ADDRESSED: posted on website
RECOMMENDATION DATE: 1/1/2014	OBJECTIVES ADDRESSED: posted on website
TARGET COMPLETION DATE: 12/31/2016	
ISSUE: Lack of Adequate Drainage facilities in Old Town results in local flooding of businesses on Cleveland Avenue (Hwy 1).	
RECOMMENDATION: Construction of New Stormwater Facilities	
ACTION: Design and Construction of Stormwater pipe and inlets, directing storm flows to Boxelder Creek.	
LEAD AGENCY: Town of Wellington	EXPECTED COST: $1.8 Million
SUPPORT AGENCIES: CDOT	POTENTIAL FUNDING SOURCES: Storm Drainage Fund, Grants
PROGRESS MILESTONES: Feasibility Study and Preliminary Design completed. First of two projects needed to solve issue currently under final design.	

Letter of Intent to Participate

TOWN OF WELLINGTON
3735 CLEVELAND AVENUE
WELLINGTON, CO 80549
TOWN HALL (970) 568-3381
FAX (970) 568-3951

LETTER OF INTENT TO PARTICIPATE

December 6, 2014

Lori R. Hodges
Larimer County Emergency Management
200 West Oak Street
Fort Collins, CO 80526

Re: "Statement of Intent to Participate" as a participating jurisdiction in the Larimer County Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Dear Ms. Hodges,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the Town of Wellington is submitting this letter of intent to confirm that Town has agreed to participate in the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, Town of Wellington agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Larimer County OEM to complete the plan in conformance with FEMA requirements.

The Town of Wellington understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

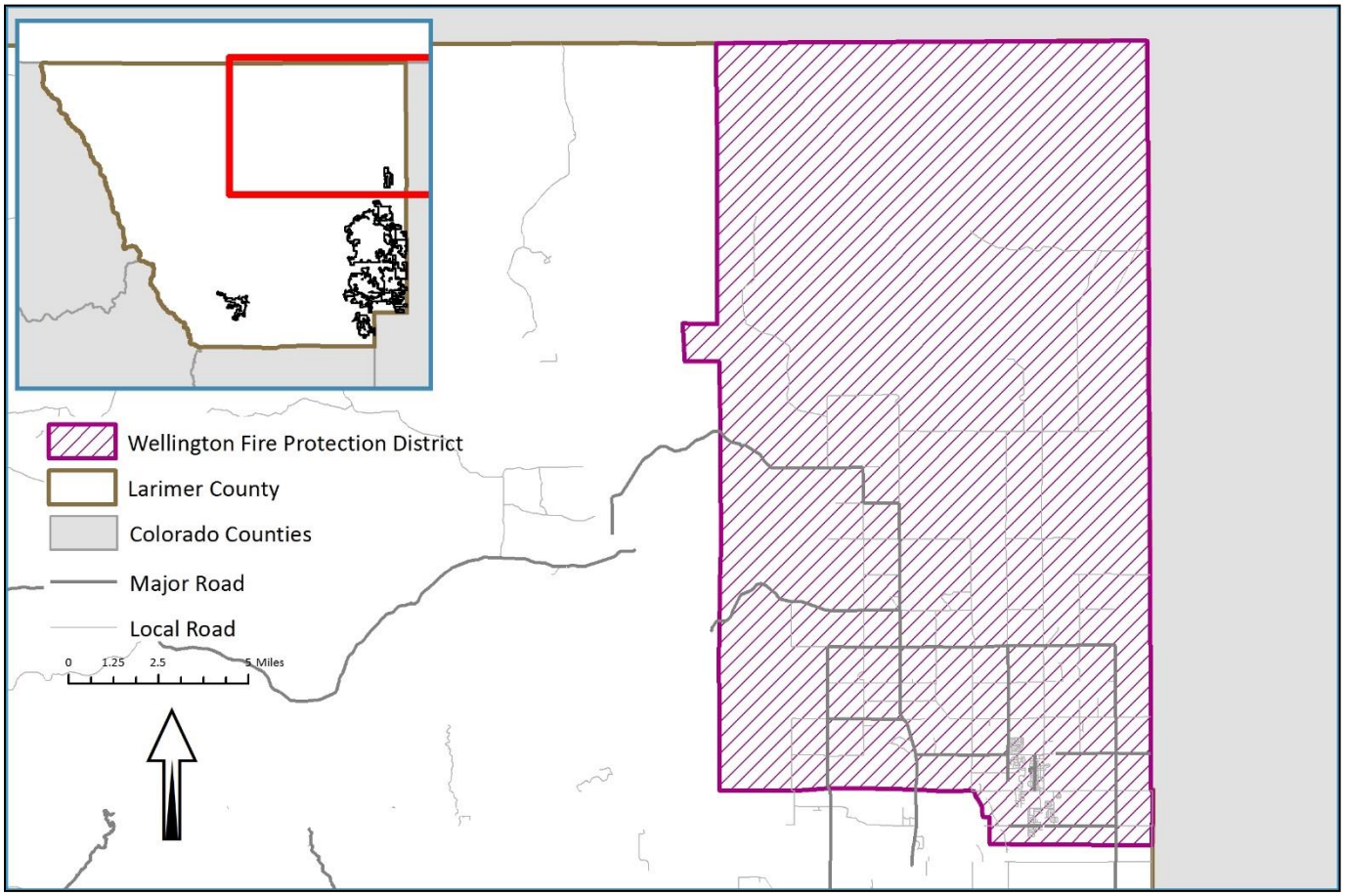
- Identification of hazards unique to the jurisdiction and not addressed in the master planning document.
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area.
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to these goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan.
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Wellington Fire Protection District

"Essential community partners serving as a cohesive team of highly skilled, professional responders exceeding expectations with courage, confidence, and uncompromising safety."
— Mission Statement, Wellington Fire Protection District

Community Profile

The Wellington Fire Protection District (WFPD) serves over 10,000 residents living throughout an area of 288 square miles in Northern Colorado. The members respond to over 500 calls per year ranging from medical emergencies to hazardous material incidents. Although we the WFPD longer relies on horse-powered fire apparatus to respond to emergencies, the department values the department's history and all the members who have served the community over the last hundred years.



Hazard Identification and Risk Assessment

The following Hazard Identification and Risk Assessment Summary table is based on jurisdiction-specific responses to the risk factor exercise and differs from the risk factor results that were determined at the county scale.

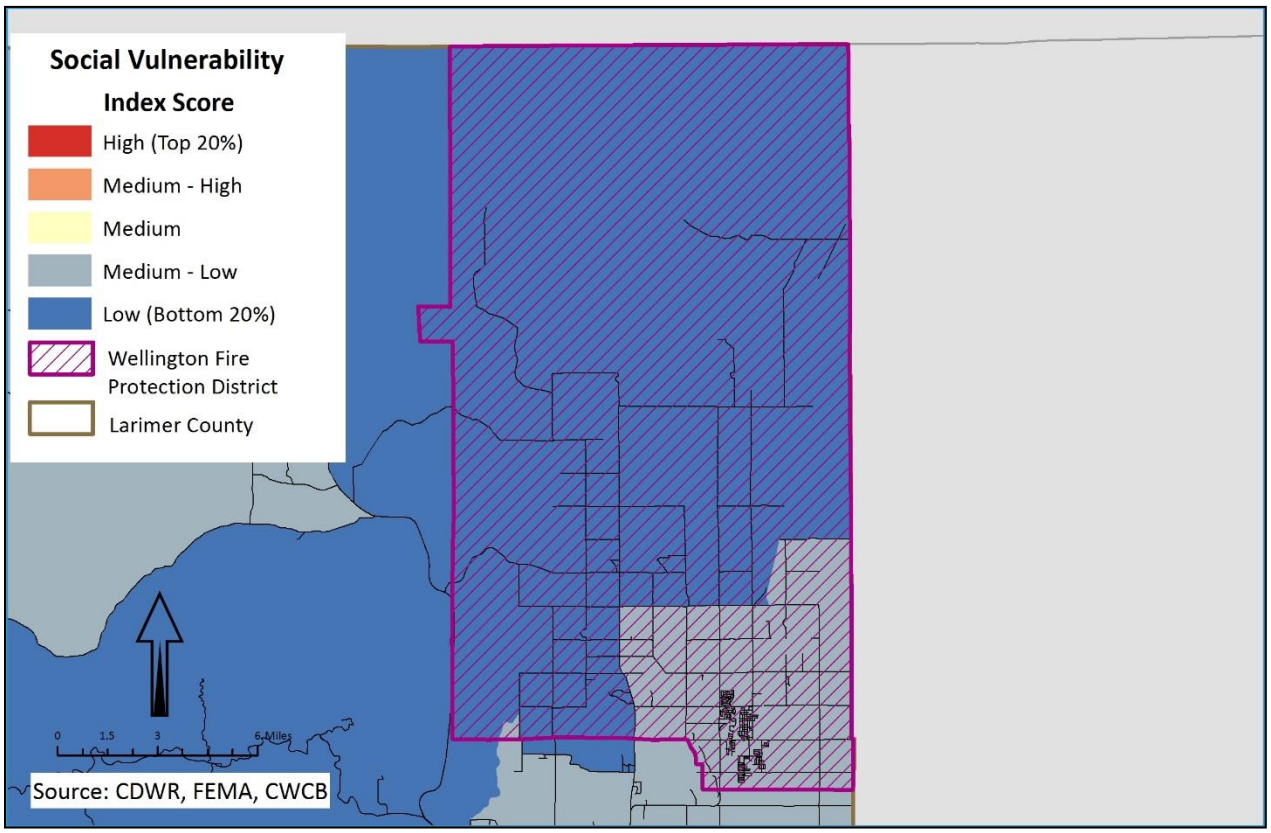
NATURAL HAZARD	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Fire – Wildland	1.2	0.6	0.6	0.4	0.2	3.0
Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)	1.2	0.6	0.6	0.2	0.3	2.9
Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)	1.2	0.6	0.6	0.3	0.1	2.8
Utility Disruption	0.9	0.6	0.6	0.4	0.3	2.8
Tornado	0.9	0.6	0.6	0.4	0.1	2.6
Flood – Flash and Riverine	0.9	0.6	0.4	0.2	0.3	2.4
Hazmat – Fixed and Transport	0.9	0.6	0.4	0.4	0.1	2.4
Erosion / Deposition	0.9	0.6	0.2	0.4	0.1	2.2
Earthquake	0.3	0.3	0.6	0.4	0.1	1.7
Biological Hazards / Contagion	0.3	0.3	0.4	0.1	0.4	1.5
Civil Disturbance	0.3	0.3	0.4	0.4	0.1	1.5
Landslide / Rockslide	0.3	0.3	0.2	0.4	0.1	1.3
HIGH RISK (2.5 or higher): Fire – Wildland; Winter Storm (Blizzard Conditions, Heavy Snow Accumulation); Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning); Utility Disruption; Tornado						
MODERATE RISK HAZARD (2.0 - 2.4): Flood – Flash and Riverine; Hazmat – Fixed and Transport; Erosion / Deposition						
Low Risk (1.9 and lower): Earthquake; Biological Hazards / Contagion; Civil Disturbance; Landslide / Rockslide						

Vulnerability Assessment

This section provides a refined vulnerability assessment, specific for the Wellington Fire Protection District, for those hazards that were identified as being rated HIGH in the preceding section. This analysis was conducted separately from that of the county-wide vulnerability assessment to specifically focus on the population, structures, infrastructure, and other assets unique to the Wellington Fire Protection District.

The results of the social vulnerability assessment are displayed on the map below. On the map, social vulnerability is represented at the census tract level by 5 classes of vulnerability: Low (bottom 20% of the county), Medium-Low, Medium, Medium-High, and High (top 20% of the county). The Wellington Fire Protection District's social vulnerability map shows social vulnerability within the community.

Social Vulnerability Map – Wellington Fire Protection District[246]



Social vulnerability is represented as the social, economic, demographic, and housing characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to hazard events. The pre-existing social conditions that contribute to disaster losses can be identified using social vulnerability indicators. Using methods identified in the Social Vulnerability Index (SoVI) developed by Cutter et. al. (2003) this layer shows the social vulnerability index scores for the State of Colorado at the census tract level. Social vulnerability is represented at the Census tract level by five classes of vulnerability: Low, Medium-Low, Medium, Medium-High, and High.

Wellington Fire Protection District is characterized by a mix of medium-low to low levels of social vulnerability. This does not mean, however, that there aren't any socially vulnerable residents living in the area or that social vulnerability levels will remain the same over time. Close analysis of the individual social

[246] Source: Colorado Division of Water Resources Dam Safety Branch, FEMA, Colorado Water Conservation Board (CWCB)

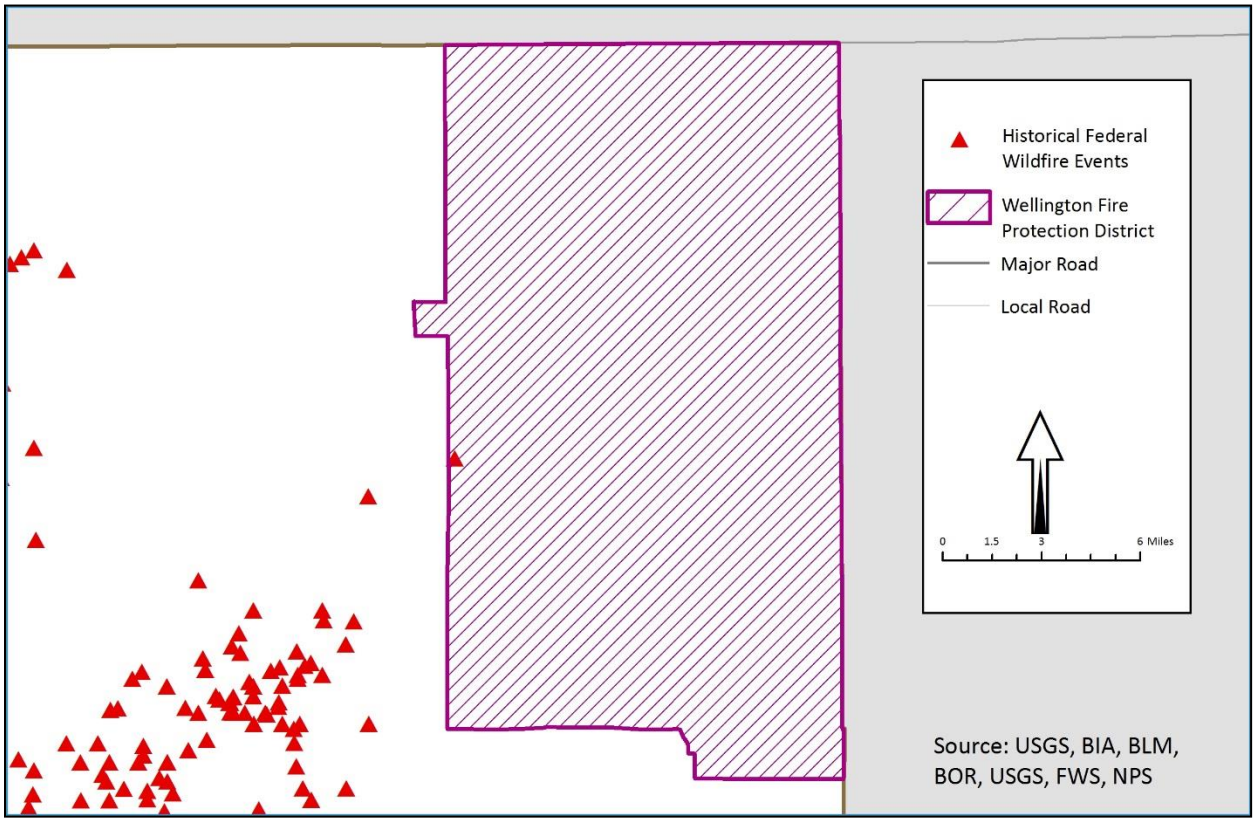
vulnerability indicators within the district will give decision makers a clearer picture of which social vulnerability factors threaten the community the most and where social and economic resources should be allocated in order to reduce vulnerability. Over time, the Wellington Fire Protection District should continue to monitor local social vulnerability as demographic, economic, and housing related conditions change over time.

Fire – Wildland

Previous Occurrences

According to USGS there has been 1 reported wildfire events in the Wellington Fire Protection District. Based on the historic data showing hazardous impacts on the District, there is a great potential for wildfire events to occur at any given time.

Wellington Fire Protection District Historical Federal Wildfire Map[247]

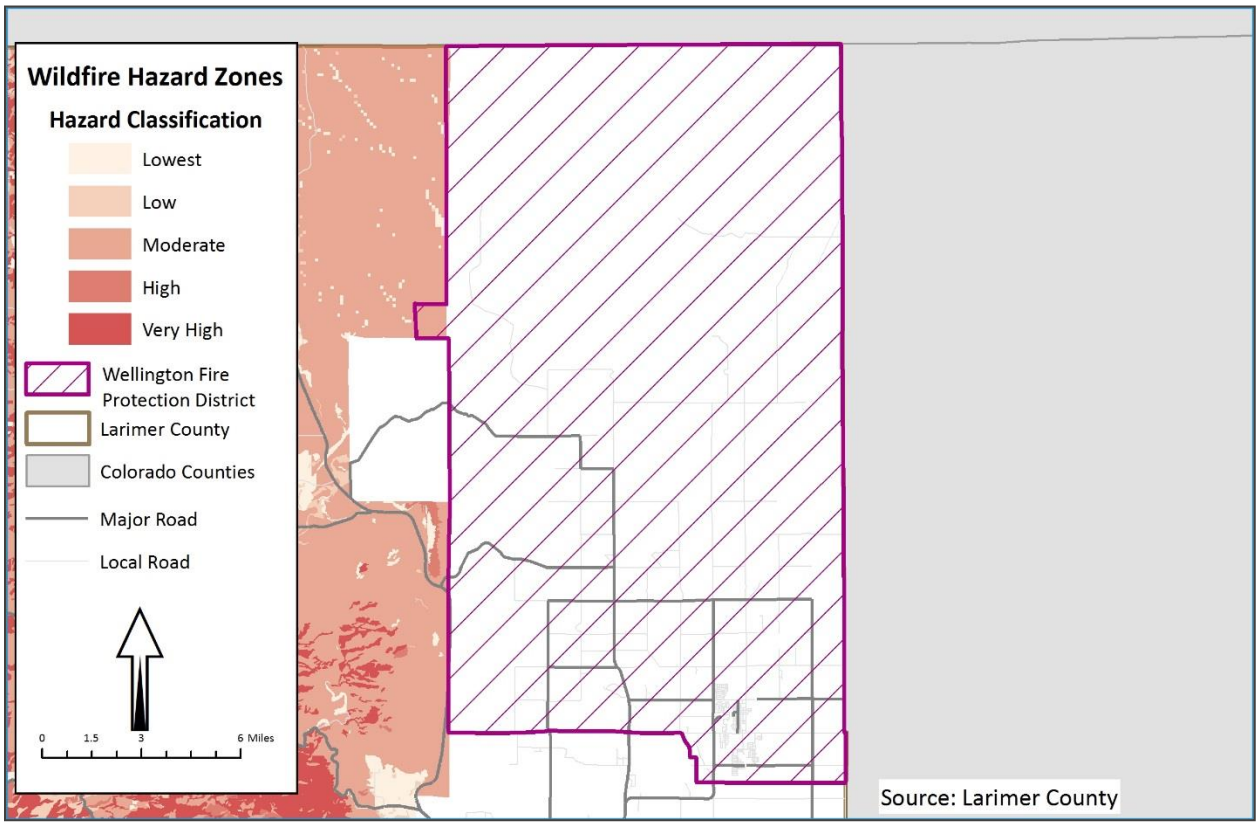


[247] Historical wildland fire occurrence data compiled by USGS from 1980 - 2013, from BIA, BLM, BOR, USGS, FWS, and NPS.

Inventory Exposed

The following Wildfire Hazard Zone map identifies the expected wildfire behavior. The highest wildfire hazard zones in the district are located in the western region, in areas where there are lower population densities.

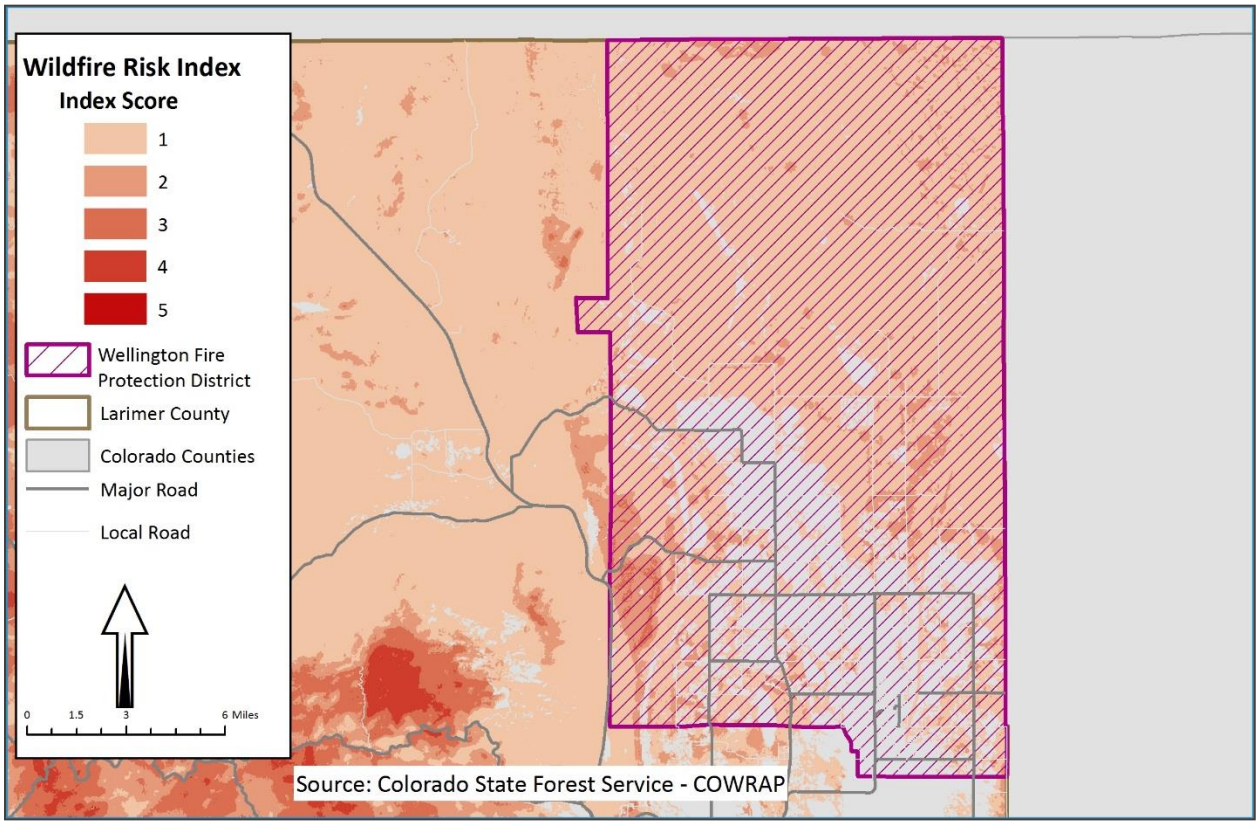
Wellington Fire Protection District Wildfire Hazard Zone Map[248]



The following Wildfire Risk map identifies areas with the greatest potential impacts from a wildfire, in other words, those areas most at risk. The highest wildfire risk areas in the district are located in the southwestern and northern region, in areas where there are lower population densities.

[248] To be used to identify wildfire hazards within the Wildfire Mitigation Area. The hazards are determined based on vegetation cover type, habitat structure stage (cover type, tree size and crown cover percentage), southern facing aspects and 30% and greater slopes according to the Wildfire Hazard Area Mapping (WHAM) guidelines.

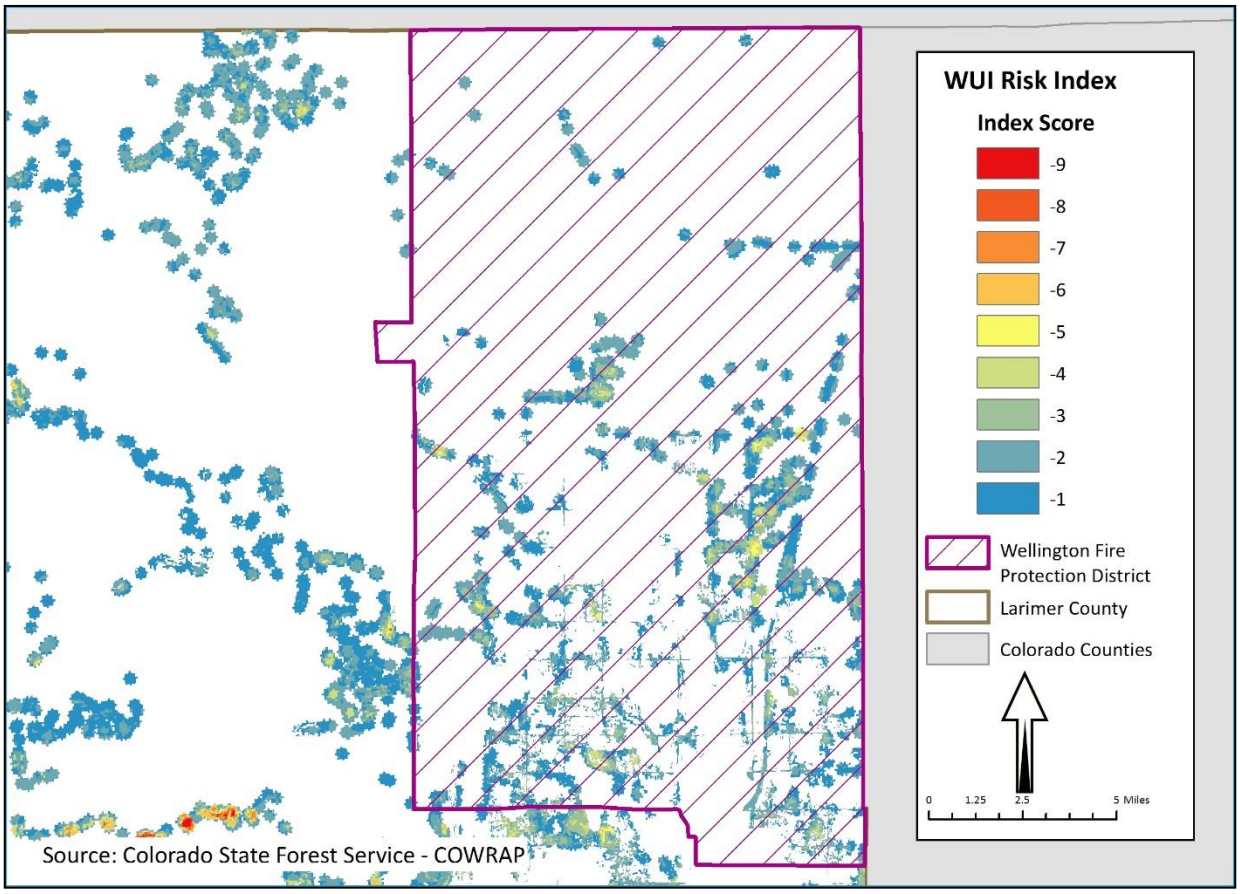
Wellington Fire Protection District Wildfire Risk Index Map[249]



There are a number of areas in the eastern region of the district that are within the lower level on the WUI Risk Index Scale. This means that the potential impact on people and homes from a wildfire in those areas is low in relationship to the rest of Larimer County. This level of risk is derived by combining housing density with predicted flame length.

[249] Wildfire Risk represents the possibility of loss or harm occurring from a wildfire. Risk is derived by combining wildfire threat and fire effects. The COWRAP data set was produced statewide and ranks areas on a scale that includes: lowest risk to highest risk.

Wellington Fire Protection District WUI Map[250]



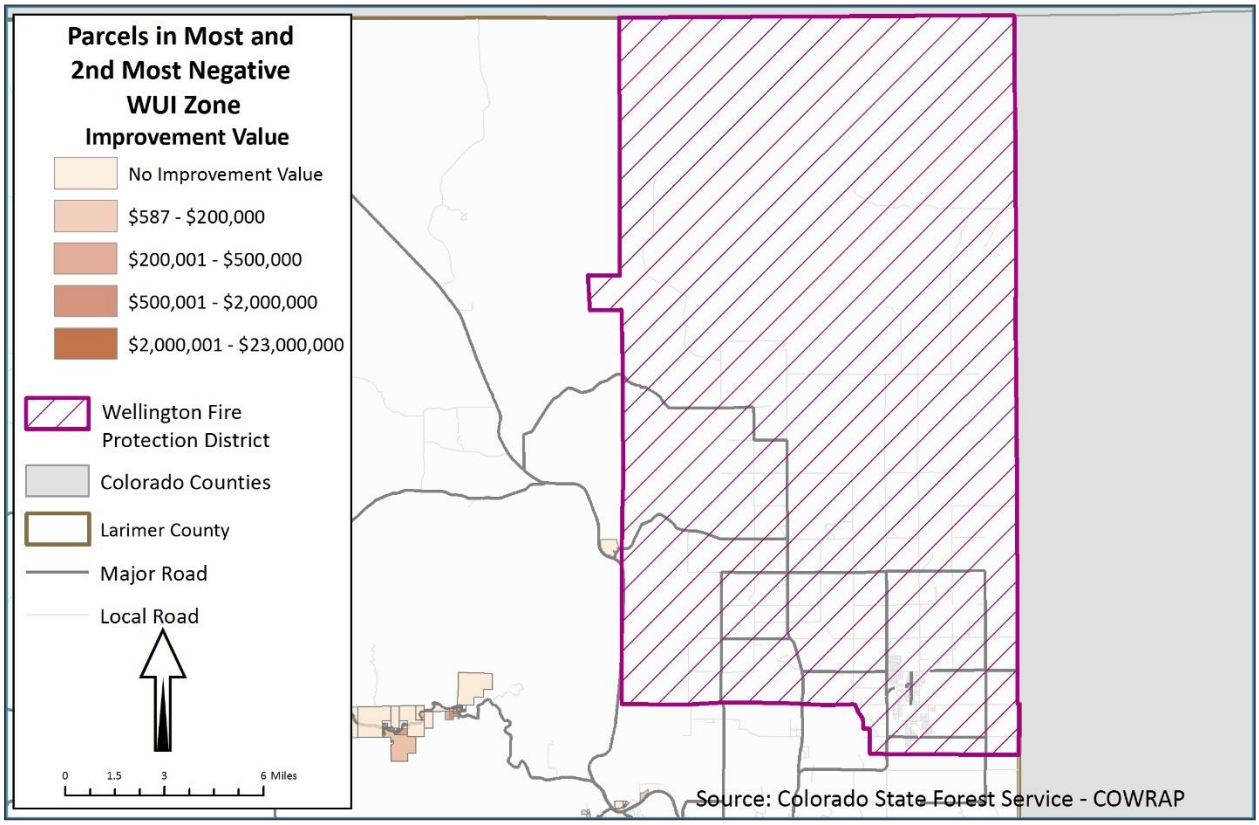
Fires can extensively impact the economy of an affected area, including the agricultural, recreation and tourism industries, water resources, and the critical facilities upon which the Wellington Fire Protection District depends. There are no areas of *most negative* and *2nd most negative* wildfire threat in the district according to the WUI Risk Index.

Potential Losses

[250] Wildland Urban Interface (WUI) Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length. The COWRAP data set was produced statewide and ranks areas on a scale that includes: least negative to most negative impacts. This scale stretched from -1 (least) to -9 (most) statewide.

The exposure data provided in the previous section (Inventory Assets Exposed) provides the clearest picture of potential losses to wildfire in the Wellington Fire Protection District. The risk assessment uses worst case scenario loss estimates. For this reason it is important to plan for relative levels of loss rather than specific potential loss dollar amounts.

Wellington Fire Protection District Parcels in the Most Negative and Second Most Negative WUI Zone[251]



Probability of Future Occurrences

The likelihood of wildfires attaining significant size and intensity is unpredictable and highly dependent on environmental conditions and firefighting response. Weather conditions, particularly drought events, increase the likelihood of wildfires occurring. That said, it is important to note that 98% of wildfires are human-caused. Ultimately, the occurrence of future wildfire events will strongly depend on patterns of human activity and events are more likely to occur in wildfire-prone areas experiencing new or additional development.

[251] Wildland Urban Interface Risk represents the potential impact on people and their homes from a wildfire. Risk is derived by combining housing density with predicted flame length.

Wildfires can occur at any time of day and during any month of the year. Moreover, the length of a wildfire season and/or peak months may vary appreciably from year to year. As evidenced by the wildfire risk assessment, areas within the Wellington Fire Protection District that are characterized by dense development and single family homes along the wildland-urban interface are most vulnerable to wildfire.

Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)

Previous Occurrences

According to NOAA's Storm Events Database, the Wellington Fire Protection District has experienced 74 Winter Storms since 1996. On March 17, 2003 there was report of a winter storm causing $15,500,000 in property damage in areas of Larimer County below 6,000 feet and eastern Larimer County. There were no deaths, injuries or damage to crops reported for any of these storms. The Wellington Fire Protection District is at high risk of experiencing Winter Storms during the winter months.

Inventory Exposed

All assets located in the Wellington Fire Protection District can be considered at risk from winter storms. This includes all people, or 100% of the District's population, and all buildings and infrastructure within the district. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the District's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Potential Losses

Winter storms affect the entire planning area of the Wellington Fire Protection District including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Winter storms will remain a highly likely occurrence for the Wellington Fire Protection District.

Probability of Future Occurrences

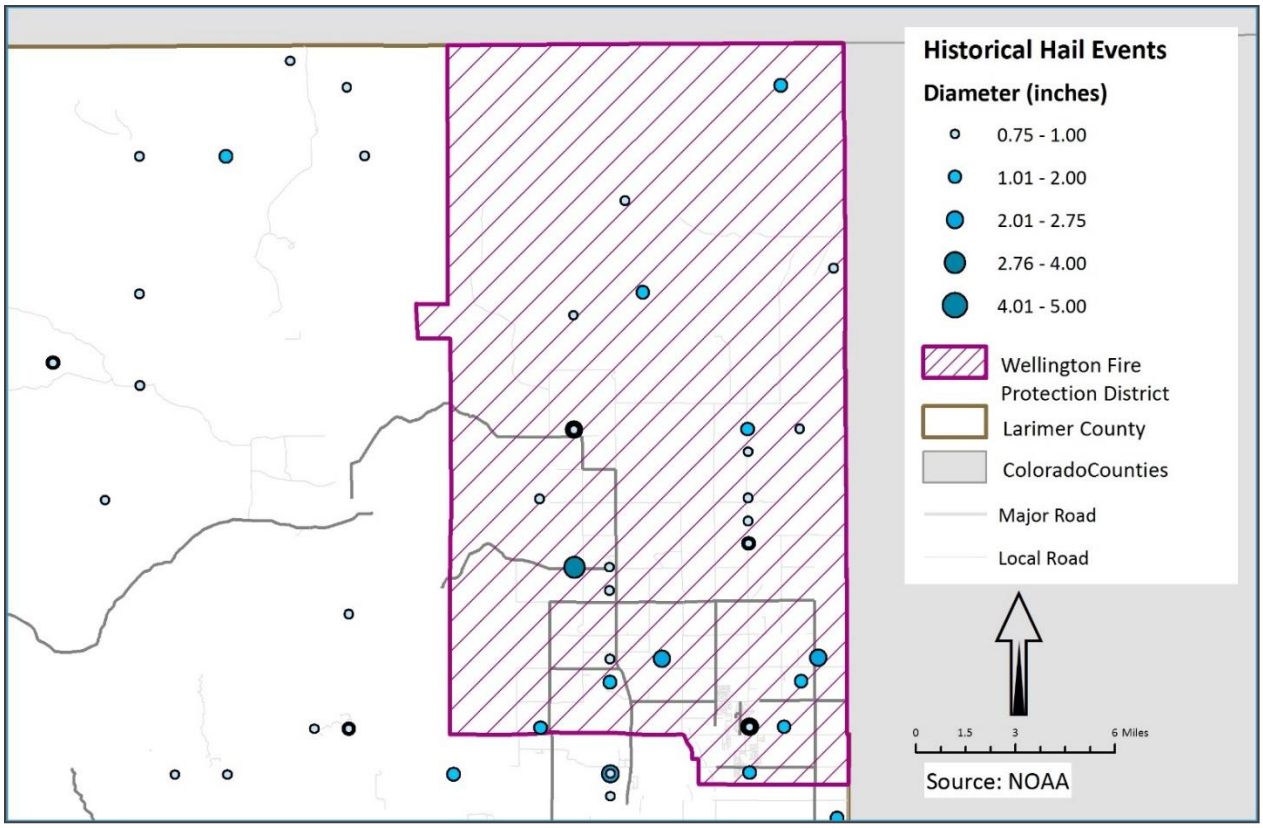
Severe winter storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past severe winter events provide benchmarks for projecting similar conditions into the future. The probability that the Wellington Fire Protection District will experience a severe winter storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the District at least once every year.

Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)

Previous Occurrences

According to NOAA's Storm Events Database there are no reported injuries or deaths in the Wellington Fire Protection District due to hail. There have been 44 hail events reported in district between 1955 and 2014. Of the 44 incidents, 3 reported losses totaling $15,000. Based on the historic data showing hazardous impacts on the district, there is a great potential for hail events to occur at any given time.

Historical Hail Events in the Wellington Fire Protection District[252]



According to NOAA's Storm Events Database there have been no injuries, deaths, or damages in the Wellington Fire Protection District due to thunderstorm wind. There have been 3 thunderstorm wind events reported in the Wellington Fire Protection District between 1955 and 2014. Based on the historic data showing hazardous impacts on the district, there is a great potential for thunderstorm wind events to occur at any given time.

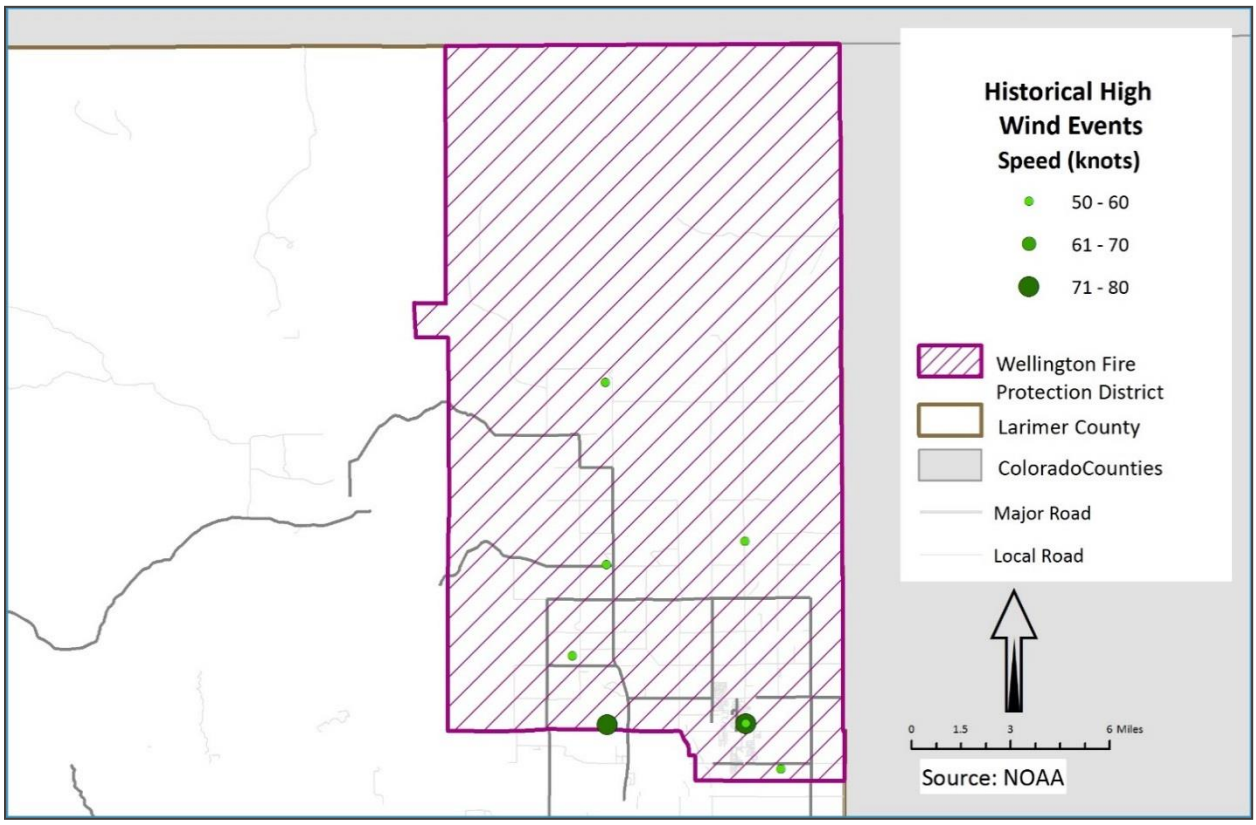
According to NOAA's Storm Events Database there has been 1 lightning event in the Wellington Fire Protection District between 1996 and 2014. There have been 9 reported injuries, no deaths, and no

[252] Source: NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

damages. Based on the historic data showing hazardous impacts on the district, there is a great potential for lightning events to occur at any given time.

According to NOAA's Storm Events Database there have been 10 Windstorm events in the Wellington Fire Protection District between 1996 and 2014. There have been no reported injuries, deaths, or damages within the district.

Historical High Wind Events in the Wellington Fire Protection District[253]



Inventory Exposed

All assets located in the Wellington Fire Protection District can be considered at risk from spring and summer storms. This includes approximately 10,000 people, or 100% of the District's population, and all buildings and infrastructure within the district. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the District's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows

[253] Source: NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Inventory assets exposed to severe wind is dependent on the age of the building, type, construction material used, and condition of the structure. Possible losses to critical infrastructure include:

- Electric power disruption
- Communication disruption
- Water and fuel shortages
- Road closures
- Damaged infrastructure components, such as sewer lift stations and treatment plants
- Damage to homes, structures, and shelters

Potential Losses

Spring and summer storms affect the entire planning area of the Wellington Fire Protection District including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Severe storms will remain a highly likely occurrence for the Wellington Fire Protection District. It is likely that lightning and hail will also be experienced in the area due to such storms.

Generally, straight-line wind events destroy private, commercial, and public property. Additional costs stem from debris removal, maintenance, repair, and response. Indirect costs include loss of industrial and commercial productivity as a result of damage to infrastructure, facilities, or interruption of services. Because no specific, countywide loss estimation exists for wind, potential losses are related to historical property damage and injuries/deaths.

Probability of Future Occurrences

Spring and summer storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past spring and summer events provide benchmarks for projecting similar conditions into the future. The probability that Wellington Fire Protection District will experience a spring or summer storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the Wellington Fire Protection District at least once every year.

Reported straight-line wind events over the past nineteen years provide an acceptable framework for determining the future occurrence in terms of event. The probability of the Wellington Fire Protection District experiencing a severe wind event associated with damages or injuries can be difficult to quantify,

but based on historical record of 10 severe wind events since 1996, there is a chance of this type of event occurring each year.

Utility Disruption

Previous Occurrences

The Wellington Fire Protection District does not currently track incidences of utility disruption.

Inventory Exposed

All assets located in the Wellington Fire Protection District are considered at risk from the impacts of utility disruption events. This includes approximately 10,000 people, or 100% of the County's population, and all buildings and infrastructure within the County.

Potential Losses

Utility disruption events have the potential to threaten lives and disrupt business activity. However, monetary losses and casualty estimates are largely unknown.

Probability of Future Occurrences

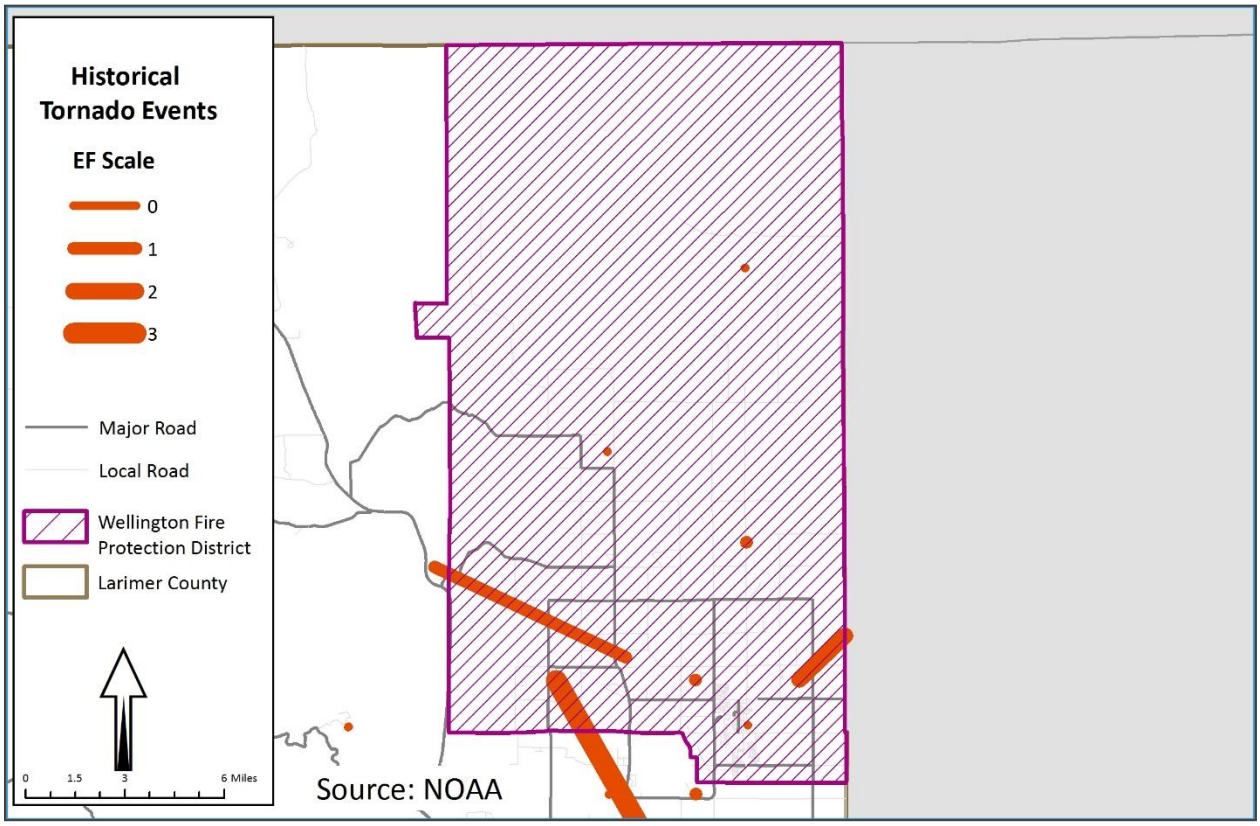
In general, utility outages result from failures in the distribution system as opposed to shortages of supply. Distribution systems are most susceptible to failure during extreme hot and cold temperatures as well as during violent weather conditions. Regional utility failures can threaten human life, particularly when outages affect hospitals, nursing homes, or other healthcare facilities. As both population and climate variability increase across the State of Colorado, and put more pressure on aging distribution systems, it is likely that utility disturbance events will become more frequent in and around the Wellington Fire Protection District.

Tornado

Previous Occurrences

According to NOAA, 78 injuries, 1death, and over $147 million dollars in damages have been recorded within and near the Wellington Fire Protection District service area due to tornadoes. There is record of 9 tornadoes reported within the district limits between 1954 and 2015. The most severe event occurred on May 22, 2008. This EF3 tornado traveled in a north westerly direction and reached speeds of over 165 miles per hour. This tornado event consisted of a formation of several combined tornadoes forming a wedge that was between a half and three quarters of a mile wide. The tornado caused damage to not only the Town of Windsor but also the towns of Milliken, Platteville, Gilchrest, and the City of Greeley. One person was killed at the Missile Silo Campground near Greeley. The tornado impacted area was designated a national disaster. The Rocky Mountain Insurance Information Association (RMIIA) reported that there was an estimated $193.5 million in insured damages and approximately 24,000 auto and homeowners claims. Tornadoes will remain a highly likely occurrence for the Wellington Fire Protection District.

Wellington Fire Protection District Historic Tornadoes[254]



Inventory Exposed

All assets located in Wellington Fire Protection District can be considered at risk from severe wind and tornadoes. This includes over 10,000 people, or 100% of the District's population and all buildings and infrastructure within the District.[255] Most structures, including the district's critical facilities, should be able to withstand and provide adequate protection from tornadoes. Those facilities with back-up generators should be fully equipped to handle tornado events should the power go out.

Potential Losses

Generally, tornadoes destroy private, commercial, and public property. Additional costs stem from debris removal, maintenance, repair, and response. Indirect costs include loss of industrial and commercial productivity as a result of damage to infrastructure, facilities, or interruption of services. Because no specific, countywide loss estimation exists tornado hazards, potential losses are related to historical property damage and injuries/deaths.

[254] Historical tornado events. NOAA's National Weather Service Storm Prediction Center, 1950 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

[255] 2010 Census

Probability of Future Occurrences

Reported tornadoes over the past 61 years provide an acceptable framework for determining the future occurrence in terms of frequency for such events. The probability of the Wellington Fire Protection District experiencing a tornado associated with damages or injuries can be difficult to quantify. Historic tornado frequencies suggest that there is a chance of this type of event occurring somewhere in within the district boundaries each year.

Capabilities Assessment

The capability assessment examines the ability of the Wellington Fire Protection District to implement and manage the comprehensive mitigation strategy laid out in this Plan. The strengths, weaknesses, and resources of the community are identified here as a means for evaluating and maintaining effective and appropriate management of the district's hazard mitigation program.

Local Personnel

The ability of a community to implement a comprehensive mitigation strategy depends, in part, on available resources, including people and staff. The following table outlines the district's capabilities as they relate to key personnel.

	Full Time	Part Time	None or Not-Identified
Emergency Manager	X		
Floodplain Administrator			X
Community Planner	X		
GIS Specialist	X		
Grant Writer			X

Land Use Planning and Codes

Local land use plans and building codes are tremendous tools for evaluating local policies related to hazard mitigation and risk reduction. Additionally, comprehensive master plans, capital improvement plans, stormwater plans and zoning ordinances all present opportunities for enhanced local capabilities. The following table outlines the district's current capabilities as they relate to land use planning and codes.

	Yes (Y); No (N)
A zoning ordinance	Y
A hazard-specific ordinance	-
Local building codes	Y
A Comprehensive Plan / Master Plan	Y
A Capital Improvements Plan	Y
A Stormwater Plan	Y
A Continuity of Operations Plan (COOP)	-
An Emergency Operations Plan (EOP)	Y
A Long-Term Recovery Plan	-

Participates in the NFIP	-

Plan Maintenance and Implementation

Wellington Fire Protection District has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the district will continue public participation in the plan maintenance process.

Jurisdiction	Plan Maintenance and Implementation Strategy
Wellington Fire Protection District	"The plans and our mitigation actions will be reviewed and updated with County, Town, and mutual aid agencies on an annual basis." "We will work cooperatively with the County, Town and other local agencies to seek input and share in public communication efforts."

Integrating Hazard Mitigation into Local Planning

Through discussions at planning meetings and the use of an online survey, individual outreach, and phone calls, each participating jurisdiction brainstormed with the planning team to identify processes for integrating hazard mitigation into their local planning mechanisms and policies. The following table lists the specific integration strategy identified by the Wellington Fire Protection District based on the mitigation actions listed in this plan.

Jurisdiction	Strategy
Wellington Fire Protection District	*"Plans and actions will be integrated into fire district SOP's, Strategic Planning, Annual Budget Development, and coordinated with County and Town efforts."*

Mitigation Action Guides

The following Mitigation Action Guide presents Wellington FPD's new mitigation action that was developed for the 2016 Plan.

Wellington Fire Protection District: Railroad Pre-Incident Planning (Wellington FPD – 1)	
PRIORITY: 1	HAZARDS ADDRESSED: Hazmat (Ground Transport and Rail)
LOCATION: I-25 and BNSF rail within the Wellington Fire Protection District boundary, CO-WY border to approximately Larimer County Road 58.	GOALS ADDRESSED: Goals 1, 2, 3 and 5
RECOMMENDATION DATE: 11/11/2015	OBJECTIVES ADDRESSED: Objectives C and E
TARGET COMPLETION DATE: 12/31/2020	
ISSUE: Interagency communication, information sharing, initial response and evacuation planning.	
RECOMMENDATION: Interagency coordinated development of a pre-incident plan and regional exercise	
ACTION: Development of a Pre-Incident Response and Evacuation Plan	
LEAD AGENCY: Wellington Fire Protection District	EXPECTED COST: $8,000 (inclusive of estimated personnel time and exercise supplies)
SUPPORT AGENCIES: Colorado State Patrol, Colorado Department of Transportation, BNSF, Larimer County Emergency Management, Larimer County Sheriff's Office, Poudre Fire Authority.	POTENTIAL FUNDING SOURCES: Grant funding, private sector investment, interagency training funds
PROGRESS MILESTONES: 1) Initial interagency coordination meeting to discuss essential steps 2) Project management by Wellington Fire Protection District 3) Conduct plan development meetings 4) Resource inventory 5) Formation of an exercise design team 6) Plan development 7) Exercise and test the plan 8) Plan maintenance	

Wellington Fire Protection District: Homeowner Fire Mitigation Program (Wellington FPD – 2)	
PRIORITY: 2	HAZARDS ADDRESSED: Wildfire (grassfires)
LOCATION: I-25 and BNSF rail within the Wellington Fire Protection District	GOALS ADDRESSED: Goals 1, 2, 3 and 5

boundary, CO-WY border to approximately Larimer County Road 58.	
RECOMMENDATION DATE: 11/11/2015	OBJECTIVES ADDRESSED: Objectives C and E
TARGET COMPLETION DATE: 12/31/2018	
ISSUE: The Wellington Fire Protection District has a high risk of large-scale grassfires that can move quickly and cause damage and destruction.	
RECOMMENDATION: Inform homeowners and property owners of best practices in mitigating properties against wildfire and grassfire hazards.	
ACTION: Present at community meetings, provide written recommendations and actions to homeowners and provided one-on-one assessments regarding wildfire/grassfire risk.	
LEAD AGENCY: Wellington Fire Protection District	EXPECTED COST: $2,500 (inclusive of estimated personnel time and exercise supplies)
SUPPORT AGENCIES: Larimer County Emergency Management, Larimer County Sheriff's Office, Poudre Fire Authority.	POTENTIAL FUNDING SOURCES: Grant funding, private sector investment, interagency training funds
PROGRESS MILESTONES: 1) Presentations at Community Meetings 2) Email Distribution List Information 3) One-on-one Property Assessments 4) Written Newsletters and informational bulletins	

Letter of Intent to Participate

WELLINGTON FIRE PROTECTION DISTRICT
8130 3RD ST., P.O. BOX 10
WELLINGTON, CO 80549
(970) 568-3232

protecting lives and property

LETTER OF INTENT TO PARTICIPATE

December 15, 2014

Lori R. Hodges
Larimer County Emergency Management
200 West Oak Street
Fort Collins, CO 80526

Re: "Statement of Intent to Participate" as a participating jurisdiction in the Larimer County Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Dear Ms. Hodges,

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Further, as a condition to participating in the mitigation planning, WELLINGTON FIRE PROTECTION DISTRICT agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Larimer County OEM to complete the plan in conformance with FEMA requirements.

WELLINGTON FIRE PROTECTION DISTRICT understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by an agreement between the Lead Jurisdiction and the Participating Jurisdiction, I, KENNETH PETTIT, commit WELLINGTON FIRE PROTECTION DISTRICT to the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 15TH day of December, 2014

Kenneth Pettit, District Board President

LARIMER COUNTY
COMMITTED TO EXCELLENCE

Michael Baker
INTERNATIONAL

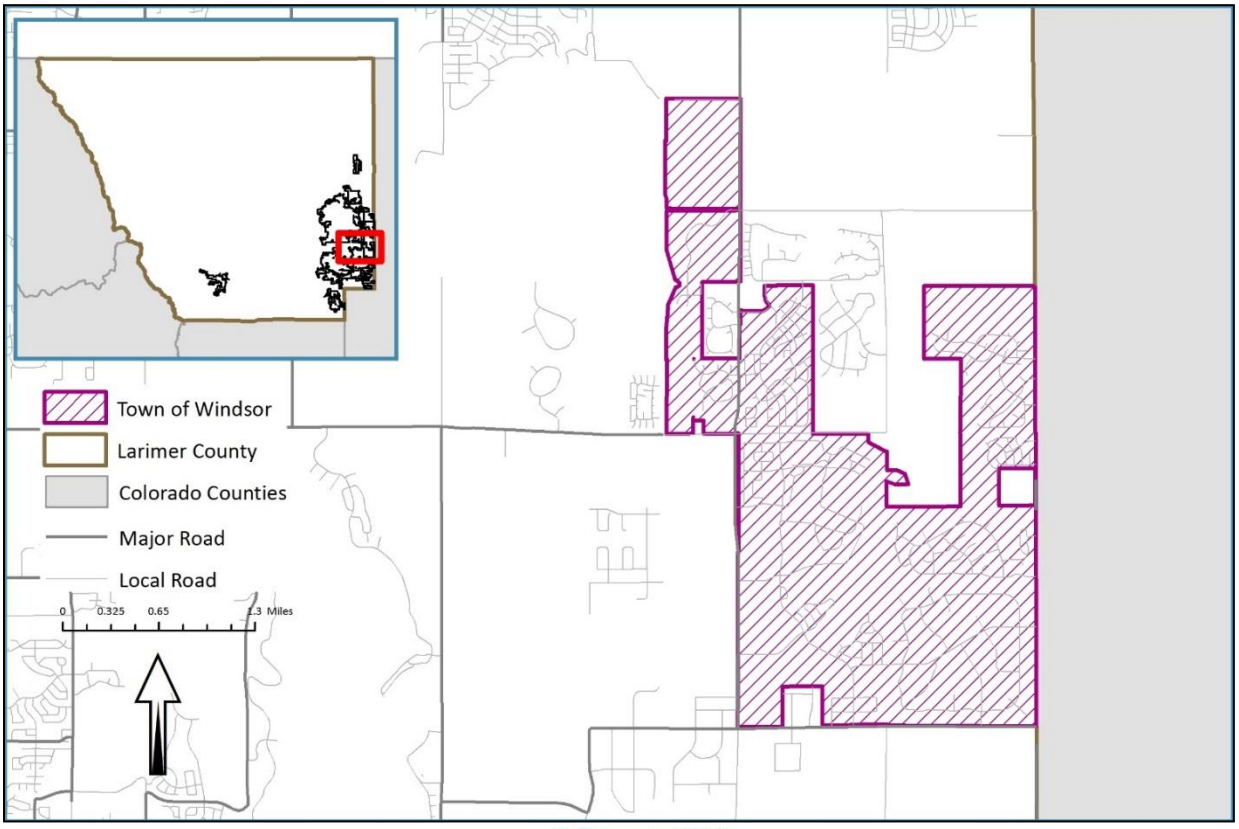
Town of Windsor

During the development of the 2016 Larimer County HMP, the Town of Windsor was in the early stages of developing their 2015 Comprehensive Plan Update. Some of the key visions that have been previously established for Windsor by local residents include:

- Windsor's hometown feel fosters an energetic community spirit and pride that makes our town a special place in Northern Colorado.
- Windsor has a strong local economy with diverse business sectors that provide jobs and services for residents.
- Windsor promotes quality development.
- Windsor enjoys a friendly community with a vibrant downtown, housing opportunities, and choices for leisure, cultural activities, recreation, and mobility for all.
- Windsor is a good environmental steward.

Community Profile

Windsor was founded in 1882 and was incorporated on April 2, 1890. The Town's location in the fertile Cache la Poudre River Valley, the introduction of irrigation, and the development of the railroad through the area each contributed to the early development of the Town and Region. Windsor's early economy was centered largely on agriculture. As compared to the dramatic population increases of the 1970s, Windsor experienced only moderate growth between 1980 and 1990. During this time period, population growth in the Region was concentrated mainly in the larger cities of Fort Collins and Loveland, where large employers such as the Colorado State University and the Hewlett-Packard Corporation are located.



The following table summarizes key demographic and development related characteristics of the Town of Windsor.

Town of Windsor Statistics		
	Town of Windsor	Colorado
Population, 2010	18,644	5,029,196
2000-2010 Population Change, %	%	14.5%
% Population under 5 years, 2010	%	6.8%
% Population under 19 years, 2010	%	20.3
% Population 65 years and over, 2010	%	10.9%
Language other than English spoken at home, % age 5+, 2009-2013	%	15.9%
Homeownership Rate 2010	%	65.5%
Persons Per Household 2010		2.57
Persons below poverty level, %, 2013	%	13.2%
Median Household Income, 2013	$	$58,433

Hazard Identification and Risk Assessment

The following Hazard Identification and Risk Assessment Summary table is based on jurisdiction-specific responses to the risk factor exercise and differs from the risk factor results that were determined at the county scale. The Town of Windsor is situated in both Larimer and Weld Counties. For the purpose of this plan, spatially analyzed hazard risks have been assessed for the areas of the town that lie specifically within Larimer County.

NATURAL HAZARD	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Flood – Flash and Riverine	1.2	0.9	0.6	0.2	0.4	3.3
Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)	1.2	0.9	0.8	0.2	0.2	3.3
Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)	1.2	0.6	0.8	0.2	0.4	3.2
Tornado	0.3	1.2	0.8	0.2	0.4	2.9
Utility Disruption	1.2	0.3	0.6	0.4	0.2	2.7
Civil Disturbance	0.6	0.6	0.4	0.4	0.1	2.1
Earthquake	0.3	0.9	0.2	0.4	0.2	2.0
Fire – Wildland	0.3	0.6	0.2	0.4	0.3	1.8

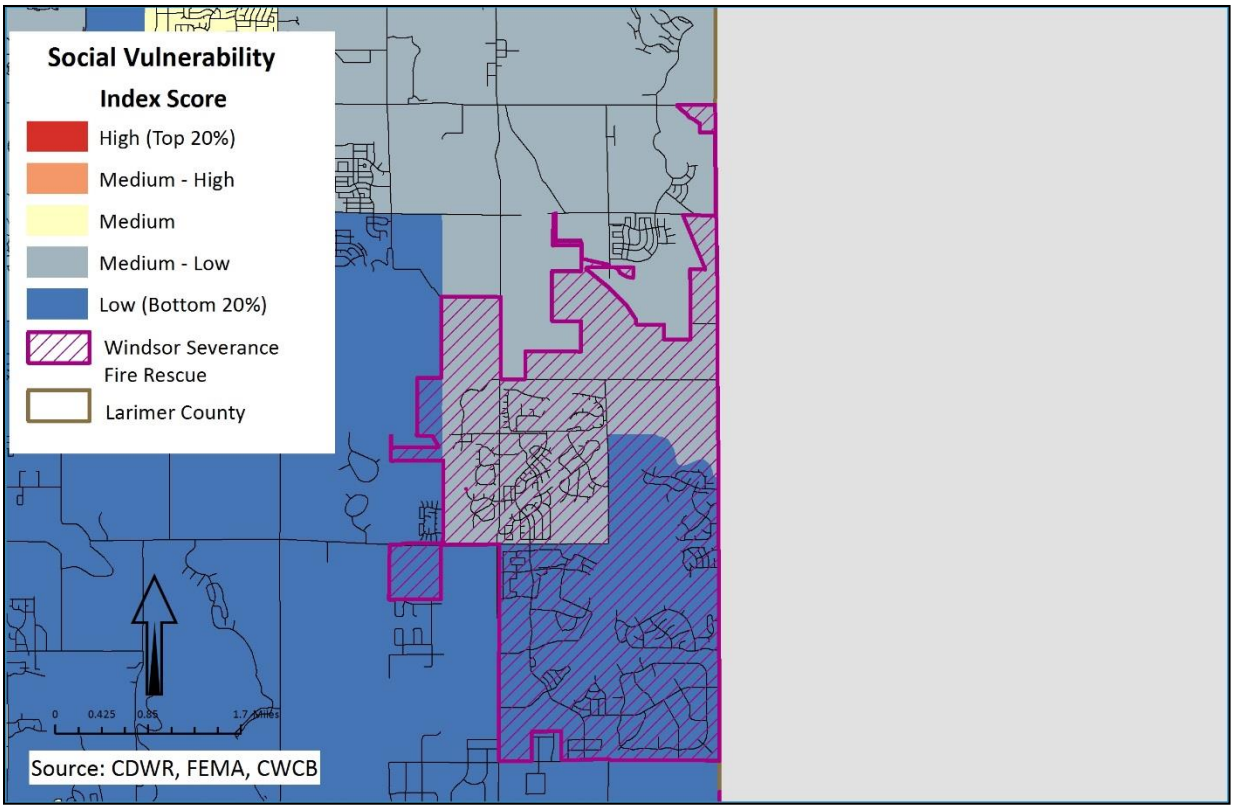
Erosion / Deposition	0.6	0.3	0.2	0.4	0.1	1.6
Hazmat – Fixed and Transport	0.3	0.3	0.2	0.4	0.2	1.4
Biological Hazards / Contagion	0.3	0.3	0.2	0.4	0.1	1.3
Landslide / Rockslide	0.3	0.3	0.2	0.4	0.1	1.3
HIGH RISK (2.5 or higher): Flood – Flash and Riverine; Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning); Winter Storm (Blizzard Conditions, Heavy Snow Accumulation); Tornado; Utility Disruption						
MODERATE RISK HAZARD (2.0 - 2.4): Civil Disturbance; Earthquake;						
Low Risk (1.9 and lower): Fire – Wildland; Erosion / Deposition; Hazmat – Fixed and Transport; Biological Hazards / Contagion; Landslide / Rockslide						

Vulnerability Assessment

This section provides a refined vulnerability assessment, specific for the Town of Windsor, for those hazards that were identified as being rated HIGH in the preceding section. This analysis was conducted separately from that of the county-wide vulnerability assessment to specifically focus on the population, structures, infrastructure, and other assets unique to Windsor.

The results of the social vulnerability assessment are displayed on the map below. On the map, social vulnerability is represented at the census tract level by 5 classes of vulnerability: Low (bottom 20% of the county), Medium-Low, Medium, Medium-High, and High (top 20% of the county). The Town of Windsor's social vulnerability map shows social vulnerability within the community.

Social Vulnerability Map – Town of Windsor[256]



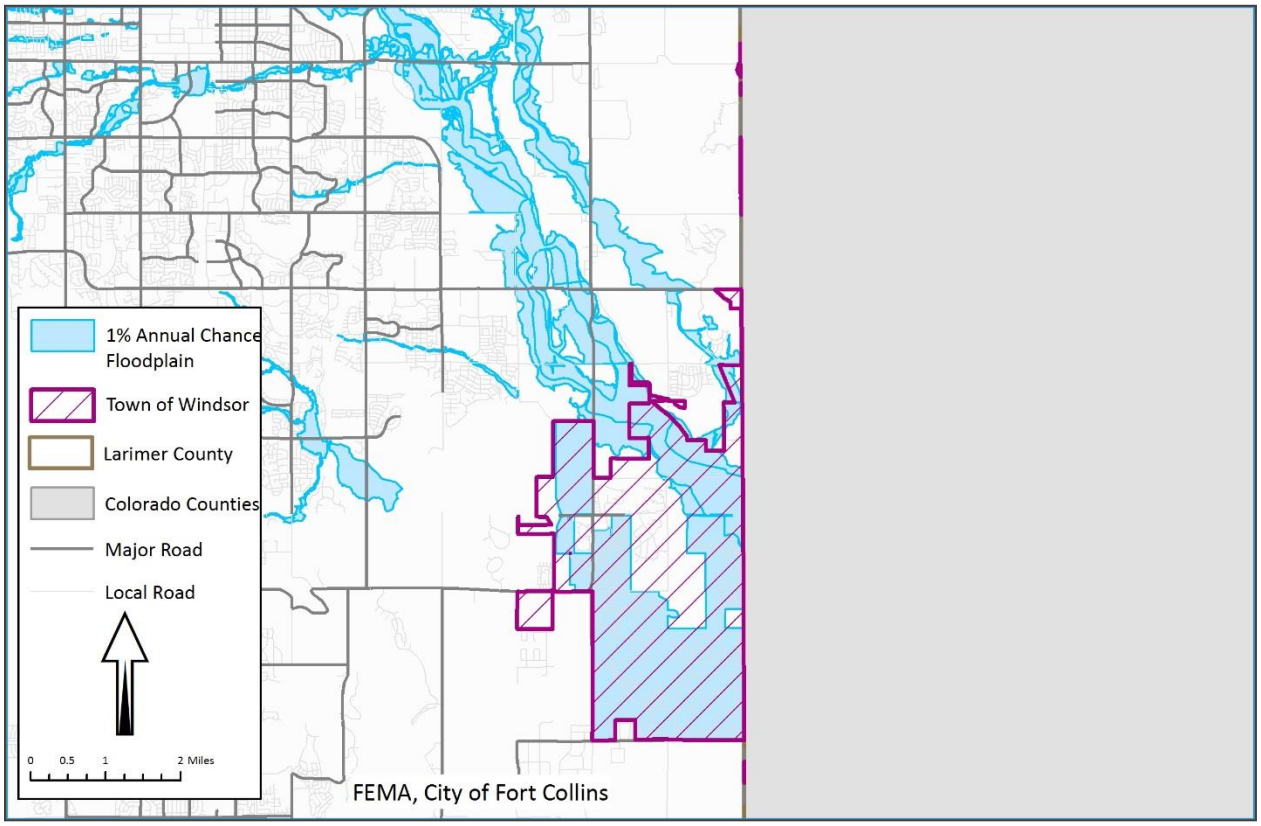
Social vulnerability is represented as the social, economic, demographic, and housing characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to hazard events. The pre-existing social conditions that contribute to disaster losses can be identified using social vulnerability indicators. Using methods identified in the Social Vulnerability Index (SoVI) developed by Cutter et. al. (2003) this layer shows the social vulnerability index scores for the State of Colorado at the census tract level. Social vulnerability is represented at the Census tract level by five classes of vulnerability: Low, Medium-Low, Medium, Medium-High, and High.

Windsor is characterized by a mix of medium-low to low levels of social vulnerability. This does not mean, however, that there aren't any socially vulnerable residents living in the community or that social vulnerability levels will remain the same over time. Close analysis of the individual social vulnerability indicators within the community will give local emergency managers, planners, and stakeholders a clearer picture of which social vulnerability factors threaten the community the most and where social and economic resources should be allocated in order to reduce vulnerability. Over time, the Town of Windsor should continue to monitor their local social vulnerability as demographic, economic, and housing related conditions change.

[256] Source: Colorado Division of Water Resources Dam Safety Branch, FEMA, Colorado Water Conservation Board (CWCB)

Flood – Flash and Riverine

Town of Windsor Special Flood Hazard Area[257]

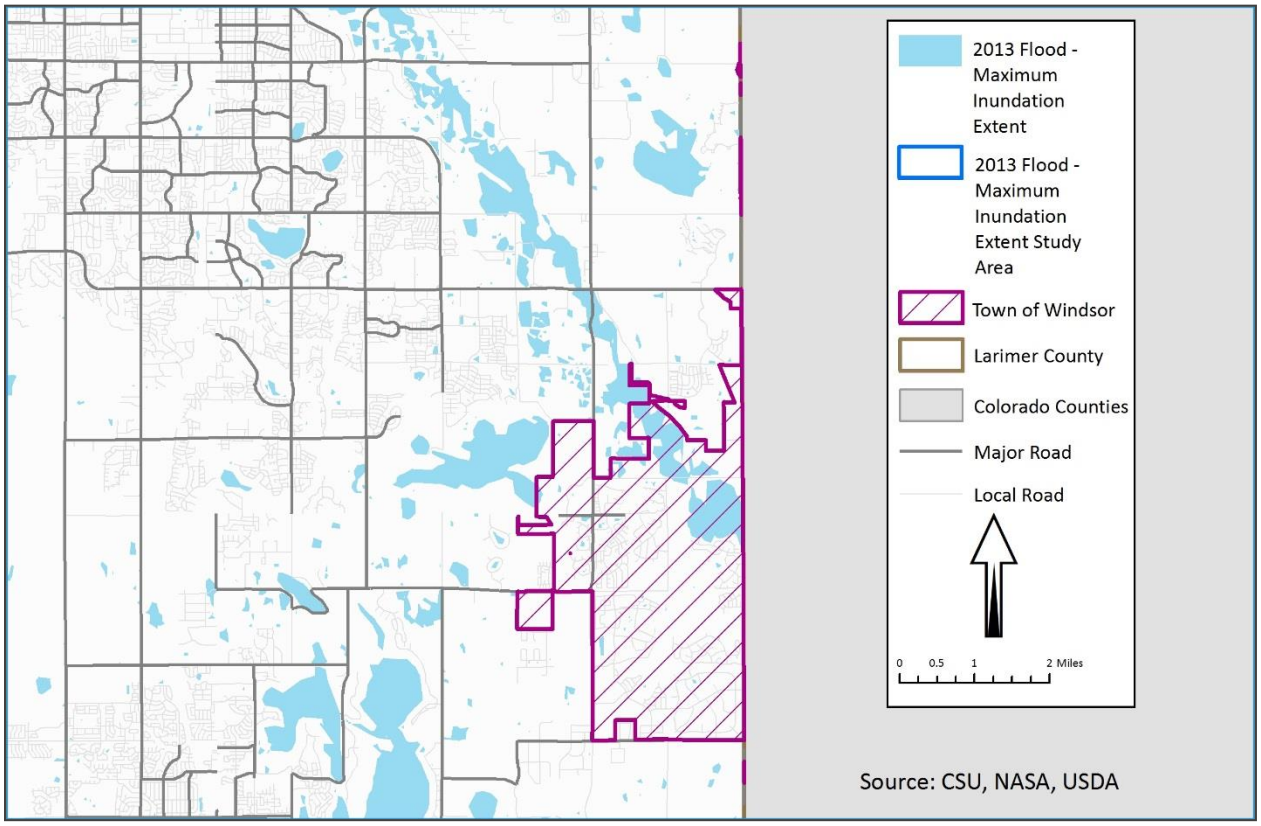


Previous Occurrences

According to NOAA's Storm Events Database there have been no reported injuries, property loss, or crop damage in the Town of Windsor caused by flooding. Based on the historic data showing hazardous impacts on the county, however, there is a great potential for flooding events to occur at any given time.

[257] This layer is compiled utilizing the most recent Special Flood Hazard Areas (SFHA) as defined by FEMA's National Flood Hazard Layer (NFHL) in combination with some recent flood studies performed by the City of Fort Collins. These areas are also referred to as the 1% Annual Chance Floodplain.

Town of Windsor 2013 Flood Extent[258]



Maximum flood extent—a key data need for disaster response and mitigation—is rarely quantified due to storm-related cloud cover and the low temporal resolution of optical sensors. While change detection approaches can circumvent these issues through the identification of inundated land and soil from post-flood imagery, their accuracy can suffer in the narrow and complex channels of increasingly developed and heterogeneous floodplains. The data depicted above is from a study that explored the utility of the Operational Land Imager (OLI) and Independent Component Analysis (ICA) for addressing these challenges in the unprecedented 2013 Flood along the Colorado Front Range, USA. The approach was able to simultaneously distinguish flood-related water and soil moisture from pre-existing water bodies and other spectrally similar classes within the narrow and braided channels of the study site.

Inventory Exposed

Critical facilities are essential to the health and welfare of the whole population and are especially important both during and after hazard events. Critical structures or areas that overlap or touch the SFHA are considered "flood prone."

The critical facility and structure exposure analysis estimates that there are 3 critical facilities and 3,186 parcels/structures in the Town of Windsor that are flood prone (not including the total miles of flood

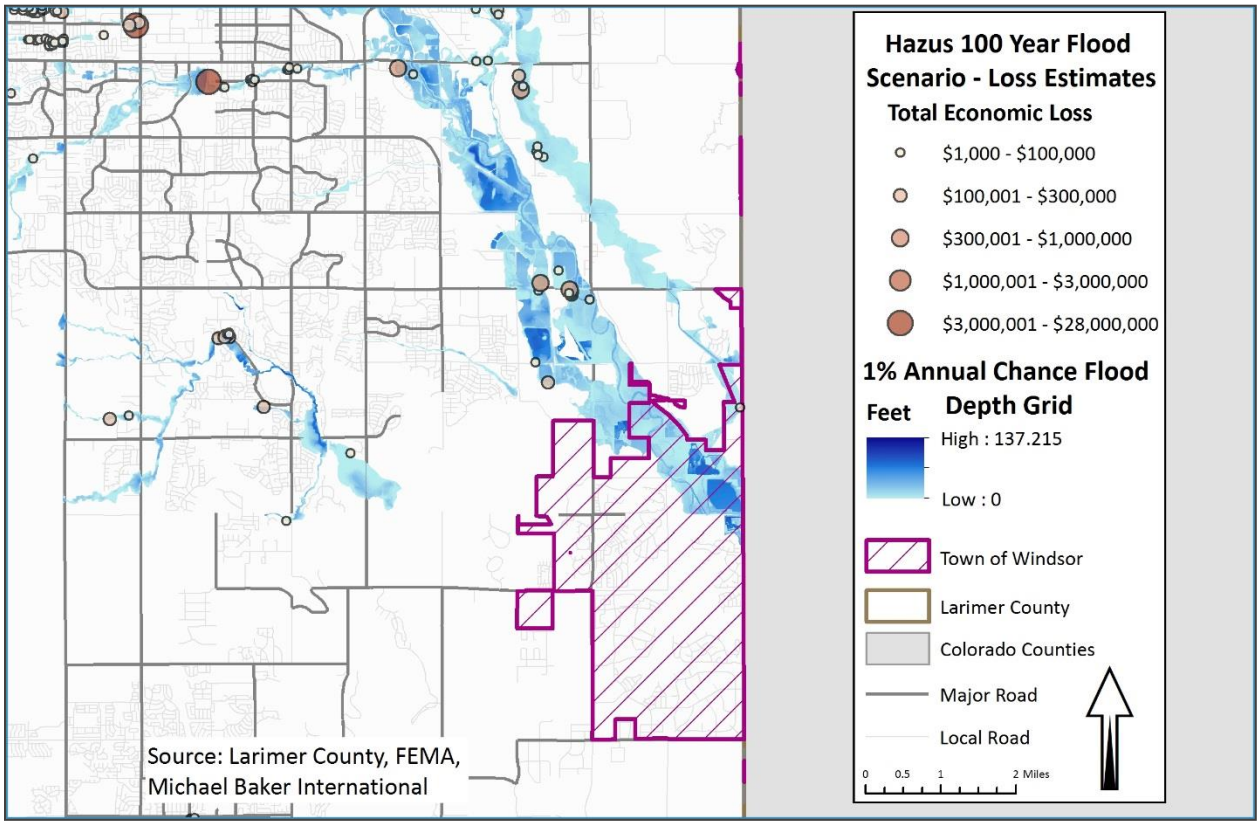
[258] Multi-Temporal Independent Component Analysis and Landsat 8 for Delineating Maximum Extent of the 2013 Colorado Front Range Flood

prone infrastructure). The appraised value of these exposed critical facilities is over $2.8 million dollars. The appraised value of these exposed structures is over $950.4 million dollars.

Potential Losses

Hazus estimates for the Town of Windsor that for a 100-year flood event, no critical facilities or buildings will experience flood damage.

Town of Windsor 1% Annual Flood Loss Estimation and Flood Depth Grid Map[259]



[259] FEMA's loss estimation modeling software, Hazus, was utilized to produce this data set. A 100 year flood scenario was defined and losses were calculated for each point (structure) that intersected the depth grid based on the Hazus depth damage curves for specific structure attributes (such as foundation type, building type, and first flood height). Information derived from Hazus-MH 2.2 flood scenario. Total Losses equals a sum of building losses, content losses, and inventory losses. 1% Annual Chance Flood flooding depth grid, produced from the best available topographic and floodplain data.

Probability of Future Occurrences

Frequency of previously reported flood events in the Town of Windsor provide an acceptable framework for determining the probability of future flood occurrence in the area. The probability that the district will experience a flood event can be difficult to predict or quantify.

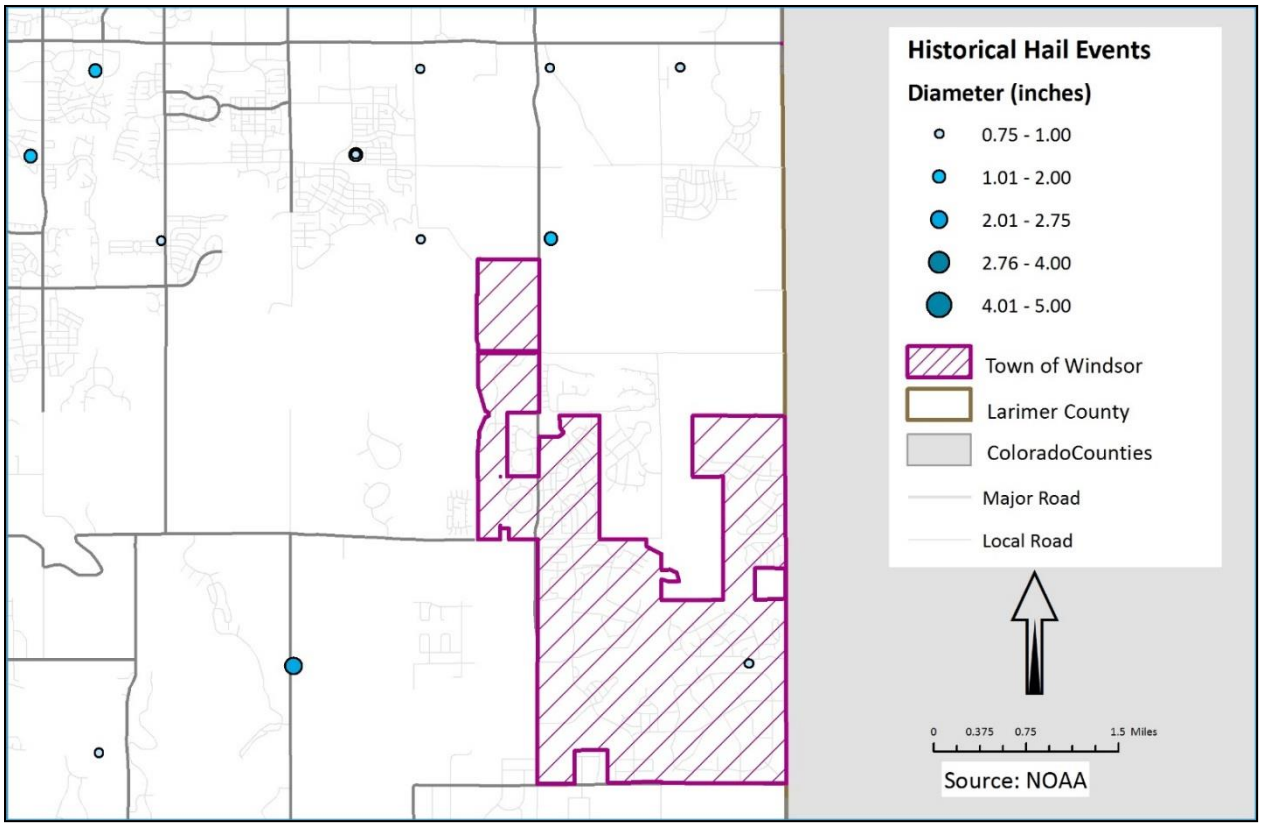
Severe flooding has the potential to inflict significant damage to people and property in the town. Mitigating flood damage requires that communities remain diligent and notify local officials of potential flood (and flash flood) prone areas near infrastructure such as roads, bridges, and buildings.

Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)

Previous Occurrences

According to NOAA's Storm Events Database there are no reported injuries or deaths in Town of Windsor due to hail. There has been 1 hail events reported in Town of Windsor between 1955 and 2014. Based on the historic data showing hazardous impacts on the town, there is potential for hail events to occur at any given time.

Historical Hail Events in the Town of Windsor[260]



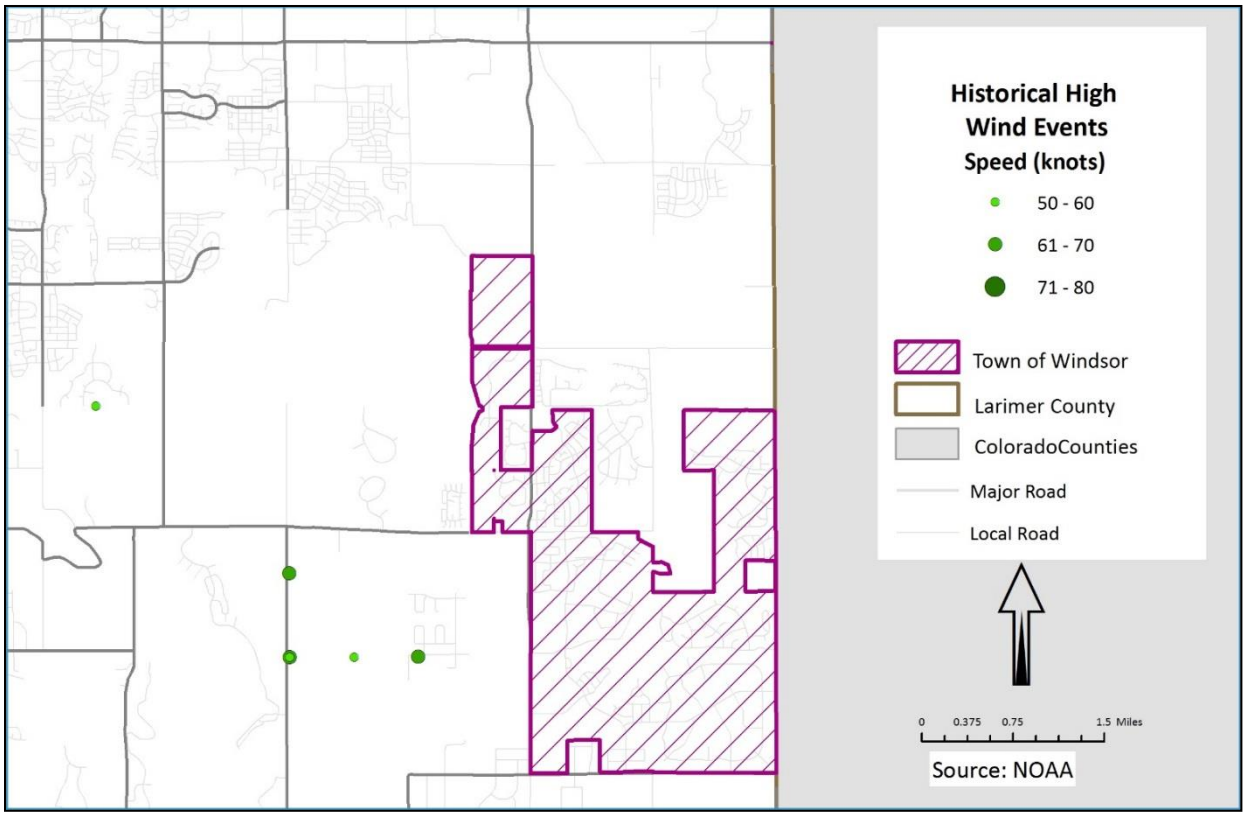
According to NOAA's Storm Events Database there have been no injuries, deaths, or damages in the Town of Windsor due to thunderstorm wind. There have been no thunderstorm wind events reported in the Town of Windsor between 1955 and 2014. Based on the historic data showing hazardous impacts on the county, there is potential for thunderstorm wind events to occur at any given time.

According to NOAA's Storm Events Database there have been no lightning events in the Town of Windsor between 1996 and 2014. Based on the historic data showing hazardous impacts on the county, there is potential for lightning events to occur at any given time.

According to NOAA's Storm Events Database there have been no Windstorm events in the Town of Windsor between 1996 and 2014. Based on the historic data showing hazardous impacts on the county, there is potential for high wind events to occur at any given time

[260] Source: NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

Historical High Wind Events in the Town of Windsor[261]



Inventory Exposed

All assets located in the Town of Windsor can be considered at risk from spring and summer storms. This includes 18,644 people, or 100% of the Town's population, and all buildings and infrastructure within the district. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the Town's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Inventory assets exposed to severe wind is dependent on the age of the building, type, construction material used, and condition of the structure. Possible losses to critical infrastructure include:

- Electric power disruption
- Communication disruption
- Water and fuel shortages
- Road closures

[261] Source: NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

- Damaged infrastructure components, such as sewer lift stations and treatment plants
- Damage to homes, structures, and shelters

Potential Losses

Spring and summer storms affect the entire planning area of the Town of Windsor including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Severe storms will remain a highly likely occurrence for the Town of Windsor. It is likely that lightning and hail will also be experienced in the area due to such storms.

Generally, straight-line wind events destroy private, commercial, and public property. Additional costs stem from debris removal, maintenance, repair, and response. Indirect costs include loss of industrial and commercial productivity as a result of damage to infrastructure, facilities, or interruption of services. Because no specific, countywide loss estimation exists for wind, potential losses are related to historical property damage and injuries/deaths.

Probability of Future Occurrences

Spring and summer storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past spring and summer events provide benchmarks for projecting similar conditions into the future. The probability that Town of Windsor will experience a spring or summer storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the Town of Windsor at least once every year.

Reported straight-line wind events over the past nineteen years provide an acceptable framework for determining the future occurrence in terms of event. The probability of the Town of Windsor experiencing a severe wind event associated with damages or injuries can be difficult to quantify, but based on historical record of severe wind events in Larimer County, there is a high chance of this type of event occurring each year.

Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)

Previous Occurrences

According to NOAA's Storm Events Database, the Town of Windsor has experienced 74 Winter Storms since 1996. On March 17, 2003 there was report of a winter storm causing $15,500,000 in property damage in areas of Larimer County below 6,000 feet and eastern Larimer County. There were no deaths, injuries or damage to crops reported for any of these storms. The Town of Windsor is at high risk of experiencing Winter Storms during the winter months.

Inventory Exposed

All assets located in the Town of Windsor can be considered at risk from winter storms. This includes 18,644 people, or 100% of the Town's population, and all buildings and infrastructure within the town. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the Town's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Potential Losses

Winter storms affect the entire planning area of the Town of Windsor including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Winter storms will remain a highly likely occurrence for the Town of Windsor.

Probability of Future Occurrences

Severe winter storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past severe winter events provide benchmarks for projecting similar conditions into the future. The probability that the Town of Windsor will experience a severe winter storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the town at least once every year.

Tornado

Previous Occurrences

According to NOAA's Storm Events Database, 78 injuries, one death, approximately $147,000 of property damage, and no crop damages have been recorded within and near the Town of Windsor due to tornadoes.

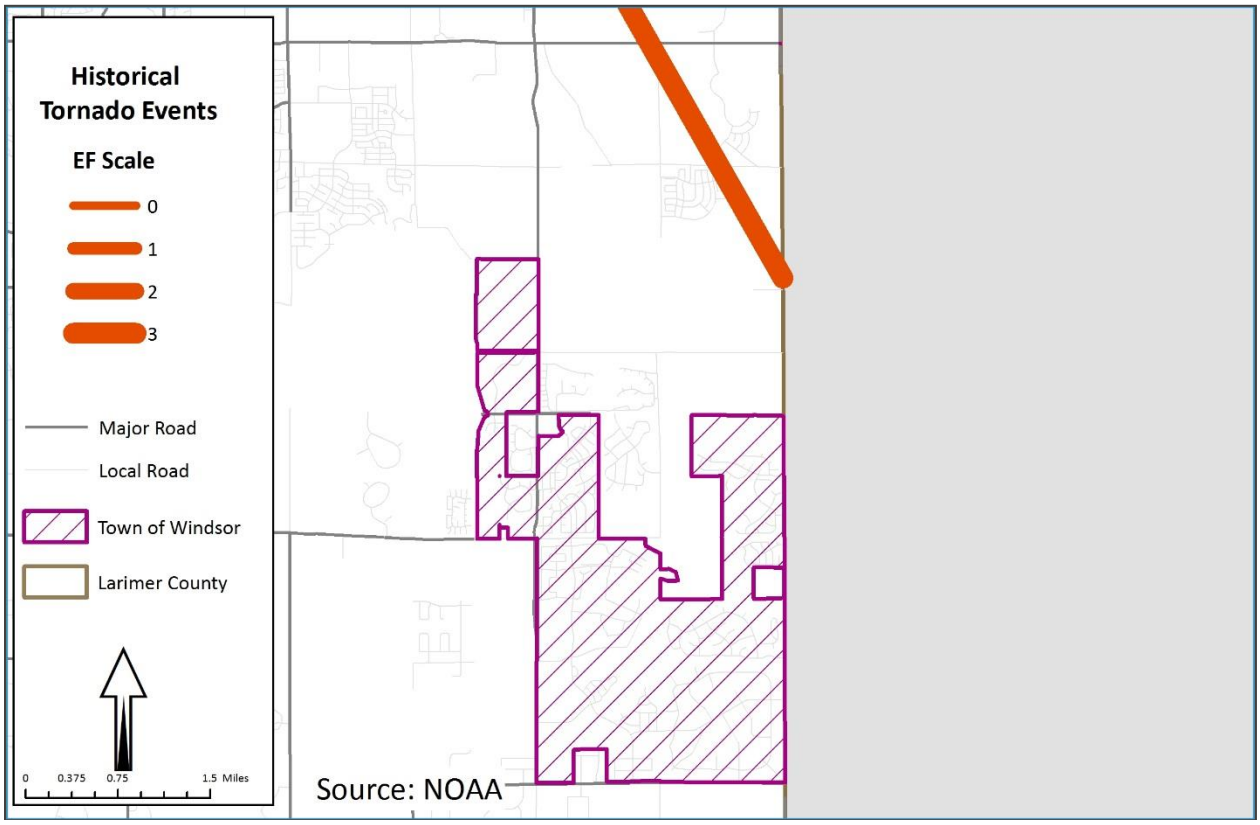
There have been six tornadoes in the Town of Windsor within Weld County and no reported tornadoes in the Town of Windsor within Larimer County between 1954 and 2015. The most severe event occurred on May 22, 2008. This EF3 tornado traveled in a north westerly direction and reached speeds of over 165 miles per hour. This tornado event consisted of a formation of several combined tornadoes forming a wedge that was between a half and three quarters of a mile wide. The tornado caused damage to not only the Town of Windsor but also the towns of Milliken, Platteville, Gilchrest, and the City of Greeley. One person was killed at the Missile Silo Campground near Greeley. The tornado impacted area was designated a national disaster. The Rocky Mountain Insurance Information Association (RMIIA) reported that there was an estimated $193.5 million in insured damages and approximately 24,000 auto

and homeowners claims. Additional details concerning this damaging event can be found in the post-event reports posted on the Town's website.

There have been tornadoes reported very close to the northern, eastern and southern borders of the Town limits as well. Tornadoes will remain a highly likely occurrence for the Town of Windsor.

Two residents of Chimney Park walk away with some of their belongings after the tornado blew through Windsor on May 22, 2008. (Photo Credit: Joe Amon, The Denver Post)

Town of Windsor Historical Tornado Events[262]



Inventory Exposed

All assets located in the Town of Windsor can be considered at risk from severe wind and tornadoes. This includes 18,644 people, or 100% of the Town's population and all buildings and infrastructure within the town.[263] Most structures, including the town's critical facilities, should be able to withstand and provide adequate protection from tornadoes. Those facilities with back-up generators should be fully equipped to handle tornado events should the power go out.

Potential Losses

Generally, tornadoes destroy private, commercial, and public property. Additional costs stem from debris removal, maintenance, repair, and response. Indirect costs include loss of industrial and commercial productivity as a result of damage to infrastructure, facilities, or interruption of services. Because no specific, countywide loss estimation exists tornado hazards, potential losses are related to historical property damage and injuries/deaths.

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[262] Historical tornado events. NOAA's National Weather Service Storm Prediction Center, 1950 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

[263] 2010 Census

Probability of Future Occurrences

Reported tornadoes over the past 61 years provide an acceptable framework for determining the future occurrence in terms of frequency for such events. The probability of the Town of Windsor experiencing a tornado associated with damages or injuries can be difficult to quantify. Historic tornado frequencies suggest that there is a chance of this type of event occurring somewhere in within the town boundaries each year.

Utility Disruption

Previous Occurrences

The Town of Windsor does not currently track incidences of utility disruption.

Inventory Exposed

All assets located in Town of Windsor are considered at risk from the impacts of utility disruption events. This includes 18,644 people, or 100% of the County's population, and all buildings and infrastructure within the County.

Potential Losses

Utility disruption events have the potential to threaten lives and disrupt business activity. However, monetary losses and casualty estimates are largely unknown.

Probability of Future Occurrences

In general, utility outages result from failures in the distribution system as opposed to shortages of supply. Distribution systems are most susceptible to failure during extreme hot and cold temperatures as well as during violent weather conditions. Regional utility failures can threaten human life, particularly when outages affect hospitals, nursing homes, or other healthcare facilities. As both population and climate variability increase across the State of Colorado, and put more pressure on aging distribution systems, it is likely that utility disturbance events will become more frequent in and around the Town of Windsor.

Capabilities Assessment

The capability assessment examines the ability of the Town of Windsor to implement and manage the comprehensive mitigation strategy laid out in this Plan. The strengths, weaknesses, and resources of the community are identified here as a means for evaluating and maintaining effective and appropriate management of the town's hazard mitigation program.

Local Personnel

The ability of a community to implement a comprehensive mitigation strategy depends, in part, on available resources, including people and staff. The following table outlines the town's capabilities as they relate to key personnel.

	Full Time	Part Time	None or Not-Identified
Emergency Manager			X
Floodplain Administrator			X
Community Planner	X		
GIS Specialist	X		

Grant Writer		X	

Land Use Planning and Codes

Local land use plans and building codes are tremendous tools for evaluating local policies related to hazard mitigation and risk reduction. Additionally, comprehensive master plans, capital improvement plans, stormwater plans and zoning ordinances all present opportunities for enhanced local capabilities. The following table outlines the town's current capabilities as they relate to land use planning and codes.

	Yes (Y); No (N)
A zoning ordinance	Y
A hazard-specific ordinance	-
Local building codes	Y
A Comprehensive Plan / Master Plan	Y
A Capital Improvements Plan	Y
A Stormwater Plan	Y
A Continuity of Operations Plan (COOP)	-
An Emergency Operations Plan (EOP)	Y
A Long-Term Recovery Plan	-
Participates in the NFIP	Y

Building codes are one tool that communities use to enhance public safety. For example, they can increase structural integrity, mitigate structure fires, and provide benefits in relation to natural hazard avoidance. In Colorado, land use regulations and building codes are typically implemented at the local level. Even without a statewide mandate, most counties and many municipalities have enacted regulations and codes. The Town of Windsor has adopted a local building code requirement, demonstrating their understanding of the benefits codes provide, including reduced exposure to hazards.

Plan Maintenance and Implementation

Windsor has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the town will continue public participation in the plan maintenance process.

Jurisdiction	Plan Maintenance and Implementation Strategy
Town of Windsor	*"The Larimer County (and Weld County Hazard Mitigation Plan) will be reviewed annually by Town Board and review by Engineering/Public Work/ Police Department Staff to ensure items are up to date."*

	"The public will have the opportunity to voice their opinions during Town Board meetings."

Integrating Hazard Mitigation into Local Planning

Through discussions at planning meetings and the use of an online survey, individual outreach, and phone calls, each participating jurisdiction brainstormed with the planning team to identify processes for integrating hazard mitigation into their local planning mechanisms and policies. The following table lists the specific integration strategy identified by Windsor based on the mitigation actions listed in this plan.

Jurisdiction	Strategy
Town of Windsor	*"Our mitigation actions will be included in our yearly budget, capital improvement plan, and strategic plan."*

Mitigation Action Guides

The following Mitigation Action Guides presents the town's mitigation actions that were developed for the 2016 Plan.

Windsor: NFIP Promotion and Administration (2009 UPDATE) (Windsor – 1)	
PRIORITY: Medium	HAZARDS ADDRESSED: Flooding
LOCATION: Windsor	GOALS ADDRESSED: 1
RECOMMENDATION DATE: Ongoing	OBJECTIVES ADDRESSED: C & E
TARGET COMPLETION DATE: Ongoing	
ISSUE: As participants in the NFIP the Community will continue to promote wise use of floodplains through ordinance administration and periodic update, promotion of flood insurance and staff training, including encouragement of Certified Floodplain Manager status.	
RECOMMENDATION: The benefits are to flood-prone building owners who choose to insure against flood losses, and to taxpayers who no longer would be faced with subsidizing those potential losses.	
ACTION: Continued administration of floodplain regulations and updates to town ordinances.	
LEAD AGENCY: Floodplain Management officials	EXPECTED COST: Can be accomplished within existing budgets
SUPPORT AGENCIES: PW Department	POTENTIAL FUNDING SOURCES: N/A
PROGRESS MILESTONES: Floodplain reviews prior to permitting any development in the floodplain. Floodplain information is posted on the Town of Johnstown website. Updates to town ordinances with regard to floodplain regulations.	

Windsor: John Law Ditch- Flood Mitigation Project (Windsor – 2)	
PRIORITY: High	HAZARDS ADDRESSED: Flooding
LOCATION: Windsor	GOALS ADDRESSED: 1, 2
RECOMMENDATION DATE: Ongoing	OBJECTIVES ADDRESSED: E

TARGET COMPLETION DATE: 2016	
ISSUE: FEMA mitigation match for the installation of concrete box culverts under the Greeley No. 2 Canal, Weld County Road 21 and State Highway 392 to reduce flood damage within the John Law Floodplain.	
RECOMMENDATION: Complete project within given timeline to receive grant funding	
ACTION:	
LEAD AGENCY: Town of Windsor	EXPECTED COST: $2,977,504.59
SUPPORT AGENCIES:	POTENTIAL FUNDING SOURCES: FEMA and CDBG-DR
PROGRESS MILESTONES: Received FEMA grant and CDBG-DR funding. Project is scheduled to be complete in 2016.	

Windsor: Emergency Power (Windsor – 3)	
PRIORITY: Medium	HAZARDS ADDRESSED: Any hazard that may knock out power
LOCATION: Windsor	GOALS ADDRESSED: 1, 2, 3
RECOMMENDATION DATE: 2016	OBJECTIVES ADDRESSED: E
TARGET COMPLETION DATE: 2016	
ISSUE: In Colorado, there a numerous events that could knock out power to Town offices. In case of emergency, there are several Town employees who need to stay connected to serve our residents.	
RECOMMENDATION: The Town plans on purchasing a backup generator	
ACTION: Purchase a backup generator	
LEAD AGENCY: Town of Windsor	EXPECTED COST: Can be accomplished within existing budgets
SUPPORT AGENCIES:	POTENTIAL FUNDING SOURCES:
PROGRESS MILESTONES: Funds included in the 2016 budget.	

Windsor: LETA 911 (Windsor – 4)	
PRIORITY: Medium	HAZARDS ADDRESSED: All hazards
LOCATION: Windsor	GOALS ADDRESSED: 2, 3, 4
RECOMMENDATION DATE:	OBJECTIVES ADDRESSED: A, E
TARGET COMPLETION DATE: ongoing	
ISSUE: Residents need to be informed in case emergency situations arise.	
RECOMMENDATION: The Town continuously partners with LETA 911 to provide emergency communications to our residents. We will provide LETA 911 each year and encourage residents to sign-up for this great service.	
ACTION: Continue to provide 911 services and related outreach.	
LEAD AGENCY: Larimer County	EXPECTED COST: Can be accomplished within existing budgets
SUPPORT AGENCIES: Town of Windsor and other jurisdictions	POTENTIAL FUNDING SOURCES: Already funded
PROGRESS MILESTONES: Town of Windsor staff was recently trained to use LETA 911.	

Windsor: Flood Prevention on CR 13 (Windsor – 5)	
PRIORITY: Medium	HAZARDS ADDRESSED: Flooding
LOCATION: Windsor	GOALS ADDRESSED: 1, 2
RECOMMENDATION DATE: Yearly	OBJECTIVES ADDRESSED: E
TARGET COMPLETION DATE: ongoing	
ISSUE: CR 13 is vulnerable to flooding each year	
RECOMMENDATION: The Town invests $50,000 annually to prevent flooding by removing excess gravel	
ACTION: Removing excess gravel.	
LEAD AGENCY: Town	EXPECTED COST: Can be accomplished within existing budgets
SUPPORT AGENCIES:	POTENTIAL FUNDING SOURCES: Already funded
PROGRESS MILESTONES:	

Windsor: Floodplain (Windsor – 6)	
PRIORITY: Medium	HAZARDS ADDRESSED: Flooding
LOCATION: Windsor	GOALS ADDRESSED:1, 4
RECOMMENDATION DATE: Yearly	OBJECTIVES ADDRESSED: A, C, E
TARGET COMPLETION DATE: ongoing	
ISSUE: NFIP participation	
RECOMMENDATION: Windsor not participating in the CRS program, however we are a member of NFIP. Windsor adopted the model ordinance in Jan of 2014 as required by the State of Colorado. The Town enforces the floodplain regulations in accordance with FEMA's requirements.	
ACTION: Continued participation in NFIP	
LEAD AGENCY: Town	EXPECTED COST:
SUPPORT AGENCIES: Both Weld and Larimer County	POTENTIAL FUNDING SOURCES: Already funded
PROGRESS MILESTONES:	

Letter of Intent to Participate

TOWN OF WINDSOR
COLORADO

LETTER OF INTENT TO PARTICIPATE

January 12, 2015

Lori R. Hodges
Larimer County Emergency Management
200 West Oak Street
Fort Collins, CO 80526

Re: "Statement of Intent to Participate" as a participating jurisdiction in the Larimer County Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Dear Ms. Hodges,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, the Town of Windsor is submitting this letter of intent to confirm that Town of Windsor has agreed to participate in the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, Town of Windsor agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Larimer County OEM to complete the plan in conformance with FEMA requirements.

Town of Windsor understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by an agreement between the Lead Jurisdiction and the Participating Jurisdiction, John Vazquez, Mayor commit Town of Windsor to the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 12th day of January

301 Walnut Street · Windsor, Colorado · 80550 · phone 970-674-2400 · fax 970-674-2456
www.windsorgov.com

LARIMER COUNTY
COMMITTED TO EXCELLENCE

Michael Baker
INTERNATIONAL

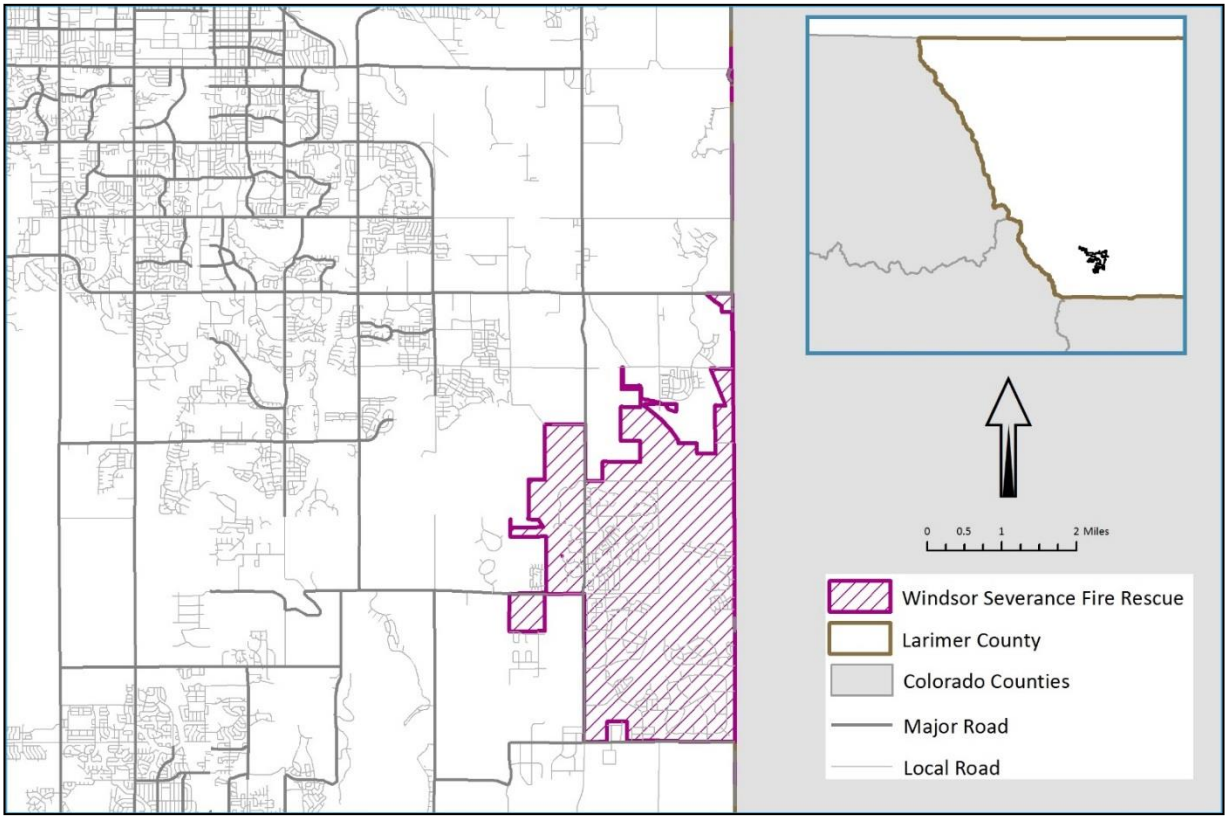
Windsor Severance Fire Rescue

"Providing professional service and compassionate care from our family to yours."
– Mission, Windsor Severance Fire Rescue

Community Profile

Windsor Severance Fire Rescue (WSFR) provides fire and rescue services to the towns of Windsor and Severance as part of the 110 square mile area it protects. The fire district employs 80 firefighters utilizing full-time, part-time and volunteer staffing. WSFR has three fire stations that are staffed 24 hours a day. Station 1 is located in downtown Windsor at 100 7th Street and serves as the department's headquarters. Station 2 is located at 209 1st St. in Severance. A new Station 2 is projected to open in early 2014 and will be located at the intersection of Timber Ridge Parkway and Scotch Pine Drive. Station 3 is located at 7790 REA Parkway in west Windsor.

WSFR is an all-hazards organization. It handles fires, emergency medical services, hazardous materials response, specialized rescue, and wildland firefighting. Fire prevention is heavily promoted through business inspections, school presentations, carbon monoxide and fire detector programs and proactive relationships with town and county officials. Mutual aid and automatic aid agreements with surrounding fire agencies ensures a high level of resources are available for all types of events.



Hazard Identification and Risk Assessment

The following Hazard Identification and Risk Assessment Summary table is based on jurisdiction-specific responses to the risk factor exercise and differs from the risk factor results that were determined at the county scale.

NATURAL HAZARD	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	RF RATING
Hazmat – Fixed and Transport	1.2	1.2	0.8	0.4	0.3	3.9
Flood – Flash and Riverine	1.2	0.9	0.6	0.2	0.4	3.3
Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)	1.2	0.6	0.8	0.3	0.4	3.3
Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)	1.2	0.6	0.8	0.3	0.4	3.3
Utility Disruption	1.2	0.6	0.8	0.4	0.3	3.3
Biological Hazards / Contagion	0.6	0.9	0.8	0.4	0.2	2.9
Tornado	0.6	0.6	0.8	0.4	0.1	2.5
Fire – Wildland	0.6	0.6	0.4	0.4	0.2	2.2
Civil Disturbance	0.6	0.6	0.2	0.4	0.2	2.0
Earthquake	0.6	0.6	0.2	0.4	0.1	1.9
Erosion / Deposition	0.6	0.3	0.2	0.1	0.1	1.3
Landslide / Rockslide	0.3	0.3	0.2	0.4	0.1	1.3
HIGH RISK (2.5 or higher): Hazmat – Fixed and Transport; Flood – Flash and Riverine; Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning); Winter Storm (Blizzard Conditions, Heavy Snow Accumulation); Utility Disruption; Biological Hazards / Contagion; Tornado						
MODERATE RISK HAZARD (2.0 - 2.4): Fire – Wildland; Civil Disturbance						
Low Risk (1.9 and lower): Earthquake; Erosion / Deposition; Landslide / Rockslide						

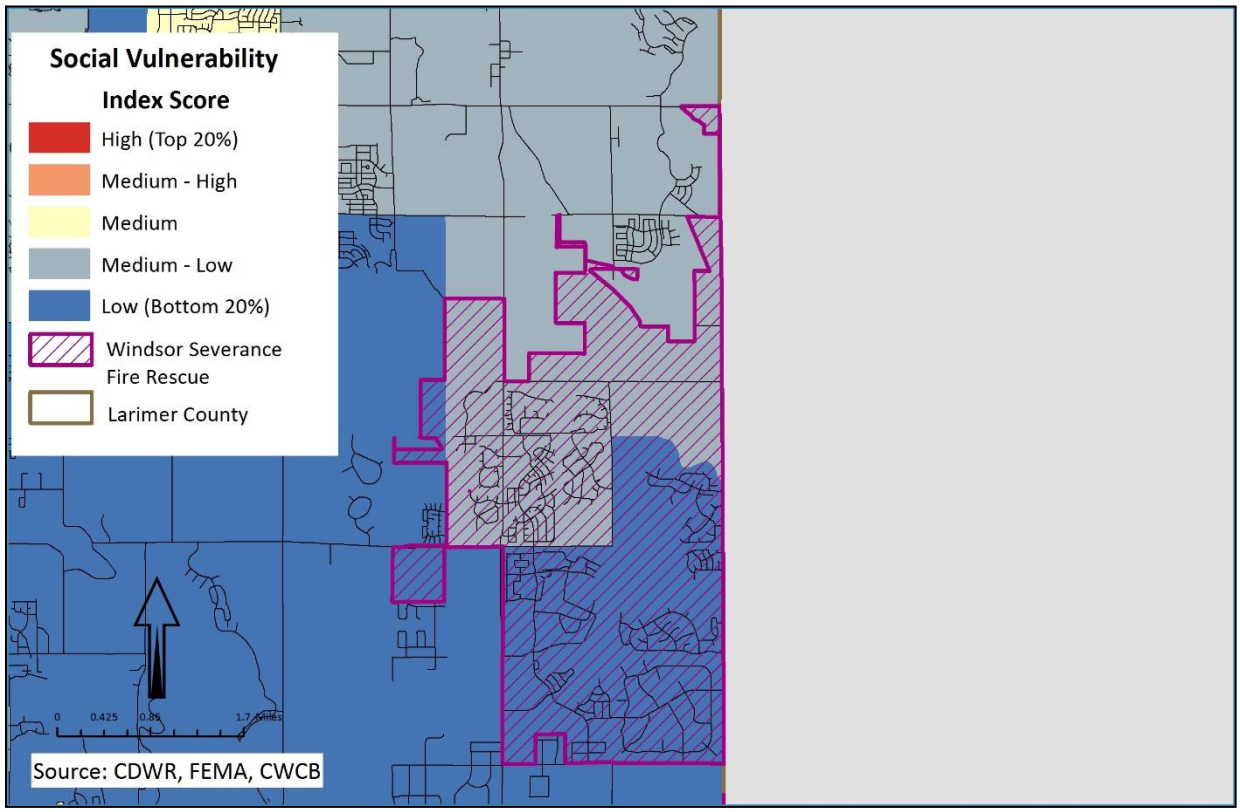
Vulnerability Assessment

This section provides a refined vulnerability assessment, specific for the Windsor Severance Fire Rescue, for those hazards that were identified as being rated HIGH in the preceding section. This analysis was

conducted separately from that of the county-wide vulnerability assessment to specifically focus on the population, structures, infrastructure, and other assets unique to Windsor.

The results of the social vulnerability assessment are displayed on the map below. On the map, social vulnerability is represented at the census tract level by 5 classes of vulnerability: Low (bottom 20% of the county), Medium-Low, Medium, Medium-High, and High (top 20% of the county). Windsor Severance Fire Rescue's social vulnerability map shows social vulnerability within the service area.

Social Vulnerability Map – Windsor Severance Fire Rescue[264]



Social vulnerability is represented as the social, economic, demographic, and housing characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to hazard events. The pre-existing social conditions that contribute to disaster losses can be identified using social vulnerability indicators. Using methods identified in the Social Vulnerability Index (SoVI) developed by Cutter et. al. (2003) this layer shows the social vulnerability index scores for the State of Colorado at the census tract level. Social vulnerability is represented at the Census tract level by five classes of vulnerability: Low, Medium-Low, Medium, Medium-High, and High.

[264] Source: Colorado Division of Water Resources Dam Safety Branch, FEMA, Colorado Water Conservation Board (CWCB)

The Windsor Severance Fire Rescue service area is characterized by a mix of medium-low to low levels of social vulnerability. This does not mean, however, that there aren't any socially vulnerable residents living in the area or that social vulnerability levels will remain the same over time. Close analysis of the individual social vulnerability indicators within the area will give local emergency managers, planners, and stakeholders a clearer picture of which social vulnerability factors threaten the community the most and where social and economic resources should be allocated in order to reduce vulnerability. Over time, the Windsor Severance Fire Rescue should continue to monitor their local social vulnerability as demographic, economic, and housing related conditions change.

Hazmat – Fixed and Transport

Previous Occurrences

Based on data supplied by the Pipeline and Hazardous Materials Safety Administration's (PHMSA) Incident Reports Database there have been 9 reported HAZMAT incidents within the Windsor Severance Fire Rescue service area between 1972 and 2015. Many more unreported events have occurred within the service area during that same time period.

Inventory Exposed

We can't accurately predict when or where a HAZMAT incident may occur. Therefore, for the purpose of this plan, all existing and future buildings, facilities, and populations in the Windsor Severance Fire Rescue service area are considered to be equally exposed and couple potentially be impacted. This includes 18,644 people, or 100% of the service area's population, and all buildings and infrastructure within the Windsor Severance Fire Rescue service area.

When hazardous materials are being transported they are particularly vulnerability to transportation related accidents, misuse, or terrorist threats. Most hazardous materials are transported in large quantities in order to reduce costs and security is difficult to maintain around moving vehicles that cross jurisdictional boundaries. When transported close to populated areas or critical infrastructure, HAZMAT releases can have serious consequences. The inventory that is most often exposed to HAZMAT risks are railways, roadways, and fixed facilities that contain hazardous materials, and all assets that lie within a mile of the potential release areas.

I-25 runs through the Windsor Severance Fire Rescue service area and is a designated nuclear and hazardous materials transportation route. All structures, natural resources, and people located within one mile of these transportation routes (and railways) are exposed to the impacts of a potential HAZMAT event. Structures, people, and natural resources located outside of a one mile buffer of these routes are also at risk of exposure.

Assets and people that are located within one mile of an industrial or commercial fixed site are also at risk of exposure to the impacts of a HAZMAT release.

Potential Losses

HAZMAT related events occur within the Windsor Severance Fire Rescue service area almost every year. The intensity and magnitude of these incidents depend on weather conditions, the location of the event, the time of day, and the process by which the materials are released. *Was is raining when the event happened? Were the hazardous materials being transported by rail when they were released or were they at a fixed facility? Did the spill happen during rush hour traffic or in the middle of the night?* All of these

considerations matter when determining the risk and potential damages associated with a HAZMAT incident.

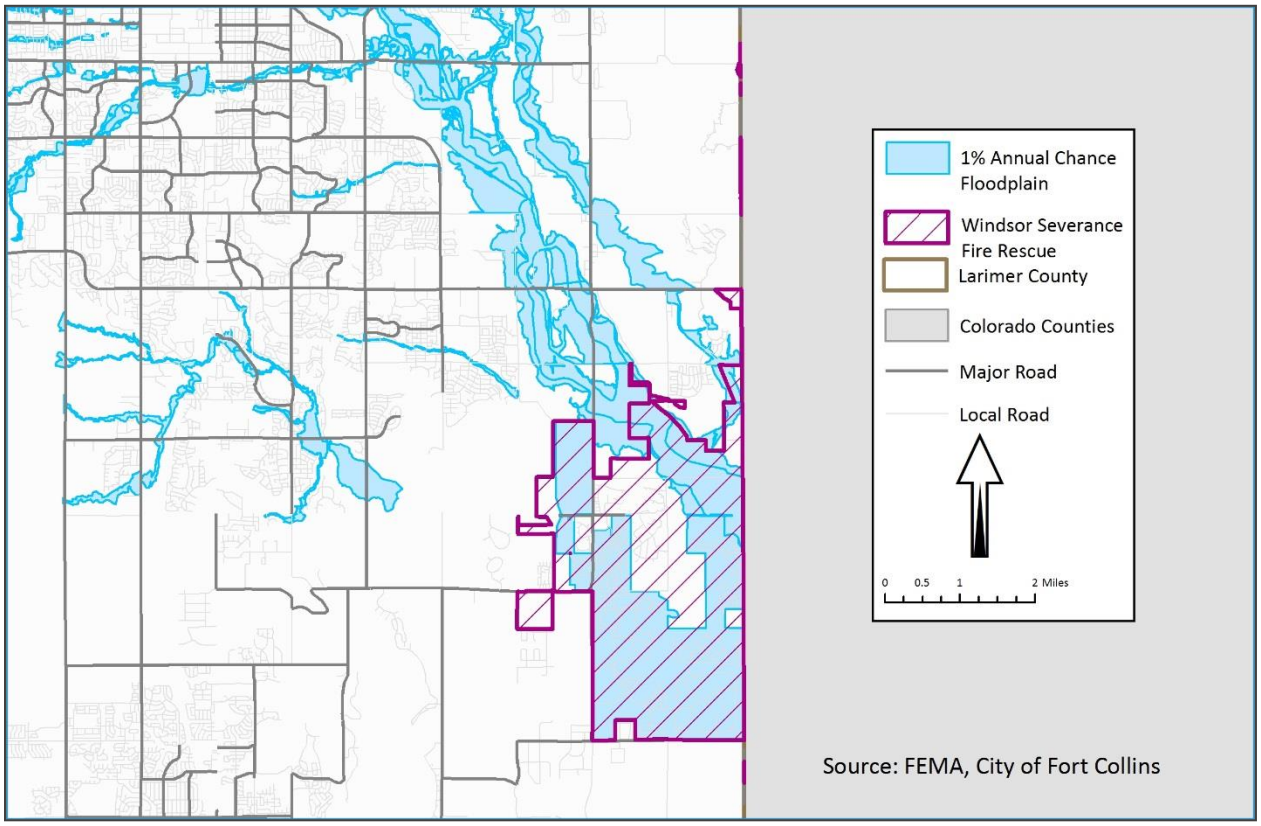
HAZMAT events have the potential to threaten lives and disrupt business activity. Moreover, HAZMAT incidents can cause serious environmental contamination to non-renewable resources such as air, ground, and water sources.

Probability of Future Occurrences

As with most hazards that have limited spatial predictability or warning time, the probability of future occurrences of HAZMAT events is difficult to predict. However, as development continues to encroach into existing industrial areas and becomes more dense along high-risk designated hazardous materials transportation routes, the risk of future occurrences becomes greater. Even if the frequency of HAZMAT spills remains the same over time, population growth will increase the probability of a disaster event.

Flood – Flash and Riverine

Windsor Severance Fire Rescue Special Flood Hazard Area[265]

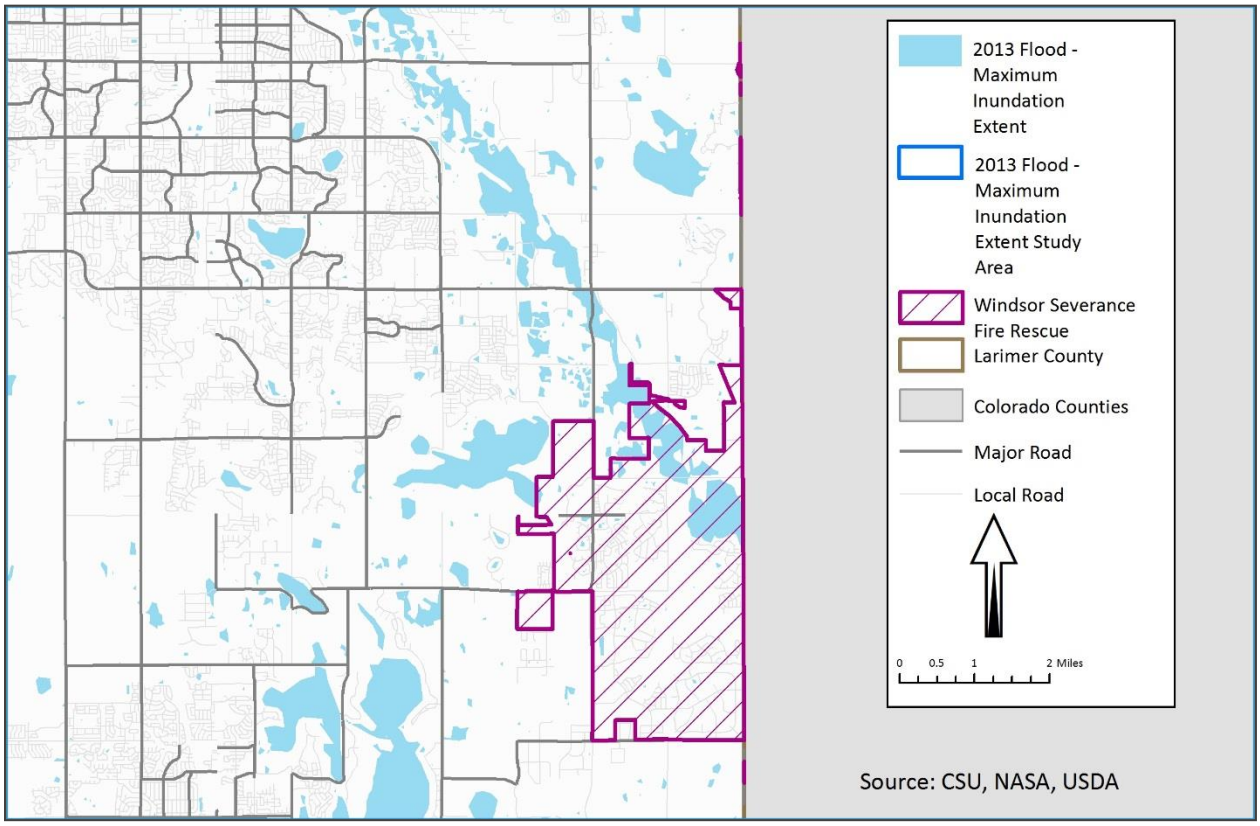


Previous Occurrences

According to NOAA's Storm Events Database there have been no reported injuries, property loss, or crop damage in the Windsor Severance Fire Rescue service area caused by flooding. Based on the historic data showing hazardous impacts on the county, there is a great potential for flooding events to occur at any given time.

[265] This layer is compiled utilizing the most recent Special Flood Hazard Areas (SFHA) as defined by FEMA's National Flood Hazard Layer (NFHL) in combination with some recent flood studies performed by the City of Fort Collins. These areas are also referred to as the 1% Annual Chance Floodplain.

Windsor Severance Fire Rescue 2013 Flood Extent[266]



Maximum flood extent—a key data need for disaster response and mitigation—is rarely quantified due to storm-related cloud cover and the low temporal resolution of optical sensors. While change detection approaches can circumvent these issues through the identification of inundated land and soil from post-flood imagery, their accuracy can suffer in the narrow and complex channels of increasingly developed and heterogeneous floodplains. The data depicted above is from a study that explored the utility of the Operational Land Imager (OLI) and Independent Component Analysis (ICA) for addressing these challenges in the unprecedented 2013 Flood along the Colorado Front Range, USA. The approach was able to simultaneously distinguish flood-related water and soil moisture from pre-existing water bodies and other spectrally similar classes within the narrow and braided channels of the study site.

Inventory Exposed

Critical facilities are essential to the health and welfare of the whole population and are especially important both during and after hazard events. Critical structures or areas that overlap or touch the SFHA are considered "flood prone."

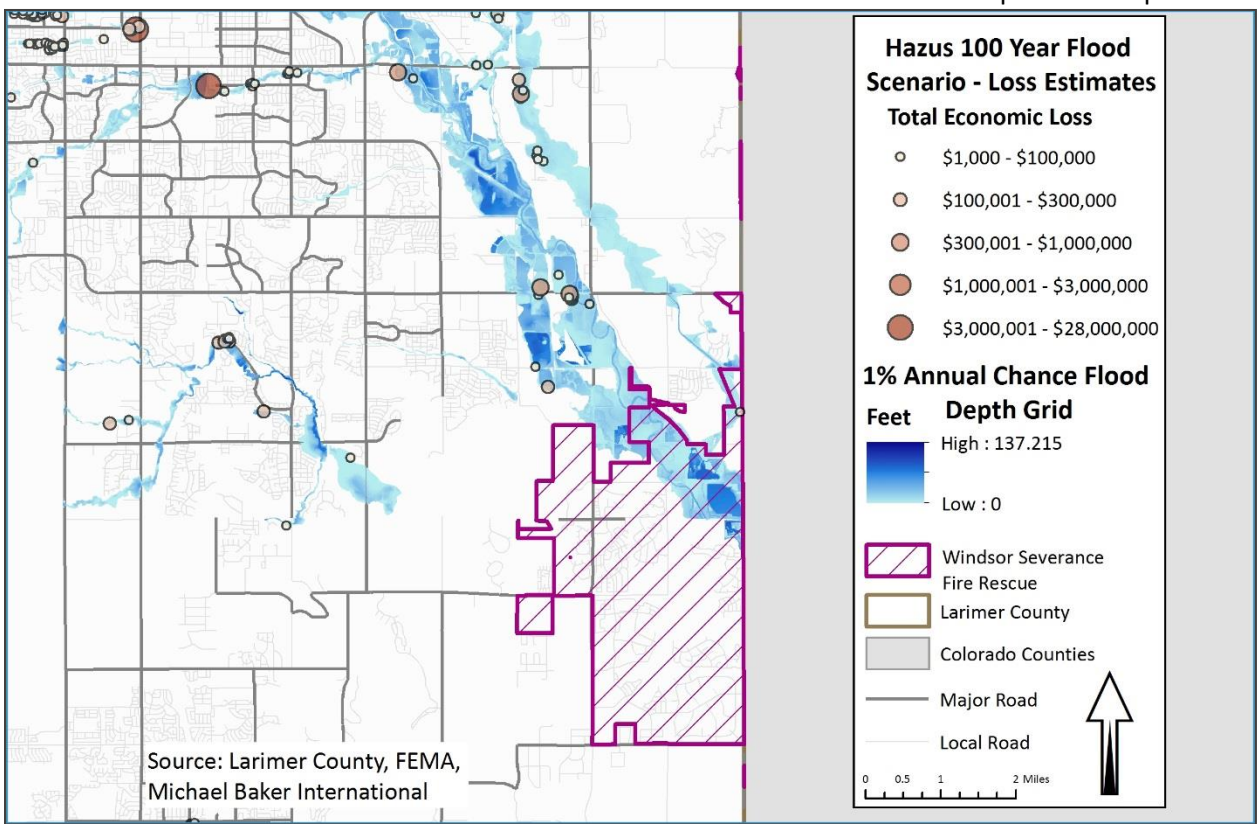
[266] Multi-Temporal Independent Component Analysis and Landsat 8 for Delineating Maximum Extent of the 2013 Colorado Front Range Flood

The critical facility and structure exposure analysis estimates that there are 3 critical facilities and 3,186 parcels/structures in the Windsor Severance Fire Rescue service area that are flood prone (not including the total miles of flood prone infrastructure). The appraised value of these exposed critical facilities is over $2.8 million dollars. The appraised value of these exposed structures is over $950.4 million dollars.

Potential Losses

Hazus estimates for the Windsor Severance Fire Rescue service area that for a 100-year flood event, no critical facilities or buildings will experience flood damage.

Windsor Severance Fire Rescue 1% Annual Flood Loss Estimation and Flood Depth Grid Map[267]



[267] FEMA's loss estimation modeling software, Hazus, was utilized to produce this data set. A 100 year flood scenario was defined and losses were calculated for each point (structure) that intersected the depth grid based on the Hazus depth damage curves for specific structure attributes (such as foundation type, building type, and first flood height). Information derived from Hazus-MH 2.2 flood scenario. Total Losses equals a sum of building losses, content losses, and inventory losses. 1% Annual Chance Flood flooding depth grid, produced from the best available topographic and floodplain data.

Probability of Future Occurrences

Frequency of previously reported flood events in the Windsor Severance Fire Rescue service area provide an acceptable framework for determining the probability of future flood occurrence in the area. The probability that the district will experience a flood event can be difficult to predict or quantify.

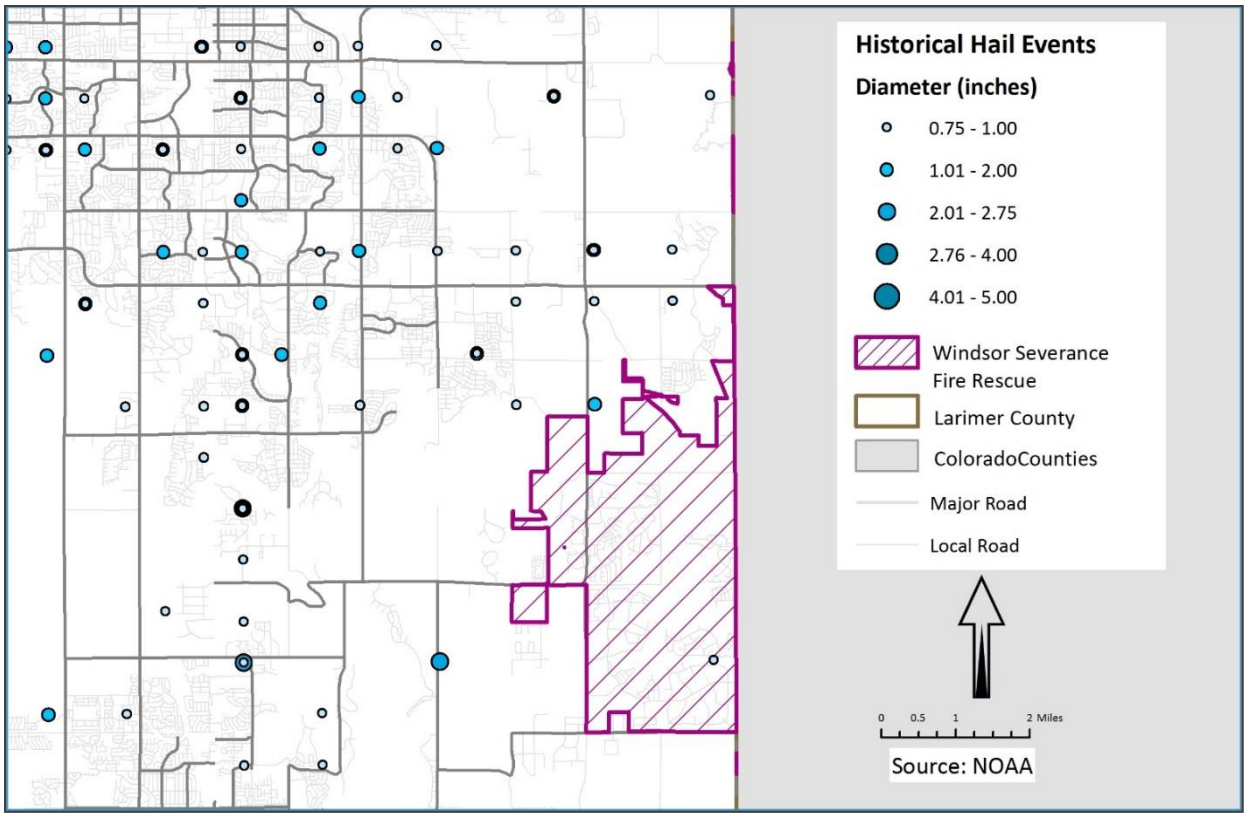
Severe flooding has the potential to inflict significant damage to people and property in the service area. Mitigating flood damage requires that communities remain diligent and notify local officials of potential flood (and flash flood) prone areas near infrastructure such as roads, bridges, and buildings.

Spring / Summer Storm (Hail, Thunderstorm, Wind Storm, Lightning)

Previous Occurrences

According to NOAA's Storm Events Database there are no reported injuries or deaths in Windsor Severance Fire Rescue service area due to hail. There has been 1 hail events reported in Windsor Severance Fire Rescue service area between 1955 and 2014. Based on the historic data showing hazardous impacts on the town, there is potential for hail events to occur at any given time.

Historical Hail Events in the Windsor Severance Fire Rescue[268]



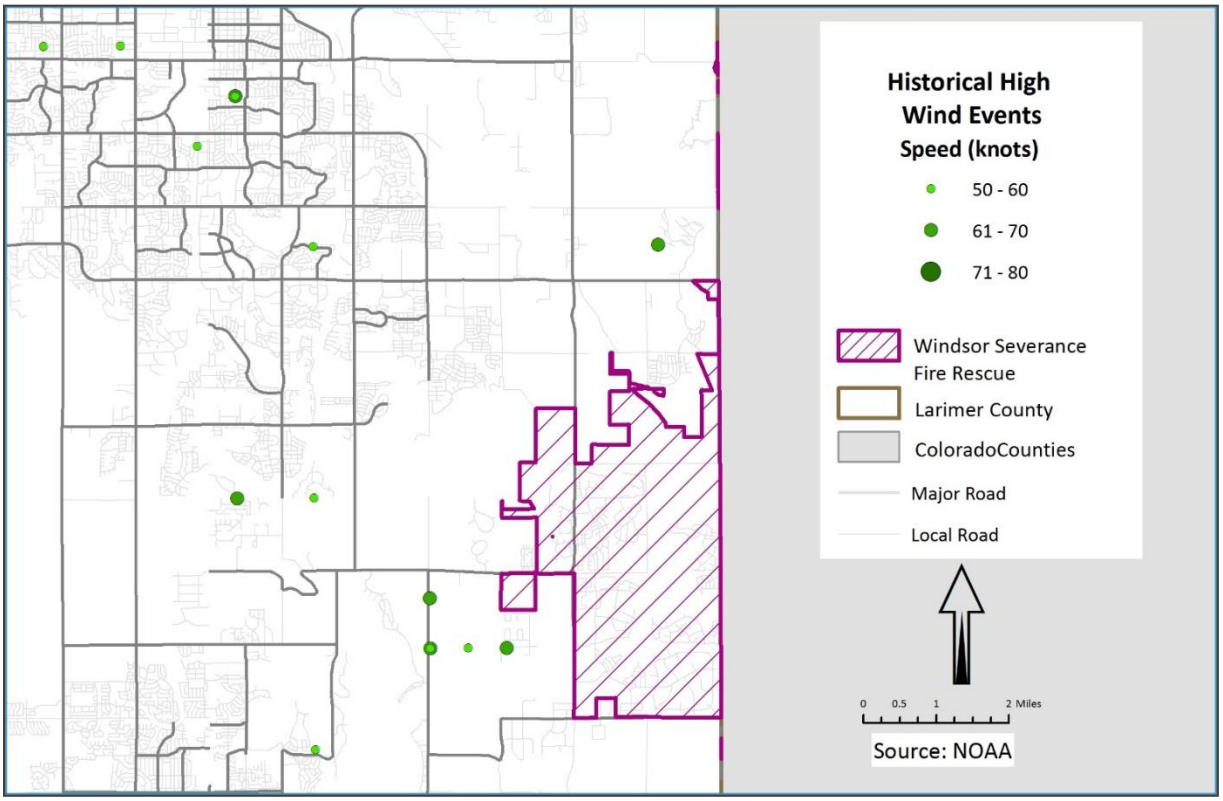
According to NOAA's Storm Events Database there have been no injuries, deaths, or damages in the Windsor Severance Fire Rescue service area due to thunderstorm wind. There have been no thunderstorm wind events reported in the service area between 1955 and 2014. Based on the historic data showing hazardous impacts on the county, there is potential for thunderstorm wind events to occur at any given time.

According to NOAA's Storm Events Database there have been no lightning events in the Windsor Severance Fire Rescue service area between 1996 and 2014. Based on the historic data showing hazardous impacts on the county, there is potential for lightning events to occur at any given time.

According to NOAA's Storm Events Database there have been no Windstorm events in the Windsor Severance Fire Rescue service area between 1996 and 2014. Based on the historic data showing hazardous impacts on the county, there is potential for high wind events to occur at any given time

[268] Source: Historical hail events. NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

Historical High Wind Events in Windsor Severance Fire Rescue[269]



Inventory Exposed

All assets located in the Windsor Severance Fire Rescue service area can be considered at risk from spring and summer storms. This includes 18,644 people, or 100% of the service area's population, and all buildings and infrastructure within the district. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the service area's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Inventory assets exposed to severe wind is dependent on the age of the building, type, construction material used, and condition of the structure. Possible losses to critical infrastructure include:

- Electric power disruption
- Communication disruption
- Water and fuel shortages
- Road closures
- Damaged infrastructure components, such as sewer lift stations and treatment plants

[269] Source: NOAA's National Weather Service Storm Prediction Center, 1955 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

- Damage to homes, structures, and shelters

Potential Losses

Spring and summer storms affect the entire planning area of the Windsor Severance Fire Rescue including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Severe storms will remain a highly likely occurrence for the Windsor Severance Fire Rescue service area. It is likely that lightning and hail will also be experienced in the area due to such storms.

Generally, straight-line wind events destroy private, commercial, and public property. Additional costs stem from debris removal, maintenance, repair, and response. Indirect costs include loss of industrial and commercial productivity as a result of damage to infrastructure, facilities, or interruption of services. Because no specific, countywide loss estimation exists for wind, potential losses are related to historical property damage and injuries/deaths.

Probability of Future Occurrences

Spring and summer storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past spring and summer events provide benchmarks for projecting similar conditions into the future. The probability that Windsor Severance Fire Rescue District will experience a spring or summer storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the Windsor Severance Fire Rescue District at least once every year.

Reported straight-line wind events over the past nineteen years provide an acceptable framework for determining the future occurrence in terms of event. The probability of the Windsor Severance Fire Rescue District experiencing a severe wind event associated with damages or injuries can be difficult to quantify, but based on historical record of severe wind events in Larimer County, there is a high chance of this type of event occurring each year.

Winter Storm (Blizzard Conditions, Heavy Snow Accumulation)

Previous Occurrences

According to NOAA's Storm Events Database, Windsor Severance Fire Rescue District has experienced 74 Winter Storms since 1996. On March 17, 2003 there was report of a winter storm causing $15,500,000 in property damage in areas of Larimer County below 6,000 feet and eastern Larimer County. There were no deaths, injuries or damage to crops reported for any of these storms. The Windsor Severance Fire Rescue District is at high risk of experiencing Winter Storms during the winter months.

Inventory Exposed

All assets located in the Windsor Severance Fire Rescue District can be considered at risk from winter storms. This includes all people, or 100% of the District's population, and all buildings and infrastructure within the district. Damages primarily occur as a result of high winds, lightning strikes, hail, snow-loading, and flooding. Most structures, including the District's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

Potential Losses

Winter storms affect the entire planning area of the Windsor Severance Fire Rescue District including all above-ground structures and infrastructure. Although losses to structures are typically minimal and covered by insurance, there can be impacts with lost time, maintenance costs, and contents within structures. A timely forecast may not be able to mitigate the property loss, but could reduce the casualties and associated injury.

It appears possible to forecast these extreme events with some skill, but further research needs to be done to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. Winter storms will remain a highly likely occurrence for the Windsor Severance Fire Rescue District.

Probability of Future Occurrences

Severe winter storms can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past severe winter events provide benchmarks for projecting similar conditions into the future. The probability that the Windsor Severance Fire Rescue service area will experience a severe winter storm event can be difficult to quantify. However, based on historical records and frequencies there is nearly a 100% chance of this type of event will occur somewhere in the service area at least once every year.

Utility Disruption

Previous Occurrences

The Windsor Severance Fire Rescue does not currently track incidences of utility disruption.

Inventory Exposed

All assets located in the Windsor Severance Fire Rescue service area are considered at risk from the impacts of utility disruption events. This includes 18,644 people, or 100% of the County's population, and all buildings and infrastructure within the County.

Potential Losses

Utility disruption events have the potential to threaten lives and disrupt business activity. However, monetary losses and casualty estimates are largely unknown.

Probability of Future Occurrences

In general, utility outages result from failures in the distribution system as opposed to shortages of supply. Distribution systems are most susceptible to failure during extreme hot and cold temperatures as well as during violent weather conditions. Regional utility failures can threaten human life, particularly when outages affect hospitals, nursing homes, or other healthcare facilities. As both population and climate variability increase across the State of Colorado, and put more pressure on aging distribution systems, it is likely that utility disturbance events will become more frequent in and around the Windsor Severance Fire Rescue service area.

Biological Hazards / Contagion

Biological hazards, including epidemics and pandemics, have the potential to cause serious illness and death, especially among those who have compromised immune systems due to age or underlying medical conditions. During the 2015 planning process, pandemic flu was identified as the key public health hazard in the county.

Previous Occurrences

There is no available data for historic occurrences of biological hazards specifically within the Windsor Severance Fire Rescue service area.

Inventory Exposed

Due to the regional nature of public health hazards, jurisdictions with higher numbers of socially vulnerable residents are expected to experience magnified impacts of public health hazards. This includes places with high numbers of elderly residents, young children, low income families, and homeless individuals/outdoor laborers. Future mitigation efforts related to biological hazards should focus on reaching those residents who are elderly, young children, and live in poverty or are homeless.

Potential Losses

Because there is no defined geographic boundary for public health hazards, all of the people and infrastructure within the Windsor Severance Fire Rescue service area are exposed to public health hazards. Those with elevated risk and potential loss are the homeless, infirm, elderly, young and low income families. Placing a dollar amount on the cost of a human life are beyond the scope of the Plan, annualized economic losses for the Fire Rescue due to public health hazards can be best quantified in terms of number of days of work lost due to sick staff.

Probability of Future Occurrences

Based on the Colorado Department of Public Health and Environment annual reportable disease summary of 2,308 Reportable Diseases within Larimer County, there is great potential for biological hazards to occur at any given time in the Windsor Severance Fire Rescue service area.

Tornado

Previous Occurrences

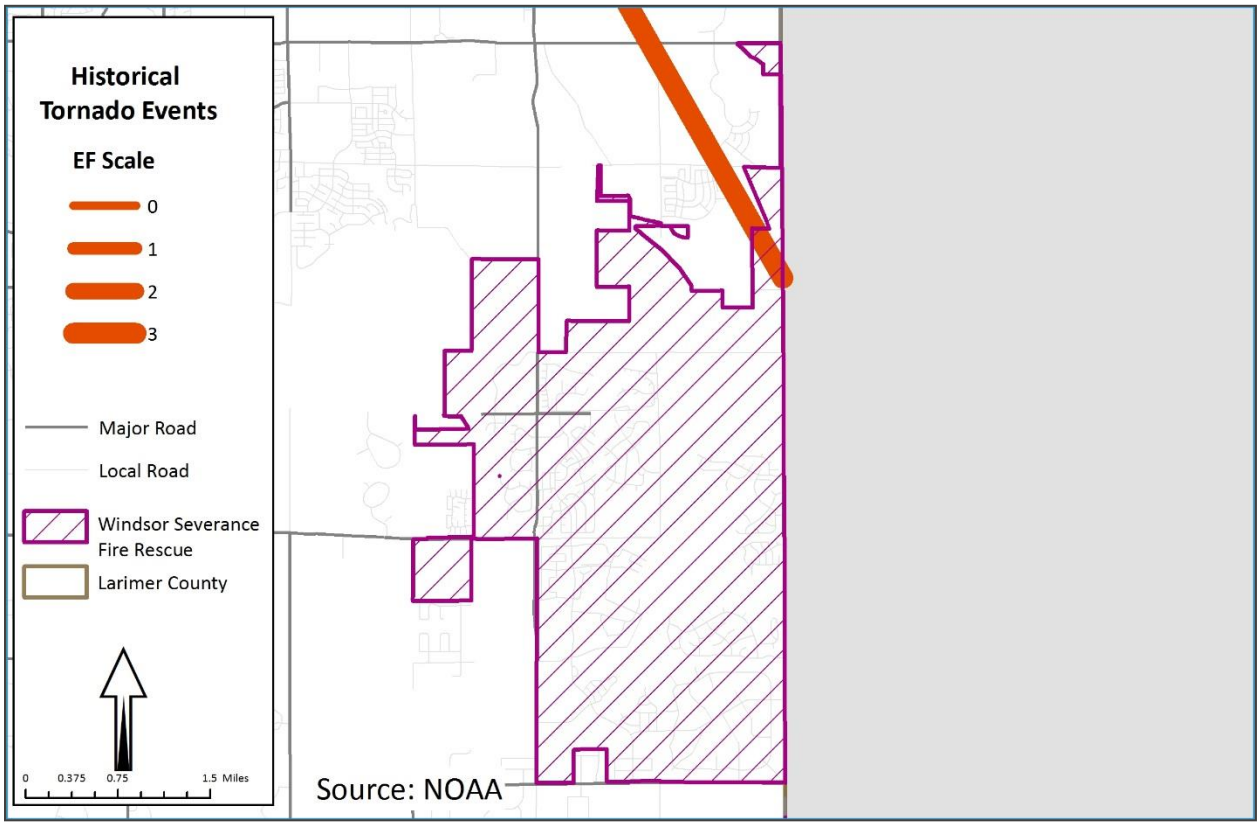
According to NOAA's Storm Events Database, 78 injuries, one death, approximately $147,000 of property damage, and no crop damages have been recorded within and near the Windsor Severance Fire Rescue District due to tornadoes.

There have been six tornadoes in the Windsor Severance Fire Rescue District within Weld County and no reported tornadoes in the Windsor Severance Fire Rescue District within Larimer County between 1954 and 2015. This EF3 tornado traveled in a north westerly direction and reached speeds of over 165 miles per hour. This tornado event consisted of a formation of several combined tornadoes forming a wedge that was between a half and three quarters of a mile wide. The tornado caused damage to not only the Town of Windsor but also the towns of Milliken, Platteville, Gilchrest, and the City of Greeley. One person was killed at the Missile Silo Campground near Greeley. The tornado impacted area was designated a national disaster. The Rocky Mountain Insurance Information Association (RMIIA) reported that there was an estimated $193.5 million in insured damages and approximately 24,000 auto and homeowners claims. Additional details concerning this damaging event can be found in the post-event reports posted on the Town of Windsor's website.

There have been tornadoes reported very close to the northern, eastern and southern borders of the District limits as well. Tornadoes will remain a highly likely occurrence for the Windsor Severance Fire Rescue District.

Two residents of Chimney Park walk away with some of their belongings after the tornado blew through Windsor on May 22, 2008. (Photo Credit: Joe Amon, The Denver Post)

Historic Tornadoes - Windsor Severance Fire Rescue Service Area[270]



Inventory Exposed

All assets located in the Windsor Severance Fire Rescue District can be considered at risk from severe wind and tornadoes. This includes all people, or 100% of the District's population and all buildings and infrastructure within the District.[271] Most structures, including the district's critical facilities, should be able to withstand and provide adequate protection from tornadoes. Those facilities with back-up generators should be fully equipped to handle tornado events should the power go out.

Potential Losses

Generally, tornadoes destroy private, commercial, and public property. Additional costs stem from debris removal, maintenance, repair, and response. Indirect costs include loss of industrial and commercial productivity as a result of damage to infrastructure, facilities, or interruption of services. Because no specific, countywide loss estimation exists tornado hazards, potential losses are related to historical property damage and injuries/deaths.

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[270] Historical tornado events. NOAA's National Weather Service Storm Prediction Center, 1950 – 2014. Attribute details can be found at http://www.spc.noaa.gov/wcm/SPC_severe_database_description.pdf

[271] 2010 Census

Probability of Future Occurrences

Reported tornadoes over the past 61 years provide an acceptable framework for determining the future occurrence in terms of frequency for such events. The probability of the Windsor Severance Fire Rescue District experiencing a tornado associated with damages or injuries can be difficult to quantify. Historic tornado frequencies suggest that there is a chance of this type of event occurring somewhere in within the district boundaries each year.

Capabilities Assessment

The capability assessment examines the ability of the WSFR to implement and manage the comprehensive mitigation strategy laid out in this Plan. The strengths, weaknesses, and resources of the community are identified here as a means for evaluating and maintaining effective and appropriate management of the organization's hazard mitigation program.

Local Personnel

The ability of a community to implement a comprehensive mitigation strategy depends, in part, on available resources, including people and staff. The following table outlines WSFR's capabilities as they relate to key personnel.

	Full Time	Part Time	None or Not-Identified
Emergency Manager	X		
Floodplain Administrator	X		
Community Planner	X		
GIS Specialist	X		
Grant Writer			X

Land Use Planning and Codes

Local land use plans and building codes are tremendous tools for evaluating local policies related to hazard mitigation and risk reduction. Additionally, comprehensive master plans, capital improvement plans, stormwater plans and zoning ordinances all present opportunities for enhanced local capabilities. The following table outlines WSFR's current capabilities as they relate to land use planning and codes.

	Yes (Y); No (N)
A zoning ordinance	Y
A hazard-specific ordinance	N
Local building codes	Y
A Comprehensive Plan / Master Plan	Y
A Capital Improvements Plan	Y
A Stormwater Plan	Y
A Continuity of Operations Plan (COOP)	-
An Emergency Operations Plan (EOP)	Y
A Long-Term Recovery Plan	Y

Participates in the NFIP	-

Plan Maintenance and Implementation

Windsor Severance Fire Rescue has developed a Plan Maintenance and Implementation Strategy outlining their method and schedule for keeping the plan current. The Implementation Strategy below also includes a discussion of how the organization will continue public participation in the plan maintenance process.

Jurisdiction	Plan Maintenance and Implementation Strategy
Windsor Severance Fire Rescue	*"Our mitigation actions will be reviewed by staff on an annual basis"* *"Any major changes will be relayed to the community via social media, Everbridge, and our district's website."*

Integrating Hazard Mitigation into Local Planning

Through discussions at planning meetings and the use of an online survey, individual outreach, and phone calls, each participating jurisdiction brainstormed with the planning team to identify processes for integrating hazard mitigation into their local planning mechanisms and policies. The following table lists the specific integration strategy identified by WSFR based on the mitigation actions listed in this plan.

Jurisdiction	Strategy
Windsor Severance Fire Rescue	*"We will implement a hazardous materials inspection and permitting process for businesses in our jurisdiction"*

Mitigation Action Guides

The following Mitigation Action Guide presents WSFR's mitigation action that was developed for the 2016 Plan.

Windsor Severance Fire Rescue: Mitigation Code Changes	
PRIORITY: High	HAZARDS ADDRESSED: Wildfire
LOCATION: Windsor Severance Service Area	GOALS ADDRESSED: Goals 1, 2, 4, and 5
RECOMMENDATION DATE: 6/1/2015	OBJECTIVES ADDRESSED: Objectives B, C, and E
TARGET COMPLETION DATE: 12/31/2016	
ISSUE: Recent large-scale disasters have caused Windsor Severance Fire to re-evaluate all Wildfire codes for possible mitigation actions	
RECOMMENDATION: Provide recommendations for code changes to the Windsor Severance Board for reducing losses and mitigating risk to structural and wildfire	
ACTION: Update fire codes with recommendations approved by the Board to decrease future risk and disaster losses.	
LEAD AGENCY: Windsor Severance Fire	EXPECTED COST: $0
SUPPORT AGENCIES: Larimer Community Development Division, Office of Emergency Management	POTENTIAL FUNDING SOURCES: Staff time
PROGRESS MILESTONES: – Develop a review team to go over all codes and provide suggested changes – Compile all recommended changes and present to the Fire Board for consideration – Make changes as appropriate and finalize recommended actions – Participate in the code revision process, including public meetings	

Windsor Severance Fire Rescue: Community Emergency Preparedness (Windsor Severance FR – 1)	
PRIORITY: Medium	HAZARDS ADDRESSED: Drought, Earthquake, Land Subsidence, Extreme Temperatures, Flood, Severe Storm, Wind & Tornado, Fire, Public Health, Hazmat
LOCATION: Windsor, Fort Collins	GOALS ADDRESSED: 1, 4
RECOMMENDATION DATE: 2016	OBJECTIVES ADDRESSED: A, E
TARGET COMPLETION DATE: Ongoing	
ISSUE: There is a need for increased public awareness regarding emergency preparedness for hazards common to our area.	
RECOMMENDATION: Information on websites, social media, community events, more collaboration with government entities.	
ACTION: Establish and implement plan for continuous community education.	
LEAD AGENCY: Windsor Severance Fire Rescue	EXPECTED COST: Can be accomplished within existing budgets.

SUPPORT AGENCIES: Town of Windsor, City of Fort Collins, RE-4 School District, Library District	POTENTIAL FUNDING SOURCES:
PROGRESS MILESTONES: Implementation of a plan that includes supporting agencies.	

Windsor Severance Fire Rescue: Mitigation Assessment (Windsor Severance FR – 2)	
PRIORITY: Medium	HAZARDS ADDRESSED: All
LOCATION: Windsor Severance Fire Rescue	GOALS ADDRESSED: 1. Protect people, property and natural resources
RECOMMENDATION DATE: 10/30/2015	OBJECTIVES ADDRESSED: C. Incorporate risk reduction principles into policy documents and initiatives; other institutional plans
TARGET COMPLETION DATE: 01/01/2018	
ISSUE: With the new HIRA information, Windsor Severance Fire is susceptible to multiple natural hazards, including tornado, fire, and flood.	
RECOMMENDATION: A determination of mitigation actions to protect the area is needed.	
ACTION: Conduct a mitigation assessment to protect Windsor Severance Fire Rescue assets is needed.	
LEAD AGENCY: Windsor Severance Fire Rescue	EXPECTED COST: Unknown
SUPPORT AGENCIES: Town of Windsor	POTENTIAL FUNDING SOURCES: General operating funds and/or potential grants.
PROGRESS MILESTONES: - Conduct an asset and infrastructure inventory to determine critical infrastructure in the district - Assess each area for hazard vulnerability and risk - Determine key mitigation actions for each area in the future	

Letter of Intent to Participate

Windsor Severance Fire Rescue
100 7th Street, Windsor, Colorado, 80550
970-686-2026
www.wsfr.us

LETTER OF INTENT TO PARTICIPATE

January 8, 2015

Lori R. Hodges
Larimer County Emergency Management
200 West Oak Street
Fort Collins, CO 80526

Re: "Statement of Intent to Participate" as a participating jurisdiction in the Larimer County Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Dear Ms. Hodges,

In accordance with the Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (HMP) requirements, under 44 CFR §201.6, which specifically identify criteria that allow for multi-jurisdictional mitigation plans, Windsor Severance Fire Rescue is submitting this letter of intent to confirm that Windsor Severance Fire Rescue has agreed to participate in the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Further, as a condition to participating in the mitigation planning, Windsor Severance Fire Rescue agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Larimer County OEM to complete the plan in conformance with FEMA requirements.

Windsor Severance Fire Rescue understands that it must engage in the following planning process, as more fully described in FEMA's *Local Mitigation Planning Handbook* dated March 2013 including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by an agreement between the Lead Jurisdiction and the Participating Jurisdiction, I Jim Abbott, commit Windsor Severance Fire Rescue to the Larimer County Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 8th day of January, 2015 _____

Appendix C – Local Jurisdiction Mitigation Outreach

Larimer County Hazard Mitigation Plan Update

As a participating member of the Larimer County Hazard Mitigation Large Planning Team, you can help ensure a successful planning process by helping to inform your communities about this process and the ultimate goal of a more resilient Larimer County. Please leverage any opportunities that you may have to inform your jurisdictional staff and the public about this important project (www.LarimerHMP2016.com).

When opportunities do arise to hold internal meetings or to provide outreach to groups of citizens, it is important to document these interactions so that they can be mentioned in the plan document. During the course of the planning process, please help to document these interactions with the public using the brief form below.

Jurisdiction/Organization:	LARIMER COUNTY
Meeting / Event :	PUBLIC OPEN HOUSE FOR MITIGATION PLAN
Date:	7/27/2015
Location:	FORT COLLINS POLICE SVCS BLDG 2221 S. TIMBERLINE RD, FORT COLLINS CO
Brief Description of outreach performed:	OPEN HOUSE TO OUTLINE THE PLANNING PROCESS, TALK ABOUT RISK ASSESSMENT & IMPORTANCE OF MITIGATION PLANNING

Please return these forms to Mike Garner (mgarner@mbakerintl.com). Thanks for your participation.

Larimer County Hazard Mitigation Plan Update

As a participating member of the Larimer County Hazard Mitigation Large Planning Team, you can help ensure a successful planning process by helping to inform your communities about this process and the ultimate goal of a more resilient Larimer County. Please leverage any opportunities that you may have to inform your jurisdictional staff and the public about this important project (www.LarimerHMP2016.com).

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Jurisdiction/Organization:	LARIMER COUNTY
Meeting / Event :	HAZARD MITIGATION PLANNING MTG
Date:	10/16/2015
Location:	COUNTY BUILDING 200 W. OAK ST, FORT COLLINS CO
Brief Description of outreach performed:	COUNTY STAFF MTG TO DISCUSS THE PLAN & POSSIBLE MITIGATION ACTIONS

Please return these forms to Mike Garner (mgarner@mbakerintl.com). Thanks for your participation.

Larimer County Hazard Mitigation Plan Update

As a participating member of the Larimer County Hazard Mitigation Large Planning Team, you can help ensure a successful planning process by helping to inform your communities about this process and the ultimate goal of a more resilient Larimer County. Please leverage any opportunities that you may have to inform your jurisdictional staff and the public about this important project (www.LarimerHMP2016.com).

When opportunities do arise to hold internal meetings or to provide outreach to groups of citizens, it is important to document these interactions so that they can be mentioned in the plan document. During the course of the planning process, please help to document these interactions with the public using the brief form below.

Jurisdiction/Organization:	Loveland *
Meeting / Event :	Loveland MAG development
Date:	September 28, 2015
Location:	Loveland Library Erion Room
Brief Description of outreach performed:	Refresher on HMP project and comparisons with the Mitigation Strategy Master Plan project. Began developing a list of potential Mitigation Actions. *Participating jurisdictions: City of Loveland Thompson Valley EMS Loveland Fire Rescue Authority

Please return these forms to Mike Garner (mgarner@mbakerintl.com). Thanks for your participation.

Larimer County Hazard Mitigation Plan Update

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When opportunities do arise to hold internal meetings or to provide outreach to groups of citizens, it is important to document these interactions so that they can be mentioned in the plan document. During the course of the planning process, please help to document these interactions with the public using the brief form below.

Jurisdiction/Organization:	LARIMER COUNTY BERTHOUD FIRE / TOWN OF BERTHOUD
Meeting / Event :	HAZARD MITIGATION PLAN
Date:	THURSDAY, OCTOBER 15, 2015
Location:	328 MASSACHUSETTS AVE., BERTHOUD, CO 80513
Brief Description of outreach performed:	DISCUSSED HAZARD MITIGATION PLAN & MITIGATION ACTION GUIDE SPECIFICALLY.

Please return these forms to Mike Garner (mgarner@mbakerintl.com). Thanks for your participation.

~~Weld~~ County Hazard Mitigation Plan Update

As a participating member of the ~~Weld~~ County Hazard Mitigation Planning Committee (HMPC), you serve as a vital link between the county and its businesses and residents. Individual jurisdictional and organizational representatives can help ensure a successful planning process by helping to inform your communities about this process and the ultimate goal of a more resilient Weld County. Please leverage any opportunities that you may have to inform the public about this important project (www.WeldHMP2016.com).

When opportunities do arise to outreach to groups of citizens, it is important to document these public interactions so that they can be mentioned in the plan document. During the course of the planning process, please help to document these interactions with the public using the brief form below.

Jurisdiction/Organization:	City of Fort Collins / Poudre Fire
Meeting / Event :	
Date:	
Location:	Various Presentations to Discuss Plan
Brief Description of outreach performed: Facebook. FC/OEM info	Public Meeting - July 7, 2015 Better Business Bureau - July ~~2015~~ 16, 2015 75 attended Family Safety + Emergency Preparedness Expo - Sept 2015 - 450 Attended - Had a booth to Explain + gather input - (PFA, Loveland, Larimer County) Poudre Fire/OEM Website has info on planning process City Mitigation Action Planning - Oct 12, 2015 22 Participants City Executive Leadership Team Meeting - 10 Sept 2015 - Discuss Plan Process.

Please return these forms to Mike Garner (mgarner@mbakercorp.com). Thanks for your participation.

~~Fort~~ Fort Collins

HAZARD MITIGATION PLANNING

OCT. 12, 2015

GREG YEAGER	FCPS	gyeager@fcgov.com
Mark Kempton	Fort Collins	mkempton@fcgov.com
Jill Oropeza	CoFC	joropeza@fcgov.com
Chris Donegan	Fort Collins	cdonegan@fcgov.com
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Dianne Green	COFC	dgreen@fcgov.com
Matt Zoccali	CoFC	mzoccali@fcgov.com
Carol A Webb	Cof FC	cwebb@fcgov.com
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DEE BERNHARDT	CITY FORESTRY	dbernhardt@fcgov.com
Dianne C. Tjalkens	CoFC	dtjalkens@fcgov.com
Clint Andrews	COFC	candrews@fcgov.com
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TERRI RUNYAN	CWRD	trunyan@fcgov.com

NAME	DEPT
Heidi Hansen	Fort Collins Utilities Stormwater
Marshe Hilmes-Robinson	Ft. Collins Utilities Stormwater

Larimer County Hazard Mitigation Plan Update

As a participating member of the Larimer County Hazard Mitigation Large Planning Team, you can help ensure a successful planning process by helping to inform your communities about this process and the ultimate goal of a more resilient Larimer County. Please leverage any opportunities that you may have to inform your jurisdictional staff and the public about this important project (www.LarimerHMP2016.com).

When opportunities do arise to hold internal meetings or to provide outreach to groups of citizens, it is important to document these interactions so that they can be mentioned in the plan document. During the course of the planning process, please help to document these interactions with the public using the brief form below.

Jurisdiction/Organization:	Livermore Fire Protection District and Larimer County Office of Emergency Management
Meeting / Event :	HMP Planning Meeting - Webinar
Date:	11/1/2015
Location:	Larimer County - Webinar
Brief Description of outreach performed:	This one-hour webinar was designed to provide comprehensive planning information to jurisdictions unable to attend the final planning meeting on October 20, 2015. Livermore Fire Protection District was the only jurisdiction that participated. The webinar included information regarding: - Project Website Review - FEMA Hazard Mitigation Planning Resources - Hazard and Risk Assessment and Risk Mapping Data - Planning Goals and Objectives - Community Profile Information - Plan Review Requirements - Participant Survey Requirements - Development of Mitigation Actions

2016 Larimer Multi-Jurisdictional Hazard Mitigation Plan Update

City of Fort Collins

Project:	Hazard Mitigation Open House	**Meeting Date:**	12/2/2015
Facilitator:	Mike Gavin – PFA, Lori Hodges – Larimer County, Marsha Hilmes-Robinson – City of Fort Collins, Pat Mialy – City of Loveland	**Place/Room:**	200 W Oak St. Larimer County Building

Name	Address	Zip Code	E-Mail	Phone
Errin Henggeler	4726 Shavano Dr.	80550	ehenggeler@fcgov.com	970-218-7680
Umi Claywell	5131 Hahns Peak Dr, Apt 103	80538	umi.claywell@[illegible].com	970.820.[illegible]
Lori Hodges	2012 Brousseau St. Ft. Collins	80526	hodgeslr@co.larimer.co.us	303-656-3214
Marsha Robinson	4207 Lochview Ct. Ft. Collins	80526	mhilmesrobinson@fcgov.com	970-224-6036
Pat Mialy	5275 Crabapple Ct Lovld	80538	Pat.mialy@cityofloveland.org	970-[illegible]-2534
Mike Gavin	8461 Castaway Dr	80528	m.gavin@poudre-fire.org	970 416 2878
Will Welch	1224 Twin Oak Ct	80525	wwelch@[illegible].com	970-215-4099

NOTICE: The City of Fort Collins will use the contact information you provide on this sign in sheet to deliver any additional information related to the topic of this meeting to you. This sign in sheet and the contact information you provide (except email addresses) is considered a public record.

Page 1 of 3

LARIMER COUNTY COMMITTED TO EXCELLENCE

Michael Baker INTERNATIONAL

Appendix D – Additional Fort Collins CRS Documentation

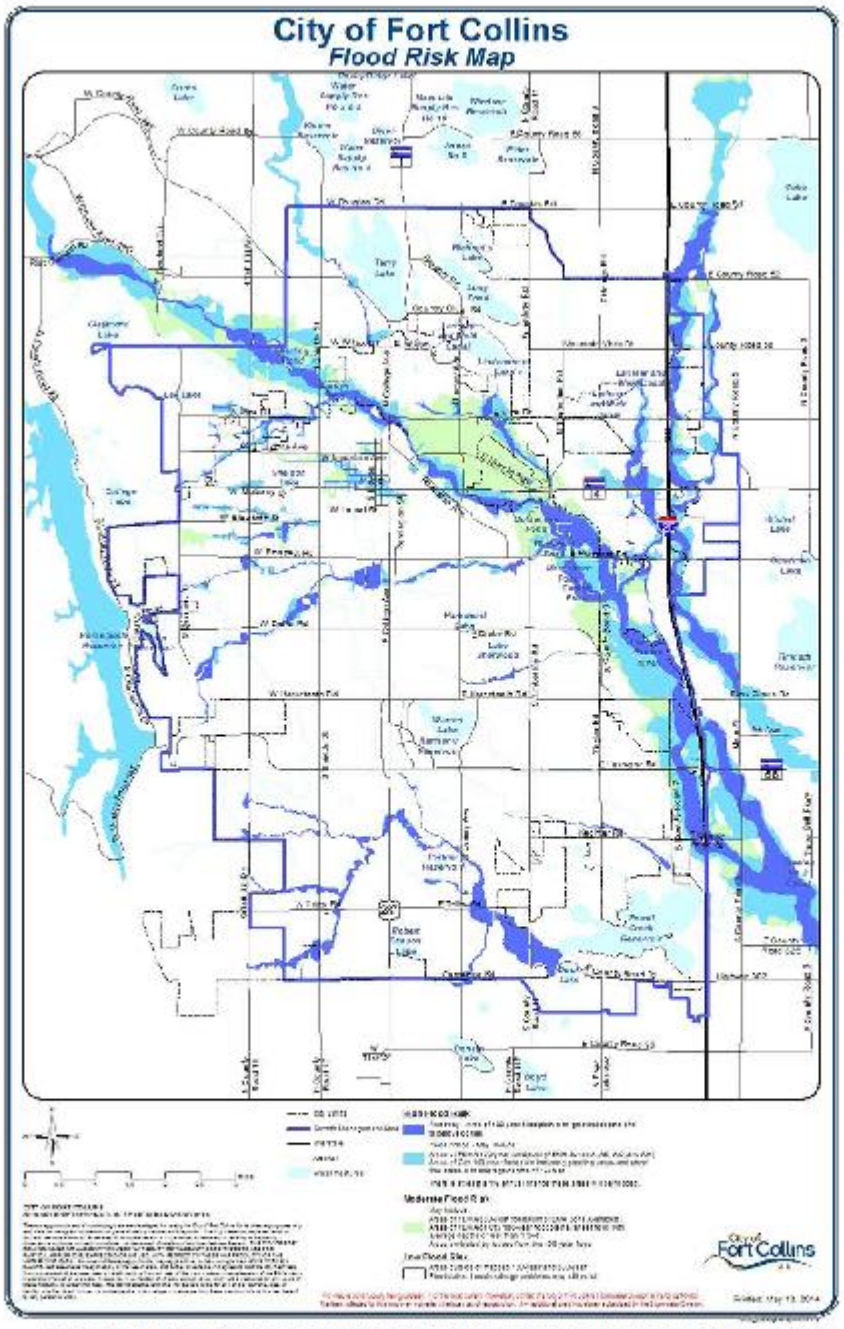


FIGURE 4 - FORT COLLINS FLOOD RISK MAP SHOWING BOTH FEMA AND CITY-DESIGNATED FLOODPLAINS

Chapter 3: Community's Public Information Needs

City of Fort Collins Utility Services

POLICY NUMBER AND TITLE:
UOPS 2.0 SUBSTANTIAL DAMAGE POLICY

ORIGINATOR'S NAME AND TITLE: Marsha Hilmes-Robinson, Floodplain Administrator

LOCATION OF DOCUMENT: S:/STAFF/Policies and Procedures/POLICIES-APPROVED/UOPS-UTILITIES OPERATIONS POLICIES/UOPS 2.0 Substantial Damage Policy

INITIAL ADOPTION DATE: February 3, 2012

REVISION HISTORY (Last revision listed represents the version currently in effect):

Name	Date	Reason for Change	Version Suffix
			.01
			.02
			.03
			.04

REVIEW SCHEDULE: Annual

ATTACHMENTS:

1. Sample Property Owner Notification Letter
2. Substantial Damage Review - Requirements for Applications to Repair Damaged Structures in the 100-year Floodplain
3. Owner's Affidavit
4. Contractor's Affidavit
5. Damage Evaluation Form
6. Sample Substantial Damage Determination Notification

REFERENCES: 1) City of Fort Collins Municipal Code, Chapter 10, "Flood Prevention and Protection".
2) "Substantial Improvement/Substantial Damage Desk Reference," FEMA P-758, May 2010.

PURPOSE: To establish a uniform policy for calculating Substantial Damage as related to the City's floodplain management ordinance in Chapter 10 of City Code.

LARIMER COUNTY COMMITTED TO EXCELLENCE

Michael Baker INTERNATIONAL

Flood Response Projects

During and after a flood, Utilities will implement specific flood response projects as indicated in Table 9.

TABLE 9 - FLOOD RESPONSE PROJECTS

Flood Response Projects				
Projects	**Message Topics**	**Audience**	**Stakeholder Support**	**Action**
Website	• Know Your Flood Hazard • Protect People from Hazard • Protect Property from Hazard • Insure Your Property • Build Responsibly • Floodplain Regulations • Flood warning • Basement Flooding • Drive Safe	• General • Residents and owners in 100-year floodplain • Flooded homes and businesses • Building design professionals	• Utilities • FEMA • Red Cross	• During and after a flood: Post information on City website and provide links to additional FEMA and Red Cross resources.
Brochure Displays	• Know Your Flood Hazard • Protect People from Hazard • Protect Property from Hazard • Insure Your Property • Build Responsibly • Floodplain Regulations	• General • Flooded homes and businesses • Building design professionals	• Utilities • Red Cross • FEMA	• After a flood: Set up displays at locations around town with brochures for the public. • Provide brochures.
Social Media	• Know Your Flood Hazard • Protect People from Hazard • Protect Property from Hazard • Insure Your Property • Build Responsibly • Floodplain Regulations • Flood warning • Basement Flooding • Drive Safe	• General • Residents and owners in 100-year floodplain • Flooded homes and businesses • Building design professionals	• Utilities	• During and after a flood: Send social media messages via Facebook/Twitter.

City of Fort Collins Flood Mitigation

Floodplain Management Program Goal

The goal of the City of Fort Collins floodplain management program is to take a proactive, comprehensive approach to dealing with potential loss of life and property damage due to flooding. Components of this program are:

- Drainage Basin Master Planning that evaluates the flood risk and examines alternatives to mitigate the risk.
- Floodplain regulations and development criteria that attempt to balance risk with regulation
- Cost effective capital projects to reduce the flood hazard.
- Educational outreach efforts to promote awareness of the flood hazard and water quality issues.
- Drainage system maintenance so that facilities can function in a flood.
- Flood warning system maintenance and technical assistance to the Office of Emergency Management for flood response.

Hazard Mitigation Planning Process

The Drainage Basin Master Planning Effort

The Drainage Basin Master Planning Effort

The City of Fort Collins has 12 drainage basins: the Cache la Poudre, Dry Creek, Cooper Slough/Boxelder, West Vine, Old Town, Canal Importation, Spring Creek, Foothills, Mail Creek, Fox Meadows, McClellands and Fossil Creek. All have flooded in the past for various reasons and have different features that must be taken into account when considering safety. The Drainage Basin Master Plan, approved by City Council in June 2004, describes the flooding history of each basin, identifies potential problem areas and recommends improvements. There are continuous updates occurring for each of the plans.

In addition, the Master Plan:

- Recommends cost-effective projects to remove properties from floodplains, reduce risk and reduce street flooding
- Offers guidance for new development in the basins
- Provides ways to enhance the riparian habitat along stream corridors and improve water quality
- Offers guidance to stabilize streams where necessary

The City updated the Master Plan and floodplain maps after the 1997 flood, including criteria for a "100-year storm." During the update process, officials determined that approximately 2,745 structures and numerous roads would be damaged in the event of such a storm. The total estimated cost of damage would be $139.6 million. Numerous improvements were recommended in the plan and construction of all improvements is expected to occur by 2036. The Master Plan called for more than 2,300 structures to be removed from the 100-year floodplain and flood damages are estimated to be reduced by approximately $289 million. In 2012, the master plans were updated to include a stream rehabilitation program and also identified necessary regional Best Management Practices (BMPs).

The Fort Collins Utilities Stormwater Master Planning Department was in charge of the overall drainage basin master planning. Consultants were used to develop the floodplain maps and to assist in evaluating the problems and potential solutions. In addition to the City master planning staff, representatives from numerous other City departments (Emergency Management, Engineering, Parks, Natural Resources, Advanced Planning, Current Planning, Transportation) and outside agencies (Irrigation Ditch companies, Larimer County Engineering Department, Poudre School District, and Colorado State University) were brought together several times throughout the process to review information and provide input. All property owners and renters who were identified as being in the floodplain were sent information about the flooding hazard and then invited to an open house for their basin. In addition, numerous presentations were made to the various City boards and commissions as well as local organizations and special interest groups. Some of the these groups included the Chamber of Commerce, Home Builders Association, Affordable Housing, Kiwanas, several Home Owners Associations, etc. The City's website also had information about the drainage basin planning process.

Hazard Assessment by Drainage Basin

General Information

Figure 1 is a city-wide map of stormwater basins in Fort Collins. Individual maps of the floodplain for each of the 12 basins are shown as part of the basin description. Four of these drainage basins have Federal Emergency Management Agency (FEMA) designated floodplains and seven basins have City-designated floodplains (Table 1). One of those basins, Fox Meadows, does not have any mapped floodplains.

There are approximately 3,700 acres in the mapped 100-year floodplain. However, over 1,600 of those acres are preserved as open space in the form of parks or natural areas.

The effective FEMA Flood Insurance Rate Map is dated May 2, 2012. FEMA is in the process of remapping the Cache la Poudre River as part of RiskMAP. Each of the City-designated floodplains was developed as part of the Drainage Basin Master Planning process. The floodplain maps can be viewed on the Fort Collins Utilities' website at fcgov.com/floodplain-maps. These maps are continuously updated.

Table 1 - FEMA and City-designated floodplains

FEMA-designated Floodplains	City-designated Floodplains
Cache la Poudre River (Poudre River)	Old Town
Spring Creek	West Vine Basin
Dry Creek	Canal Importation Basin
Boxelder Creek and Cooper Slough	Fossil Creek
	Foothills Channel
	Mail Creek
	McClellands Creek

In addition to mapping floodplains, the City also has mapped Erosion Buffer Zones on Fossil Creek and Boxelder Creek. These Buffer Zones designate areas of channel instability and potential future lateral migration of the channel.

Fort Collins has a total of 1,015 structures located in the mapped 100-year floodplain. These structures are divided between the basins as shown in Table 5. More than half of the total at-risk structures are located in the Old Town Floodplain, which is subject to street flooding since there are no remaining natural drainageways to convey the water. During the past 15 years, Old Town has been the location of several large capital improvement projects to install large storm sewers that capture storm runoff and convey it to the Poudre River. However, there are many structures, both residential and nonresidential, still at risk. Other basins with high numbers of structures at risk include the Poudre River, Spring Creek and West Vine.

Of the structures in the 100-year floodplain:

- 83 percent are one-to-four family residential structures
- 2 percent are multi-family
- 15 percent are non-residential structures

There also are several critical facilities at risk in the 100-year and 500-year floodplain.

Table 2 - Structures in Floodplains

Floodplain Name	Physical structures greater than 500 sq. ft.
FEMA Basins	
Boxelder / Cooper Slough	40
Dry Creek	25
Poudre River	63
Spring Creek	81
FEMA Basin TOTAL	**209**
City Basins	
Canal Importation	156*
Foothills	5
Fossil Creek	20
Mail Creek	0
McClelland's Creek	0
Old Town	538
West Vine	87
City Basin TOTAL	**981**
TOTAL (all basins)	**1015**

**Estimated value. Waiting for final mapping for this basin.*

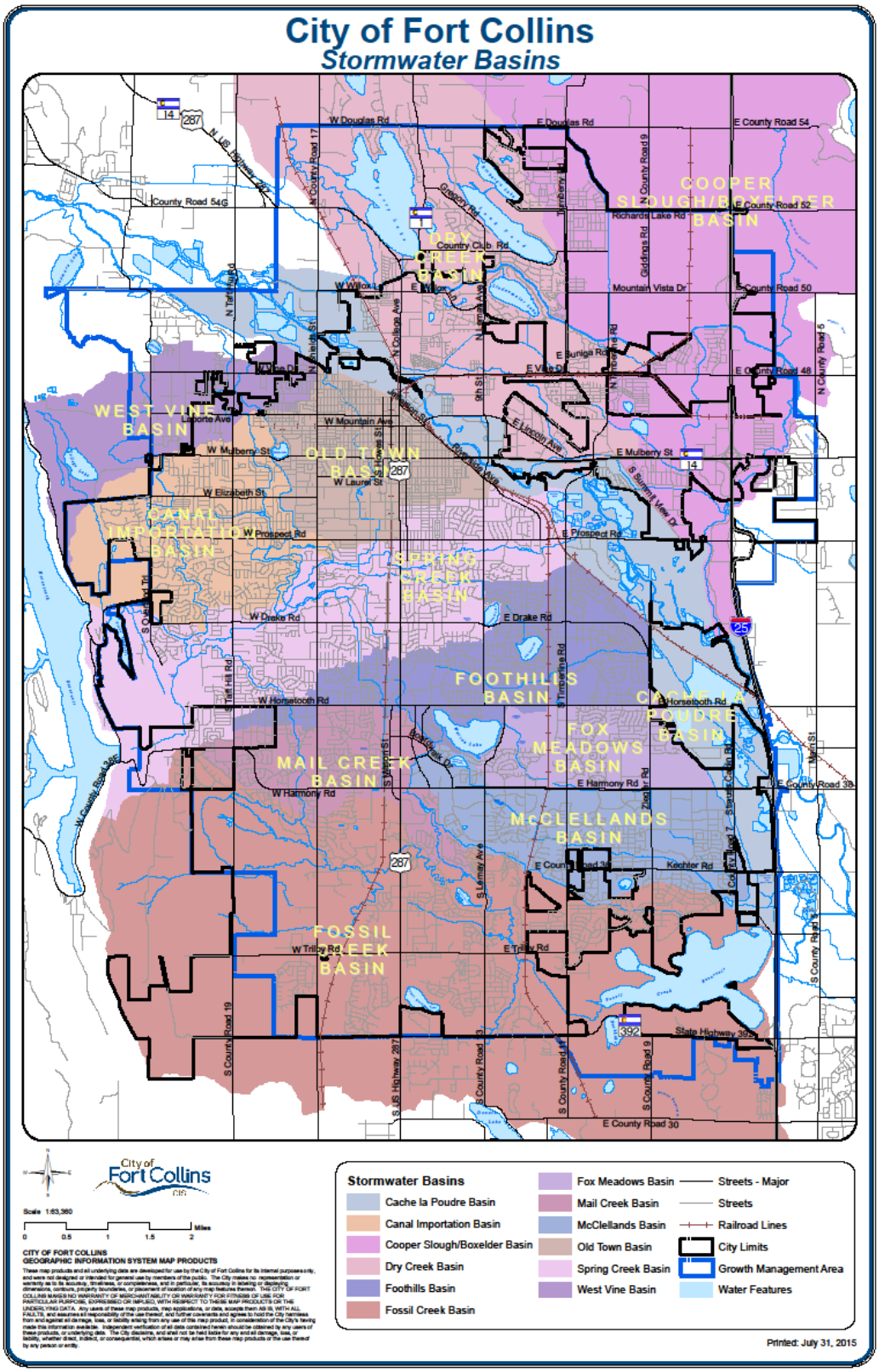


Figure 1 – City Stormwater Basins

Dry Creek Basin

Dry Creek, a tributary to the Poudre River, extends from near the Wyoming border to where it joins the river near Mulberry and Timberline. The Dry Creek Basin is approximately 23 miles long and six miles wide, encompassing approximately 62 square-miles. The upper and middle portions of the basin are primarily used as rangeland, irrigated hay meadows and pastures. The majority of the lower basin is developed for commercial, industrial and residential uses. The natural channel has disappeared in some areas of the lower basin because of development.

Dry Creek is a FEMA-designated floodplain and is subject to the City's floodplain regulations. The new mapping also includes areas beyond the FEMA floodplain which are considered to be in a City-designated floodplain.

Basin Problems - While there is no history of flooding in the upper and middle portions of the basin, a large storm could threaten the lower basin. In the lower basin, there are 614 structures, nine roads, Larimer and Weld Canal and one railroad that would be damaged during a 100-year storm event, with an estimated $24.4 million in damage. If nothing is done to mitigate this damage, it is estimated that $21.6 million of damage would occur over the next 50 years.

Minor flooding has occurred in the lower portion of the basin due to inadequate or non-existent drainage facilities. Areas south of the Larimer and Weld Canal would be flooded if the canal were overtopped during a large storm. Areas of potential flooding include, but are not limited to:

- Airpark business area, including the runway and several hangars;
- Several mobile home parks and neighborhoods;
- Vine Drive, College Avenue, Lemay Avenue, and Mulberry Street; and
- Redwood and Conifer Streets intersection.

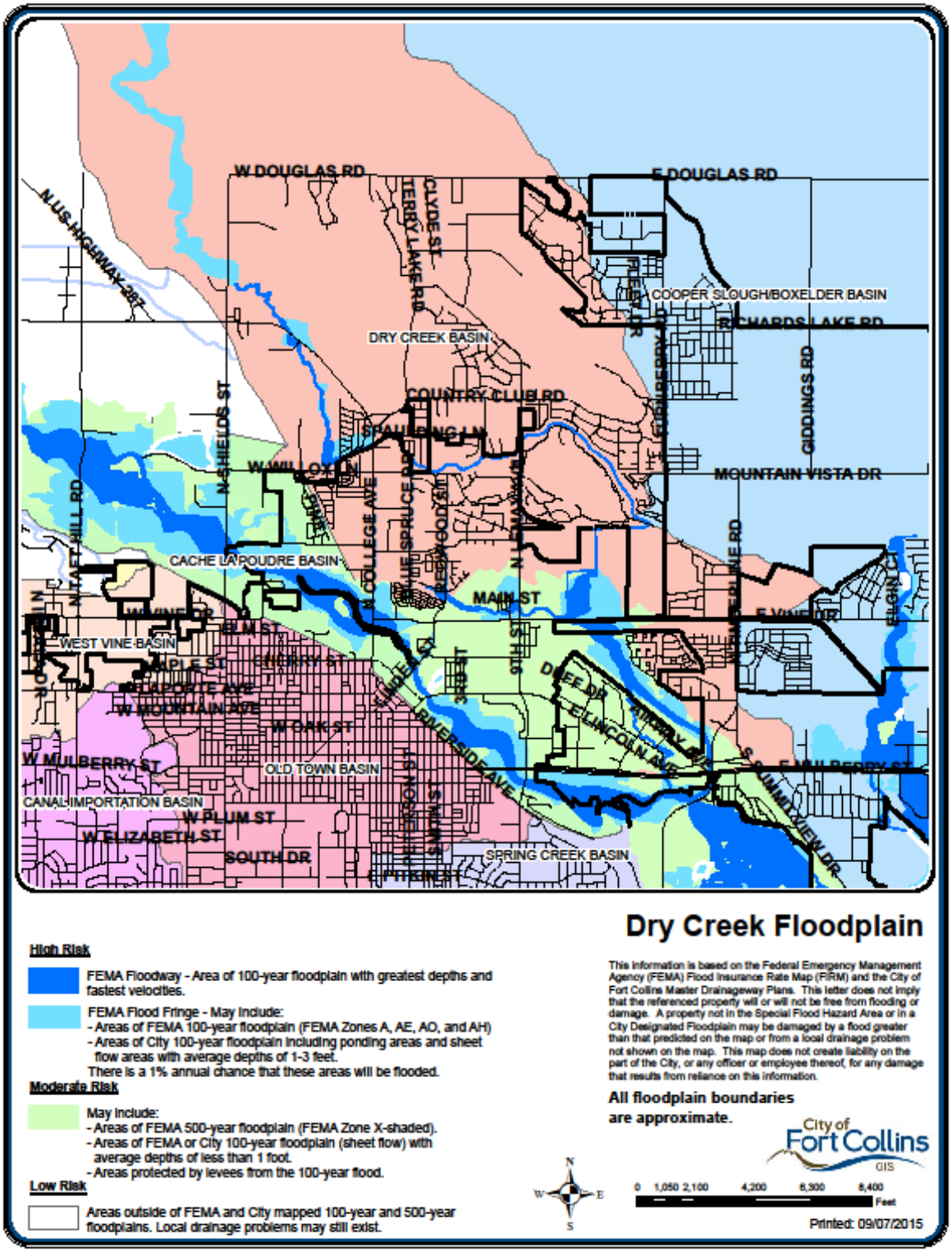
Summary of Road Overtopping Depths and Velocities for the 100-year Event Dry Creek Basin

Location	Over-topping Elevation (ft)	Flow Depth (ft)	Velocity (ft/sec)	Flow Depth times Velocity
Lemay Ave north of Vine Drive (Dry Creek Lower flowpath)	4947.8	1.2	4.8	5.8
Vine Drive and Dry Creek (Dry Creek Lower flowpath)	4941.0	3.3	2.1	6.9
Lincoln and Dry Creek near Timberline (Dry Creek Lower flowpath)	4919.0	1.5	0.9	1.4
Mulberry and Dry Creek near Timberline (Dry Creek Lower flowpath):	4918.7	1.0	4.4	4.4

Canal Spills - There are several locations along the canals in the Dry Creek basin that have the potential to overtop and spill or where there is excess flow during storm events. These include:

- Larimer and Weld Canal at the Pond 6 Overflow,
- Larimer and Weld Canal at Black Hollow,
- Larimer and Weld Canal at Waterfield,
- The Lake Lindenmeier Overflow, and
- Lake Canal (various locations).

- Critical Facilities – In general, flooding and overtopping of roadways in the North College area have been removed with the Dry Creek Flood Control Project. All of the critical facilities previously listed have also been removed. There is still some danger of overtopping and flooding of critical facilities in storm events that exceed the 100-year design storm



Boxelder Creek and Cooper Slough Basins

The Boxelder Creek and Cooper Slough Basins encompass approximately 265 square miles beginning at the Colorado/Wyoming border, extending southward into east Fort Collins and ending at the Cache la Poudre River. The basins are primarily characterized by farmland with isolated areas of mixed-use residential development and limited commercial development.

These basins are interconnected. Floodwaters from Boxelder Creek Basin can spill into Cooper Slough Basin upstream of Vine Drive. Most of the water from Cooper Slough drains into Boxelder Creek at Prospect Road, near the downstream end of the basins.

Storm runoff from the upper 186 square miles of the basin is controlled by a series of flood control reservoirs. However, the lower 80 square miles of the basin can generate a substantial amount of runoff contributing to flooding along Boxelder Creek and the Cooper Slough on both sides of I-25. A portion of this runoff crosses I-25 through the Larimer and Weld Canal and also contributes to flooding problems on the west side of the interstate.

Basin Problems - The master plan update estimated that 134 structures would be damaged during a 100-year storm with the most significant structural damage at the State Highway 14 and I-25 intersection. There are also 18 roads within the basin that would be overtopped during a 100-year storm. The master plan update estimated there would be $23 million in damages during a 100-year storm. If nothing is done to mitigate this damage, it is estimated that $62 million of damage would occur over the next 50-years.

In addition to flooding hazards, erosion has occurred because of natural processes, agricultural practices and urban development. Excessive erosion leads to poor water quality; damage to adjacent property, roads and utilities; and reduced biological diversity to support riparian habitat.

Summary of Hydraulic Data at Stream Crossings

Location	Structure Size & Type	Structure Capacity	100-Year Channel Velocity (fps)[a]	100-Year WSE (ft, NGVD)[b]	Roadway Overtopping Depth (ft)				
					2-Year	5-Year	10-Year	50-Year	100-Year
Boxelder Creek									
Boxelder Sanitation District Access Road	3 - 7' High Pipe Arches	No Overtopping Occurs	6.9	4872.5	--	--	--	--	--
Prospect Road	1 - 3' High * 14' Wide Box Culvert	5-Year	8.2	4902.2	--	--	0.5	0.9	1.1
I-25, South of Mulberry St.	2 - 10' Wide * 6.5' High Box Culverts	10-Year	5.4	4917.7	--	--	--	--	--
Mulberry St. (SH 14)	3 - 21' Wide * 7.5' High Box Culverts	No Overtopping Occurs	12.5	4931.2	--	--	--	--	--
Vine Drive (CR 48)	1 - 6' Diameter CMP	10-Year	2.8	4969.2	--	--	--	1.0	1.2
Mountain Vista Dr. (CR 50)	1 - 7' Diameter CMP	2-Year	9.6	4989.5	--	0.8	1.0	1.5	1.5
County Road 52	1 - 7' Diameter RCP	5-Year	7.6	5021.3	--	--	0.3	0.9	1.3
County Road 54	2 - 14' Wide * 8' High Box Culverts	10-Year	8.2	5051.2	--	--	--	1.2	1.2
Boxelder Creek Overflow									
Mulberry St.	No Culvert at this location.	N/A	4.6	4934.2	0.3	0.3	0.4	0.7	1.2
C & S Railroad	No Culvert at this location.	N/A	4.7	4946.5	--	--	--	1.0	1.5
Vine Drive (CR 48)	No Culvert at this location.	N/A	5.6	4967.1	0.0	0.1	0.1	0.6	1.1
Mountain Vista Dr. (CR 50)	1 - 11' Wide * 6' High Box Culvert &	50-Year	8.9	4996.7	--	--	--	--	0.7
County Road 52	No Culvert at this location.	N/A	7.6	5021.3	--	--	0.3	0.9	1.3
Boxelder Split Flow Path									
I-25 Northbound Lane at CR 42	No Culvert at this location.	N/A	0.7	4902.8	--	--	--	1.9	2.8
I-25 Frontage Rd. South of Prospect Rd.	No Culvert at this location.	N/A	3.9	4902.8	--	--	--	1.9	2.8
Prospect Road	No Culvert at this location.	N/A	6.2	4908.2	--	--	--	1.6	2.1

Location	Structure Size & Type	Structure Capacity	100-Year Channel Velocity (fps)[a]	100-Year WSE (ft, NGVD)[b]	Roadway Overtopping Depth (ft)				
					2-Year	5-Year	10-Year	50-Year	100-Year
I-25 Frontage Rd. North of Prospect Rd.	No Culvert at this location.	N/A	2.3	4909.6	--	--	--	1.0	1.6
Cooper Slough									
Emergency Access Road in Waterglen	2 - 10' Wide * 3' High Box Culverts	10-Year	0.8	4973.3	--	--	--	0.3	1.3
Vine Drive	2 - 3.5' Diameter RCP's	50-Year	1.3	4957.0	--	--	--	0.3	1.0
C & S Railroad	1 - 2' Diameter CMP	10-Year	0.2	4943.0	--	--	--	0.5	1.0
Mulberry St.	2 - 4' Diameter CMP's	2-Year	0.1	4928.0	--	0.2	0.4	0.9	1.6

[a] Downstream of Structure [b] Upstream of Structure

Summary of Detention Pond Operating Parameters

7.1.4.1 Detention Pond	SWMM ID	Approximate Location	100-Year Event Operating Parameters					
			Normal Outlet Discharge (cfs)	Overtopping Discharge (cfs)	Total Release (cfs)	Emergency Spillway/ Flow Depth (ft)	Approximate Width of Overtopping (ft.)	Ponded Water Surface Elevation (ft, NGVD)
South Gray Reservoir	402	North of CR 50, and West of Boxelder Creek	N/A	278.2	278.2	1.2	--	Gage Height =20.7 ft
North Gray Reservoir	401	North of CR 50, and West of Boxelder Creek	N/A	65.2	65.2	1.6	--	Gage Height = 15.7 ft
Waterglen Pond (A)	470	East of Elgin Place in Waterglen, West of Cooper Slough	2	N/A	2	N/A	N/A	4961.0
Waterglen Pond (B)	471	East of Cullen Court in Waterglen, West of Cooper Slough	2.4	3.6	6	0.1	56.0	4957.2
Waterglen Pond (C)	472	South of Gardenwall Court in Waterglen, East of Cooper Slough	4.3	13.4	17.7	0.1	100.0	4964.7
Waterglen Pond (D)	473	South of Bannoch Street in Waterglen, East of Cooper Slough	15.1	N/A	15.1	N/A	N/A	4959.4
Waterglen Pond (E)	474	North of Vine Drive, East of Cooper Slough	43.5	46	89.5	0.2	210.0	4955.2
Inadvertent Detention behind Vine Dr. & CSRR	416	N.E. Corner of Vine Dr. and C&S Railroad	N/A	144.3	144.3	0.3	730.0	4964.3
Story Book Patio Homes On-Site Detention Pond	424	N.E. Corner of Mountain Vista Dr. & CR 11	8.6	17.6	26.2	0.4	23.0	5010.8
Anheuser Busch Regional Detention Pond	425	North of Waterglen, West of I-25, and South of Mountain Vista Dr.	455.1	455.1	455.1	3.0	45.0	4978.6
C&S Railroad, West of Waterglen	426	West of C&S Railroad, just West of Waterglen	20.4	895.1	915.5	2.6	890.0	4986.6
Inadvertent Detention behind CR 50 & CR 9	427	N.W. Corner of CR 50 & CR 9	10.9	156.4	167.3	0.5	420.0	4988.7
Story Book Patio Homes Detention/Retention Pond	428	Adjacent to the No. 8 Ditch, and North of Mountain Vista Dr.	203.4	203.4	203.4	0.8	86.0	4997.8

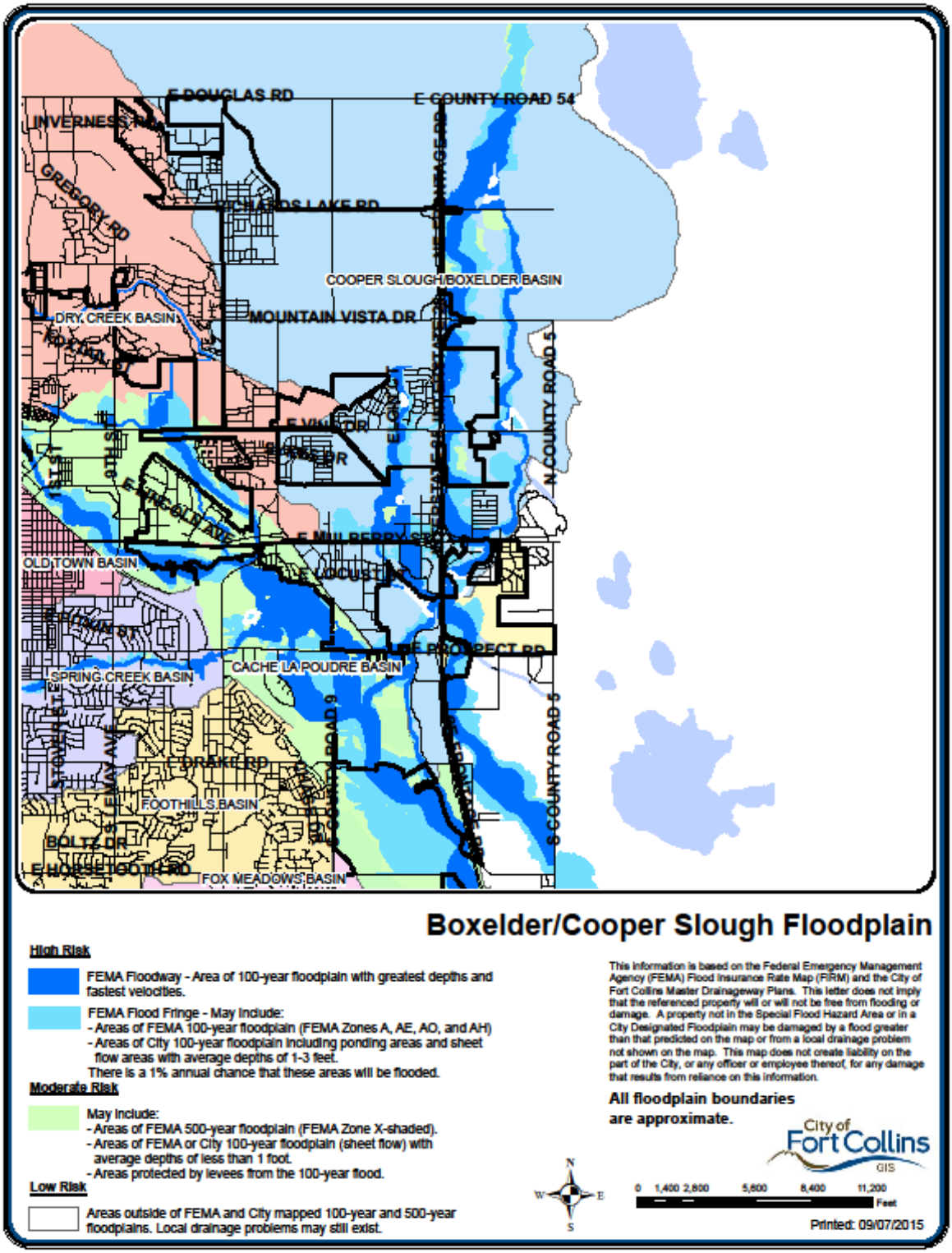
7.1.4.1 Detention Pond	SWMM ID	Approximate Location	100-Year Event Operating Parameters					
			Normal Outlet Discharge (cfs)	Overtopping Discharge (cfs)	Total Release (cfs)	Emergency Spillway/ Flow Depth (ft)	Approximate Width of Overtopping (ft.)	Ponded Water Surface Elevation (ft, NGVD)
Anheuser Busch On-Site Detention Pond	430	North of Mountain Vista Dr., West of I-25	34.1	34.1	34.1	0.3	30.0	4993.8
Inadvertent Detention behind CR 50 & CSRR	431	N.W. Corner of CR 50 & C&S Railroad	8.1	1660.1	1668.2	1.5	750.0	4991.5
Inadvertent Detention behind CR 50 & CR 9	432	West side of CR 9, North of CR 50	0	0	0	N/A	N/A	N/A
Inadvertent Detention behind CR 52 & I-25	435	North of CR 52, West of I-25	58.8	365.4	424.2	0.8	320.0	5026.8
Inadvertent Detention behind CR 52, b/w CR 9 and C&SRR	436	North of CR 52, between CR 9 and C&S Railroad	13.3	1316.4	1329.7	1.2	700.0	5024.1
Inadvertent Detention behind CR 9 & CR 52	437	S.W. Corner of CR 9 and CR 52	10.2	347.9	358.1	0.8	340.0	5025.8
Inadvertent Detention Area North of CR 52 on Turf farm	438	North of CR 52, East of the No. 8 Ditch	N/A	75.7	75.7	0.2	330.0	5030.2
Richard's Lake P.U.D.	441	N.W. Corner of CR 11 and CR 52	N/A	N/A	5.3	N/A	N/A	N/A
Inadvertent Detention behind CR 11 & CR 54	446	West side of CR 11, South of CR 54	19.8	467.7	487.5	0.8	550.0	5066

Summary of Detention Pond Overtopping Data

Detention Pond	SWMM ID	Approximate Location	Potential Flooding Scenario	Potential Flooding Scenario if the Normal Outlet is Blocked
South Gray Reservoir	402	North of CR 50, and West of Boxelder Creek	Spills directly into Boxelder Creek	Spills directly into Boxelder Creek
North Gray Reservoir	401	North of CR 50, and West of Boxelder Creek	Spills directly into Boxelder Creek	Spills directly into Boxelder Creek
Waterglen Pond (A)	470	East of Elgin Place in Waterglen, West of Cooper Slough	Discharges to Cooper Slough through pipe outlet	Discharges to Cooper Slough through emergency spillway
Waterglen Pond (B)	471	East of Cullen Court in Waterglen, West of Cooper Slough	Discharges to Cooper Slough through pipe outlet, and emergency spillway	Discharges to Cooper Slough through emergency spillway
Waterglen Pond (C)	472	South of Gardenwall Court in Waterglen, East of Cooper Slough	Discharges to Cooper Slough through pipe outlet, and emergency spillway	Discharges to Cooper Slough through emergency spillway
Waterglen Pond (D)	473	South of Bannoch Street in Waterglen, East of Cooper Slough	Discharges to Cooper Slough through pipe outlet	Discharges to Cooper Slough through emergency spillway
Waterglen Pond (E)	474	North of Vine Drive, East of Cooper Slough	Discharges to Cooper Slough through pipe outlet, and emergency spillway	Discharges to Cooper Slough through emergency spillway
Inadvertent Detention behind Vine Dr. & CSRR	416	N.E. Corner of Vine Dr. and C&S Railroad	Overtops Vine Drive and flows to the south across field, may be some flow to the west along Vine Dr.	Overtops Vine Drive and flows to the south across field, may be some flow to the west along Vine Dr.
Story Book Patio Homes On-Site Detention Pond	424	N.E. Corner of Mountain Vista Dr. & CR 11	Overtops emergency spillway and flows into an open graded ditch which leads into the No. 8 Ditch	Increased flow depth through emergency spillway and flows into an open graded ditch which leads into the No. 8 Ditch
Anheuser Busch Regional Detention Pond	425	North of Waterglen, West of I-25, and South of Mountain Vista Dr.	Flows into the Larimer & Weld Canal through a concrete spill structure	Flows would move to the east into an adjacent open field
C&S Railroad , West of Waterglen	426	West of C&S Railroad, just West of Waterglen	Overtops the C&S Railroad to the south west, and ultimately flows into the L&W Canal	Overtops the C&S Railroad to the south west, and ultimately flows into the L&W Canal

Detention Pond	SWMM ID	Approximate Location	Potential Flooding Scenario	Potential Flooding Scenario if the Normal Outlet is Blocked
Inadvertent Detention behind CR 50 & CR 9	427	N.W. Corner of CR 50 & CR 9	Overtops CR 50 and flows to the south through an open field	Overtops CR 50 and flows to the south through an open field
Story Book Patio Homes Detention/ Retention Pond	428	Adjacent to the No. 8 Ditch, and North of Mountain Vista Dr.	Overtops emergency spillway and flows into the No. 8 Ditch	Overtops emergency spillway and flows into the No. 8 ditch
Anheuser Busch On-Site Detention Pond	430	North of Mountain Vista Dr., West of I-25	Overtops emergency spillway and flows into downstream channel	Increased flow depth through emergency spillway and flows into downstream channel
Inadvertent Detention behind CR 50 & CSRR	431	N.W. Corner of CR 50 & C&S Railroad	Overtops CR 50 and flows to the south through an open field - one structure threatened	Overtops CR 50 and flows to the south through an open field - one structure threatened
Inadvertent Detention behind CR 50 & CR 9	432	West side of CR 9, North of CR 50	None - all flows contained within pond	Overtops CR 9 and flows to the east into an open field
Inadvertent Detention behind CR 52 & I-25	435	North of CR 52, West of I-25	Overtops CR 52 and flows to the south into Anheuser Busch Brewery	Overtops CR 52 and flows to the south into Anheuser Busch Brewery
Inadvertent Detention behind CR 52, b/w CR 9 and C&SRR	436	North of CR 52, between CR 9 and C&S Railroad	Overtops CR 52 and flows to the south through Anheuser Busch	Overtops CR 52 and flows to the south through Anheuser Busch
Inadvertent Detention behind CR 9 & CR 52	437	S.W. Corner of CR 9 and CR 52	Overtops CR 9 and flows to the east into an open field	Overtops CR 9 and flows to the east into an open field
Inadvertent Detention Area North of CR 52 on Turf Farm	438	North of CR 52, East of the No. 8 Ditch	Flows southeast towards the intersection of CR 52 and CR 9	Flows southeast towards the intersection of CR 52 and CR 9
Richard's Lake P.U.D.	441	N.W. Corner of CR 11 and CR 52	N/A - Combined four ponds into one pond release	N/A - Combined four ponds into one pond release
Inadvertent Detention behind CR 11 & CR 54	446	West side of CR 11, South of CR 54	Overtops CR 11 and flows to the east through an open field	Overtops CR 11 and flows to the east through an open field

Critical Facilities - No critical facilities would be directly impacted by the 100-year flood flows but access would be compromised for an electrical substation located north of the Larimer and Weld Canal and east of I-25.



Poudre River Basin

The Cache la Poudre River, a major tributary to the South Platte River, is located in Larimer and Weld Counties, with a small portion of the drainage basin extending into southern Wyoming. Passing through Fort Collins, the Poudre River corridor provides for stormwater drainage from various contributing City drainage basins.

Floodplain restrictions have limited the amount of building in the floodplain, resulting in lower development density. This lower density, combined with sensitivities to the natural environment, has resulted in a high concentration of parks and open space along the river corridor. Portions of the river corridor also contain old industrial sites, reflecting a time when the river was seen as a convenient means of carrying off waste products.

Many of the city's natural areas are located within the Poudre River corridor. The riparian ecosystem provides important habitat for a variety of wildlife and also contains diverse vegetation that is both biologically and aesthetically valuable. The biological diversity, along with the sheer length of mostly undeveloped land, create a critical habitat of regional significance.

The Poudre River has the longest amount of warning time of any of the drainage basins in Fort Collins. This is because most flooding will be a result of snowmelt in the upper basin. The travel time from the mouth of Poudre Canyon to the city is approximately 2 hours.

Basin Problems - Approximately 3,160 acres of floodplain between Taft Hill Road and I-25 would be inundated by a 100-year flood, damaging approximately 188 structures. Estimates indicate that damages to property, utilities and infrastructure caused by the 100-year flood would total $9.5 million, with expected annual damages of $460,000. Additional damages would be expected due to significant erosion.

Riverbank conditions vary widely both in terms of their ecological condition and structural stability. Some sections have stable banks and a well-developed floodplain with developing riparian zones. Other sections have been stabilized but are not aesthetically pleasing and provide little wildlife benefit. Still other sections have steep, eroding banks with concrete embankments and little vegetation.

Summary of Bridge Data Within the Study Reach.

Inventory of Bridges

Location	Station[1] (ft)	Type of Structure[2]	100-year Water Surface Elevation (ft, msl)	Highest Roadway Crown Elevation on Bridge (ft, msl)	Low Chord Elevation (ft, msl)	Minimum Overbank Elevation (ft, msl)	100-Year Velocity Thru Bridge (fps)	Frequency of Flows Required to Inundate Bridge Low Chord (yrs)
I-25	189498	R.C.	4850.88	4853.2	4949.2	4853.2	6.77	11
BNRR	193727	W.T.	4863.00	4863.2	4860.8	4960.0	3.40	45
Haul Road	196897	W.&S.	4865.61	4868.4	4862.0	4860.0	4.93	3
Haul Road	200990	W.&S.	4873.60	4877.9	4873.2	4870.0	6.58	45
Prospect Road	208917	R.C.	4898.07	4909.2	4901.2	4901.0	8.09	>100
Lemay Avenue	221702	R.C.	4932.25	4941.8	4938.9	4938.0	8.52	>100
Mulberry Street	222452	R.C.	4934.34	4939.6	4935.6	4939.6	7.06	>100
Lincoln Avenue	227437	R.C.	4947.06	4957.8	4956.5	4957.8	13.69	>100
Linden Street	228687	R.C.	4953.65	4962.4	4954.6	4956.0	6.84	>100
C&S RR	230017	W.&S.	4958.28	4968.9	4964.4	4964.0	8.15	>100
College Avenue	230912	R.C.	4965.15	4970.2	4965.7	4963.4	5.25	>100
UP RR	231022	W.T.	4965.54	4971.8	4969.5	4966.0	3.61	>100
Shields Street	237537	R.C.	4986.41	4993.5	4990.6	4988.0	10.45	>100
Haul Road	241267	W.&S.	5002.30	5003.0	4999.3	5000.0	7.89	52
Taft Hill Road	244547	S.G.	5019.77	5021.9	5018.0	5018.0	5.21	22

[1]Upstream face of bridge
[2]R.C. = Reinforced Concrete; W.T. = Wood Trestle; W.&S. = Wood and Steel; S.G. = Steel Girder

Summary of Road Overtopping Conditions.

Location	Station	Total River Discharge at Overtopping (cfs)	Frequency	Road Overtopping Conditions			
				Peak Discharge (cfs)	Velocity (fps)	Depth (ft)	Duration (hrs)
I-25	189,498	9,990	25-yr[8]	4,564	5.2	0.92	18
Harmony Road	182,253[1]	9,990	25-yr[8]	4,564	3.8	2.9	18
BNRR	193,727	9,990	25-yr	2,950	1.4	3.0	14
Prospect Road	208,917	11,986	50-yr	3,680	2.0	2.0	10
E. Mulberry Street (Hwy 14)	214,500	7,820[7]	25-yr	3,477	4.1	0.85	12
Airpark Drive	450[2]	7,820[7]	25-yr	2,903	2.1	~1.5	12
Link Lane	2,050[2]	7,820[7]	25-yr	2,903	1.1	~2	12
Lincoln Avenue (airpark area)	0[2]	7,820[7]	25-yr	N/A[5]	<1	~2	12
Lincoln Avenue (Buckingham area)	8,425[6]	13,700	100-yr	4	<1	<1	11
North College Ave.	230,912	10,200	50-yr	4,083	2.4[4]	1.8	9
Taft Hill Road	244,547	8,521	25-yr	7,032[3]	3.7	1.8	11

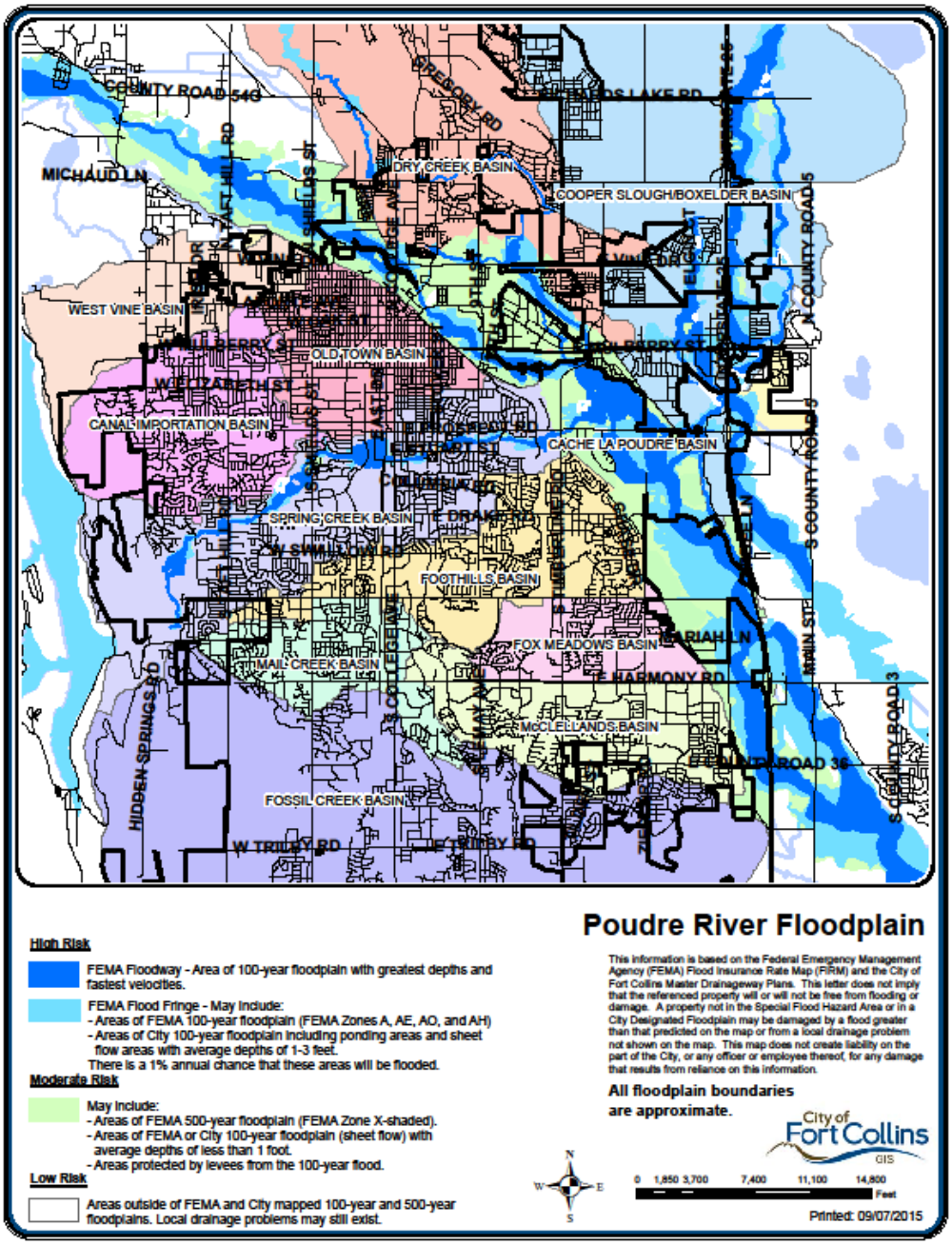
[1]Flow path I25MAIN.DAT
[2]Flow path RLMAYDS.DAT
[3]Includes flow over roadway north and south of river.
[4]Estimated using weir length and depth of flow.
[5]Flow is parallel to Lincoln Avenue.
[6]Flow path LINC92.DAT
[7]Assumes breach of Lemay Avenue embankment.
[8]Although the hydraulic analysis indicates split flow from the mainstem for the 5- and 10-year events, with the available storage upstream of Harmony Road, it is unlikely that flows below the 25-year event will overtop Harmony or Interstate 25.
~ = Approximate

Critical Facilities – There are several critical facilities in the 100-year Poudre River floodplain:

- Team Petroleum - 105 E. Lincoln Ave.
- City of Fort Collins Mulberry Wastewater Reclamation Facility, 500 block of East Mulberry Street,
- Boxelder Sanitation District Wastewater Facility, 3201 East Mulberry Street,
- Orthopedic Center of the Rockies/Gateway medical/Health South Rehabilitation Center, 2500 East Prospect Rd (100 & 500-yr floodplains)

In addition, the following two facilities are located in the 500-year floodplain:

- IonTech/Vecco, 2330 East Prospect Rd
- City of Fort Collins Drake Wastewater Reclamation Facility, 3036 East Drake Rd.


COUNTY ROAD 54G
MICHAUD LN
DRY CREEK BASIN
COOPER SLOUGH/BOXELDER BASIN
WEST VINE BASIN
OLDTOWN BASIN
CANAL IMPORTATION BASIN
CACHE LA POUDRE BASIN
SPRING CREEK BASIN
FOOTHILLS BASIN
FOX MEADOWS BASIN
MAIL CREEK BASIN
McCLELLANDS BASIN
FOSSIL CREEK BASIN
HIDDEN SPRINGS RD
S COUNTY ROAD 5
S COUNTY ROAD 3
E HARMONY RD
W TRILBY RD
E TRILBY RD
Poudre River Floodplain
High Risk
FEMA Floodway - Area of 100-year floodplain with greatest depths and fastest velocities.
FEMA Flood Fringe - May include:
- Areas of FEMA 100-year floodplain (FEMA Zones A, AE, AO, and AH)
- Areas of City 100-year floodplain including ponding areas and sheet flow areas with average depths of 1-3 feet.
There is a 1% annual chance that these areas will be flooded.
Moderate Risk
May include:
- Areas of FEMA 500-year floodplain (FEMA Zone X-shaded).
- Areas of FEMA or City 100-year floodplain (sheet flow) with average depths of less than 1 foot.
- Areas protected by levees from the 100-year flood.
Low Risk
Areas outside of FEMA and City mapped 100-year and 500-year floodplains. Local drainage problems may still exist.
This information is based on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) and the City of Fort Collins Master Drainageway Plans. This letter does not imply that the referenced property will or will not be free from flooding or damage. A property not in the Special Flood Hazard Area or in a City Designated Floodplain may be damaged by a flood greater than that predicted on the map or from a local drainage problem not shown on the map. This map does not create liability on the part of the City, or any officer or employee thereof, for any damage that results from reliance on this information.
All floodplain boundaries are approximate.
City of Fort Collins GIS
N
W
E
S
0 1,850 3,700 7,400 11,100 14,800
Feet
Printed: 09/07/2015

West Vine Basin

The West Vine Basin, located in northwest Fort Collins, extends east from Horsetooth Reservoir to the Cache la Poudre River and south from West Vine Drive to Mulberry Street and Laporte Avenue. The total area is approximately 2,350 acres. The eastern half of the basin is part of the Fort Collins Urban Growth Area. The western half of the basin, west of Overland Trail, includes open space and the Colorado State University Foothills Campus. Less than 15 percent of the basin is within city limits; the rest is in Larimer County.

In general, the basin drains from west to east along five flow paths that are not well defined. Throughout the years, development has occurred over the historical flow paths. Most of the basin's drainage facilities are inadequate during any storm event, and as a result, drainage problems have occurred regularly.

The main channel of the West Vine drainage, downstream of Laporte Avenue, is usually dry. Several locations lack a well-defined channel because of development and because stormwater is intercepted by irrigation canals. Only the reach upstream of Laporte Avenue and Poudre High School has perennial flow in a well-defined channel. This reach is known as Soldier Canyon Creek, and typically there is a small amount of base flow in the bottom of the channel.

Five irrigation canals cross the basin, generally from north to south. The three main canals—the Pleasant Valley and Lake Canal (PV&L), the New Mercer Ditch (NMD) and the Larimer County Canal No. 2 (LC2)—impact the drainage in the basin. The canals intercept runoff traveling through the basin and transport it out. They also regularly spill runoff into the basin when their capacity is exceeded.

Basin Problems - Three main areas in the West Vine Basin have a history of flooding problems. They include the Irish Green Subdivision, the subdivision at the northwest corner of Taft Hill Road and Laporte Avenue, and the Second Filing of the Hanna Subdivision. Residents have indicated there has been stormwater up to their homes' foundation levels or higher on a regular basis. Other reports indicate that the open field west of the Hanna Subdivision has experienced ponding during long or intense storms.

Other flooded areas include the Bonnaview and Rosteks Subdivisions and the railroad embankment near Shields Street and West Vine Drive. Flooding in the Bonnaview Subdivision resulted from spilling from the PV&L. The abandoned railroad embankment near Shields and Vine was overtopped downstream of the existing culvert.

During a 100-year storm, there are 33 structures and 14 roads that would be damaged, in addition to an estimated 18 spills off the PV&L, NMD and LC2. This would result in an estimated $1.7 million in damages. If nothing is done to mitigate this damage, it is estimated that $10.4 million of damage would occur over the next 50 years.

Summary of Road Overtopping Depths

Location	Existing Conditions				Selected Plan
	Overtopping Elevation (ft)	Flow Depth (ft)	Travel Time ** (min)	Velocity (ft/sec)	Flow Depth (ft)
LaPorte Ave. and Impala Drive (Poudre High School)	5067	1.7	106	3.9	0.5
New Mercer Ditch and:					
Taft Hill Road and LaPorte (Southern Flow Path)	5056	2.8	106	3.4	spill structure
Cherry St. (Central Flow Path)	5060	1.2	81	1.0	spill structure

Location	Existing Conditions				Selected Plan
	Overtopping Elevation (ft)	Flow Depth (ft)	Travel Time ** (min)	Velocity (ft/sec)	Flow Depth (ft)
Taft Hill Road and:					
Vine Drive (Northern Flow Path)	5055	0.5	63	2.9	0.0
Larimer County Canal No. 2 (Central Flow Path)	5050	0.4	75	0.3	0.0
LaPorte (Southern Flow Path)	5053.5	0.6	109	3.4	0.0
Larimer County Canal No. 2 and:					
Northern Flow Path	5048	1.7	36	4.2	0.5
Central Flow Path	5046	1.6	57	3.5	spill structure
Southern Flow Path	5046	1.6	110	2.0	spill structure
Southeastern Flow Path	5044	0.4	173	0.5	0.0
Vine Drive and Hanna St. (all flow paths converge)	5010.5	1.2	94	2.6	0.0
Abandoned RR Embankment	5006.5	0.7	*	0.8	0.0
Shields Street and:					
Main Flow Path	4995	1.4	*	5.2	0.0
Eastern Flow Path	5006.5	0.8	*	3.8	0.0

*beyond hydrological modeling limits
**travel time to peak discharge

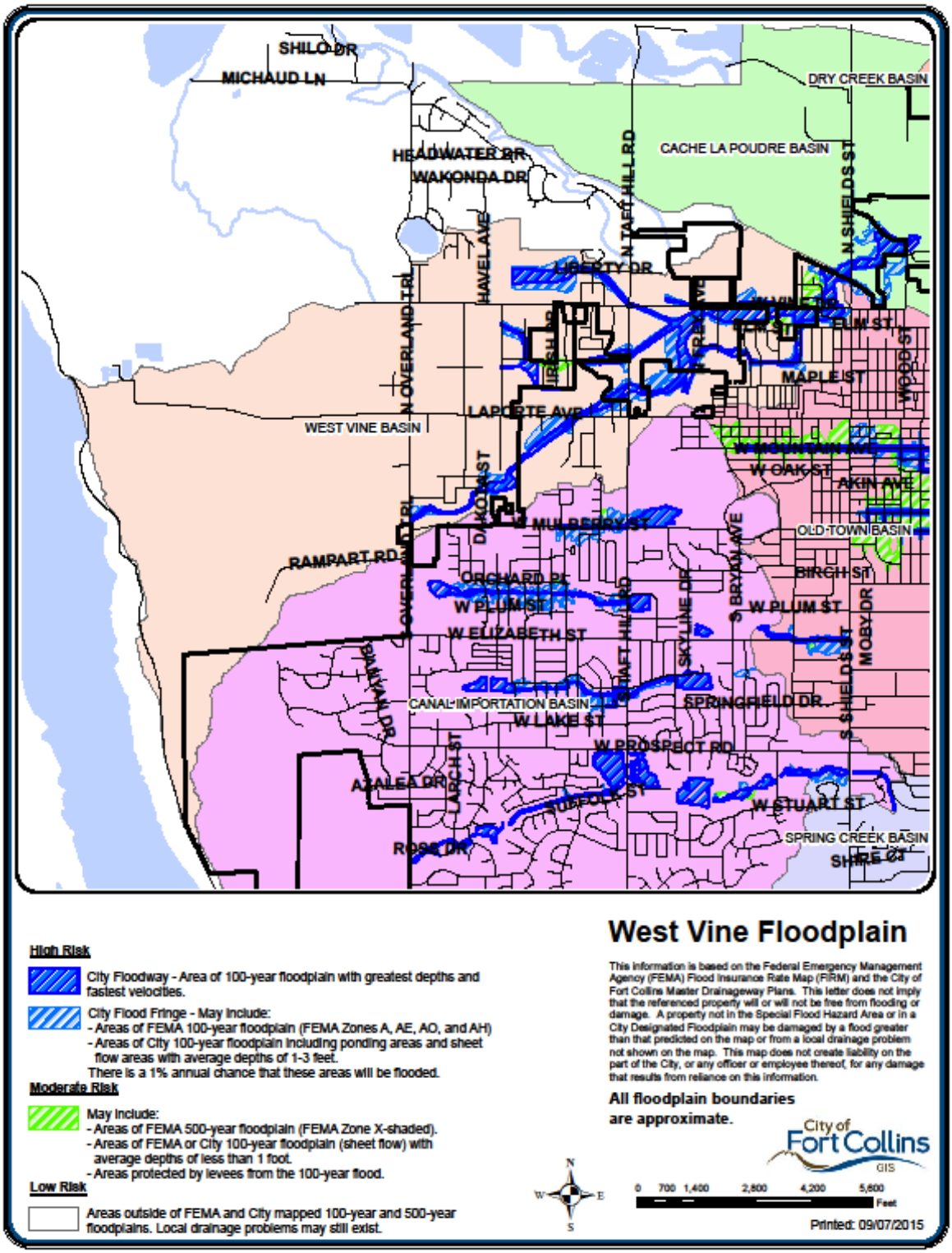
Critical Facilities - Seven critical facilities were identified within the West Vine Basin:

Locations within the West Vine floodplain are as follows:

(1) Poudre School District Admin Center, 2407 Laporte Ave (100-year floodplain)

Locations within the West Vine Basin but not directly in the floodplain are as follows:

(1) Irish Elementary School, 515 Irish Dr.,
(2) Lincoln Junior High School, 1600 W. Lancer Dr
(3) Poudre High School, 201 Impala Dr
(4) Putnam Elementary School, Maple
(5) Gasamat, 1054 W. Vine Dr


SHILO DR
MICHAUD LN
HEADWATER DR
WAKONDA DR
DRY CREEK BASIN
CACHE LA POUDRE BASIN
N TAFT HILL RD
N SHIELDS ST
HAVEL AVE
LIBERTY DR
ELM ST
MAPLE ST
WOOD ST
N OVERLAND TRL
LAPORTE AVE
WEST VINE BASIN
W OAK ST
AKIN AVE
DAKOTA ST
MULBERRY ST
OLD TOWN BASIN
RAMPART RD
ORCHARD PL
BIRCH ST
W PLUM ST
S BRYDEN AVE
W ELIZABETH ST
SKYLINE DR
MOBY DR
S SHIELDS ST
CANAL IMPORTATION BASIN
SPRINGFIELD DR
W LAKE ST
W PROSPECT RD
AZALEA DR
LARCH ST
SUFFOLK ST
W STUART ST
ROSE DR
SPRING CREEK BASIN
SHIRE CT
High Risk
City Floodway - Area of 100-year floodplain with greatest depths and fastest velocities.
City Flood Fringe - May include:
- Areas of FEMA 100-year floodplain (FEMA Zones A, AE, AO, and AH)
- Areas of City 100-year floodplain including ponding areas and sheet flow areas with average depths of 1-3 feet.
There is a 1% annual chance that these areas will be flooded.
Moderate Risk
May include:
- Areas of FEMA 500-year floodplain (FEMA Zone X-shaded).
- Areas of FEMA or City 100-year floodplain (sheet flow) with average depths of less than 1 foot.
- Areas protected by levees from the 100-year flood.
Low Risk
Areas outside of FEMA and City mapped 100-year and 500-year floodplains. Local drainage problems may still exist.
West Vine Floodplain
This information is based on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) and the City of Fort Collins Master Drainageway Plans. This letter does not imply that the referenced property will or will not be free from flooding or damage. A property not in the Special Flood Hazard Area or in a City Designated Floodplain may be damaged by a flood greater than that predicted on the map or from a local drainage problem not shown on the map. This map does not create liability on the part of the City, or any officer or employee thereof, for any damage that results from reliance on this information.
All floodplain boundaries are approximate.
City of Fort Collins GIS
N
W
E
S
0 700 1,400 2,800 4,200 5,600
Feet
Printed: 09/07/2015

Canal Importation Basin

The Canal Importation Drainage Basin spans nearly five square miles in west-central Fort Collins. Three major irrigation canals traverse the basin from north to south and impact drainage in the basin. The canals can intercept runoff traveling through the basin and transport it out of the basin, and they also spill runoff into the basin when their capacity is exceeded.

The basin, which suffered significant property damage in the flood of 1997, is almost completely urbanized with primarily mixed density residential and isolated commercial land uses. Runoff from the basin empties into the Old Town and Spring Creek Basins.

Much development in the basin occurred before the City adopted drainage criteria. The basin's original master plan, prepared in 1980, identified several drainage improvement projects. Many of these projects have been completed or are in the process of being constructed, including the Sheldon Lake and City Park Nine Detention Ponds, Canal Importation Channel, Fairbrooke Detention Pond, Rodeo Detention Pond, Willow Lane Channel, Plum Street Regional Detention Pond and a spill structure and outlet pipe at Prospect Road. Other improvements include construction of the Fairbrooke Channel, enlargement of the Avery Park Detention Pond, widening of Clearview Channel and construction of Hughes Stadium Detention Pond.

Basin Problems - Flooding potential in the basin continues to be widespread, due to significant loss of natural drainage channels and uncontrolled spilling of storm runoff from the canals. A 100-year storm event would result in more than 700 structures being flooded with total damages estimated at $25.6 million. If nothing is done to mitigate this damage, it is estimated that $125 million of direct flood damage would occur over the next 50 years.

During a 100-year storm, there is significant street and neighborhood flooding, severely impeding traffic and placing citizens and emergency responders at risk.

- Taft Hill Road would be overtopped at five locations;
- Shields Street, Prospect Road and Overland Trail would be overtopped at several locations;
- Significant street flooding would occur along West Elizabeth, West Mulberry, Mountain and Oak Streets;
- Many other collector and local streets would be flooded or overtopped; and
- Entire neighborhoods could be flooded.

Summary of 10-Year and 100-Year Flow Depths Along Major Streets for Developed Conditions with Existing Facilities

Street	Reach	Street Flow Depth (ft)[a]	
		10-Year	100-Year
Mountain Avenue	Shields Street to Roosevelt Avenue	0.9 - 1.4	1.5 - 2.0
	West of Roosevelt Avenue	0.7 - 1.7	1.1 - 2.1
Mulberry Street	Taft Hill to Briarwood Road	0.9 - 1.0	1.4 – 1.6
Elizabeth Street	Shields Street to City Park Avenue	0.9 - 4.1	1.9 - 5.2
	City Park Avenue to NMD	0.7 - 1.3	1.2 - 2.2

[a] Relative to the gutter flowline

Summary of 10-Year and 100-Year Flow Depths Crossing Major Streets for Developed Conditions with Existing Facilities

Location	Street Overtopping Depth (ft)[a]	
	10-Year	100-Year
Shields Street, at Mountain Avenue	0.4	0.9
Taft Hill Road, at Mulberry Street	0.5	0.8
Skyline Drive, at Plum Street	0.6	1.2
Taft Hill Road, between Orchard Place and Plum Street	2.3	3.7
Ponderosa Drive, between Orchard Place and Plum Street	0.5	1.1
Shields Street, at Elizabeth Street	0.7	1.6
City Park Avenue, at Elizabeth Street	1.3	2.2
Castlerock Drive, between Clearview Avenue and Oakwood Drive	0.7	1.1
Taft Hill Road, between Clearview Avenue and Springfield Drive	---	2.4
Ponderosa Drive, South of Clearview Avenue	1.2	3.0
Taft Hill Road, between Prospect Road and Suffolk Street	0.6	1.1
Hampshire Road, between Cedarwood Drive and Suffolk Street	---	0.9
Langshire Drive, North of White Rock Court	---	0.7
Taft Hill Road, at Manchester Drive	0.1	0.8

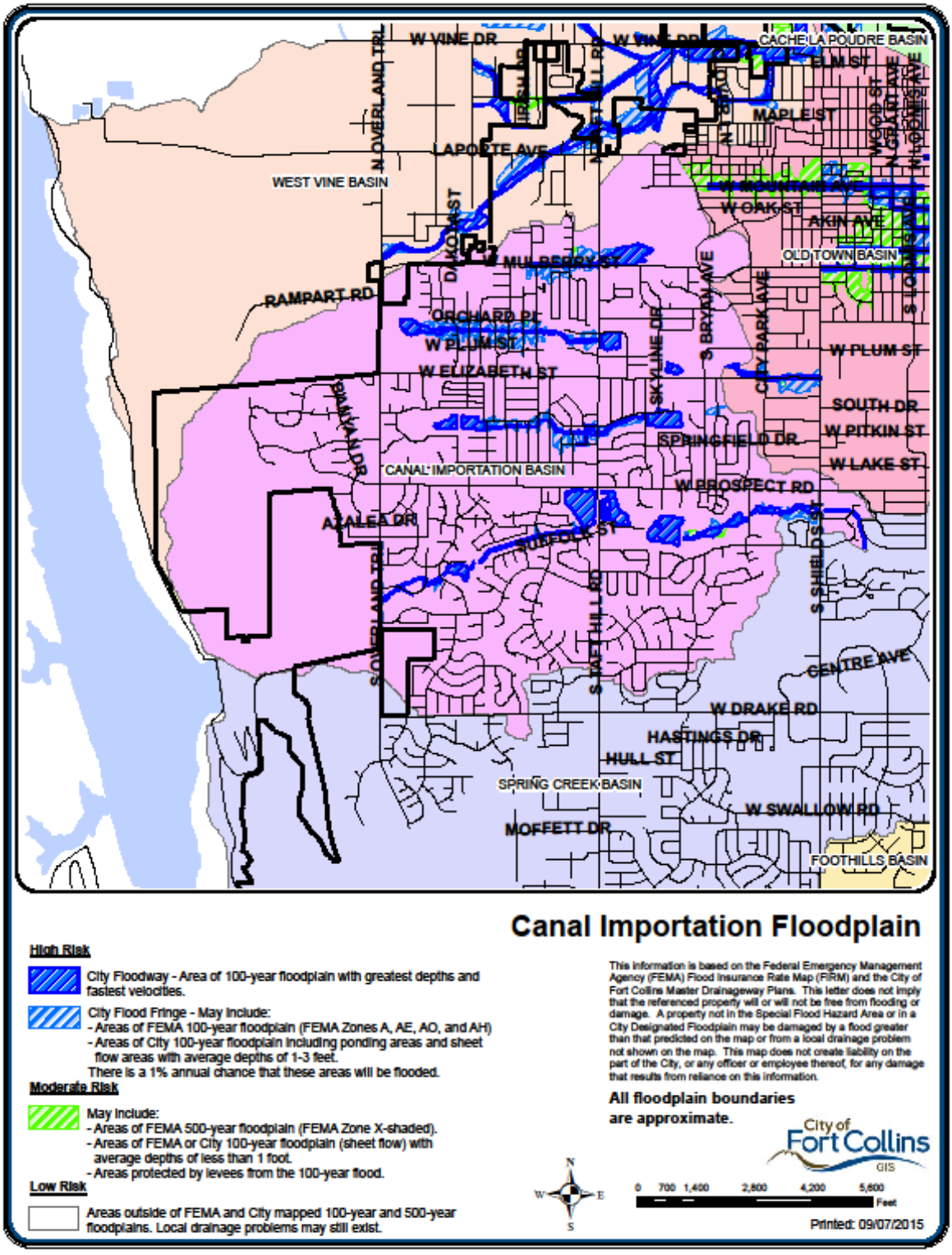
[a] Relative to the crown of the street

Critical Facilities – There are several critical facilities in the Canal Importation 100-year floodplain:

- Children's House Montessori School, 113 N. Shields Street;
- CSU Moby Arena, 1951 W. Plum Street
- two gas stations located at 501 S. Taft Hill Road and 1015 S. Shields Street

In addition to the facilities which would be directly impacted by flood flows, emergency access would be compromised for two public schools, Moore Elementary at 1905 Orchard Place, and Blevins Junior High School at 2101 S. Taft Hill Road. In the event that flooding occurs across the northern half of the basin, access to Moore Elementary School would be severely compromised due to: (a) overtopping of Taft Hill

Road both at Mulberry Street and south of Orchard Place; (b) overtopping of Skyline Drive at Plum Street; and (c) flooding of Mulberry Street east of Taft Hill Road. Access to Blevins Junior High School would not be as severely limited, but would be compromised due to overtopping of Taft Hill Road both south of Prospect Road and at Manchester Drive.



Old Town Basin

The Old Town Drainage Basin is located in north-central Fort Collins. The basin has a drainage area of approximately 2,120 acres, including approximately 400 acres of the Colorado State University campus. The entire basin is urbanized, with some development occurring in the late 1800s.

In general, the basin drains from west to east. The Old Town Basin receives some runoff water from the Canal Importation Basin directly west of Old Town. Most of the water from Old Town drains to the Poudre River, just to the east.

Three major capital projects were completed in Old Town since the 1997 flood: the Howes Street Outfall, the Locust Street Outfall and the Oak Street Outfall. These projects significantly reduced flooding problems in the basin, and they removed more than 700 properties from the mapped floodplain. However, in general the projects did not reduce flooding west of Mason Street. Many properties remain in the floodplain.

Basin Problems - Basin flooding results primarily from encroachment and urbanization of natural drainage corridors, none of which are visible today. Instead, the streets become stream channels. When the streets and the undersized storm sewer system cannot contain the flow, water spills out of the street and floods homes and businesses. Flooding in the Old Town Basin occurs regularly.

The remapping of the floodplain identified several areas of flood hazard within the basin. During a 100-year storm, approximately 624 structures would be damaged and nearly 50 street intersections would be flooded. This would result in an estimated $35 million in damages. If nothing is done to mitigate this damage, it is estimated that $97.5 million of damage would occur over the next 50 years.

Summary of Hydraulic Data at Cross Streets

Cross Street	100-Year WSEL (ft, NGVD)	Flow Depth (fps)			Flow Velocity (fps)		
		2-Year	10-Year	100-Year	2-Year	10-Year	100-Year
Flow Path: Myrtle Street							
Mason St	4994.5	1.0	1.4	1.8	3.6	4.3	5.3
College Ave	4992.3	0.4	0.7	1.4	3.2	3.6	3.8
Remington St	4990.1	0.9	1.2	1.9	4.9	5.1	7.8
Mathews St	4988.1	0.9	1.2	2.1	3.4	3.8	6.5
Peterson St	4985.8	0.6	0.8	1.6	2.7	3.5	6.2
Flow Path: Mulberry Street							
Wayne St	5023.1	0.9	1.2	1.9	4.1	5.2	7.4
Gordon St	5021.0	0.7	0.9	1.4	4.7	5.4	7.4
Washington Ave	5015.2	0.7	0.9	1.3	6.0	7.0	8.6
Grant Ave	5009.4	0.7	1.0	1.5	4.5	4.9	6.3
Loomis Ave	5006.6	0.8	1.1	1.6	3.5	3.9	5.4
Whitcomb St	5003.6	0.6	0.9	1.2	2.7	3.2	4.9
Canyon Ave	5002.4	0.9	1.0	1.2	2.1	2.2	2.4
Sherwood St	4999.0	0.6	0.7	0.8	3.6	4.0	5.6
Meldrum St	4997.1	1.2	1.5	1.9	3.5	3.6	4.4
Howes St	4994.2	1.4	2.0	2.2	2.0	3.1	3.2
Mason St	4993.3	0.1	0.6	1.3	1.7	3.2	5.1
College Ave	4992.3	n/a	n/a	n/a	n/a	n/a	n/a
Flow Path: Magnolia Street							
Gordon St	5018.2	1.0	1.3	2.2	3.9	4.3	6.3
Washington Ave	5015.9	1.0	1.4	2.2	6.3	6.1	7.5
Grant Ave	5009.9	1.1	1.4	2.1	5.8	7.3	9.9
Loomis Ave	5006.3	1.1	1.5	2.2	7.4	7.3	9.2
Whitcomb St	5002.6	1.1	1.6	2.4	3.5	4.7	7.2
Canyon Ave	5000.3	1.5	2.2	2.8	0.0	0.3	1.2
Meldrum St	4997.3	0.5	1.9	3.1	2.1	4.9	8.2
Howes St	4995.9	1.2	1.6	2.9	0.1	3.7	7.0
Mason St	4993.3	0.1	0.6	1.3	1.9	3.3	5.1
College Ave	4992.3	n/a	n/a	n/a	n/a	n/a	n/a
Flow Path: Olive Street							
Loomis Ave	5003.3	1.1	1.4	2.1	3.3	4.3	6.2
Whitcomb St	5001.1	1.4	1.8	2.9	3.5	2.8	6.5
Canyon Ave	5000.3	n/a	n/a	n/a	n/a	n/a	n/a
Howes St	4997.2	0.4	0.6	1.2	0.5	1.3	5.6
Mason St	4993.3	0.1	0.6	1.3	1.9	3.1	5.1
College Ave	4492.3	n/a	n/a	n/a	n/a	n/a	n/a
Flow Path: Oak Street							
Grant Ave	5007.6	1.3	1.7	2.8	4.3	4.4	6.5
Loomis Ave	5004.6	0.9	1.2	2.1	2.9	3.4	8.9
Whitcomb St	5002.2	0.9	1.2	1.8	2.1	2.7	4.0
Flow Path: Mountain Avenue							
Washington Ave	5011.6	0.5	0.8	1.5	4.1	5.8	8.5
Grant Ave	5009.4	0.8	1.1	1.8	8.0	6.5	8.7
Loomis Ave	5007.0	0.7	1.1	1.7	1.7	5.1	6.9
Flow Path: Laporte Avenue							

Cross Street	100-Year WSEL (ft, NGVD)	Flow Depth (fps)			Flow Velocity (fps)		
		2-Year	10-Year	100-Year	2-Year	10-Year	100-Year
Whitcomb St	5003.2	0.8	1.0	1.3	5.6	6.9	7.2
Sherwood St	4992.7	0.7	0.9	1.2	3.8	4.8	6.6
Meldrum St	4987.7	0.9	1.2	1.7	3.6	4.3	6.1
Howes St	4984.3	0.4	0.6	1.3	1.6	1.9	2.0
Flow Path: Maple Street							
Sherwood St	4990.8	0.9	1.2	1.6	3.1	3.7	5.1
Meldrum St	4988.8	0.9	1.1	1.5	3.3	3.7	5.7
Howes St	4984.8	0.1	0.1	0.2	1.3	1.3	2.2

Summary of Hydraulic Data for Flow Along Streets

Description	Average Flow Depth (ft)		Average Flow Velocity (fps)	
	10-Year	100-Year	10-Year	100-Year
Flow Path: Myrtle Street				
College to Remington	1.2	2.0	5.7	7.4
Remington to Mathews	1.2	2.0	3.8	6.5
Mathews to Peterson	1.0	1.8	3.0	5.7
Flow Path: Mulberry Street				
Shields to Wayne	1.4	2.0	5.6	8.2
Flow Path: Magnolia Street				
Wayne to Gordon	1.6	2.4	4.7	6.1
Gordon to Washington	1.4	2.1	4.6	6.4
Washington to Grant	1.3	2.0	6.8	8.9
Grant to Loomis	1.2	1.9	5.3	7.4
Loomis to Whitcomb	1.6	2.3	5.5	7.8
Whitcomb to Canyon	2.1	2.7	2.6	5.4
Canyon to Meldrum	1.6	2.7	4.1	7.9
Meldrum to Howes	1.6	2.9	4.3	7.5
Howes to Mason	1.4	2.5	4.0	8.2
Flow Path: Mason Street				
Olive to Oak	0.7	1.4	3.2	6. 4
Flow Path: Olive Street				
Loomis to Whitcomb	1.3	2.2	4.1	6.4
Whitcomb to Sherwood	1.8	2.5	2.2	5.8
Mason to College	1.1	1.7	3.7	6.6
Flow Path: Loomis Street				
Oak to Olive	1.5	2.4	2.9	4.9
Flow Path: Oak Street				
Grant to Loomis	1.3	2.1	4.5	7.0
Flow Path: Grant Street				
Mountain to Oak	1.4	2.5	2.5	4.2
Flow Path: Mountain Avenue				
Shields to Mack	1.1	1.8	5.2	8.1

Description	Average Flow Depth (ft)		Average Flow Velocity (fps)	
	10-Year	100-Year	10-Year	100-Year
Mack to Washington	1.1	1.8	5.3	8.1
Washington to Grant	1.0	1.7	4.2	6.3
Flow Path: Laporte Avenue				
Meldrum to Howes	1.2	1.7	5.1	7.2
East of Howes	0.9	1.4	5.6	7.8

Critical Facilities – there are several critical facilities in the Old Town 100-year floodplain:

- Theresa Jekel Family Child Care, 100 N Grant;
- Larimer County Mental Health Center, 525 W. Oak St (also addressed 214 S. Whitcomb);
- Qwest Relay/Switching Center, NE corner of Mason and Magnolia; and
- Four gas stations, 429 S. Mason, 816 E. Mulberry, 1032 W. Mountain, and 803 Riverside

As well as two critical facilities in the Old Town 500-year floodplain:

- Centennial High School; 300 E. Laurel;
- Children's House, 113 N. Shields;

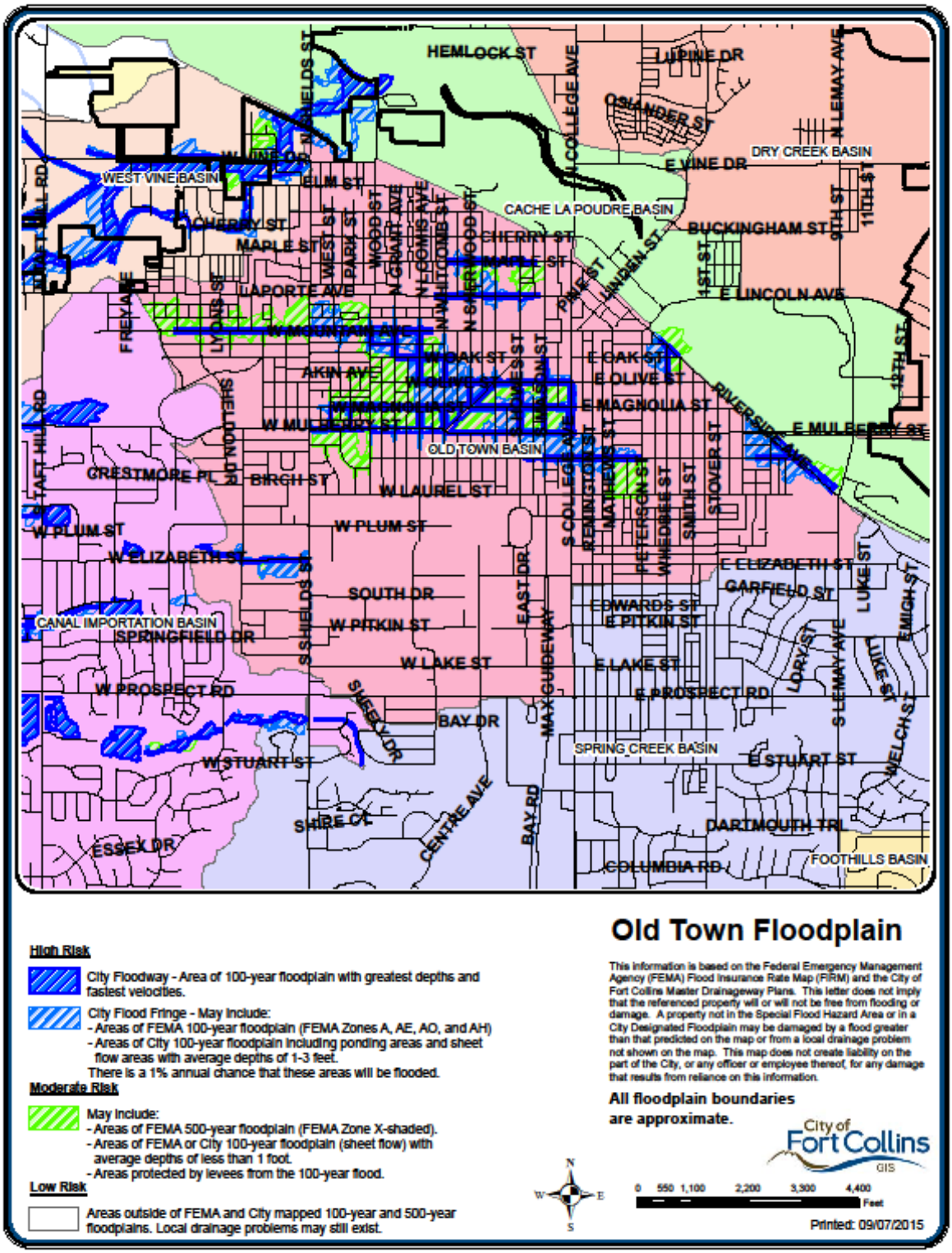
In addition to the critical facilities directly in the 100-year floodplain, two more would be islands completely surrounded by floodwaters without street access; these facilities are:

- Dunn Elementary School, 501 S. Washington; and
- The Fort Collins Police Department, 300 Laporte Avenue.

Emergency response throughout much of the basin, particularly in the portion of the basin east of Shields Street, west of Peterson Street, south of Cherry Street and north of Laurel Street, may be compromised due to widespread street flooding throughout that area. Fortunately, Poudre Fire Authority (PFA) Fire Stations #1 and #2 are located east and west of the primary flooding area defined for this study, respectively. However, PFA Fire Station #2 at 415 South Bryan Avenue is located in the 100-year floodplain along Mulberry Street defined as part of the Canal Importation Basin Master Drainage Plan.

In addition to the critical facilities that would be directly impacted or surrounded by major flood flows within the Old Town Basin, as defined herein, the following 19 critical facilities were identified within the Old Town Basin:

- Beebe Christian School, 821 W. Lake;
- Children's Workshop Early Learning Center, 635 S. Grant;
- First United Methodist Pre-School, 100 S. Stover;
- Fullana Elementary School, 200 N. Grant;
- Harris Elementary School, 501 E. Elizabeth;
- Open Arms Christian Preschool, 305 E. Elizabeth;
- PFA Fire Station #1, 505 Peterson;
- Plymouth Children's Center, 916 W. Prospect;
- St. Joseph's Catholic School, 127 N. Howes;
- United Day Care Center, 424 Pine;
- Young People's Learning Center (two), 209 E. Plum and 405 Mathews; and
- Seven gas stations.



Old Town Floodplain

High Risk

City Floodway - Area of 100-year floodplain with greatest depths and fastest velocities.

City Flood Fringe - May include:
- Areas of FEMA 100-year floodplain (FEMA Zones A, AE, AO, and AH)
- Areas of City 100-year floodplain including ponding areas and sheet flow areas with average depths of 1-3 feet.

There is a 1% annual chance that these areas will be flooded.

Moderate Risk

May include:
- Areas of FEMA 500-year floodplain (FEMA Zone X-shaded).
- Areas of FEMA or City 100-year floodplain (sheet flow) with average depths of less than 1 foot.
- Areas protected by levees from the 100-year flood.

Low Risk

Areas outside of FEMA and City mapped 100-year and 500-year floodplains. Local drainage problems may still exist.

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All floodplain boundaries are approximate.

City of Fort Collins GIS

N W E S

0 550 1,100 2,200 3,300 4,400 Feet

Printed: 09/07/2015

Spring Creek

Spring Creek is a major watercourse that flows from Spring Canyon Dam at Horsetooth Reservoir to its confluence with the Poudre River. The Spring Creek Drainage Basin encompasses nearly nine square miles in central Fort Collins. The basin is dominated by residential development, but it also includes open space, parks and isolated areas of commercial and industrial development.

The city's worst natural disaster occurred on July 28, 1997, when Spring Creek flooded following 14.5 inches of rainfall in 31 hours. Five residents lost their lives, a building exploded, a train derailed and 400 people were rescued from the floodwaters. Across the city, more than $200 million in damages were attributed to the storm. The impact of the storm would have been far worse if the City had not invested more than $5 million in stormwater improvements in the basin in the early 1990s. These included improvements to channels and bridges, reinforcement of the Burlington Northern railroad embankment, and acquisition and relocation of structures in high hazard areas (30 mobile homes, nine houses, one business and one retirement home).

Spring Creek is a FEMA-designated floodplain and is subject to the City's floodplain regulations. The new mapping also includes areas beyond the FEMA floodplain which are considered to be in a City-designated floodplain.

Basin Problems - The master plan update identified 178 structures, eight roads and the Burlington Northern railroad that would be damaged during a 100-year storm with an estimated $8.78 million in damages. If nothing is done to mitigate this damage, it is estimated that $12.25 million of damage would occur over the next 50 years.

Summary of Hydraulic Data at Stream Crossings

Location	Structure Type	Structure Size	Structure Capacity	100-Year Channel Velocity (fps)[a]	100-Year WSEL (ft, NGVD)[b]	Roadway Overtopping Depth (ft)		
						2-Year	10-Year	100-Year
Along Spring Creek								
Prospect Road	Three span bridge	Total width = 95'	100-YR	7.2	4907.3	0.0	0.0	0.0
Timberline Road	Two span bridge	Total width = 84'	100-YR	9.3	4910.7	0.0	0.0	0.0
C&SRR	Single RCB	9'4"H x 13'10"W	< 100-YR	10.2	4919.4	0.0	0.0	0.0
Riverside Avenue	Single span bridge	Total width = 37'	10-YR	9.6	4923.9	0.0	0.0	3.7
Welch Street	Single span bridge	Total width = 30'	< 100-YR	15.7	4936.1	0.0	0.0	0.0
Lemay Avenue	Three span bridge	Total width = 92'	100-YR	12.0	4944.4	0.0	0.0	0.0
Stover Street	Single span bridge	Total width = 52'	< 100-YR	7.8	4962.1	0.0	0.0	0.0
Stuart Street	Two span bridge	Total width = 55'	< 100-YR	6.0	4967.9	0.0	0.0	0.0
Remington Street	Single span bridge	Total width = 30'	10-YR	8.7	4978.8	0.0	0.0	0.0
College Avenue	Single span bridge	Total width = 32'	100-YR	11.0	4981.3	0.0	0.0	0.0
BNRR	Three RCP's; one arch CMP	RCP Dia. = 7'; Arch CMP = 9.0'H x 9.2'W	< 100-YR	8.2	4995.0	0.0	0.0	0.0
Centre Avenue	Two RCB's	North RCB = 11.6'H x 20.2'W, South RCB = 9.0'H x 18.4'W	< 100-YR	0.8	4995.2	0.0	0.0	0.0
Shields Street	Four span bridge	Total width = 54'	100-YR	6.0	5014.9	0.0	0.0	0.0
Drake Road	Two span bridge	Total width = 48'	100-YR	9.5	5052.5	0.0	0.0	0.0
Taft Hill Road	Single RCB	6.0'H x 10.7'W	100-YR	8.7	5084.6	0.0	0.0	0.0
7.1.4.2 Other Areas								
Timberline Road at the C&SRR		n/a	n/a	n/a	4916.8	0.0	0.0	0.7
Shields Street at Shire Court		n/a	n/a	n/a	Varies	0.0	0.0	0.5
Dixon Creek at Drake Road		18" RCP	2-yr	9.9	5136.5	0.0	0.1	0.5
Dixon Creek at Overland Trail		18" ADS/CMP	2-yr	9.4	5149.6	0.0	0.4	1.0

[a] Downstream of Structure

[b] Upstream of Structure

Summary of Detention Pond Operating Parameters

Detention Pond	SWMM ID	Approximate location	100-Year Event Operating Parameters					
			Normal Outlet Discharge (cfs)	Overtopping Discharge (cfs)	Total Release (cfs)	Emergency Spillway/Flow Depth (ft)	Active Storage Volume (ac-ft)	Ponded Water Surface Elevation (ft, NGVD)
Veterinary Teaching Hospital (VTH) Pond	50	NW corner of Drake Road and Bay Road	512	0	512	0.0	21.0	5023.6
Woodwest Pond	51	South of Drake Road/ NMD Intersection	269	268	537	0.4	16.0	5042.0
Rossborough Park Pond	103	NE corner of Dunbar Ave. and Casa Grande Blvd.	51	0	51	0.0	23.6	5089.3
Silver Oaks P.U.D. Pond	108	NW corner of Bronson St. and Taft Hill Road	11	77	88	0.2	6.6	5122.7
Conceptual Sub-basin 9 Pond	109	NW corner of Taft Hill Road and Horsetooth Road	1.7	0	1.7	N/A	1.3	N/A (future pond)
Springfield East Ponds	112	Between Dalton Dr. and Horsetooth Road	6	15	21	0.2	3.0	N/A (combination of two existing ponds)
Avocet Road Pond	282	Along Avocet Road east of Meadowlark Ave.	37	36	73	0.5	5.0	5033.4
Conceptual Centre for Advanced Technology (CAT) Ponds	287	SW corner of Worthington Circle and Centre Ave.	11	35	46	N/A	11.5	N/A (combination of seven future ponds)
Conceptual north CAT Pond	288	NW corner of LCC No. 2 and Centre Ave.	2.7	0	2.7	N/A	4.6	N/A (future pond)
Conceptual east CAT Pond	289	NE corner of LCC No. 2 and Centre Ave.	4.5	0	4.5	N/A	6.6	N/A (future pond)
Burlington Northern Railroad (BNRR) Pond	303	BNRR embankment SW of Prospect Road and College Ave.	1975	0	1975	N/A	340.9	4995.0
Taft Hill Road Pond	304	SW corner of Drake Road and Taft Hill Road	843	0	843	N/A	83.3	5084.6
Conceptual Sub-basin 100 Pond	318	South of Spring Creek near Swallow Road	11.4	0	11.4	N/A	8.5	N/A (future pond)
Raintree Townhomes P.U.D. Ponds	333	NW corner of Drake Road and Shields St.	6.4	0	6.4	0.0	5.0	N/A (combination of two existing ponds)
Preserve P.U.D. Ponds	334	Immediately west of Raintree Townhomes P.U.D. Pond	6.1	0	6.1	0.0	4.9	N/A (combination of three existing ponds)
Kensington South Pond	336	SE corner of Dunbar Ave. and Drake Road	65	87	152	0.5	4.4	5052.8

Detention Pond	SWMM ID	Approximate location	100-Year Event Operating Parameters					
			Normal Outlet Discharge (cfs)	Overtopping Discharge (cfs)	Total Release (cfs)	Emergency Spillway/Flow Depth (ft)	Active Storage Volume (ac-ft)	Ponded Water Surface Elevation (ft, NGVD)
Dixon Reservoir	340	West of Drake Road and Overland Trail	110	0	110	0.0	72.0	5200.3
Springfield Pond	349	SW corner of Platte Dr. and Horsetooth Road	6	50	56	0.9	8.2	5142.1
Quail Hollow First Filing Pond	357	SE of Drake Road and Overland Trail	19	247	266	1.4	8.7	5115.4
Quail Hollow Third Filing Pond	358	South of Drake Road and Overland Trail	1	125	126	1.7	3.5	5125.7
Fox Creek P.U.D. West Pond	360	Between McKeag Drive and PV&L Canal	7	22	29	0.4	2.5	5109.9
Fox Creek P.U.D. East Pond	361	NE of Moore Lane and PV&L Canal	0.5	1.8	2.3	0.1	0.7	5109.3

Summary of Detention Pond Operating Parameters (Continued)

Detention Pond	SWMM ID	Approximate location	100-Year Event Operating Parameters					
			Normal Outlet Discharge (cfs)	Overtopping Discharge (cfs)	Total Release (cfs)	Emergency Spillway/Flow Depth (ft)	Active Storage Volume (ac-ft)	Ponded Water Surface Elevation (ft, NGVD)
Conceptual Sub-basin 62 Pond	362	NE of Research Blvd. and Drake Road	1.5	0	1.5	N/A	1.4	N/A (future pond)
CAT 18th and 19th Filing Ponds	363	NW corner of Worthington Circle and Drake Road	4.8	0	4.8	0.0	4.4	N/A (combination of seven existing ponds)
CAT Sub-basin 64 Pond	364	NW corner of Research Blvd. and Drake Road	7.5	0	7.5	N/A	3.5	N/A (future pond)
Kingston Woods P.U.D. Pond	370	NW of Horsetooth Road and Shields St.	3	25	28	0.1	1.7	5091.6
Chaparral P.U.D. Pond	371	SW corner of Shields St. and Casa Grande Blvd.	21	85	106	0.6	4.4	5079.1
Wagon Wheel P.U.D. Pond	372	SW corner of Shields St. and Swallow Road	19	59	78	0.1	13.8	5073.5
Rocky Mountain High School Ponds	373	NW corner of Shields St. and Swallow Road	7	93	100	N/A	5.3	N/A (combination of two existing ponds)

Detention Pond	SWMM ID	Approximate location	100-Year Event Operating Parameters					
			Normal Outlet Discharge (cfs)	Overtopping Discharge (cfs)	Total Release (cfs)	Emergency Spillway/Flow Depth (ft)	Active Storage Volume (ac-ft)	Ponded Water Surface Elevation (ft, NGVD)
Silverplume P.U.D. Ponds	374	West of Rocky Mountain High School	4.2	0	4.2	0.0	1.7	N/A (combination of four existing ponds)
Drake Road/Shields St. Ponds	380	Intersection of Drake Road and Shields St.	18.6	0	18.6	0.0	1.3	N/A (combination of two existing ponds)
Southeast Timberline Lake Pond	603	NE of Timberline Road and Spring Creek	31	69	100	0.7	22.1	4904.5
Southwest Timberline Lake Pond	604	West of Timberline Road and SE Timberline Lake Pond	115	0	115	0.0	37.6	4907.5
Northwest Timberline Lake Pond	605	West of Timberline Road and north of SW Timberline Lake Pond	0	0	0	N/A	11.9	
C&SRR Pond	610	C&SRR/Spring Creek	2632	0	2632	N/A	73.5	4919.4
Parkwood East Apartments Pond	613	NE corner of Parwood East Apartment Complex and Riverside Ave.	38	0	38	0.0	2.9	4943.5
Stonehenge Ponds	616	SW corner of Stuart St. and Brookwood Dr.	2	95	97	1.1	3.8	N/A (combination of five existing ponds)
Poudre Valley Hospital Ponds	618	East side of PVH campus	9.1	0	9.1	0.0	3.9	N/A (combination of two existing ponds)
Rolland Moore Park Pond	630	North of Drake on west side of Shields	2112	193	2305	0.5	30.1	5023.8
Remington/Lake St. Pond	637	Intersection of Remington St. and Lake St.	3.3	0	3.3	0.0	6.2	4990.6
Parkwood Lake Pond	640	NE corner of Drake Road and Lemay Ave.	4.8	0	4.8	0.0	121.9	4971.7
Mission Hills Ponds	641	SW corner of Lemay Ave. and Columbia Road	4	105	109	0.1	7.5	N/A (combination of two existing ponds)
Scotch Pines Filing No. 7 Ponds	642	SW corner of Drake Road and Lemay Ave.	5.8	0	5.8	0.0	1.9	N/A (combination of two existing ponds)
Cottonwood P.U.D. Pond	646	NW of Drake Road and Lemay Ave.	29	31	60	0.1	4.9	4982.1
Spring Canyon Park Pond	838	Northwest of the dog park off of Horsetooth Road	10.5	712.5	723	1.9	49.2	5118.4

Summary of Detention Pond Overtopping Data

Detention Pond	SWMM ID	Approximate Location	Potential Flooding Scenario	Potential Flooding Scenario if the Normal Outlet is Blocked
Woodwest Pond	51	South of Drake Road/NMD intersection	Major (268 cfs) overtopping into NMD to the east	Additional (up to 269 cfs) flows spilling into NMD; max. possible discharge = 537 cfs; possible overtopping of left (east) bank of NMD toward houses along Meadowlark Avenue
Silver Oaks P.U.D. Pond	108	NW corner of Bronson St. and Taft Hill Road	Significant (77 cfs) overtopping of Taft Hill Road	Additional (up to 11 cfs) flows overtopping Taft Hill Road; max. possible discharge = 88 cfs
Springfield East Ponds	112	Between Dalton Dr. and Horsetooth Road	Minor (16 cfs) overtopping of pond berm south of Horsetooth Road	Additional (up to 6 cfs) flows overtopping berm south of Horsetooth Road; max. possible discharge = 22 cfs
Avocet Road Pond	282	Along Avocet Road east of Meadowlark Ave.	Minor (36 cfs) overland flows to LCC No. 2 between houses	Additional (up to 37 cfs) overland flows to LCC No. 2; max. possible discharge = 73 cfs; possible overtopping of left (east) bank of LCC No. 2 toward Redwing Office Park and potential ponding along Avocet Road
Burlington Northern Railroad (BNRR) Pond	303	BNRR embankment SW of Prospect Road and College Ave.	Potential for overtopping in storms larger than 100-year design storm. Minimal (if any) overtopping during 100-year storm.	Significant (up to 1975 cfs) overtopping may occur if outlets become plugged.
Kensington South Pond	336	SE corner of Dunbar Ave. and Drake Road	Significant (87 cfs) overtopping of Drake Road	Additional (up to 65 cfs) flows overtopping Drake Road; max. possible discharge = 152 cfs
Springfield Pond	349	SW corner of Platte Dr. and Horsetooth Road	Significant (50 cfs) overtopping of Horsetooth Road	Additional (up to 6 cfs) flows overtopping Horsetooth Road; max. possible discharge = 56 cfs
Quail Hollow First Filing Pond	357	SE of Drake Road and Overland Trail	Major (247 cfs) flows through emergency spillway to Dixon Creek	Additional (up to 19 cfs) flows using emergency spillway; max. possible discharge = 266 cfs
Quail Hollow Third Filing Pond	358	South of Drake Road and Overland Trail	Major (125 cfs) flows through emergency spillway	Additional (up to 1 cfs) flows using emergency spillway; max. possible discharge = 126 cfs
Fox Creek P.U.D. West Pond	360	Between McKeag Drive and PV&L Canal	Minor (22 cfs) flows through emergency spillway to Dixon Creek	Additional (up to 7 cfs) flows using emergency spillway; max. possible discharge = 29 cfs
Fox Creek P.U.D. East Pond	361	NE of Moore Lane and PV&L Canal	Minor (1.8 cfs) flows through emergency spillway into PV&L Canal	Additional (up to 0.5 cfs) flows using emergency spillway into PV&L Canal; max. possible discharge = 2.3 cfs

Detention Pond	SWMM ID	Approximate Location	Potential Flooding Scenario	Potential Flooding Scenario if the Normal Outlet is Blocked
Kingston Woods P.U.D. Pond	370	NW of Horsetooth Road and Shields St.	Minor (25 cfs) flows overtopping berm to the north (between Kingston Woods and Casa Grande P.U.D.'s)	Additional (up to 3 cfs) flows overtopping berm; max. possible discharge = 28 cfs

Summary of Detention Pond Overtopping Data (Continued)

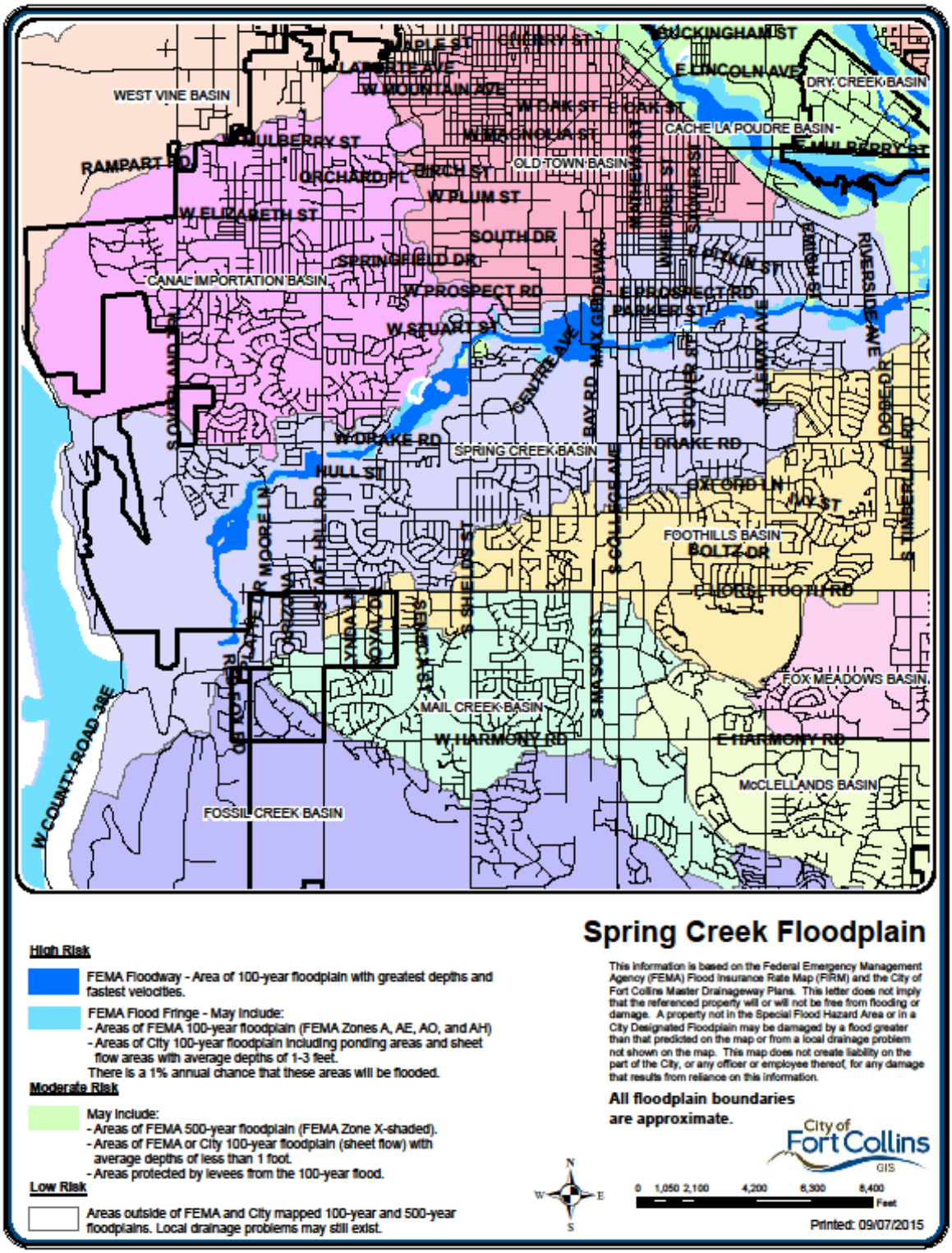
Detention Pond	SWMM ID	Approximate Location	Potential Flooding Scenario	Potential Flooding Scenario if the Normal Outlet is Blocked
Chaparral P.U.D. Pond	371	SW corner of Shields St. and Casa Grande Blvd.	Significant (85 cfs) overtopping of Shields Street	Additional (up to 21 cfs) flows overtopping Shields Street; max. possible discharge = 106 cfs
Wagon Wheel P.U.D. Pond	372	SW corner of Shields St. and Swallow Road	Significant (59 cfs) overtopping of Shields Street	Additional (up to 19 cfs) flows overtopping Shields Street; max. possible discharge = 78 cfs
Rocky Mountain High School Ponds	373	NW corner of Shields St. and Swallow Road	Significant (93 cfs) overland flows along Rocky Mountain Way	Additional (up to 7 cfs) overland flows along Rocky Mountain Way; max. possible discharge = 100 cfs
Southeast Timberline Lake Pond	603	NE of Timberline Road and Spring Creek	Significant (69 cfs) overtopping of berm to the east toward Spring Creek	Additional (up to 31 cfs) overtopping of berm to the east toward Spring Creek; max. possible discharge = 100 cfs
Stonehenge Ponds	616	SW corner of Stuart St. and Brookwood Dr.	Significant (95 cfs) overtopping of Stuart Street	Additional (up to 2 cfs) overtopping of Stuart Street, max. possible discharge = 97 cfs
Remington/Lake St. Pond	637	Intersection of Remington St. and Lake St.	Up to 3.2' of ponding at Lake and Remington Street intersection	Additional ponding at Lake and Remington Street intersection
Mission Hills Ponds	641	SW corner of Lemay Ave. and Columbia Road	Major (105 cfs) overtopping of Lemay Ave.	Additional (up to 4 cfs) overtopping of Lemay Ave.; max. possible discharge = 109 cfs
Cottonwood P.U.D. Pond	646	NW of Drake Road and Lemay Ave.	Minor (31 cfs) overtopping of berm to east toward Woodward Governor site	Additional (up to 29 cfs) overtopping of berm to the east toward Woodward Governor site; max. possible discharge = 60 cfs
Spring Canyon Park Pond	303	Northwest of dog park off of Horsetooth Rd.	Overtopping is designed to occur from Spring Creek into pond then back into Spring Creek. No overtopping of streets will occur during normal operation.	Additional (up to 10.5 cfs) overtopping back into Spring Creek; max possible discharge = 723 cfs

Critical Facilities – There are two critical facilities are located in the Spring Creek 100-year floodplain:

- Spring Creek Country Day School, 1900 Remington St;
- Mountain Center Pre-School Day Camp, 419 E Stuart St;
- Orthopaedic Center of the Rockies, 2500 E Prospect Rd.

Emergency response in the eastern portion of the basin may be compromised due to direct flood impacts to Fire Station No. 3, and reduced access due to the overtopping of Remington Street, Stuart Street, Stover Street, Welch Avenue, Riverside Avenue, and Timberline Road. In addition to the critical facilities that would be directly impacted by flood flows along Spring Creek, the following facilities were identified within the Spring Creek basin:

- Poudre Fire Authority Station No. 3, 2000 Mathews St;
- Poudre River Power Authority Timberline Substation, 2000 E Horsetooth Rd; and
- Poudre Fire Authority Station No. 4, 1945 W Drake Rd;
- Platte River Power Authority Dixon Creek Substation, Drake Rd and Overland Trail;
- City of Fort Collins Drake Substation, Drake/McClelland, NW corner;
- Mountain Sage Charter School, 2310 E. Prospect Rd;
- Poudre Online Academy/Barton School, 703 E. Prospect Rd;
- Sunshine School, 906 E. Stuart St;
- Spring Creek Health Care Center, 1000 E. Stuart St



Spring Creek Floodplain

High Risk

FEMA Floodway - Area of 100-year floodplain with greatest depths and fastest velocities.

FEMA Flood Fringe - May include:
- Areas of FEMA 100-year floodplain (FEMA Zones A, AE, AO, and AH)
- Areas of City 100-year floodplain including ponding areas and sheet flow areas with average depths of 1-3 feet.

There is a 1% annual chance that these areas will be flooded.

Moderate Risk

May include:
- Areas of FEMA 500-year floodplain (FEMA Zone X-shaded).
- Areas of FEMA or City 100-year floodplain (sheet flow) with average depths of less than 1 foot.
- Areas protected by levees from the 100-year flood.

Low Risk

Areas outside of FEMA and City mapped 100-year and 500-year floodplains. Local drainage problems may still exist.

This information is based on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) and the City of Fort Collins Master Drainageway Plans. This letter does not imply that the referenced property will or will not be free from flooding or damage. A property not in the Special Flood Hazard Area or in a City Designated Floodplain may be damaged by a flood greater than that predicted on the map or from a local drainage problem not shown on the map. This map does not create liability on the part of the City, or any officer or employee thereof, for any damage that results from reliance on this information.

All floodplain boundaries are approximate.

City of Fort Collins GIS

Printed: 09/07/2015

Foothills Basin

The Foothills Basin is centrally located in Fort Collins. It covers about 3,200 acres generally between Taft Hill and Ziegler Roads and between Horsetooth and Drake Roads. The basin is mostly developed, with commercial development along College Avenue and mixed-use residential in the remainder.

The basin drains from west to east through open channels or the storm sewer system to the Fossil Creek Reservoir Inlet Ditch. Three irrigation canals intercept stormwater to transport it out of the basin, but runoff spills into the basin when canal capacity is exceeded.

Drainage between Taft Hill Road and the Foothills Fashion Mall is characterized by street and storm sewer flow with some grass-lined channels and detention ponds. The main channel begins downstream of Stanford Road. This channel is generally well-defined with a low base flow. The City of Fort Collins constructed a regional channel east of Timberline Road to carry stormwater runoff from the entire Foothills Basin.

Basin Problems - Since the Foothills Basin was developed according to the original 1981 master plan and the Storm Drainage Design Criteria, many of the recommended improvements were completed. Because of this, most of the basin is capable of handling a 100-year storm event. However, some localized flooding problems exist:

- Warren Farms detention pond located at the northwest corner of Horsetooth Road and the Burlington Northern Railroad;
- Nelson Farm detention pond located northwest of the corner of Lochwood Drive and Horsetooth Road;
- Southmoor Village ponds located near Boltz Drive and Lemay Avenue; and
- Oxford Apartment pond located near Oxford Lane and Lemay Avenue.

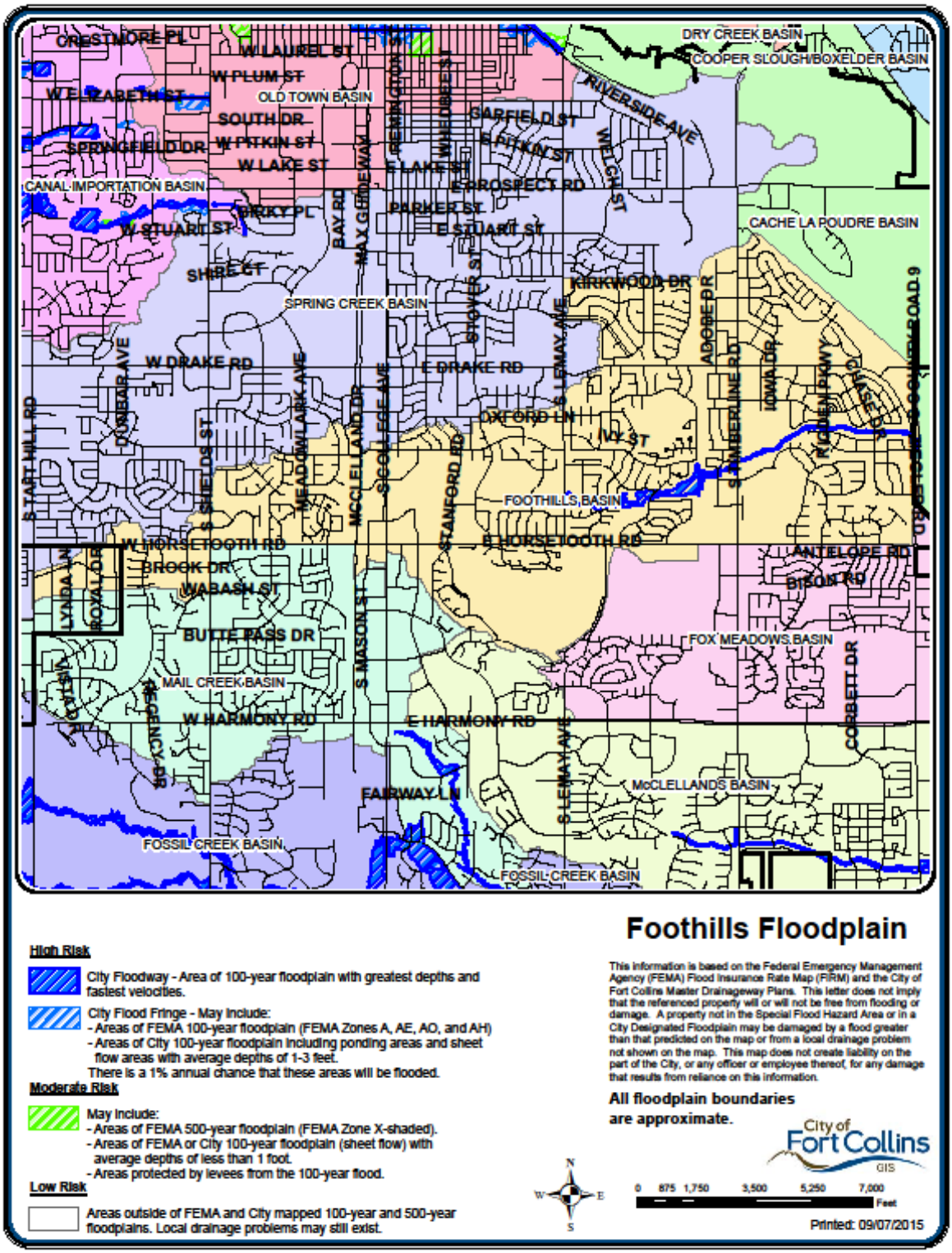
The master plan update estimates there are 21 structures, four roads and one railroad crossing that would be damaged during a 100-year storm, with an estimated $1.5 million in damages. If nothing is done to mitigate this damage, it is estimated that $0.91 million of damage would occur over the next 50 years.

Summary of Roadway Overtopping – Foothills Basin

SWMM Element ID #	D/S Road	Road Classification (*allowable overtopping depth)	Overtopping Elevation	100-year Velocity (ft/s) **	100-year WSEL (Crown overtopping depth – feet)	50-year WSEL (Crown overtopping depth – feet)
Pond 157	Timberline Rd.	Major Arterial (zero inches)	4939.5	0.0 ft/s	4934.96 (0 feet)	4935.1 (0 feet)
Pond 57	Eastbrook e Dr.	Local (18 inches over flowline)	4940.0	3.0 ft/s	4941.22 (1 foot)	4940.5 (0.5 feet)
Pond 56	UPRR	n/a (zero inches)	4953.1	2.2 ft/s	4952.07 (0 feet)	4949.3 (0 feet)
CE 55	Lochwood Dr.	Collector (18 inches over flowline)	4954.0	3.0 ft/s	4955.63 (1.6 feet)	4955.56 (1.6 feet)***
Pond 42	Lemay Ave.	Arterial (6 inches over crown)	4979.5	2.4 ft/s	4980.3 (0.8 feet)	4979.8 (0.3 feet)
Pond 41	Camelot	Local (18 inches over flowline)	4981.0	7.4 ft/s	4983.31 (2.3 feet)	4980.5 (0 feet)

SWMM Element ID #	D/S Road	Road Classification (*allowable overtopping depth)	Overtopping Elevation	100-year Velocity (ft/s) **	100-year WSEL (Crown overtopping depth – feet)	50-year WSEL (Crown overtopping depth – feet)
Pond 15	Meadow-lark Ave.	Collector (18 inches over flowline)	5045.6	1.9 ft/s	5046.3 (0.8 feet)	5043.7 (0 feet)
Pond 44	Lemay Ave.	Arterial (6 inches over crown)	4979.7	0.5 ft/s	4981.7 (2 feet)	4981.3 (1.6 feet)****

*Local & Collector – 18 inches over flowline equates to 1 foot over crown assuming 24-foot width for ½ street and 2% cross-slope.
** Note – Velocities based on Q=AV where A is approximate overtopping area, or results of HEC-RAS.
*** Note – 10-year depth of flow over Lochwood =0.9 feet based on 10-year water surface elevation of 4954.9 from HEC-RAS model Lochwood.prj (cross section #3) in Hydraulics Technical Appendix.
**** Note - 10-year depth of flow over Lemay=0.0 feet based on 10-year water surface elevation of 4979.7 from pond 44 rating curve in Hydrology Technical Appendix.



Foothills Floodplain

High Risk

City Floodway - Area of 100-year floodplain with greatest depths and fastest velocities.

City Flood Fringe - May include:
- Areas of FEMA 100-year floodplain (FEMA Zones A, AE, AO, and AH)
- Areas of City 100-year floodplain including ponding areas and sheet flow areas with average depths of 1-3 feet.

There is a 1% annual chance that these areas will be flooded.

Moderate Risk

May include:
- Areas of FEMA 500-year floodplain (FEMA Zone X-shaded).
- Areas of FEMA or City 100-year floodplain (sheet flow) with average depths of less than 1 foot.
- Areas protected by levees from the 100-year flood.

Low Risk

Areas outside of FEMA and City mapped 100-year and 500-year floodplains. Local drainage problems may still exist.

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All floodplain boundaries are approximate.

City of Fort Collins GIS

N W E S

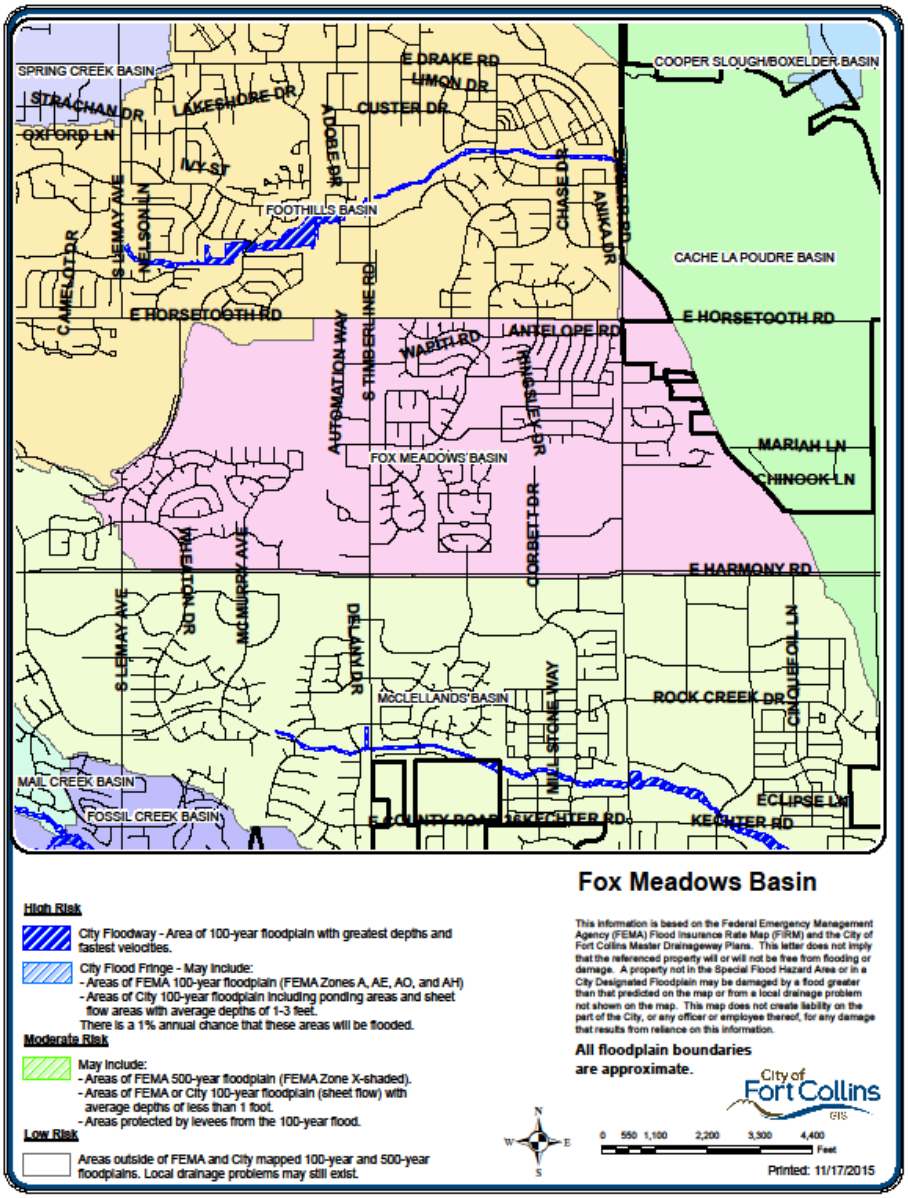
0 875 1,750 3,500 5,250 7,000 Feet

Printed: 09/07/2015

Fox Meadows Basin

The Fox Meadows Basin encompasses approximately 2.4 square miles in southeast Fort Collins. The basin is bound by Horsetooth Road on the north, Lemay Avenue on the west, Harmony Road on the south and the Cache La Poudre River on the east. The basin is primarily developed with residential development, some commercial areas and the Collindale Golf Course. The basin does not include a major drainageway for conveying flows through the basin, so no regulatory floodplain has been mapped. Storm runoff flows through a network of storm sewers, local drainage channels and detention ponds.

Basin Problems - The basin has limited flooding problems because it was developed with the guidance of the Storm Drainage Design Criteria and the original drainage master plan. However, the updated master plan, which includes a higher rainfall standard adopted by City Council in 1999, identified a few potential problems. These include overtopping of existing detention facilities, ponding behind railroad embankments, roadway overtopping and inadequate ditch capacity. The master plan estimates 14 structures would be damaged in a 100-year storm, with $610,000 worth of damage. If nothing is done to mitigate this damage, an estimated $670,000 worth of damage could occur over the next 50 years.


SPRING CREEK BASIN
STRATHAM DR
OXFORD LN
LAKESHORE DR
IVY ST
E DRAKE RD
LIMON DR
CUSTER DR
ADOBE DR
FOOTHILLS BASIN
CHASE DR
ANIKA DR
COOPER SLOUGH/BOXELDER BASIN
CACHE LA POUDRE BASIN
S LEMAY AVE
NELSON LN
CAMELOT DR
E HORSETOOTH RD
AUTOMATION WAY
S TIMBERLINE RD
WAPITI RD
ANTELOPE RD
WHEELER DR
FOX MEADOWS BASIN
MARIAH LN
CHINOOK LN
CORBETT DR
E HARMONY RD
WHELTON DR
MCMURRY AVE
DELANEY DR
McCLELLANDS BASIN
MILLSTONE WAY
ROCK CREEK DR
CINQUEFOIL LN
MAIL CREEK BASIN
FOSSIL CREEK BASIN
E COUNTY ROAD 32
KECHTER RD
ECLIPSE LN
Fox Meadows Basin
High Risk
City Floodway - Area of 100-year floodplain with greatest depths and fastest velocities.
City Flood Fringe - May include:
- Areas of FEMA 100-year floodplain (FEMA Zones A, AE, AO, and AH)
- Areas of City 100-year floodplain including ponding areas and sheet flow areas with average depths of 1-3 feet.
There is a 1% annual chance that these areas will be flooded.
Moderate Risk
May include:
- Areas of FEMA 500-year floodplain (FEMA Zone X-shaded).
- Areas of FEMA or City 100-year floodplain (sheet flow) with average depths of less than 1 foot.
- Areas protected by levees from the 100-year flood.
Low Risk
Areas outside of FEMA and City mapped 100-year and 500-year floodplains. Local drainage problems may still exist.
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All floodplain boundaries are approximate.
City of Fort Collins GIS
N
W
E
S
0 550 1,100 2,200 3,300 4,400
Feet
Printed: 11/17/2015

Inventory of Detention Ponds – Fox Meadows Basin

Location	Outlet Size	Volume Before Overtopping (acre-ft)	Overtopping Elevation (feet)	Discharge at Overtopping Elevation (cfs)	Overtopping					100-yr WSEL (feet)	Roadway / Embankment
					2-Year Overtopping Depth (feet)	5-Year Overtopping Depth (feet)	10-Year Overtopping Depth (feet)	50-Year Overtopping Depth (feet)	100-yr Overtopping Depth (feet)		
HP Site Pond	18" Dia.	11.9	4892.0 ****	22	0.0	0.0	0.0	0.0	0.0	4894.0	Embankment
Woodland Park Regional Detention Pond	12" Dia. Plate	5.5	4881.00	11	0.0	0.0	0.0	0.0	1.1	4882.1	Embankment
Inadvertent Detention at Undeveloped Lots	(2) 18" Dia.	23.1	4927.00	29	0.0	0.0	0.0	0.0	0.0	4927.0	Ziegler Road
LSI Pond	36" Dia.	7.0	4930.00	66	0.0	0.0	0.0	0.0	0.0	4927.3	LSI Entrance Road
English Ranch Pond #7	18"x18" Plate	6.6	4926.80	30	0.0	0.0	0.0	0.0	0.1	4926.9	Embankment
English Ranch Pond #6	24" Dia.	6.0	4927.10	33	0.0	0.0	0.0	0.0	0.0	4924.3	Paddington Road
English Ranch Pond #5	6.5"x7.5" Plate	4.5	4918.50	5	0.0	0.0	0.0	0.2	0.4	4918.9	Ziegler Road
English Ranch Pond #4	6"x7" Plate	3.5	4918.00	4	0.0	0.0	0.1	0.6	1.1	4919.1	Ashmount Drive
English Ranch Pond #3	6" Plate	4.5	4919.00	5	0.0	0.0	0.3	1.0	1.3	4920.3	Embankment
English Ranch Pond #2	6" Plate	1.8	4922.20	5	0.0	0.0	0.3	0.8	0.9	4923.1	Kingsley Drive
Sunstone Village Pond #5	24" Dia.	6.5	4940.10	46	0.0	0.0	0.0	0.2	0.4	4940.5	Embankment
Sunstone Village Regional Detention Pond	30" Dia.	17.0	4934.00	27	0.0	0.1	0.6	0.9	1.1	4935.1	Embankment
Fox Meadows Pond	21" Dia.	5.8	4931.00	30	0.0	0.0	0.0	0.0	0.3	4931.3	Embankment
SunstoneVillage Pond #4	15" Dia.	5.9	4949.26	11	0.0	0.0	0.0	0.3	0.4	4949.7	Embankment
Fox Meadows Apartments Pond	12" Dia. Plate	2.0	4941.10	8	0.0	0.0	0.0	0.0	0.1	4941.2	Embankment
Sunstone Village Pond #3	24" Dia.	6.5	4958.0 ***	34	0.0	0.0	0.0	0.0	0.0	4956.8	Embankment
Timberline Sump	36" Dia.	95.5	4957.50	111	0.0	0.0	0.0	0.0	0.0	4952.4	Timberline Road
Collindale Business Park	24" Dia.	21.6	4948.00	35	0.0	0.0	0.0	0.0	0.0	4946.8	Timberline Road
Golden Meadows Detention Pond	36" Dia.	65.8 *	4962.60	117	0.0	0.0	0.0	0.0	0.0	4961.9	Union Pacific Railroad
Collindale Golf Course Inadvertent Detention	18" Dia.	43.6	4956.5 **	19	0.0	0.0	0.0	0.0	0.0	4954.6	Union Pacific Railroad

* Note: Total pond storage exceeds the actual pond and collects behind the UP Railroad Embankment.

** Note: Above El. 4956.50, overtopping will occur to the North, to the Foothills Basin, before overtopping the UP Railroad to the East.

*** Note: Maximum pond stage exceeds the actual design capacity of the pond. Excess storage occurs in undeveloped area to the south of the pond.

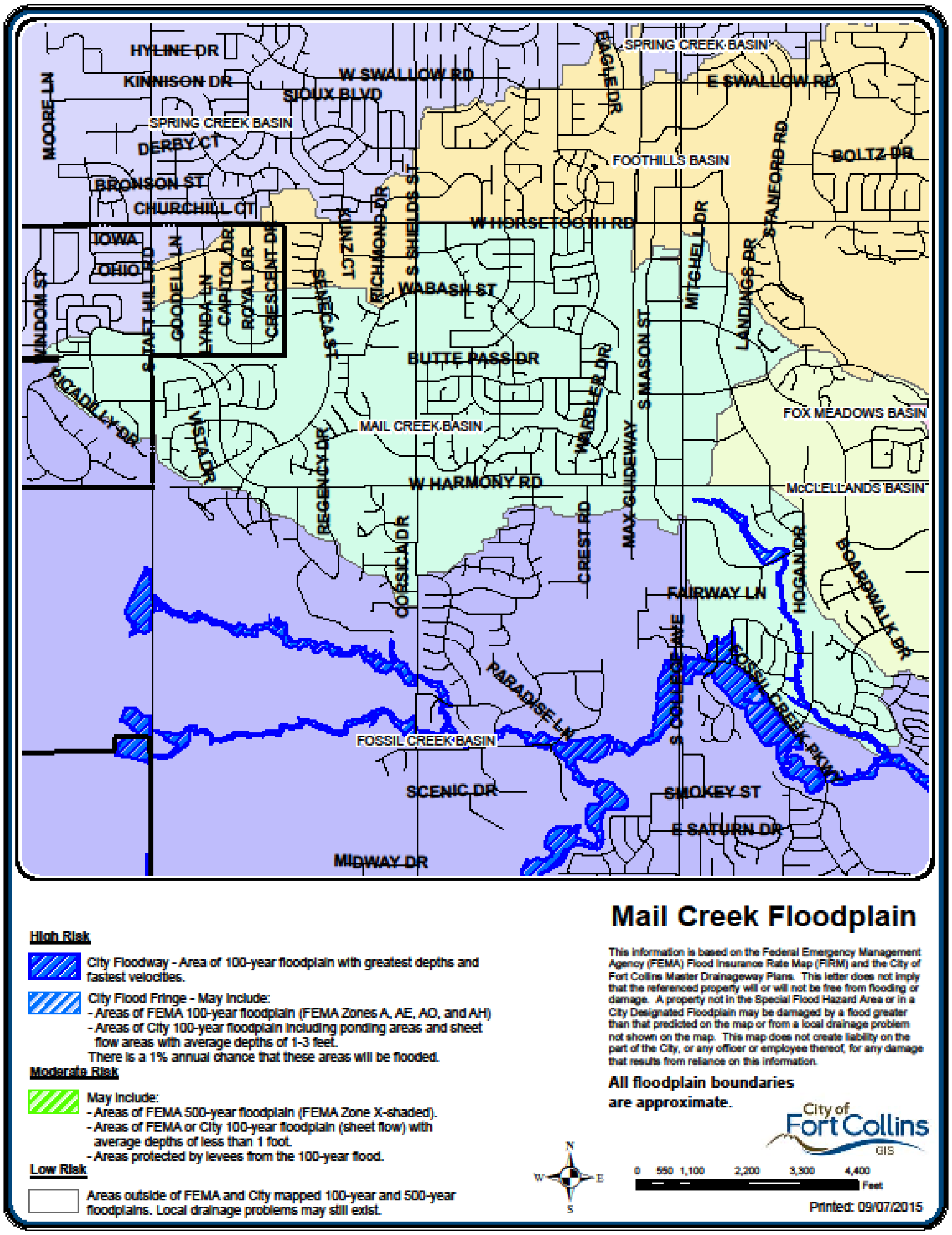
**** Note: The Overtopping Elevation corresponds with the invert elevation of the FCRID Bypass Spillway. The discharge at the full capacity of the Bypass Spillway is 1039-cfs at El. 95.8.

Pond locations are shown on the Flood Potential Maps in Appendix A, and discussed in detail in the Hydrology Report

Mail Creek Basin

The McClellands Basin encompasses approximately 3.4 square miles in southeast Fort Collins. The storm runoff from the basin originates northeast of College Avenue and Harmony Road and drains southeast through the Oakridge, Willow Springs, Stetson Creek and Harvest Park developments. A single major drainageway, McClellands Creek, conveys flow from the upper end of the basin to the downstream discharge point along the Fossil Creek Reservoir Inlet Ditch. The majority of the basin is either developed, or is being developed, with residential and commercial land areas.

Basin Problems - The basin has limited flooding problems because it was developed with the guidance of the Storm Drainage Design Criteria and the original master drainage plan. The updated master plan, which includes the higher rainfall standard adopted by City Council in 1999, identifies no structures damaged during a 100-year storm. However, several drainage problems have been identified in the basin, including pond overtopping, stream instability, water quality and street flooding.


HYLINE DR
KINNISON DR
W SWALLOW RD
SIOUX BLVD
MOORE LN
SPRING CREEK BASIN
DERBY CT
BRONSON ST
CHURCHILL CT
IOWA
OHIO
WINDOM ST
S TAFT HILL RD
GOODELL LN
LYNDA LN
CAPITOL DR
ROYAL DR
CRESCENT DR
SENECA ST
KUNZLCT
RICHMOND DR
S SHIELDS ST
W HORSETOOTH RD
WABASH ST
BUTTE PASS DR
PICADILLY DR
VISTA DR
REGENCY DR
MAIL CREEK BASIN
W HARMONY RD
CORSICA DR
WARBLER DR
S MASON ST
MAX GUIDEWAY
CREST RD
EAGLE DR
SPRING CREEK BASIN
E SWALLOW RD
FOOTHILLS BASIN
STANFORD RD
BOLTZ DR
MITCHELL DR
LANDINGS DR
FOX MEADOWS BASIN
McCLELLANDS BASIN
HOGAN DR
BOARDWALK DR
FAIRWAY LN
S COLLEGE AVE
FOSSIL CREEK PKWY
PARADISE LN
FOSSIL CREEK BASIN
SCENIC DR
SMOKEY ST
E SATURN DR
MIDWAY DR
Mail Creek Floodplain
High Risk
City Floodway - Area of 100-year floodplain with greatest depths and fastest velocities.
City Flood Fringe - May include:
- Areas of FEMA 100-year floodplain (FEMA Zones A, AE, AO, and AH)
- Areas of City 100-year floodplain including ponding areas and sheet flow areas with average depths of 1-3 feet.
There is a 1% annual chance that these areas will be flooded.
Moderate Risk
May include:
- Areas of FEMA 500-year floodplain (FEMA Zone X-shaded).
- Areas of FEMA or City 100-year floodplain (sheet flow) with average depths of less than 1 foot.
- Areas protected by levees from the 100-year flood.
Low Risk
Areas outside of FEMA and City mapped 100-year and 500-year floodplains. Local drainage problems may still exist.
This information is based on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) and the City of Fort Collins Master Drainageway Plans. This letter does not imply that the referenced property will or will not be free from flooding or damage. A property not in the Special Flood Hazard Area or in a City Designated Floodplain may be damaged by a flood greater than that predicted on the map or from a local drainage problem not shown on the map. This map does not create liability on the part of the City, or any officer or employee thereof, for any damage that results from reliance on this information.
All floodplain boundaries are approximate.
City of Fort Collins GIS
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Feet
Printed: 09/07/2015

Summary of Roadway Overtopping – Mail Creek Basin

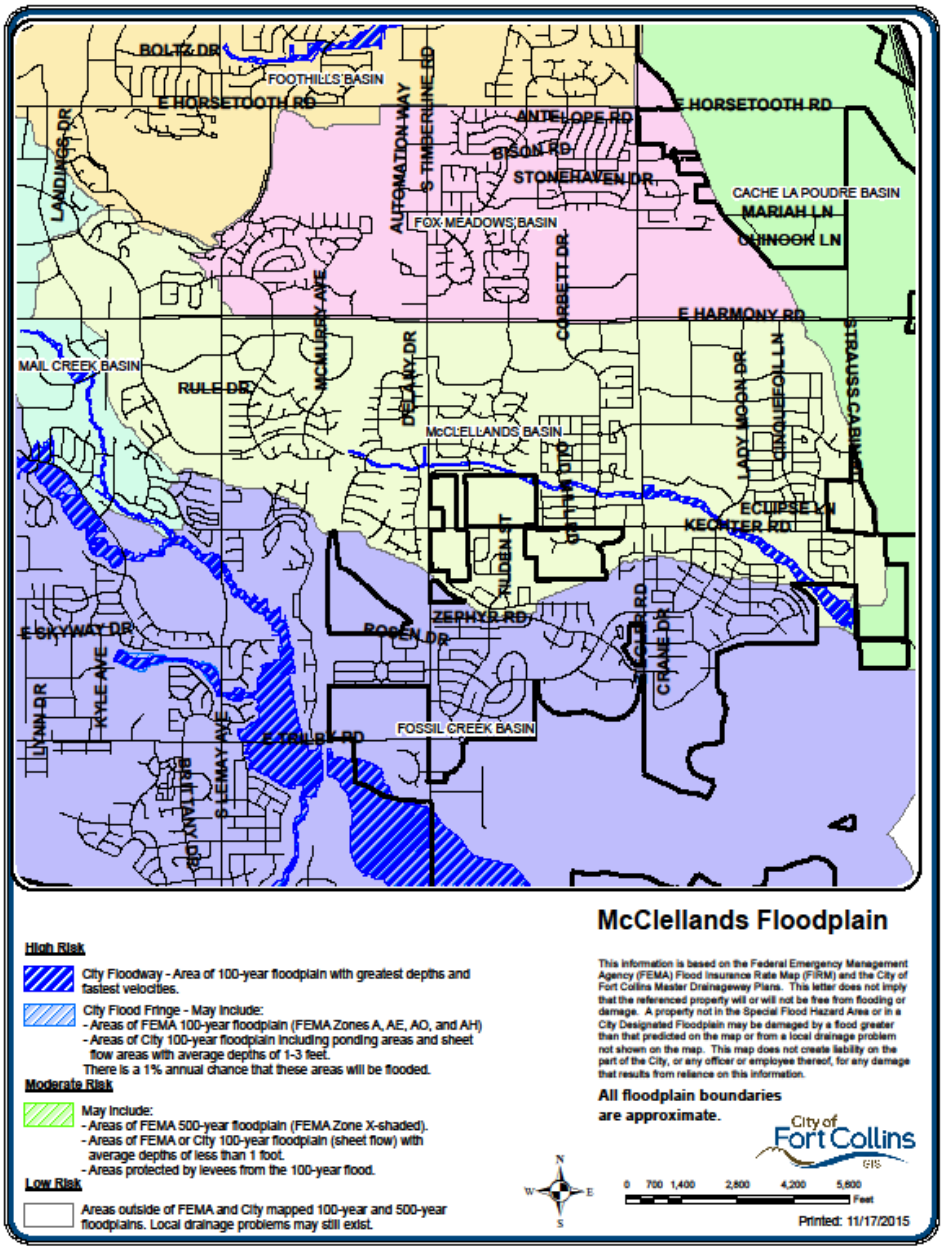
SWMM Element ID	D/S Road	Road classification (*allowable depth)	Over-topping	Overtopping elevation	100-year WSEL (overtopping depth – inches)	50-year WSEL (overtopping depth-inches)
Pond 189	Westbury Drive	Local (18 inches over flowline)	Yes	5085.0	5085.22 (2.6 inches)	NA
Pond 279	Seneca Street	Collector (18 inches over flowline)	Yes	5107.0	5107.05 (0.6 inches)	NA
Pond 321	N/a – d/s swale	N/a	Yes	5055.0	5055.13 (1.6 inches)	NA
Pond 412	Wabash Street	Collector (18 inches over flowline)	Yes	5075.0	5075.07 (0.8 inches)	NA
Pond 104	N/a – d/s swale	N/a	No	5059.5	5058.99 (0 inches)	NA
Pond 230	Seneca Street	Collector (18 inches over flowline)	No	5116.5	5115.88 (0 inches)	NA
CE 16	Crest Road	Local (18 inches over flowline)	Yes	5042.25	5042.88 (7.6 inches)	5042.46 (2.5 inches)
CE 17	Hinsdale Drive	Collector (18 inches over flowline)	Yes	5054.36	5054.82 (5.5 inches)	NA
CE 35	Hummingbird Drive	Local (18 inches over flowline)	Yes	101.76 (relative elevation)	102.6 (10 inches)	102.43 (8 inches)
CE 35	Warbler	Local (18 inches over flowline)	Yes	103.95 (relative elevation)	104.81 (10.3 inches)	104.62 (8 inches)
CE 38	Manhattan Avenue	Collector (18 inches over flowline)	Yes	105.96 (relative elevation)	106.59 (7.5 inches)	106.46 (6 inches)
CE 49	Royal Drive	Local (18 inches over flowline)	Yes	5119.5	5120.59 (13.1 inches)	5120.41 (10.9 inches)
CE 49	Crescent Drive	Local (18 inches over flowline)	Yes	5115.43	5116.38 (11.4 inches)	5116.24 (9.7 inches)
CE 200	Taft Hill Road	Arterial (6 inches over crown)	Yes	5150.75	5151.56 (9.7 inches)	5151.45 (8.4 inches)
CE 200	Goodell Lane	Local (18 inches over flowline)	Yes	5137.81	5139.09 (15.4 inches)	5138.90 (13.1 inches)
CE 200	Lynda Lane	Local (18 inches over flowline)	Yes	5131.56	5132.29 (8.8 inches)	5132.17 (7.3 inches)
CE 200	Capitol Drive	Local (18 inches over flowline)	Yes	5124.27	5125.61 (16.1 inches)	5125.42 (13.8 inches)
CE 366	Moss Creek	Local (18 inches over flowline)	No	109.49 (relative elevation)	102.06 (0 inches)	NA
CE 366	Benthaven Street	Local (18 inches over flowline)	No	105.17 (relative elevation)	103.00 (0 inches)	NA
CE 369	Dennison Avenue	Local (18 inches over flowline)	No	105.79 (relative elevation)	104.6 (0 inches)	NA

*Local & Collector – 18 inches over flowline equates to 12 inches over crown assuming 24 foot ½ street width and 2% cross-slope.

McClellands Basin

The McClellands Basin encompasses approximately 3.4 square miles in southeast Fort Collins. The storm runoff from the basin originates northeast of College Avenue and Harmony Road and drains southeast through the Oakridge, Willow Springs, Stetson Creek and Harvest Park developments. A single major drainageway, McClellands Creek, conveys flow from the upper end of the basin to the downstream discharge point along the Fossil Creek Reservoir Inlet Ditch. The majority of the basin is either developed, or is being developed, with residential and commercial land areas.

Basin Problems - The basin has limited flooding problems because it was developed with the guidance of the Storm Drainage Design Criteria and the original master drainage plan. The updated master plan, which includes the higher rainfall standard adopted by City Council in 1999, identifies no structures damaged during a 100-year storm. However, several drainage problems have been identified in the basin, including pond overtopping, stream instability, water quality and street flooding.


BOLTZ DR
FOOTHILLS BASIN
E HORSETOOTH RD
LANDINGS DR
AUTOMATION WAY
S TIMBERLINE RD
ANTELOPE RD
BISON RD
STONEHAVEN DR
CACHE LA POUDRE BASIN
MARIAH LN
CHINOOK LN
FOX MEADOWS BASIN
CORBETT DR
E HARMONY RD
STRAUSS CABIN RD
MAIL CREEK BASIN
RULE DR
MCMURRY AVE
DELANEY DR
McCLELLANDS BASIN
OLD MILL RD
LADY MOON DR
CIRQUEFOIL LN
ECLIPSE LN
KECHTER RD
TILDEN ST
ZEPHYR RD
ROSEN DR
SCHLAGEL RD
CRANE DR
E SKYWAY DR
KYLE AVE
LYNN DR
FOSSIL CREEK BASIN
E TROUT RD
S LEMAY AVE
BRITTANY DR
High Risk
City Floodway - Area of 100-year floodplain with greatest depths and fastest velocities.
City Flood Fringe - May include:
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- Areas of City 100-year floodplain including ponding areas and sheet flow areas with average depths of 1-3 feet.
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Moderate Risk
May include:
- Areas of FEMA 500-year floodplain (FEMA Zone X-shaded).
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- Areas protected by levees from the 100-year flood.
Low Risk
Areas outside of FEMA and City mapped 100-year and 500-year floodplains. Local drainage problems may still exist.
McClellands Floodplain
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All floodplain boundaries are approximate.
City of Fort Collins GIS
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Feet
Printed: 11/17/2015

Inventory of Overtopping Culverts and Roadways (Developed Conditions) – McClellands Basin

						Existing Conditions			Developed Conditions			
Location	SWMM Design Point	Type of Structure	Approximate Capacity (cfs)	Capacity Relative to Frequency*	Top of Road Elev. (ft)	100-Year Discharge (cfs)	100-Year WSEL (ft)	100-Year Overtopping Depth (ft)	100-Year Discharge (cfs)	100-Year WSEL (ft)	100-Year Overtopping Depth (ft)	Approximate Travel Time (hrs)
Wheaton Drive	42	(2) 42" RCP**	64	<25-yr	4972.2	115	4972.5	0.3	115	4972.5	0.3	0.9
Keenland Drive @ Wheaton Drive	4	34"x53" HERCP	105	<50-yr	4959.2	166	4959.5	0.3	166	4959.5	0.3	1.0
Boardwalk Dr. West of Lemay Ave.	326	42" RCP	76	<25-yr	4968.5	179	4968.8	0.3	179	4968.8	0.3	0.6
Boardwalk at Whalers Way	486	21" RCP	20	<25-yr	5003.3	40	5003.7	0.4	54	5003.8	0.5	2.0
McMurray Avenue	43	(2) 42" RCP	202	<100-yr	4959.2	223	4959.2	0.0	223	4959.2	0.0	0.6
Lemay Avenue & Harmony Road	31	36" RCP	49	<100-yr	4987.3	71	4987.5	0.2	86	4987.5	0.2	2.0

*Capacity relative to developed conditions SWMM discharges

**Without additional inlet access to the 2-42" RCPs, actual capacity under Wheaton is limited to the combined capacity of the 12" and 42" RCPs.

Inventory of Major Non-Overtopping Culverts and Roadways (Developed Conditions) – McClellands Basin

						Existing Conditions			Developed Conditions			
Location	SWMM Design Point	Type of Structure	Approximate Capacity (cfs)	Capacity Relative to Frequency*	Top of Road Elev. (ft)	100-Year Discharge (cfs)	100-Year WSEL (ft)	100-Year Overtopping Depth (ft)	100-Year Discharge (cfs)	100-Year WSEL (ft)	100-Year Overtopping Depth (ft)	Approximate Travel Time (hrs)
County Road 36	414	(2) 20'x5' RCB	1900	>100	4893.0	1489	4888.8	0	1943	4890.3	0	1.1
County Road 9	102	30'x5.5' RCB	159	<2-yr	4907.0	891	4905.1	0	1130	4906.9	0	1.0
Oakridge Drive	41	(3) 42" RCP	170	>100-yr	4978.0	102	4977.4	0.0	102	4977.4	0.0	0.9
Timberline Road	358	(2) 4'x8' RCBC	576	>100-yr	4939.0	380	4937.1	0.0	381	4937.1	0.0	1.3
UPRR	2	72" RCP**	310	>100-yr	4960.4	274	4954.3	0.0	276	4954.3	0.0	2.6
Lemay N. of Boardwalk Drive	341	(3) 36" RCP	197	>100-yr	4963.0	165	4963.0	0.0	165	4963.0	0.0	0.9
White Willow Drive	140	(3) 60" RCP	750	>100-yr	4945.0	293	4939.2	0.0	295	4939.3	0.0	2.6
Battle Creek Drive	116	(3) 60" RCP	900	>100-yr	4955.0	283	4945.2	0.0	285	4945.2	0.0	2.6

*Capacity relative to developed conditions SWMM discharges

**Actual outlet capacity controlled by smaller orifice plate.

Fossil Creek Basin

The Fossil Creek drainage basin extends along the south end of Fort Collins, from the foothills across Interstate 25 past County Road 5. It encompasses 32 square miles in the City of Fort Collins and Larimer County. Historically, the basin consisted of agricultural land, but the basin has experienced significant development in the past decade.

The original Fossil Creek Master Plan (1982) mapped the 100-year floodplain and restricted any new development from this floodplain. Construction that occurred throughout the 1990s took place outside the floodplain. Early in 2002, Fort Collins Utilities mapped a new floodplain for this basin as part of a comprehensive update of the City's Stormwater Master Plan. The new floodplain map reflects the higher rainfall standard adopted by City Council in 1999.

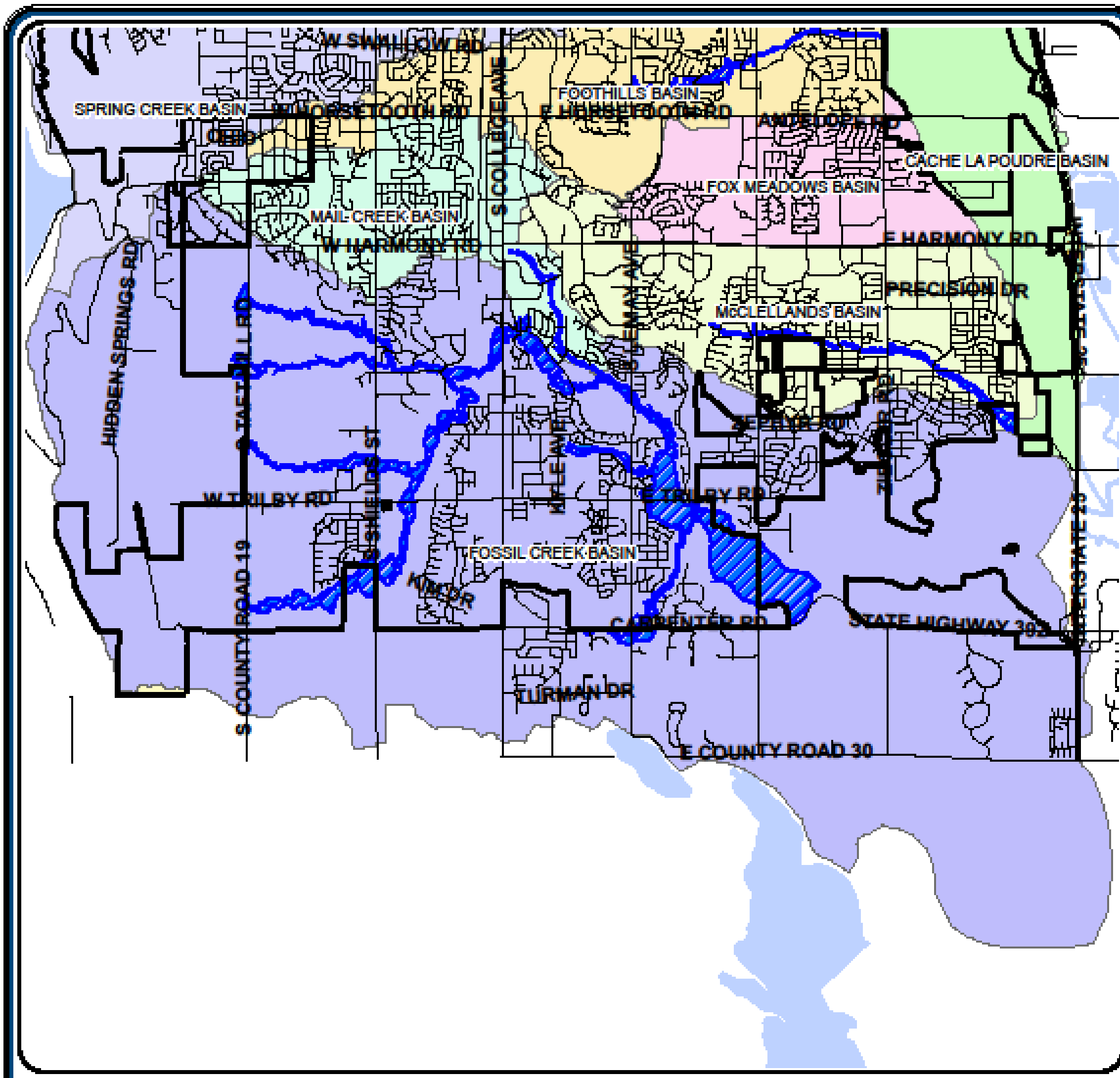
Basin Problems - The Fossil Creek floodplain is now wider in many locations. Flooding problems are primarily due to undersized culverts that back water up into homes or overtop roadways. The majority of flooding of structures would occur along Fossil Creek between the Union Pacific Railroad and Lemay Avenue. Water would back up behind the railroad embankment south of Trilby Road. The 10-foot-diameter culvert through the railroad embankment would not be able to handle the amount of water generated by a flood, and water would back up all the way to the Southridge Greens Golf Course.

Since the rainfall standard was increased, there are now 117 homes, 13 roads and three railroads that would be damaged during a 100-year storm, with an estimated $10.6 million in damage. If nothing is done to mitigate this damage, it is estimated that $5.97 million of damage would occur over the next 50 years, primarily from flooding of homes.

In addition to flooding hazards, erosion has occurred because of natural processes, agricultural practices and urban development. The channel of Fossil Creek and its tributaries are very unstable, with steep banks—in some places up to 25 feet high. Excessive erosion also leads to poor water quality, damage to adjacent property, damage to roads and utilities and reduced biological diversity to support riparian habitat.

Inventory of Overtopped Roadways – Fossil Creek Basin

Location	Type of Structure	Approximate Capacity*	2-Year Depth Over Road (feet)	5-Year Depth Over Road (feet)	10-Year Depth Over Road (feet)	50-Year Depth Over Road (feet)	100-Year Depth Over Road (feet)	500-Year Depth Over Road (feet)	100-Year WSEL (feet)	100-Year Velocity (fps)
FOSSIL CREEK										
Timberline Road	(8) 5'x10'RCB & (1) 6'x12'RCB	7-Year	0	0	0.6	0.8	<1.0	1.2	4876.8	0.3
Union Pacific Railroad	10' CMP & (2) 118" Steel	Exceeds 500-Year	0	0	0	0	0	0	4902.9	20.9
Trilby Road	6.5' CMP	4-Year	0	0	0	<1.0	3.7	unknown	4895.9	0.2
Lemay Avenue	3-Sided RCB	95-Year	0	0	0	0	0.1	3.5	4906.1	8.9
Fossil Creek Parkway	Bridge	150-Year	0	0	0	0	0	2.7	4916.8	4.7
College Avenue	Triple RCB	150-Year	0	0	0	0	0	2.4	4949.5	14.3
C & S Railroad	3-Sided RCB	Exceeds 500-Year	0	0	0	0	0	0	4963.4	15.6
Fossil Creek Drive	Two 7'w X 5'h RCBs	9-Year	0	0	0.2	0.3	0.4	3.4	4969.4	9.6
Shields Street	10'w X 6'h RCB	150-Year	0	0	0	0	0	1.7	5001.3	14.8
Taft Hill Road	5' & 3' CMPs	400-Year	0	0	0	0	0	0.1	5096.4	14.3
STANTON CREEK										
County Road 32	3-Sided RCB	200-Year	0	0	0	0	0.5	3.7	4944.5	11.2
Lemay Avenue	None	0	0.5	0.8	1.1	1.8	2.2	3	4952.2	6.8
STONE CREEK										
Lemay Avenue	Five 6'w X 3'h RCBs & Two 12'x4' RCBs	100-Year	0	0	0	0.4	0.9	1.6	4906.9	7.2
BURNS TRIBUTARY										
Hilldale Drive	6' RCP	30-Year	0	0	0	0.6	1.5	2.4	4994.5	8.9
Shields Street	5.5' RCP & Trail	500-Year	0	0	0	0	0	0	5007.8	19.9
Taft Hill Road	4' CMP	75-Year	0	0	0	0	0.8	1.8	5059.8	15.3
LANG GULCH										
C & S RR #1	3-Sided RCB	500-Year	0	0	0	0	0	0	4981.0	17.6
C & S RR #2	3-Sided RCB	25-Year	0	0	0	1.4	2.6	4.1	4998.6	8.4
Trilby Road	5.5' RCP & 4' RCP	40-Year	0	0	0	0.4	1.5	2.7	5027.5	18.3
C & S RR #3	10'w X 4'h RCB	15-Year	0	0	0	1.2	2.3	3.5	5027.5	0.3
C & S RR #4	8'w X 2'h RCB	2-Year	0	0.1	1.1	2.3	2.9	3.8	5042.9	11.9
Shields Street	5' RCP	30-Year	0	0	0	0.5	1.2	2.1	5053.2	16.2
Taft Hill Road	3' CMP	9-Year	0	0	0.2	1.1	1.7	2.8	5112.7	11.6
SMITH CREEK										
Shields Street	Two 6' CMPs	150-Year	0	0	0	0	0	1.9	5031.1	11.9
Taft Hill Road	3.5' RCP	150-Year	0	0	0	0	0	1.3	5091.6	19.9
* Prior to Overtopping										



Fossil Creek Floodplain

High Risk

City Floodway - Area of 100-year floodplain with greatest depths and fastest velocities.

City Flood Fringe - May include:
- Areas of FEMA 100-year floodplain (FEMA Zones A, AE, AO, and AH)
- Areas of City 100-year floodplain including ponding areas and sheet flow areas with average depths of 1-3 feet.

There is a 1% annual chance that these areas will be flooded.

Moderate Risk

May include:
- Areas of FEMA 500-year floodplain (FEMA Zone X-shaded).
- Areas of FEMA or City 100-year floodplain (sheet flow) with average depths of less than 1 foot.
- Areas protected by levees from the 100-year flood.

Low Risk

Areas outside of FEMA and City mapped 100-year and 500-year floodplains. Local drainage problems may still exist.

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All floodplain boundaries are approximate.

City of Fort Collins GIS

N W E S

0 1,450 2,900 5,800 8,700 11,600 Feet

Printed: 09/07/2015

LARIMER COUNTY COMMITTED TO EXCELLENCE

Michael Baker INTERNATIONAL

Flood Potential from Dams and Levees

Three levees are located along the Poudre River:

Oxbow Levee – Located between Lincoln and Linden Street. This levee protects the Buckingham Neighborhood and businesses along the north side of Lincoln Avenue.

RPATH Levee – Located upstream of Timberline Road. This levee keeps water in the main channel and protects business along Timberline Road near Prospect Road.

Drake Water Reclamation Facility Levee – Protects the City's Drake Water Reclamation Facility and is located along the north and west side of the facility.

There also are numerous high hazard dams, including the four large dams on Horsetooth Reservoir operated by the Bureau of Reclamation that have the potential to impact Fort Collins. The high hazard dams have been assessed and the data is available to emergency response personnel for use in an emergency.

Mitigation Alternative Analysis

Representatives from numerous City departments (Emergency Management, Engineering, Parks, Natural Resources, Advanced Planning, Current Planning, Transportation) and outside agencies (Irrigation Ditch companies, Larimer County Engineering Department, Poudre School District, and Colorado State University) were brought together to discuss the various mitigation alternatives for each basin. An example agenda and minutes from one of these meetings are included in the Attachments. Both structural and non-structural alternatives were discussed. The following table lists the alternatives that were discussed and the reasons why some alternatives were not recommended.

Summary Table of Mitigation Alternatives Considered

Mitigation Alternatives Considered	Recommended	Not Recommended	Continue Existing Program	Why it was not recommended
Preventative Activities				
Planning and Zoning		X	X	Handled through floodplain regulations. Continue to coordinate as plans are updated.
Open Space Preservation	X		X	
Floodplain Regulations	X		X	
Building Codes		X	X	Handled through floodplain regulations. Continue to coordinate as plans are updated.
Stormwater Design Criteria	X		X	
Drainage System Maintenance	X		X	
Property Protection				
Relocation		X		Not a popular option – too expensive.
Acquisition	X		X	
Building Elevation		X		Not a popular option – too expensive.
Retrofitting	X		X	Up to individuals. City offers information and advice.
Sewer Back-up Protection		X	X	Up to individuals. City offers information and advice.
Insurance		X	X	Up to individuals. City offers information.
Natural Resources Protection				
Wetlands Protection	X		X	
Erosion and Sediment Control	X		X	
Best Management Practices	X		X	
Emergency Services				
Flood Warning	X		X	

Mitigation Alternatives Considered	Recommended	Not Recommended	Continue Existing Program	Why it was not recommended
Gage Expansion	X			
Flood response	X		X	
Critical Facilities Protection		X		Structural projects will help protect many critical facilities.
Structural Projects				
Detention Ponds	X			
Levees	X			
Diversions	X			
Channel Modifications	X			
Storm Sewers	X			
Culvert Improvements	X			
Public Information				
Map Information	X		X	
Outreach Projects	X		X	
Information at Public Library	X		X	
Real Estate Disclosure		X		Left to real estate professionals. City will continue to provide information when requested.
Technical assistance to property owners	X		X	
Web page	X		X	
Cable TV program related to flooding	X			

Recommended Mitigation Strategy

The recommended mitigation strategy contains both City-wide strategies as well as basin-specific strategies. These strategies were chosen based on their ability to reduce flood damages, cost effectiveness, feasibility, and how they fit with the overall goals, policies and other programs of the City of Fort Collins Utilities. Details on the benefit cost methodology are found in the Attachments. Individual Mitigation Action Guides for the continuing programs and the basin-specific projects can be found in the Fort Collins Community Profile in Appendix B of the 2016 Larimer County Hazard Mitigation Plan.

City-Wide Strategies

The City-wide mitigation strategies are primarily a continuation of current programs. However, there are a few specific proposed projects related to public outreach and emergency response.

Continuing Programs

The City of Fort Collins plans to evaluate as needed and continue the following existing programs:

- Drainage system maintenance (Fort Collins Mitigation Action Guides, Appendix B of the 2016 Larimer County Hazard Mitigation Plan)
- Regulatory Programs – floodplain regulations higher than minimum NFIP standards, stormwater design criteria, erosion and sediment control, Low Impact Development (LID) and water quality best management practices (Fort Collins Mitigation Action Guides, Appendix B of the 2016 Larimer County Hazard Mitigation Plan)

- Public Outreach – Guided by the City's Program for Public Information (Fort Collins Mitigation Action Guides, Appendix B of the 2016 Larimer County Hazard Mitigation Plan)
    - Annual mailer to all floodplain property owners and residents
    - Annual mailer to realtors, insurance agents, and lenders
    - Updates to Stormwater web page
    - Free technical assistance to property owners for property protection measures
    - Map information service
    - Flood Awareness Week activities
    - Advertisement of services and flood information in City News.
    - Provide information on flood insurance availability, property protection measures, flood safety, flood risk, etc.
    - Information available at the public library
    - Talks and programs to community groups, schools, realtors, etc about flooding related issues
- Open Space Preservation (Fort Collins Mitigation Action Guides, Appendix B of the 2016 Larimer County Hazard Mitigation Plan)
- Low Impact Development Retrofits (Fort Collins Mitigation Action Guides, Appendix B of the 2016 Larimer County Hazard Mitigation Plan)
- Flood Warning and Emergency Response (Fort Collins Mitigation Action Guides, Appendix B of the 2016 Larimer County Hazard Mitigation Plan)
    - Maintenance of gaging system
    - Maintenance of notification tools
    - Continued coordination between Stormwater and the Office of Emergency Management
    - Annual exercise
- Stormwater Master Planning is updating the hydrology in all of the Master Plans in the City, revising one basin per year until all plans are updated (Fort Collins Mitigation Action Guides, Appendix B of the 2016 Larimer County Hazard Mitigation Plan)

These programs are in place to improve the community's awareness of flood risks, to continue to maintain and improve the infrastructure and emergency systems, and to regulate new development so that the citizens, property and floodplain itself are better protected in a future flood.

The floodplain regulations are codified in Chapter 10 of the City of Fort Collins Municipal Code. The regulations exceed minimum NFIP standards for example, require additional freeboard of 24" in the Poudre River floodplain and 18" in the other mapped floodplains, prohibiting development in the Poudre River floodway, and prohibiting Critical Facilities in the floodplain. Expected code changes in the future will clarify LID requirements as well as green infrastructure (Fort Collins Mitigation Action Guide, Green Infrastructure Policies, Appendix B of the 2016 Larimer County Hazard Mitigation Plan).

Mitigation Actions to Be Taken By Private Individuals:

The City encourages private property owners to take steps to mitigate their risk. The City can provide technical assistance and information on the following mitigation strategies:

- Retrofitting and Floodproofing
- Flood insurance
- Sewer Back-up Protection
- Emergency Preparedness planning (sign-up for LETA911, emergency supply kit, family evacuation plan, etc.)

2015 Plan Proposed Projects

- Flood Warning System software upgrade in 2015-2016.

Specific Drainage Basin Strategies

The City of Fort Collins identified a number of jurisdiction-specific mitigation actions in the 2010 Northern Colorado Hazard Mitigation Plan. The status of these "legacy" mitigation actions have been reported on by hazard mitigation planning team members and are documented in Appendix G of the 2016 Larimer County Multi-Hazard Mitigation Plan.

Boxelder Creek and Cooper Slough Basins

Regional Opportunities: The Boxelder Creek floodplain also impacts the towns of Wellington and Timnath, as well as a large amount of sparsely developed and undeveloped property east of I-25. Larimer County, the City of Fort Collins and the Town of Wellington adopted a regional drainage master plan in 2008. This plan will reduce the size of the floodplain by constructing additional flood detention in the basin (Fort Collins Mitigation Action Guide, Boxelder Basin Regional Stormwater, Appendix B).

Stream Stability and Habitat: The master plan also recommends opportunities to enhance the riparian habitat and address erosion along Boxelder Creek. This includes constructing sloping boulder drop structures, sloping back vertical banks and re-establishing native landscaping to promote biological diversity along the stream. The goal is to preserve areas with good habitat and enhance areas of poor habitat.

Fossil Creek Basin

Excessive Erosion/Poor Stream Habitat: Construct sloping boulder drop structures and sloping back vertical banks, and re-establish native landscaping to promote biological diversity along the stream. Preserve areas with good habitat and enhance areas of poor habitat (Fort Collins Mitigation Action Guide, Stream Rehab Program, Appendix B).

Mail Creek Basin

The plan proposes channel upgrades to improve habitat ratings, stream stability and water quality. Improvements include grading to flatten out steep bank slopes, creating pools and riffles, and planting vegetation.

Dry Creek Basin

The project includes a storm sewer system to mitigate local flooding (during a 100-year storm) in the area generally north of East Vine Drive, west of Lemay Avenue, south of the Larimer and Weld Canal, and east of College Avenue. The project incorporates a combination of storm sewer and increased detention to convey local storm runoff to the future East Vine Diversion Channel. The storm drainage design coordinates with the design efforts of the East Vine Drive realignment. The project also includes the construction of a stormwater detention pond and a pond outlet under Vine Drive and the Railroad Yard north of Vine Drive at Dry Creek (Fort Collins Mitigation Action Guide, North East College Corridor Outfall, Appendix B).

McClellands Basin

Stream Stability and Habitat: The goal is to preserve areas with good habitat and enhance areas of poor habitat. Projects may include constructing sloping boulder drop structures, sloping back vertical banks and re-establishing native vegetation.

Old Town Basin

This area of Fort Collins has an undersized storm sewer that does not meet our current drainage standards and does not have a proper outfall to the river. A new storm sewer system is slated for 2016 to improve drainage and reduce flooding for storms up to and including the 100 year event (Fort Collins Mitigation Action Guide, Magnolia Storm Sewer, Myrtle Storm Sewer, Riverside-Mulberry Project, DT River District, Appendix B).

Poudre River Basin

Proposed Projects include:

- Open Space Preservation in coordination with the City's Natural Areas Department. Over the next 5 years there are approximately 5 parcels that are being negotiated for conservation within the floodplain.
- Acquiring property through a willing seller/willing buyer program. Special emphasis is on structures in the floodway (Fort Collins Mitigation Action Guide, E. Vine Drive Property Acquisition, Appendix B).

Spring Creek Basin

Habitat Enhancement: The master plan also includes an assessment of the creek's habitat quality and enhancement opportunities. Enhancements include restoring banks with native vegetation, removing or modifying manmade barriers to fish passage and restoring portions of the creek to a more natural formation.

West Vine Basin

Construct a detention pond on the City-owned Forney property to reduce downstream flooding. This area of Fort Collins was the historic flow path of Soldier Creek that has been covered up or redirected by development over the years (Fort Collins Mitigation Action Guide, E. Vine Drive Property Acquisition, Appendix B).

Implementation

The City of Fort Collins has a Stormwater Utility. Fees are paid by all property owners based on the impervious surface of their property. Fees will generate approximately $5 million per year for storm drainage improvements.

Flood Control projects (channels, storm sewers, culverts, detention ponds, etc.), acquisition projects, and flood warning gauges identified in the City's Drainage Basin Master Plan will be financed by the City's Stormwater Utility. Projects in all basins will compete in a city-wide prioritization process. Projects will be rated according to the following criteria:

Rating Criteria	Criteria Weight
1. Number of structures removed from the floodplain	50%
2. Benefit-to-cost ratio	25%
3. Number of street overtoppings eliminated	25%

The result will be a ranking of projects for construction. City staff will make recommendations based on that ranking to City Council as part of the bi-annual budget process. Some projects may be recommended out of sequence due to:

- Right-of-way acquisition;
- Identification by regulatory requirements
- Joint projects with other departments, agencies, or developers; and
- Other priorities identified by City Council.

Funding for some of these projects may also come from grants. Existing programs will continue to be funded by the city department responsible for its implementation (Ex. Open Space Preservation – Natural Resources Department; Flooding Public Outreach – City of Fort Collins Utilities; Flood Warning Program – City of Fort Collins Utilities).

Any acquisition projects that are done for the Poudre River will be the responsibility of either the City of Fort Collins Utilities or the City's Natural Resources department to maintain. These properties will not redevelop in the future.

Plan Review and Updates

Appendix B and Appendix F will be reviewed annually for progress and necessary updates. A report will be sent to City Council in the fall of every year as part of the CRS annual progress report. This report will be available to the media and the public. Information included in this report will be:

1. How the reader can obtain a copy of the original plan.
2. A review of each recommendation in the action plan.
3. A discussion of why any objectives were not reached or why implementation is behind schedule.
4. Recommendations for new projects or revised objectives.

An update to this appendix will be prepared every five years in compliance with the CRS Coordinator's Manual in effect at the time.

List of Agencies Contacted by Email

CRS Step 3b – Coordinate

Email sent from Lori Hodges requesting data and information.

Agency	Name	Email
NOAA	Bob Glancy	Robert.Glancy@noaa.gov
NOAA	Treste Huse	Treste.Huse@noaa.gov
Red Cross	Erin Mounsey	Erin.Mounsey@redcross.org
FEMA Region VIII	Matt Buddie	matthew.buddie@fema.dhs.gov
FEMA Region VIII - CRS	Barbara Fitzpatrick	barbarafitzpatrick@dhs.gov
Colorado State Climatologist	Nolan Doesken	nolan@atmos.colostate.edu
Colorado Dept. of Local Affairs	Don Sandoval	Don.Sandoval@state.co.us
Colorado Dept. of Local Affairs	Anne Miller	anne.miller@state.co.us
CWCB	Chris Sturm	chris.sturm@state.co.us
CWCB – NFIP Coordinator	Jamie Prochno	jamie.prochno@state.co.us
CWCB	Kevin Houck	kevin.houck@state.co.us
Colorado OEM	Marilyn Gally	Marilyn.Gally@state.co.us
Colorado OEM	Chad Ray	Chad.Ray@state.co.us
Colorado OEM	Kevin Kuretich	Kevin.Kuretich@state.co.us
Colorado OEM	Patricia Gavelda	patricia.gavelda@state.co.us
Save The Poudre		media@savethepoudre.org
Weld County OEM	Roy Rudisill	rrudisill@co.weld.co.us
Weld County OEM	Merrie Leach	mleach@co.weld.co.us
Weld County OEM	Gracie Marquez	gmarquez@co.weld.co.us
Larimer County Long Term Recovery Group	Laura Levy	Laura@larimerltrg.org
Lutheran Family Services	Phyllis Kane	phyllis.kane@lfsrm.org
Loveland Housing Authority	Amy Irwin	airwi@lovelandhousing.org
Boulder County OEM	Mike Chard	mchard@bouldercounty.org
Boulder County OEM	Amy Danzl	adanzl@bouldercounty.org
Laramie County OEM	Rob Cleveland	rcleveland@laramiecounty.com
Phillips County OEM	Bob Heldenbrand	bob.heldenbrand@phillipscounty.co
Poudre Fire Authority	Chris Wolf	cwolf@poudre-fire.org
Logan County OEM	Cody Adams	loganoem@logancountyco.gov
Logan County	Dave Donaldson	Donaldson@logancountyco.gov
Cheyenne County OEM	Darcy Janssen	epr@co.cheyenne.co.us
City of Evans OEM	David Burns	dburns@evanscolorado.gov
Kit Carson County OEM	Della Calhoon	oem@kitcarsoncounty.org
Lincoln County OEM	John Dewitt	lclanduse@lincolncountyco.us
Sedgwick County OEM	Larry Neugebauer	LNeugebauer@sedgwickcountygov.net
Sedgwick County OEM	Mark Turner	sedgwickcoem@yahoo.com
Washington County OEM	Mike McCaleb	mmccaleb@co.washington.co.us
City of Greeley OEM	Pete Morgan	pete.morgan@greeleygov.com

Yuma County OEM	Roger Brown	yumaoem@wycomm.org
Morgan County OEM	Steve Enfante	senfante@co.morgan.co.us
Grand County OEM	Nowell Curran	ncurran@co.grand.co.us

Email to Stakeholder Agencies

Larimer County, along with the local jurisdictions of Fort Collins, Loveland, Estes Park, Wellington, Tinmath, and Berthoud are preparing a Hazard Mitigation Plan. This is an all hazards plan. However, because several of the jurisdictions participate in FEMA's Community Rating System, flooding is one of the hazards with a high priority. We are writing to you as an agency/organization that may have additional information that may help with this planning process.

Therefore, please let me know if your organization has any data or information that may be helpful in assessing the hazards, especially flooding. We would appreciate copies of any pertinent plans, reports, maps, etc. Please also let us know if your agency or organization is undertaking any projects or implementing any programs that might affect flooding or have impacts for properties in floodprone areas.

We welcome your input on the Larimer County Hazard Mitigation Plan. Please feel free to attend any of the upcoming committee meetings or the public open house. Details on dates and times are below:

- July 27, 2015 - Public Open House, Fort Collins Police Services, 6:30-8:30 pm, short presentations at 6:45 and 7:45.
- August 24, 2015, 1-3 pm – Committee Meeting, location to be determined
- September 30, 2015, 2-4 pm - Committee Meeting, location to be determined

A website, http://www.larimerhmp2016.com/, has been created that provides updates on the planning process and includes questionnaires. The draft plan is expected to be completed in October and will be posted on the website. We encourage your participation in the planning process and welcome your feedback on the draft plan.

Please feel free to contact me if you have any questions.

Sincerely,

HMP-CRS Team

Hazard Mitigation Planning Team Members

(Primary or Alternate attended at least 2 of 3 meetings)

	Governmental	Other Stakeholders
1	Larimer County Health and Environment	Estes Park FPD
2	Larimer OEM	Crystal Lakes FPD
3	Town of Estes Park	Glacier View FPD
4	City of Fort Collins Stormwater	Poudre Canyon FPD
5	City of Fort Collins Streets	Poudre FPD
6	City of Fort Collins OEM	CSU
7	City of Fort Collins Environmental Planning	Poudre Valley EMS
8	City of Fort Collins Environmental Quality	Big Thompson R. Restoration Coalition
9	City of Fort Collins Risk Management	Northern Colorado Water Conservancy District
10	City of Fort Collins Planning	Platte River Power Authority
11	City of Loveland Community Partnership	Upper Thompson Sanitation District
12	City of Loveland Facilities Management	
13	City of Loveland Risk Management	
14	City of Loveland OEM	
15	City of Loveland PD	
16	City of Loveland Stormwater	
17	City of Loveland Public Works	
18	City of Loveland Water & Power	
19	Town of Timnath	

HMP Stakeholder List

Primary Committee Member	Alternate Committee Member	First Name	Last Name	Email	Jurisdiction / Organization	Representing	Team	Kick Off?	Mid-Point?	Last?	Gov/Non-Gov	From	P and/or A Attended 2 Meetings	Group
Municipal Government - Berthoud														
P		Jan	Dowker	jdowker@berthoud.org	Berthoud	Town of Berthoud	large				G	Lori		
	A	Jim	Anderson		Berthoud	Town of Berthoud	large			Y	G	Lori		
Municipal Government - Larimer														
P		Eric	Fried	friedeb@co.larimer.co.us	County	Larimer Building Dept	large	Y			G	Lori		
P		Terry	Gilbert	gilbertt@co.larimer.co.us	County	Larimer CountyCommunity Development Director	large				G	Lori		
P		Janelle	Henderson	henderjl@co.larimer.co.us	County	Larimer Health and Environ.	large	Y	Y		G	Lori	Y	Larimer Health and Env
P		Lori	Hodges	hodgeslr@co.larimer.co.us	County	OEM	small	Y	Y	Y	G	Lori	Y	Larimer OEM
	A	Megan	Nies	niesml@co.larimer.co.us	County	Larimer County OEM	large	Y			G	Lori		
	A	Justin	Whitesell	whitesjl@co.larimer.co.us	Larimer County	Sheriff's Office EM/ES	large	Y	Y(Sub)	Y	G	Lori		
P		Mark	Peterson	petersmr@co.larimer.co.us	Larimer County	Engineering	large	Y			G	Lori		
Municipal Government - Estes Park														
P		Frank	Lancaster	flancaster@estes.org	Estes Park	Town Administrator	large	Y			G	Eric	Y	Town of Estes Park
	A	Travis	Machalek	tmachalek@estes.org	Estes Park	Assistant TA	large	Y				Eric		
P		Corey	Pass	cpass@estes.org	Estes Park	Commander	large	Y			G	Eric		
P		Will	Birchfield	wbirchfield@estes.org	Estes Park	Chief Building Official and Floodplain Manager	large				G	Eric		
		Alison	Chilcott	achilcot@estes.org	Estes Park	Community Development	large				G	Eric		
P		Karen	Thompson	kthompson@estes.org	Estes Park	Estes Park	large	Y			G	Eric		
	A	Tina	Kurtz	tkurtz@estes.org	Estes Park	Estes Park	large				G	Eric		
P		Eric	Rose	erose@estes.org	Estes Park	Estes PD	small			Y	G	Lori		
	A	Wes	Kufeld	wkufeld@estes.org	Estes Park	Police Chief	large				G	Eric		
P		Steve	McFarland	smcfarland@estes.org	Estes Park	Finance Officer	large	Y			G	Eric		
P		Alan	Fraundorf	afraundorf@estes.org	Estes Park	IT Manager	large	Y			G	Eric		
		Kate	Rusch	krusch@estes.org	Estes Park	Town of Estes Park	large				G	Eric		
Municipal Government - Fort Collins														
		Kevin	Gertig	kgertig@fcgov.com	Fort Collins	Utility Director	large				G	Gavin		
		Carol	Webb	cwebb@fcgov.com	Fort Collins	Water Utility Director	large				G	Gavin		
	A	Mike	Hergenreder	mhergenreder@fcgov.com	Fort Collins	Utilities	large			Y	G	Gavin		
P		Marsha	Hilmes-Robinson	mhilmesrobinson@fcgov.com	Fort Collins	CRS Coordinator/Stormwater	small	Y	Y	Y	G	Gavin	Y	Fort Collins Stormwater
	A	Jon	Haukaas	jhaukaas@fcgov.com	Fort Collins	Stormwater	large	Y			G	Gavin		
	A	Chris	Lochra	clochra@fcgov.com	Fort Collins	Stormwater	large				G	Gavin		
	A	Ken	Sampley	ksampley@fcgov.com	Fort Collins	Stormwater	large	Y			G	Gavin		
P		Mark	Kempton	mkempton@fcgov.com	Fort Collins	City of Fort Collins	large	Y			G	Mike		
P		Larry	Schneider	lschneider@fcgov.com	Fort Collins	Fort Collins Streets	large	Y			G	Gavin	Y	Fort Collins Streets
	A	Nicholas	Sporer	nsporer@fcgov.com	Fort Collins	Fort Collins Streets	large	Y	Y		G	Mike		
	A	Doug	Groves	dgroves@fcgov.com	Fort Collins	Fort Collins Streets	large	Y				Mike		
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P		Errin	Henggeller	ehenggeller@fcgov.com	Fort Collins	Environmental Quality	large	Y	Y	Y		Gavin	Y	Fort Collins Env Quality
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		Kelly	Bernish	kbernish@fcgov.com	Fort Collins	Risk Management	large	Y	Y			Mike	Y	Fort Collins Risk Management
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P		Lisa	Rosintoski	lrosintoski@fcgov.com	Fort Collins	PIO	large			Y	G	Gavin		
	A	Lauri	Kadrich	lkadrich@fcgov.com	Fort Collins	Planning, Development, Transportation Director	large				G	Gavin		
	A	Mark	Jackson	mjackson@fcgov.com	Fort Collins	Transportation	large				G	Gavin		
P		Pete	Wray	pwray@fcgov.com	Fort Collins	Planner	large	Y		Y	G	Marsha	Y	Fort Collins Planning
		Mike	Calhoun	Mcalhoun@fcgov.com	Fort Collins	Parks	large				G	Gavin		
P		Cory	Christensen	cchristensen@fcgov.com	Fort Collins	PD Division Chief	large	Y			G	Gavin		
	A	Joel	Tower	jtower@fcgov.com	Fort Collins	PD Traffic Division Supervisor	large				G	Gavin		
		Jaqueline	Kozak Thiel	jkozak-thiel@fcgov.com	Fort Collins	Chief Sustainability Officer	large					Gavin		
Municpal Government - Loveland														
P		Mark	Gaisford	Mark.Gaisford@cityofloveland.org	Loveland	911	large	Y			G	Pat		

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	A	Heidi	Ryan	heidi.ryan@cityofloveland.org	Loveland	911	large				G	Pat			
	A	Carmen	Bloom	Carmen.Bloom@cityofloveland.org	Loveland	911	large				G	Pat			
P		Greg	George	Greg.George@cityofloveland.org	Loveland	Building & Planning	large				G	Pat			
P		Deb	Callies	deb.callies@cityofloveland.org	Loveland	Community Partnership	large	Y			G	Pat	Y	Loveland Community Partnership	
	A	Alison	Hade	Alison.Hade@cityofloveland.org	Loveland	Community Partnership	large				G	Pat			
	A	Jodi	Lessman	jodi.lessman@cityofloveland.org	Loveland	Business Services	large		Y	Y					
		Jason	Licon	Jason.Licon@cityofloveland.org	Loveland	Airport	large					Pat			
P		Michael	Cerovski	michael.cerovski@cityofloveland.org	Loveland	Loveland Fire Rescue Authority	large	Y			G	Pat			
	A	Betsey	Hale	Betsey.Hale@cityofloveland.org	Loveland	Economic Development	large				G	Pat			
P		Ken	Cooper	Ken.Cooper@cityofloveland.org	Loveland	Facilities Management	large	Y	Y		G	Pat	Y	Loveland Facilities Management	
	A	Rod	Wensing	Rod.Wensing@cityofloveland.org	Loveland	City Administration	large				G	Pat			
P		Brent	Worthington	Brent.Worthington@cityofloveland.org	Loveland	Finance	large	Y			G	Pat			
		Bettie	Greenberg	Bettie.Greenberg@cityofloveland.org	Loveland	HR - Risk	large				G	Pat			
		Julia	Holland	Julia.Holland@cityofloveland.org	Loveland	HR	large				G	Pat			
P		Shane	Adamson	Shane.Adamson@cityofloveland.org	Loveland	IT - Library	large	Y			G	Pat			
P		John	Burns	John.Burns@cityofloveland.org	Loveland	IT	large				G	Pat			
P		Christina	Cornelison-Spight	christina.cornelison-spight@cityofloveland.or	Loveland	HR - Risk	large	Y		Y	G	Pat	Y	Loveland Risk Management	
P		Pat	Mialy	pat.mialy@cityofloveland.org	Loveland	Loveland OEM	small	Y		Y	G	Lori	Y	Loveland OEM	
		Marilyn	Hilgenberg	Marilyn.Hilgenberg@cityofloveland.org	Loveland	Parks & Rec	large				G	Pat			
		Janet	Meisel-Burns	janet.Meisel-Burns@cityofloveland.org	Loveland	Parks & Rec	large				G	Pat			
P		Brent	Newbanks	Brent.Newbanks@cityofloveland.org	Loveland	Police	large	Y	Y	Y	G	Pat	Y	Loveland PD	
	A	Bob	Klinger	bob.klinger@cityofloveland.org	Loveland	Police	large				G	Pat			
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P		Eric	Lessard	eric.lessard@cityofloveland.org	Loveland	Stormwater	large	Y	Y	Y	G	Pat	Y	Loveland Stormwater	
	A	Kevin	Gingery	Kevin.Gingery@cityofloveland.org	Loveland	Stormwater	large				G	Pat			
P		Leah	Browder	Leah.Browder@cityofloveland.org	Loveland	Public Works	large	Y	Y		G	Pat	Y	Loveland Public Works	
	A	Mick	Mercer	Mick.Mercer@cityofloveland.org	Loveland	Streets & Solid Waste	large				G	Pat			
	A	Gary	Dahlgren	Gary.Dahlgren@cityofloveland.org	Loveland	Streets	large				G	Pat			
P		Steve	Adams	Steve.Adams@cityofloveland.org	Loveland	Water & Power	large	Y			G	Pat	Y	Loveland Water & Power	
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P		Chris	Matkins	chris.matkins@cityofloveland.org	Loveland	Water	large	Y			G	Pat			
	A	Kathy	Gross	kathy.gross@cityofloveland.org	Loveland	Water	large		Y		G	Pat			
	A	Mike	McCrary	Michael.McCrary@cityofloveland.org	Loveland	Waste Water	large				G	Pat			
	A	Larry	Howard	Larry.Howard@cityofloveland.org	Loveland	Water	large				G	Pat			
	A	Bob	Miller	Bob.Miller@cityofloveland.org	Loveland	Water	large				G	Pat			
Municipal Government - Timnath															
P		April	Getchius	agetchius@timnathgov.com	Timnath	Town of Timnath	large			Y	G	Lori	Y	Town of Timnath	
	A	Sherry	Wagner	Swagner@timnathgov.com	Timnath	PD	large				G	Gavin			
	A	Milissa	Peters	mpeters@timnathgov.com	Timnath	Town of Timnath	large		Y						
Municipal Government - Wellington															
P		Larry	Lorentzen	lorentll@co.larimer.co.us	Wellington	Town of Wellington	large			Y	G	Lori			
	A	Jack	Brinkhoff	brinkhjd@co.larimer.co.us	Wellington	Town of Wellington	large				G	Lori			
	A	Alisa	Darrow		Wellington	Town of Wellington	large			Y	G	Lori			
Municpal Government - Windsor															
P		John	Vazquez	jvazquez@windsorgov.com	Windsor	Town of Windsor	large				G	Lori			
	A	John	Micheels		Windsor	Town of Windsor	large			Y	G	Lori			
Other Stakeholders - Fire															
P		Jon	Landkamer	jlandkamer@estesvalleyfire.org	Estes Park	Estes Park FPD	large	Y			G	Eric	Y	Estes Park FPD	
	A	Scott	Dorman	sdorman@estesvalleyfire.org	Estes Park	Fire Chief	large		Y		N	Eric			
		Carie	Dann	Carie.Dann@cityofLoveland.org	Loveland	Fire	large				N	Pat			
		Bill	Lundquist	welundquist@gmail.com	Loveland	Fire	large				N	Pat			
		Ingrid	McMillan-Ernst	Ingrid.McMillan-Ernst@cityofloveland.org	Loveland	Fire	large				N	Pat			
		Greg	Ward	Greg.Ward@cityofloveland.org	Loveland	Fire	large				N	Pat			
		Steve	Charles	scharles@berthoudfire.org	FPD	Berthoud Fire Protection District	large			Y	N	Lori			
P		Marian	Kelly	mkelly@clvfd.org	FPD	Crystal Lakes Fire Protection District	large	Y	Y	Y	N	Lori	Y	Crystal Lakes FPD	

	A	Dan	Deffbaugh	osenbaugh@hotmail.com	Crystal Lakes Fire I	Crystal Lakes Fire Protection District	large	Y				Lori				
	A	Jim	Kubichek	greenbackcut@yahoo.com	Crystal Lakes Fire I	Crystal Lakes Fire Protection District	large	Y			Y	Lori				
P		Robert	Isaacson	gvfdchief1@gmail.com	FPD	Glacier View Fire Protection District	large	Y	Y		N	Lori	Y	Glacier View FPD		
		Richard	Wilcox	chief@pinewoodspringsfire.org	FPD	Pinewood Springs Fire Protection District	large			Y	N	Lori				
P		Hugh	Collins	H.Collins@poudrecanyonfiredistrict.org	FPD	Poudre Canyon Fire Protection District	large	Y	Y	Y	N	Lori	Y	Poudre Canyon FPD		
		Gerry	Wagner	rflvfdchief@centurylink.net	FPD	Red Feather Fire Department	large				N	Lori				
P		Jim	Montague	jmontague@poudre-fire.org	Non Profit	Poudre Fire GIS	large	Y			N	Gavin	Y	Poudre FPD		
	A	Shawn	McGaffin	smgaffin@poudre-fire.org	Non Profit	Poudre Fire Prevention	large				N	Gavin				
	A	Bob	Poncelow	bponcelow@poudre-fire.org	Non Profit	Poudre Fire Marshall	large				N	Gavin				
	A	Ron	Gonzales	rgonzales@poudre-fire.org	Non Profit	Poudre Fire Prevention	large				N	Gavin				
	A	Mike	Coavin		Non Profit	Poudre Fire Prevention	large			Y	N	Gavin				
P		Mike	Blackwill	mblackwill@wsfr.us	Non Profit	Windsor Severance Fire Rescue	large	Y			N	Lori				
	A	Herb	Brady	hbrady@wsfr.us	Non Profit	Windsor Severance Fire Rescue	large				N	Lori				
P		Gary	Green	ggreen@wfpd.org	Wellington	Wellington FPD	small	Y			N	Lori				
Other Stakeholders - Schools																
P		Ken	Quintana	ken.quintana@colostate.edu	Educational	Colorado State University	large	Y	Y	Y	N	Lori	Y	CSU		
	A	Susanne	Cordery-Cotter	susanne.cordery-cotter@colostate.edu	Educational	Colorado State University Facilities Dept.	large				N	Marsha				
	A	Fred	Haberecht	fred.haberecht@colostate.edu	Educational	Colorado State University Facilities Dept.	large				N	Marsha				
		Mike	Ellerby	Michael.Ellerby@frontrange.edu	Educational	Front Range College - Safety	large				N	Gavin				
		Pete	Hall	phall@psdschools.org	Educational	Poudre School District Operations Director	large				N	Gavin				
		Rick	Frei	rick.frei@thompsonschools.org	Educational	Schools	large				N	Pat				
Other Stakeholders - EMS/Emergency																
P		Braden	Applegate	braden.applegate@uchealth.org	Non Profit	Poudre Valley EMS	large	Y	Y		N	Lori	Y	Poudre Valley EMS		
	A	Tim	Klippert	tbk@pvhs.org	Non Profit	UC Health Emergency Manager	large				N	Gavin				
		Erin	Mounsey	Erin.Mounsey@redcross.org	Non Profit	Red Cross	large				N	Marsha				
		Melody	Storgaard	melody.storgaard2@redcross.org	Non Profit	Red Cross	large				N	Marsha				
P		Mike	Larson	mlarson@tvems.com	Non Profit	Thompson Valley EMS	large	Y			N	Pat				
	A	Mark	Turner	Mturner@tvems.com	Non Profit	Thompson Valley EMS	large				N	Pat				
P		Mike	Bielmaier	MBielmaier@epmedcenter.com	Non Profit	Chief Medical	large	Y			N	Eric				
Other Stakeholders - Other - Likely to Attend																
P		Shayna	Jones	shayna.jones@bigthompson.com	Non Profit	Big Thompson R. Restoration Coalition	large	Y	Y	Y	N	Pat	Y	Big Thompson R. Restoration Coalition		
P		Jim	Struble	jstruble@northernwater.org	Non Profit	Nothern Colorado Water Conservancy District	large	Y			N	Lori	Y	Northern Colorado Water Conservancy		
	A	Jerry	Gibbens	jgibbens@northernwater.org	Non Profit	Nothern Colorado Water Conservancy District	large		Y	Y						
P		Jim	Bolzot	BolzotJ@prpa.org	Non Profit	Platte River Power Authority	large	Y	Y		N	Lori	Y	Platte River Power Authority		
	A	Brian	Moore	mooreb@prpa.org	Non Profit	Platte River Power Authority	large	Y	Y		N	Lori				
P		Chris	Bleker	chris@utsd.org	Sanitation	Upper Thompson Sanitation District	large		Y		N		Y	Upper Thompson Sanitation District		
	A	Matt	Allen	matt@utsd.org	Sanitation	Upper Thompson Sanitation District	large		Y	Y	N					
P		Matt	Hines			Estes Valley Recreation and Parks District	large			Y	N					
Other Stakeholders - Other - Unlikely to Attend																
		Kimberly	Culp	Kculp@leta911.org	Non Profit	LETA 911 Director	large				N	Gavin				
		Karen	Reynolds	bsdacctg@boxelderssanitation.org	Non Profit	Boxelder Sanitation District	large				N	Lori				
		Corey	Engen	corey@flywater.com	Non Profit	Colorado Riparian Association	large				N	Marsha				
		Gary	Wockner	media@savethepoudre.org	Environmental NG	Save the Poudre	large				N	Marsha				
		John	Bartholow	JohnB@WebAccess.Net	Environmental NG	Save the Poudre	large				N	Marsha				
		Gina	Janett	ginasjap@frii.com	Environmental NG	Save the Poudre	large				N	Marsha				
		Jason	Godinez	godinezj@centennialerc.org	Non Profit	ARC	large				N	Gavin				
		Shawn	Tierney	Shawn@SustainableLivingAssociation.org	Non Profit	Sustainable Living Association	large				N	Marsha				
		Jenne	Loffer	jloffer@uwaylc.org	Non Profit	United Way 211 Larimer County	large				N	Marsha				
		Nate	Boschman	nate@wlrv.org	Non Profit	Wildland Restoration Volunteers	large				N	Marsha				
		Clint	Skutchen	clint@fcbr.org	Professional Assoc	Fort Collins Board of Realtors	large				N	Marsha				
		Scott	Hummer	npicscott@qwestoffice.net	Public	North Poudre Irrigation	large				N	Marsha				
		Sean	Dougherty	sean@hawaiianshirtguy.com	Realtor (Public)	Relator (Public)	large				N	Marsha				
		Chris	Harris	charris@soldiercanyon.com	Soldier Canyon Filt	Water Treatment Facility	large				N	Lori				
		Donn	Maynard	livermorechief@gmail.com	Special District	Livermore Fire Protection Dist.	large				N	Lori				

Water Board Agenda

Utilities – Water Board
700 Wood St.
PO Box 580
Fort Collins, CO 80522
970.416.2513
970.416.2208 - fax
fcgov.com

WATER BOARD
Regular Meeting Agenda

DATE: Thursday, July 16, 2015
LOCATION: 117 N. Mason – Board Room (access via west side door)
TIME: Dinner 5:00 pm; Meeting 5:30 – 7:30 p.m.

1. Call Meeting to Order
   Steve Malers, Chairperson
2. Staff Reports
   a. Monthly Water Resources Report
   b. Northern Integrated Supply Project (NISP) Update
   c. Summary of July 14 special City Council Work Session on Water Supply Planning
3. Grading, Erosion, and Sediment Control (GESC) Permit Update (Discussion: 15 minutes)
   Matt Zoccali, Regulatory & Government Affairs Manager
4. Sole Source Purchase of a Brown Bear Hydrostatic Tractor with Aerator for the Fort Collins Water Treatment Facility (Discussion & Action: 10 minutes)
   Mark Kempton, Water Production Division Manager
5. Northern Colorado Hazard Mitigation Plan (Discussion: 20 minutes)
   Ken Sampley, Water Systems Engineering Manager
6. New Business
7. Future Agenda Review

Project Website (Screenshot 1)

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COMMUNITY DEVELOPMENT DIVISION

Home

Welcome to the project website for the **2016 Larimer County, Colorado Multi-Jurisdictional Hazard Mitigation Plan Update.** Please check back often for project updates and postings. This website will be discontinued after the project is completed.

What is Hazard Mitigation?

The term "Hazard Mitigation" describes actions that can help reduce or eliminate long-term risks caused by hazards, or disaster, such as floods, hurricanes, wildfires, landslides, tornadoes, earthquakes, dam failures, or terrorism. As the costs of disasters continue to rise, governments and ordinary citizens must find ways to reduce hazard risks to our communities and ourselves. Efforts made to reduce hazard risks are easily made compatible with other community goals; safer communities are more attractive to employers as well as residents. As communities plan for new development and improvements to existin g infrastructure, mitigation can and should be an important component of the planning effort.

While mitigation activities can and should be taken before a disaster event has the chance to occur, after disasters hazard mitigation is essential. Oftentimes after disasters, repairs and reconstruction are often completed in such a way as to simply restore damaged property to pre-disaster conditions. These efforts may "get things back to normal", but the replication of pre-disaster conditions often results in a repetitive cycle of damage, reconstruction, and repeated damage. Hazard mitigation breaks this repetitive cycle by producing less vulnerable conditions through post-disaster repairs and reconstruction. The implementation of such hazard mitigation actions now by state and local governments means building stronger, safer and smarter communities that will be able to reduce future injuries and future damage.

About the Project

Larimer County created its previous Mitigation Plan in accordance with the requirements of the Federal Stafford Act, the National Flood Insurance Act, and 44 Code of Federal Regulations (CFR). That Northern Colorado Regional Hazard Mitigation Plan was approved by the Federal Emergency Management Agency (FEMA) on July 26, 2010. These plans must be updated and approved by FEMA every five years and the current plan will expire on July 26, 2015. Due to the damaging floods in the fall of 2013, Larimer County was granted an 'Extraordinary Circumstances' timeline by FEMA which allows the County until March 2016 to have this new Hazard Mitigation Plan approved by FEMA.

Larimer County and its participating jurisdictions, agencies, and organizations are now in the process of updating the County's Hazard Mitigation Plan and expect to have it approved by that March 2016 date.

Larimer County will benefit from this project by:

- Ensuring eligibility for all sources of hazard mitigation funds made available through FEMA.
- Increasing public awareness and understanding of vulnerabilities as well as support for specific actions to reduce losses from future natural disaster.
- Ensuring community policies, programs, and goals are compatible with reducing vulnerability to all hazards and identifying those that are incompatible.
- Building partnerships with diverse stakeholders increasing opportunities to leverage data and resources in reducing workloads as well as achieving shared community objectives.
- Expanding the understanding of potential risk reduction measures to include: local plans and

http://www.larimerhmp2016.com/ 1/2

Project Website (Screenshot 2)

regulations; structure and infrastructure projects; natural systems protection; education and awareness programs; and other tools.

- Informing the development, prioritization, and implementation of mitigation projects. Benefits accrue over the life of the project as losses are avoided from each subsequent hazard event.

Project Outreach and Communications

The Larimer County Office of Emergency Management is leading this project for the County and wants to ensure that all community stakeholders and citizens have an opportunity to be involved in this planning process. All project information and messaging will be posted utilizing this website and updates will also be communicated via Larimer County's Office of Emergency Management Facebook page.

Public Mitigation Meeting Flier

A Resilient Larimer County: Mitigating Hazards in our Backyard

Larimer County and its jurisdictions are finalizing a planning process to update the local hazard mitigation plan and would like input from the community.

Attend a Meeting

To learn more, the Larimer County Office of Emergency Management and its major cities and towns invite you to a casual evening of discussions about local natural hazards and what impacts can be expected. Your input regarding what you think can be done to mitigate these impacts is important.

Questions to think about:

- What natural hazards impact you?
- What can we do to reduce these impacts?
- How could natural hazards impact those you care about and services you rely on daily?

Other details include:

- open house setting
- casual discussions facilitated by city representatives
- high-quality, up-to-date natural hazard maps
- opportunities to learn and share ideas

Information regarding additional meeting locations and dates, as well as background on the project and hazard mitigation, are available at *www.larimerhmp2016.com*.

OPEN HOUSE

Wednesday, Dec. 2, 6-8 p.m.
Larimer County Building
200 West Oak St.
Boyd Lake Conference Room, 1st Floor
Short presentations will be given
at 6:15 p.m. and 7:15 p.m.

Contact:
Lori Hodges, Larimer County
Director of Emergency Management
303-656-3214

Mike Gavin, City of Fort Collins
Emergency Manager
970-416-2878

Pat Mialy, Loveland Fire Rescue Authority
Emergency Manager
970-962-2534

www.larimerhmp2016.com

LARIMER COUNTY COMMITTED TO EXCELLENCE

City of Fort Collins

City of Loveland

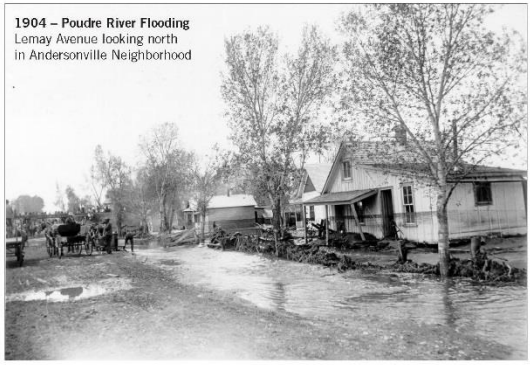
11/15

Flood History Educational Materials

Fort Collins Flood History Information

Drainage Basins	Dates	Descriptions
Cache la Poudre River	1844, 1864, 1891, 1904, 1923, 1930, 1976, 1983, 1999, 2010, 2011, 2013 and 2014	The three largest floods occurred in 1864, 1891 and 1904, with peaks of approximately 21,000 cubic feet per second (cfs). For comparison, the discharge of the Poudre River at "flood stage" is about 4,000 cfs. Flooding on the Poudre is primarily from snowmelt in late May and June. However, flash flooding can occur at any time. A severe flood has not occurred in more than 100 years.
Spring Creek	1902, 1904, 1938, 1949, 1951, 1961, 1977, 1983 and 1997	The 1997 flood resulted in five deaths, destruction of 120 mobile homes and damage to 2,000 homes and businesses. This flood was considered to be greater than a 500-year event.
Dry Creek	No serious flooding since about 1950	The absence of even minor flooding is generally attributed to the network of irrigation canals that have some capacity for intercepting small to moderate Dry Creek flows.
Fossil Creek	1902, 1938, 1965, 1977, 1979, 1997, 1999 and 2007	Fossil Creek is relatively undeveloped and past floods have gone unnoticed. In addition to flooding hazards, Fossil Creek also is susceptible to bank erosion.
Boxelder Creek/ Cooper Slough	1909, 1922, 1930, 1937, 1947, 1963, 1967, 1969 and 2007	Boxelder Creek has a drainage area of 251 square miles and 176 square miles now are controlled by Soil Conservation Service flood control dams near Wellington.
Old Town Basin	1904, 1933, 1938, 1951, 1977, 1983, 1988, 1992, 1997 and 2009	Street flooding is the primary problem in this basin.
Canal Importation Basin	1938, 1951, 1975, 1992, 1997, 1999 and 2009	There are several small drainage areas in this basin. Development prior to drainage criteria encroached on the channels, reduced the flow capacity and caused flooding. The irrigation canals also overflow their banks and cause flooding.
West Vine Basin	1980, 1997 and 1999 (Past floods were not well documented.)	Localized flooding occurs due to encroachment on drainages and from irrigation ditch spills.

1992 – Old Town Flooding
Shields and Elizabeth Street looking toward Moby Arena



1904 – Poudre River Flooding
Lemay Avenue looking north
in Andersonville Neighborhood

1997 – Spring Creek
Creekside Park along
College Avenue

2016 HMP Goals and Objectives

Michael Baker INTERNATIONAL

We Make a Difference

LARIMER COUNTY
COMMITTED TO EXCELLENCE

Larimer County 2016 Multi-Jurisdictional Hazard Mitigation Plan Update
Mitigation Strategy Goals & Objectives

Goals:

1. Protect people, property, and natural resources
2. Improve capability to reduce disaster losses
3. Strengthen communication and coordination among public agencies, non-governmental organizations, businesses, and citizens
4. Increase public awareness of natural hazards and mitigation options
5. Integrate hazard mitigation into other planning mechanisms

Objectives

A. Continue to develop and expand public awareness and information programs
B. Enhance training for hazard prevention and mitigation options
C. Incorporate risk reduction principles into policy documents and initiatives; other institutional plans
D. Continue to collaborate with area partners through mutual aid agreements and long-term planning efforts
E. Reduce the vulnerability of local assets to the impact of hazards

www.LarimerHMP2016.com

MBAKERINTL.COM

165 South Union Blvd., Suite 200 | Lakewood, CO 80228
Office: 720.514.1100 | Fax: 720.479.3157

Public Surveys Used During the HMP Process

*a detailed explanation of both surveys is included in Chapter 3 of the 2016 Larimer County HMP

Visions for a Resilient Larimer County

Core Community Resilience Themes

The purpose of this survey is to gather preliminary information from community members and stakeholders about the current capacities and resiliency conditions of their community as well as to develop a long-range vision for a resilient Larimer County. In the Colorado Resiliency Framework, resilience is defined as, "that ability of communities to rebound, positively adapt to, or thrive amidst changing conditions or challenges – including disasters and climate change – and maintain quality of live, healthy growth, durable systems and conservation of resources for present and future generations." This survey is designed to elicit input about ways to improve community capacity, capability, and resiliency. The survey should take 10-15 minutes to complete and all responses will remain anonymous.

(Note: Survey design based on the Communities Advancing Resilience Toolkit (2012), the Terrorism and Disaster Center at the University of Oklahoma Health Sciences Center)

*** 1. What community do you live in?**

*** 2. How long have you lived in this community?**

- ◯ less than a year
- ◯ 1-5 years
- ◯ 5-10 years
- ◯ over 10 years

3. The following statements are possible descriptions of your community. Please select one response for each statement.

	Strongly Disagree	Disagree	Neither Disagree Nor Agree	Agree	Strongly Agree	I Don't Know
A - People in my community feel like they belong to the community.	◯	◯	◯	◯	◯	◯
B - People in my community are committed to the well-being of the community.	◯	◯	◯	◯	◯	◯

Larimer Public Risk Perceptions

Larimer County Hazard Mitigation Plan Update - Risk Perception Survey

The Larimer County Office of Emergency Management is in the process of updating the County's Hazard Mitigation Plan. The updated Plan will provide our community with a clear picture of the risks we face and will outline a strategy for reducing those risks and preventing losses in the future. A key piece of the mitigation planning process involves local residents and their expert knowledge about where they live and the environment around them. As a resident of Larimer County, you are invited to share your experiences, concerns, and ideas with the planning team throughout the plan update process. The purpose of this survey is to better understand risk perceptions among members of the Larimer County community and to identify the best ways to communicate with you moving forward. This survey should take 5 - 10 minutes of your time and your results will be collected anonymously. This survey is one of many that the planning team has developed for this project and we look forward to working with you to develop a plan for resilience in Larimer County.

1. How many times has a natural hazard disrupted your daily life in the last five years?

- ◯ 0
- ◯ 1-2
- ◯ 3-5
- ◯ More than 5 times

2. What types of hazards or disasters have you experienced while living and/or working in Larimer County? Please list them below.

3. How concerned are you about the following hazards?

	Not Concerned	Somewhat Concerned	Extremely Concerned	I don't know
Drought	◯	◯	◯	◯
Earthquake	◯	◯	◯	◯
Erosion/Land Subsidence	◯	◯	◯	◯
Extreme Temperatures	◯	◯	◯	◯
Flooding	◯	◯	◯	◯

Press Release: Larimer County Hazard Mitigation Open House November, 2015

Utilities
electric • stormwater • wastewater • water
700 Wood St.
PO Box 580
Fort Collins, CO 80522
970.221.6700
970.221.6619 fax • 970.224.6003 TDD
utilities@fcgov.com • fcgov.com/utilities

FOR IMMEDIATE RELEASE

November 19, 2015

Contact: Mike Gavin
Emergency Manager
City of Fort Collins
970-416-2878
migavin@poudre-fire.org
www.larimerhmp2016.com

A Resilient Larimer County: Mitigating Hazards in our Backyard—Open House, Dec. 2

FORT COLLINS, Colo. – Natural hazards pose a real threat to the people and property in our community. Join the Larimer County Office of Emergency Management and City of Fort Collins at an open house regarding the impacts of local natural hazards, Wednesday, Dec. 2, 6-8 p.m., Larimer County Building, 200 W. Oak St., Fort Collins, Boyd Lake Conference Room (first floor).

Larimer County and its jurisdictions are finalizing a planning process to update the local hazard mitigation plan and would like input from the community. This event will feature an open house setting with casual discussions and short presentations at 6:15 p.m. and 7:15 p.m. High-quality, up-to-date natural hazard maps will be available.

Community members are invited to share information about:

- natural hazards that impact them
- what could be done to reduce these impacts
- how natural hazards could impact those they care about as well as the services they rely on daily

For more information, as well as background on the project and hazard mitigation, visit www.larimerhmp2016.com, call City of Fort Collins Emergency Manager Mike Gavin at 970-416-2878 or TDD 970-224-6003.

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Dam Inundation Summary Table

Dam & Levee Inundation Summary Table Updated 2/11/15
City of Fort Collins, Colorado
Legend: No Critical Facilities Impacted by failure

				Critical Facility Inventory by Type																				
	Percentage of City Limits Impacted	Buildings Inundated	Drainage Basins Impacted	Gas Station	Manufacturing	Fire Stations	Police Stations	Other Government	Communication Facilities	Utilities (Electric, Water, Wastewater)	Higher Education	Schools - Elementery, Middle and High School	Day Care, Day Camp, After-School Care	Other Educational Facilities	Nursing Homes, Group Homes and Assisted Living	Adult Day Care	Hospitals	Urgent Care Facilities	Surgery Centers	Other Critical Medical	Notes
High Hazard Dam Name																								
ANHEI #8	0.51	837	Boxelder/Cooper Slough, Dry Creek, Cache la Poudre	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	
BARNES MEADOW	4.11	71	Cache La Poudre	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	Poudre R 100 yr FP
BOXELDER #2	2.39	52	Boxelder/Cooper Slough, Cache la Poudre	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
BOXELDER #3	1.12	26	Boxelder/Cooper Slough, Cache la Poudre	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
BOXELDER #4	0.55	9	Boxelder/Cooper Slough, Cache la Poudre	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
CHAMBERS	4.11	71	Cache la Poudre	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	Poudre R 100 yr FP
COBB LAKE	4.79	158	Boxelder/Cooper Slough, Cache la Poudre	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
COLLEGE #3	0.66	469	Cache la Poudre, Old Town, West Vine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
COMMANCHE	4.11	71	Cache la Poudre	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
DIXON CANYON	36.76	27,435	Boxelder/Cooper Slough, Cache La Poudre, Canal Importation, Foothills,	35	6	5	1	17	7	3	2	20	17	12	8	6	1	2	4	5		
DOUGLAS	7.99	1,869	Cache la Poudre, Dry Creek	5	2	0	0	2	1	1	0	1	1	0	0	0	0	0	0	0	0	
ELDER	0.23	26	Boxelder/Cooper Slough, Cache la Poudre, Dry Creek	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
FAIRWAY	0.04	4	Mail Creek	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
FLOOD CONTROL BASIN #1	7.99	1,869	Cache la Poudre, Dry Creek	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
FOSSIL CREEK	0	0	Fossil Creek, Cache la Poudre	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
HALLIGAN	3.97	453	Cache la Poudre	1	2	0	0	1	0	1	0	1	2	0	0	0	0	0	0	1	1	
HORSETOOTH	12.61	2,775	Boxelder/Cooper Slough, Cache La Poudre, Dry Creek	8	2	0	0	6	1	1	0	8	2	0	0	0	0	0	0	1	1	
HOURGLASS	4.11	71	Cache la Poudre	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	Poudre R 100 yr FP
INDIAN CREEK	0.54	7	Boxelder/Cooper Slough, Cache la Poudre	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
JOE WRIGHT	4.11	71	Cache la Poudre	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	Poudre R 100 yr FP
KLUVER	0.63	417	Cache la Poudre, Dry Creek	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
LONG DRAW	4.11	453	Cache la Poudre	1	2	0	0	1	0	1	0	1	2	0	0	0	0	0	0	1	1	
LONG POND	0.49	62	Cache la Poudre, Dry Creek	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
MILTON SEAMAN	3.97	453	Cache la Poudre, Dry Creek	1	2	0	0	1	0	1	0	1	2	0	0	0	0	0	0	1	1	
NORTH POUDRE #2	5.63	485	Boxelder/Cooper Slough, Cache la Poudre, Foothills	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	
NORTH POUDRE #3	5.31	73	Boxelder/Cooper Slough, Cache la Poudre	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
NORTH POUDRE #6	5.97	603	Boxelder/Cooper Slough, Cache la Poudre	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
NORTH POUDRE #8	4.85	547	Boxelder/Cooper Slough, Cache la Poudre	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
NORTH POUDRE #15	7.99	1,869	Cache la Poudre, Dry Creek	5	2	0	0	2	1	1	0	1	1	0	0	0	0	0	0	0	0	
PANHANDLE	4.11	71	Cache la Poudre	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	Poudre R 100 yr FP
PARK CREEK	8.82	2,700	Cache la Poudre, Dry Creek	8	2	0	0	2	1	1	0	1	2	0	0	0	0	0	0	1	1	
PETERSON LAKE	4.11	71	Cache la Poudre	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	Poudre R 100 yr FP
RAWHIDE	13.46	1,232	Boxelder/Cooper Slough, Cache la Poudre	2	1	0	0	3	0	0	0	2	0	0	1	0	0	0	0	2	1	
RICHARDS	<0.00	5	Dry Creek	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
ROCKY RIDGE	0.19	86	Cache la Poudre, Dry Creek	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
SATANKA	4.11	71	Cache la Poudre	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Confined to Horsetooth
SOLDIER CANYON	39.54	12,407	Boxelder/CooperSlough, Cache La Poudre, Canal Importation, Dry Creek,	28	4	3	0	13	3	1	1	10	5	4	0	3	0	1	2	2		
SPRING CANYON	47.29	30,210	Cache La Poudre, Canal Importation, Foothills, Fossil Creek, Fox Meadow	44	6	5	0	8	15	4	2	24	29	11	10	8	1	3	4	4		
TERRY LAKE	1.69	269	Cache la Poudre, Dry Creek	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
WARREN LAKE	1.58	783	Cache la Poudre, Foothills, Fox Meadows	2	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	
WATER SUPPLY NO 3	1.85	611	Cache la Poudre, Dry Creek	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
WATER SUPPLY NO 4	0.22	82	Cache la Poudre, Dry Creek	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
WINDSOR #3	6.64	886	Boxelder/Cooper Slough, Cache la Poudre, Dry Creek	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	
Levee Name																								
DRAKE TREATMENT PLANT WO LEVEE	0.36	34	Cache la Poudre, Foothills	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
OXBOW WO LEVEE	0.3	223	Cache la Poudre, Dry Creek	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
TIMBERLINE WO LEVEE	0.7	29	Cache la Poudre, Spring Creek	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1		

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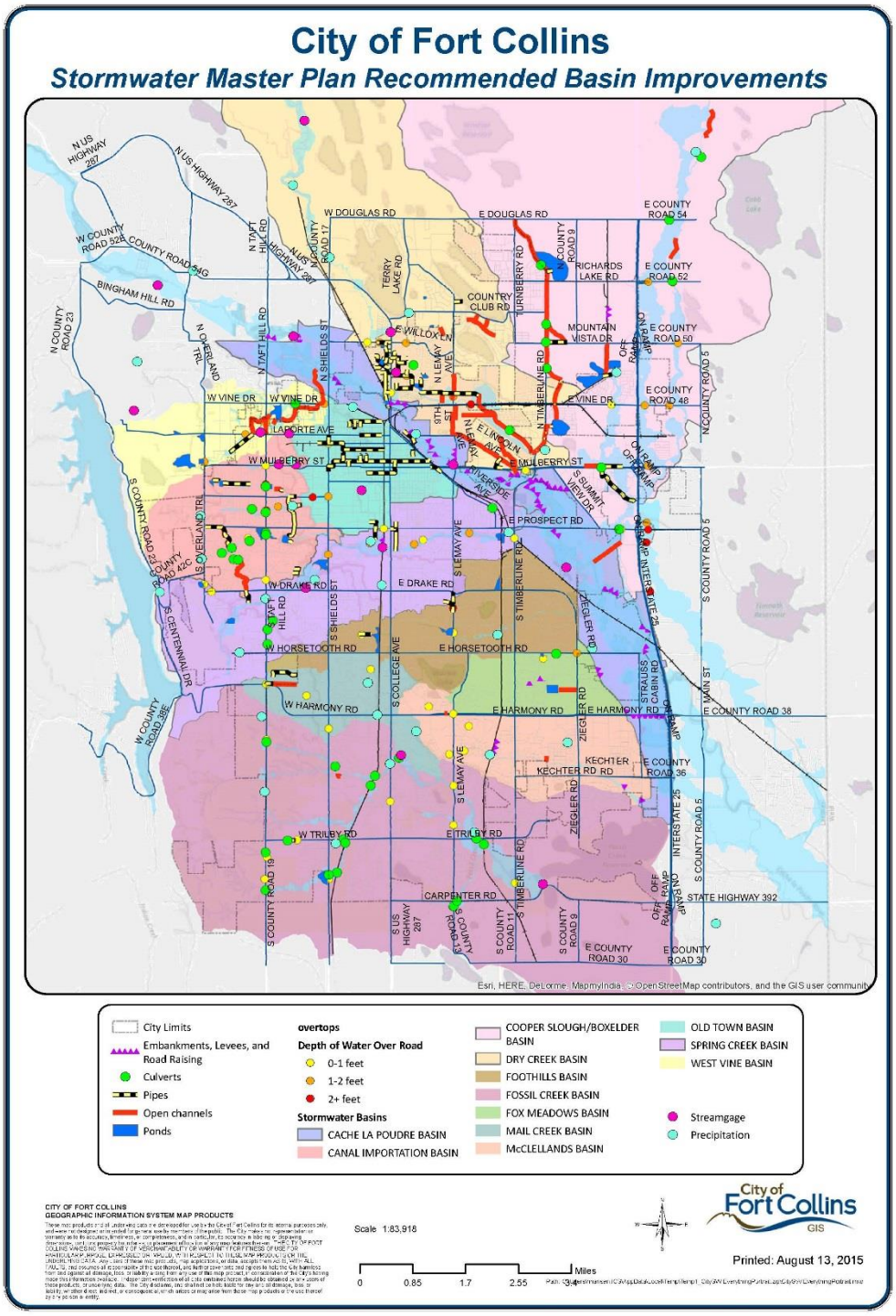
[272] Dam inundation maps are available for the City's use but are not made public.

City of Fort Collins: Stormwater Master Plan Recommended Basin Improvements



Appendix E – Update on Mitigation Actions from the 2010 Northern Colorado Regional Hazard Mitigation Plan

At the start of the 2016 Larimer County Multi-Hazard Multi-Jurisdictional Hazard Mitigation Plan update process, the MH SPT worked with participating jurisdictions to gather information and report on the status on the mitigation actions from the 2010 Northern Colorado Hazard Mitigation Plan. Over 200 actions were analyze and reported on. The results are included in the table below.

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
		x				Fort Collins-Loveland Municipal Airport	Aircraft Accidents	Annual review and update of master plan	Ongoing
x	x	x				Fort Collins-Loveland Municipal Airport	Aircraft Accidents	Construct a larger passenger terminal building: This is a long range planning item and will be reviewed yearly with the 6 year CIP update. This is low priority.	Priority dependent upon demand. When more flights and airlines come in it will drive the need for this to be done.
x	x	x				Fort Collins-Loveland Municipal Airport	Aircraft Accidents	Construct and staff an air traffic control tower: This is a long range planning item and will be reviewed yearly with the 6 year CIP update. This is low priority.	In progress with a virtual tower. Should be opened in August 2015
x	x	x				Fort Collins-Loveland Municip	Aircraft Accidents	Establish and maintain runway protection zones: The airports protections zones are established by zoning and are constantly threatened by	Ongoing

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
						al Airport		development. This is high priority. Staff attend planning meetings and keep planners and developers informed of the airports influence areas.	
x	x	x				Fort Collins-Loveland Municipal Airport	Aircraft Accidents	Extend the length of the primary runway: The runway extension is tentatively planned for 2012. The environmental assessment will begin this coming summer and will take a year and a half to complete. After the assessment the design will start construction late summer 2012. This is medium priority.	Not started
x	x	x				Fort Collins-Loveland Municipal Airport	Aircraft Accidents	Increase the width and potential of the cross-wind runway: The FAA says no funding of crosswind runways, which means we will take money from Loveland Fire Department to fund expansion. This is low priority.	Not started
x	x	x				Fort Collins-Loveland Municipal Airport	Aircraft Accidents	Install a new runway parallel to the primary runway: Install new and improved approach lighting for the main runway: This is a long range planning item and will be reviewed yearly with the 6 year CIP update. This is low priority.	Not started
x	x	x				Fort Collins-Loveland Municip	Aircraft Accidents	Pursue property acquisitions on lands adjacent to Airport property: No land acquisitions to date, but discussions with FAA have started in regard to	Not started

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
						al Airport		the dairy NW of the airport. This is medium priority.	
		x				Fort Collins-Loveland Municipal Airport	Aircraft Accidents	The runways were recently resurfaced.	Completed
x	x	x				Fort Collins-Loveland Municipal Airport	Aircraft Accidents	Work with the Transportation Safety Administration to be prepared for aircraft-related emergencies: TSA is constantly changing regulations to the ever changing security threats. As such we recently had to install fencing and access gates to secure the hangar areas. This high priority project is ongoing until the airport parameter is completely fenced (6' chain link with 1' barbed wire on top). With the hangar areas secured TSA mandated that we access badge all of the tenants, airplane owners, business owners, employees and anyone that has access to the Airport Operations Area (AOA). The airport went from having 44 badges to 590 to date. This required the airport to have its own stand alone badge access system. Fence and Gates, $480,000 to date, $400,00 to go. Badging $30,000 to date.	Completed

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
		x					All Incedent	The PFA Training Center, including the Emergency Operations Center (EOC) now has 100% back-up power via diesel. The computers and TV communications were also upgraded.	completed
							Avalanche	n/a	
		x					Biological Hazards / Influenza	Based upon the Leadership and Coordination chapter of our local influenza Response Plan, the primary focus is to limit the number of illnesses and deaths through education and inoculation, preserve continuity of essential governmental functions through the continuity of operation plans, minimize social disorder and minimize economic losses. Inoculation clinics have been implemented along with additional table top exercises for preparedness.	Completed
x	x	x	x	x	x	Larimer County Health Department	Biological Hazards / Influenza	Participation with the Larimer County Pandemic Steering Committee	Emergency Management and Public Health Officails participated in the committee and developed a Community Pandemic Flu Response

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
									Plan. This plan is due for an update. The committee no longer exists.
		x				Fort Collins Police Department	Civil Disturbance	A full scale active shooter exercise is proposed for 2010. All sworn personnel will attend this training, which is done at a local school. This is active training using volunteers as victims and as suspects. Simmunition is also used to add realism to the training. Tactics, searches, room entries, suspect contact, and victim rescue are all topics taught during this training. This is high priority.	Exercise was held at CSU between Fort Collins, CSU Police, Loveland PD, OEMS, Poudre Fire Authority, Public Health, Thompson Valley EMS in 2010 for active shooter. A follow up was held in 2012.
x	x						Civil Disturbance	All communities involved in the development of this Plan have identified employees who may become involved in potential incident responses to civil disturbances. These identified employees have completed the National Incident Management System (NIMS) training appropriate to their level of responsibility.	In 2014, as part of the CEMP, Larimer County created a Training and Exercise Annex for all personnel involved in emergency management activities,

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
									requiring NIMS coursework at varying levels. Same for Loveland and Fort Collins. Ongoing training in NIMS occurs for all jurisdictions.
		x				Fort Collins Police Department	Civil Disturbance	An Operations tabletop, in part to exercise response plans, was conducted and is proposed for 2010. This is medium priority.	Fort Collins did the Ops TTX. Loveland had LE involved in the airport exercise in 2014. Annual exercises continue to occur.
x	x						Civil Disturbance	Conduct annual emergency training exercises (table-top, functional, and/or full-scale exercises) to evaluate response plans.	All jurisdictions do this annually with TTX, Games, Functional Exercises and Full Scale.
x	x						Civil Disturbance	Develop and/or maintain emergency operations plans involving all local emergency responders.	In 2014, Larimer County updated their old EOP to a Comprehensi

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
									ve Emergency Management Plan that was approved by the Board of Commissioners and the Sheriff in January 2015. Fort Collins and Loveland reviewed annually and updated as needed. Re-written and re-published every three years.
x	x						Civil Disturbance	Develop plans to increase the number of horse-mounted law enforcement units.	In 2014, Larimer County added ESF 11b - Large Animal Response, to the CEMP. Loveland not started.
x	x						Civil Disturbance	Develop plans to increase the number of local law enforcement K-9 units. Each dog costs approximately $6,000 to purchase untrained. Training consists of approximately 10-weeks of off-	The Sheriff's Office K-9 program is currently at capacity and in a maintenance program now

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
								site training, plus at least 18 hours of training per month.	that it has been built out. They continue to increase or replace dogs as they retire or get injured. Loveland complete.
x	x						Civil Disturbance	Encourage local law enforcement officers to attend civil disturbance-relatcourses at the FEMA Emergency Management Institute.	Ongoing.
		x				Fort Collins Police Department	Civil Disturbance	Fort Collins Police also have a Mobile Field Force and all ranks continually train on ICS to maintain NIMS compliancy	Ongoing
		x				Fort Collins Police Department	Civil Disturbance	Fort Collins Police Department sworn and non-sworn employees take NIMS and ICS100 as basic training. It has been taught annually, but will now be scaled back to being taught every two years. Almost all of the staff have received ICS at the 200 level. This on-going action item is medium priority.	This has been accomplished and is an ongoing item.
		x				Fort Collins Police Department	Civil Disturbance	Fort Collins Police, within the officer, sergeant, and lieutenant rank attend a one day training session in July of each year, with 2 hours	Yes this occurred. And continues training

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
								dedicated to Mobile Field Force training, or riot control. Training is done with the department. Another one day session is proposed for 2010. This proposed action item is high priority.	occurs for active shooter and riot control. Loveland started an Active Assailant Program and trains on that program.
		x				Fort Collins Police Department	Civil Disturbance	Fort Collins School Resource officers work with individual schools in developing and training of active shooter protocol. This on going action item is high priority.	This occurs and is ongoing.
		x				Fort Collins Police Department	Civil Disturbance	In 2009, the Fort Collins Police Department (FCPD) developed plans for activation of the Police Services building Operations Room, which can serve as a EOC of sorts if necessary. A staff tabletop was conducted in June 2009 regarding the use of this room. Another tabletop is proposed for 2010 with other City emergency responders in an EOC setting. This proposed action item is medium priority.	Using a Police Ops Center at 2221 S. Timberline Training Room for a command center. Training has been done on EOC Ops. Loveland PD set up a police command center at 810 E. 10th Street, Loveland, 2nd Floor Training

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
									Room. Training occurs. Tabletop exercises in the EOC and Command Rooms
x	x						Civil Disturbance	Incorporate law enforcement K-9 units into horse-mounted law enforcement training programs whenever possible.	Loveland has not yet started. The Sheriff's Office K-9 units have not trained with mounted patrol. There is not plan to in the near future.
x	x						Civil Disturbance	Local law enforcement agencies maintain active and well-trained SWAT teams. Local fire and EMS agencies are incorporated into the SWAT training to improve intra-agency working relations during crisis response.	Well maintained and active.
	x						Civil Disturbance	Local law enforcement officers have received training in crowd control and routinely work large scale events to further develop their knowledge, skills and abilities to handle large crowds.	Ongoing

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
x	x						Civil Disturbance	Provide inter-agency training opportunities to improve the capabilities of local horse-mounted law enforcement units.	Loveland does this, on-going. The Sheriff's Posse conducts training regularly.
x	x						Civil Disturbance	Purchase additional less-lethal weapons for local law enforcement agencies. Options currently being addressed include Tasers, which cost approximately $1,000 per unit, and pepper-ball shotguns, which cost approximately $850 per unit.	This has been completed and is ongoing. Loveland outfitted all officers with Tasers, and FLIRs (Forward Looking Infra-Red). 2-FN303 launchers for patrol. Fort Collins is in the process of using cameras and Tasers. LCSO has tasers and less-lethal projectiles.

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
x	x						Civil Disturbance	Work with local school district safety committees to plan for and be prepared for possible disturbances at school district facilities.	Emergency Management partners throughout Larimer County, along with the School Districts, meet every month to work through planning requirements. One project is a Reunification Plan for emergencies and disasters at schools. Loveland meets with Thompson School District monthly as well to talk through procedures. Fort Collins meets with Poudre School District regularly.

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
	x						Civil Disturbance	Working with the Colorado Information Analysis Center and the local Terrorism Liaison Officer Program assists in providing intelligence which may assist in a Civil Disturbance.	Ongoing
x	x	x	x		x	Public Works or other appropriate department	Dam Failure	Maintain and improve existing stormwater engineering systems.	Yes and is ongoing.
x	x	x	x		x	Public Works or other appropriate department	Dam Failure	Maintain current and accurate emergency notification contact information or agencies, departments, private companies and/or individuals that may be eeded to respond in the event of a dam failure.	EAP has all of the emergency contact information. Loveland and Fort Collins has a stormwater plan with all this information as well
x	x	x			x	Public Works or other appropriate department	Dam Failure	Maintain current and accurate flood risk maps.	Fort Collins maps reviewed annually and after every incident to update. Larimer County 2013 Flood changed the

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
									mapping and we now need new mapping. A floodplain remapping effort has begun and is being managed by the Colorado Water Conservation Board.
			x			Public Works or other appropriate department	Dam Failure	Maintain current and accurate flood risk maps.	On going Maintain flood risk maps
x	x	x			x	Public Works or other appropriate department	Dam Failure	Review and update existing emergency operations plans on an annual basis to address the issue of dam failures and/or flooding.	EAPs address this need each year. Meet regularly with BOR and have regular calls with BOR during high flow incidents.
x			x			Public Works or other appropri ate	Dam Failure	Review and update existing emergency operations plans on an annual basis to address the issue of dam failures and/or flooding.	On going Review update EOP

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
						department			
x	x		x		x	Public Works or other appropriate department	Dam Failure	Work with the Colorado Division of Water Resources and/or Bureau of Reclamation to ensure that periodic assessments are conducted at area dams and that appropriate measures are taken to correct any deficiencies or issues noted.	Yes and ongoing.
		x				Public Works or other appropriate department	Dam Failure	Work with the Colorado Division of Water Resources and/or Bureau of Reclamation to ensure that periodic assessments are conducted at area dams and that appropriate measures are taken to correct any deficiencies or issues noted.	On going Correction - work with State of CO Engineers for NFIP Dam compliance
		x				Fort Collins Utilities	Drought / Extreme Heat	Facility audit program expansion.	Done.
		x				Fort Collins Utilities	Drought / Extreme Heat	Financial incentives for commercial water-saving upgrades.	Done.
		x				Fort Collins Utilities	Drought / Extreme Heat	Irrigation technology rebates.	Done.

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
x	x						Drought / Extreme Heat	Local agencies are currently studying the feasibility of increasing available domestic water supply through the construction of Windy Gap Reservoir above Carter Lake. At this time, the land purchase has been is completed and the project is in the public input phase. The project estimated to cost a total of $270 million when completed.	The proposed reservoir is referred to as 'Chimney Hollow.' The Record of Decision has been issued in the affirmative from Reclamation, and the project proponents are currently working with the State of Colorado for a 401 Certification, intended to be followed by a 404 permit from the US Army Corps of Engineers. Assuming no veto is issued by the Environmental Protection Agency, this work should be completed within the next year. Engineering design is

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
									expected to begin in the first quarter of 2016.
x	x						Drought / Extreme Heat	Local agencies are in the process of studying the feasibility of increasing available domestic water supply through the construction of Glade Reservoir north of Fort Collins. This project is currently in the initial public input phase.	This project continues to move ahead through the public input phase. The initial Environmental Impact Statement has been completed. However, a supplemental EIS is being pursued, but the Record of Decision has not been issued. The permitting process may require another couple of years.
x	x						Drought /	Local governments may consider requiring water saving	Has not been done. May be considered in the future.

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
							Extreme Heat	plumbing features in new construction projects.	Recommendations occur but not requirements. Loveland's requirements match federal and state requirements.
x	x						Drought / Extreme Heat	Local water providers as well as public works agencies provide education to property owners about use of drought-resistant or native vegetation requiring reduced amounts of water.	Reports come out to residents regarding energy and water savings and education. Large public education program regarding this. Loveland offers an optional 'hydrozone' development option to developers or HOA's, and reduces the raw water requirments to match the demands of those development

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
									s. An extensive list of suitable plants for each hydrozone are included in the City's 'Site Development Performance and Standards Guidelines' document. This program has been received well as developers want a lower raw water requirement and the public seems to enjoy the lower water use plantings.
x	x						Drought / Extreme Heat	Local water providers periodically implement domestic water use restrictions during identified periods of drought. Increases in water tap and/or water use fees are also addressed during times of drought.	Restrictions implemented and ongoing. Loveland successfully work with its citizens to encourage wise water use during drought through

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
									education and information sharing. Water use restrictions have rarely been implemented for a very short period, but that option is reserved for extreme conditions. Loveland does not have an inclining block rate structure.
		x				Fort Collins Utilities	Drought / Extreme Heat	Low income retrofit program.	Done.,
		x				Fort Collins Utilities	Drought / Extreme Heat	Online access to water history.	Done.
		x				Fort Collins Utilities	Drought / Extreme Heat	Public information campaign expansion.	Fort Collins has expanded their Public Information campaign for all-hazards. PIO and JIC fundtions

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
									have expanded and continue to train.
x	x						Drought / Extreme Heat	The City of Loveland hosts an annual Public Works Day. This annual event provides public education in the area of water conservation to the citizens of Loveland.	The City's Public Works Day is held every year, but was cancelled in 2015 due to inclement weather. Passport to Water & Power was held on July 23, 2015 and had an excellent turnout of citizens that were interested in learning more about where their water and power comes from. Outreach activities also include Children's water festival at local schools.

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
x	x						Drought / Extreme Heat	The City of Loveland recently completed a major project to increase available domestic water supply through the construction of Green Ridge Glade Reservoir west of Loveland. This project was completed in 2004 at a total cost of $20 million.	Green Ridge Glade Reservoir has been in continuous service since it was first filled in 2004/05. The City does on-going dam inspections and maintenance to insure it is in good working order.
		x					Earthquake	Additionally, infrastructure vulnerability assessments will be conducted in 2012.	Ongoing
x	x	x					Earthquake	Build hazard awareness through K-12 education programs, public courses information distribution, and appropriate offerings of hazard-relatedin local colleges and universities.	Each school has on OEM and builds these programs for their areas. The jurisdictional OEMs support these measures as needed.
x	x	x					Earthquake	Maintain open communications with the Colorado Geologic Survey to	OEM receives notifications from CGS regularly and

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
								remain informed on earthquake risk assessments.	lines of communication remain open.
x	x	x					Earthquake	Predict collateral damage and cascading failures based on models of infrastructure interdependencies.	Loveland addresses this in their COOP plan. Larimer is working on their COOP now and needs to address this further. Building Department for Larimer recently went through all building codes to look for mitigation actions for earthquake and other hazards.
x	x	x	x	x	x		Expansive Soils / Subsidence	Local Land Use Plans, Capital Improvement Plans, and Building/Zoning Codes address all of these issues.	All plans address this.
x	x	x	x	x	x	Fire Prevention Bureaus	Fires - Urban	The majority of mitigation efforts focus on fire prevention and public education activities. The local fire departments adopt and enforce standardized model fire codes which are adopted into both	True for all jurisdictions. Loveland has 2012 Int'l Fire Code adopted.

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
								municipal code as well as county ordinance.	
		x				Poudre Fire Authority	Fires - Wildland	Completing home assessments.	Has been done and is ongoing in various fire departments / districts.
x	x	x				Loveland Fire & Rescue, Poudre Fire Authority	Fires - Wildland	Conducting "Red Zone" wildfire risk assessments of the various residential neighborhoods within their identified wildland-urban interface zones. There are currently approximately 296 neighborhoods identified throughout Larimer County. This high priority project is on going and is funded by grants.	Various departments do Red Zone risk assessments annually and will continue. Growth of this program is warranted
	x			x		Fire Prevention Bureaus	Fires - Wildland	Develop a CWPP.	These exist throughout the county and we have a Larimer County CWPP.
		x				Poudre Fire Authority	Fires - Wildland	Develop a Poudre River Corridor Fire Management Plan.	The High Park Wildfire in 2012 caused changes to this action since the fuel model changed significantly in this area. City of Fort

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
									Collins Water Utilities is looking at this for the future due to the impacts from High park Wildfire.
x	x					Larimer County Coordinating Group	Fires - Wildland	Larimer County Emergency Services administers open burning permit programs designed to regulate the safe use of fire for fuels reduction projects completed by area property owners.	All jurisdictions in Larimer participate in the opn burning permit program except Berthoud, who participates in Boulders program ..
x	x					Larimer County Coordinating Group	Fires - Wildland	Larimer County Emergency Services maintains web-based wildland fire information, including links to the FireWise wildland fire safety education program (http://www.co.larimer.co.us/wildfire/). LCES would like to expand this high priority project in 2010. Funding to implement this action item is from existing program funds and grants.	LCSO still give info on FireWise. Other jurisdictions throughout Larimer also use this. Expansion of this program throughout Larimer is needed.

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
x						Larimer County Coordinating Group	Fires - Wildland	Larimer County has established and enforces building and planning codes specific to construction in the wildland urban interface. These codes require defensible space on new construction in the wildland-urban interface.	Larimer County just reviewed all land use, wildfire, and building codes and will be making recommendations to the BCC on changes to the codes.
x						Larimer County Coordinating Group	Fires - Wildland	Larimer County has historically provided tree slash disposal options to homeowners in the wildland-urban interface in order to promote the establishment of defensible space around residential dwellings. A proposed, high priority action item for 2010 is to continue to provide thisservice. Procurement of grant funding is necessary to implement this action item.	Larimer is working with communities to do their own slash disposal programs with assistance from the county, but we no longer have this program .
			x			Larimer County Coordinating Group	Fires - Wildland	Larimer County has historically provided tree slash disposal options to homeowners in the wildland-urban interface in order to promote the establishment of defensible space around residential dwellings. A proposed, high priority action item for 2010 is to continue to provide	On going Our PIO assists FD with slash disposal public info and slash site collection management

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
								thisservice. Procurement of grant funding is necessary to implement this action item.	
x	x					Larimer County Coordinating Group	Fires - Wildland	Larimer County provides public wildland fire education and information to homeowners. Topics include wildland fire safety and awareness, defensible spaces, and urban interface issues.	This occurs through several jurisdictions, including state agencies. Info distributed via multi-media, social media, and public events. Would like to expand this program to include more measures in the future.
					x	Berthoud Fire Protection District	Fires - Wildland	Numerous proposed mitigation action items were generated during the completion of the CWPP.	Countywide CWPP has been updated a few times and the LCSO reviews the actions regularly.
		x				Poudre Fire Authority	Fires - Wildland	Return Fort Collins Natural Areas back on a schedule of two prescribed fires per annum.	The 2012 Wildfire Season made the fire depts re-evaluate this program and therefore

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
									may not have 2 prescribed fires per year, but the program continues. Depends upon the risk of each season.
		x					Fires - Wildland	Vulnerability assessments are performed in the urban wildland area as part of the Community Wildfire Protection Plan. This plan includes identification of fuels management, home assessments, Firewise education, evacuation/escape routes, and restoration plans to name a few of the critical components.	Ongoing
		x				Poudre Fire Authority	Fires - Wildland	Website for homeowners accopanied by informational mailings to homeowners.	Ongoing
		x				Poudre Fire Authority	Fires - Wildland	Wildland Urban Interface fire plans.	Ongoing
x	x					Larimer County Coordinating Group	Fires - Wildland	Working with local communities to create and implement CWPPs.	CWPP's exist. Implementation efforts on-going.

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
		x					Flood - Flash and Riverine	A letter of map revision (LOMR) was approved for the Choice Center student residential housing project formerly constructed in the Spring Creek special flood hazard area (SFHA). The LOMR flood risk update became effective on July 25, 2014, formally removing 800 residents living in 2 residential structures from the SFHA as a result of fill, building elevation and engineered flood conveyance.	Completed
		x				Stormwater MP/FP Administration Staff assisted CWCB and FEMA staff	Flood - Flash and Riverine	A RiskMAP update for the Poudre River Basin has commenced to better define the flood risk for the Poudre River. Hydrology has been submitted to FEMA and is currently under review and revised hydraulic modeling has commenced. An updated flood risk map for the Poudre River corridor is expected in Summer 2014.	Ongoing
		x					Flood - Flash and Riverine	A Social Media campaign was added for Flood Awareness Week this year. It included one message per week leading up to Flood Awareness Week and five messages during Flood Awareness Week.	Ongoing
			x				Flood - Flash and Riverine	A Social Media campaign was added for Flood Awareness Week this year. It included one message per week leading up to Flood Awareness Week and	Also NFIP compliant with Flood education

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
								five messages during Flood Awareness Week.	preparation/ awareness
		x					Flood - Flash and Riverine	Along 1st Street, cured-in-place pipe was installed. Bank collapse downstream of the LPATH levee in the Riverbend Ponds area was performed with the installation of rip-rap and engineered fill material	Completed
		x					Flood - Flash and Riverine	Arapahoe Bend - Repaired the east bank of one pond at that was eroded during the 2013 flood.	Completed
		x					Flood - Flash and Riverine	As a result of the Canal Importation Ponds and Outfall project, several floodplains in central west Fort Collins have been reduced or eliminated. These floodplain changes are currently under review and will be adopted in late 2012.	Ongoing
		x					Flood - Flash and Riverine	Assisted with water quality standards setting, design review and system evaluation for various proposed new developments. Led a stormwater quality tour of existing stormwater treatment facilities as a component of a City of Fort Collins employee education program. Gave two lectures at CSU for Civil Engineering and Landscape Architecture students regarding LID-based stormwater management policies and technologies	Completed

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
		x					Flood - Flash and Riverine	Bellwether Channel – Reestablished positive drainage to keep water from covering the bike path.	Completed
		x					Flood - Flash and Riverine	Benson Lane – Eliminated erosion from the hill between 930 and 931 Benson Lane by installing a concrete pan and energy dissipaters in the pan.	Completed
		x					Flood - Flash and Riverine	Boxelder Creek at Prospect Road – This project is currently in the design phase. The project includes a flood control channel and new bridge at Boxelder Creek and Prospect Road. The purpose of the project is to prevent overtopping of Prospect Road in a 100-year flood event.	Ongoing
		x					Flood - Flash and Riverine	Burns Tributary Channel – restoration of channel bank including removing a homeowner placed retaining wall on City property, regarding slopes, and erosion protection.	Completed
		x					Flood - Flash and Riverine	Canal Importation Basin – a gasoline station at 1337 W. Elizabeth Street is gone (with underground storage tanks	Completed

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
								removed), replaced by a coffee shop.	
		x				Stormwater MP/FP Administration Staff	Flood - Flash and Riverine	City staff completed hydrology updates for three of the City's Stormwater Master Plan basins to include new EPASWMM hydrologic models in lieu of the effective, outdated MODSWMM model. The basin updates included Dry Creek, the Canal Importation Basin, and Boxelder Creek basin. The 100-year floodplain for the Dry Creek basin will be updated as part of an upcoming CLOMR/LOMR for the Dry Creek at Vine Flood Control project. The Boxelder Creek 100-year floodplain will be updated as part of an upcoming CLOMR/LOMR for the East Side Detention Facility flood control project which is being designed and built by the Boxelder Basin Stormwater Authority. Lastly, the Canal Importation Basin 100-year floodplain is currently being updated by the City. An extensive public outreach process is occurring to notify residents of the floodplain changes within the basin.	Ongoing
		x				City Stormwater	Flood - Flash and Riverine	City Stormwater developed and hosted a one-day functional training exercise to improve communication and response among City, County, State and Federal agencies responding to	

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
								flood and debris-generation from the High Park fire burn area that would threaten City and County residents and public infrastructure.	
		x				Stormwater MP/FP Administration Staff	Flood - Flash and Riverine	City Stormwater staff completed design of the City's first stream rehabilitation reach (Fossil Creek Reach 4, Sub reach 1). Construction of the project is slated to begin on October 1, 2014.	Completed
		x				Stormwater MP/FP Administration Staff	Flood - Flash and Riverine	City Stormwater staff worked closely with the City Parks Department to complete the design for the stream rehabilitation of a reach of McClelland's Creek through the new Southeast Community Park.	Ongoing
		x					Flood - Flash and Riverine	City website was updated to improve customer access to Stormwater services. Please see http://www.fcgov.com/utilities/what-we-do/stormwater.	Completed
		x					Flood - Flash and Riverine	Clearview Channel – Construction was completed on improvements to Clearview Channel between Briarwood Road and Hillcrest Drive. Improvements included rebuilding the channel to repair eroded areas and prevent future erosion, improving maintenance access and enhancing channel habitat.	Completed

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
		x					Flood - Flash and Riverine	Completed an update of the City's Stormwater Master Plan to include stream rehabilitation and water quality projects and received approval on a funding mechanism from City Council to include $650,000 annually for stream rehabilitation and water quality projects.	Completed
		x					Flood - Flash and Riverine	Conducted innovative public outreach for the Stormwater Master Plan update including development of a social media outreach approach, develop and implement an online stormwater quiz, update to the Stormwater Master Planning web page, and a booth at the New West Fest public event.	Completed
x		x		x		Boxelder Creek Regional Alliance	Flood - Flash and Riverine	Construction of a siphon / waste way along the Larimer Weld Canal at Boxelder Creek.	This project is called the Larimer Weld Canal Crossing Structure (LWCCS) and consists of a weir overflow (spill). Construction of the $0.9 Million project will begin in fall or winter 2015 and will be completed

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
									by Spring 2016.
x		x		x		Boxelder Creek Regional Alliance	Flood - Flash and Riverine	Construction of Edson Reservoir.	This project was renamed as the East Side Detention Facility (ESDF) and relocated due to site constraints to Boxelder Creek between CR 50 and 52 in order to provide the needed detention. In addition, improvements to CR 52 are included with the detention facility construction. The construction contract totals $7.5 Million and includes both the ESDF and CR52 Improvements.

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
									Construction began on Aug. 3, 2015 and is scheduled for completion by Spring 2016. The project is being completed by the BBRSA and Timnath in partnership.
x		x		x		Boxelder Creek Regional Alliance	Flood - Flash and Riverine	Construction of I-25 split flow diversion channel.	With the revisions to the BBRSA Master Plan Improvements, the diversion channel improvements were eliminated.
		x					Flood - Flash and Riverine	Coordinated with several City departments and City Boards to develop a prioritization matrix (MCDA Tool) that was used for prioritizing upcoming stream rehabilitation projects. Presented the City's stream rehabilitation and water quality update at the annual CASFM conference.	Completed
		x				Stormwater	Flood - Flash	Coordinating with CDOT to perform stream rehabilitation	Ongoing

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
						MP/FP Administration Staff	and Riverine	and scour countermeasures on Spring Creek at US Highway 287/College Avenue. Design of the project will begin in fall 2014, with construction scheduled to begin in fall 2015	
x		x		x		Boxelder Creek Regional Alliance	Flood - Flash and Riverine	Diversion of Coal Creek to Clark Reservoir.	This project was completed in 2012 by the Boxelder Basin Regional Stormwater Authority (BBRSA). The BBRSA ws formed by the City of Fort Collins, Larimer County and the Town of Wellington. The total project cost was approximately $5.1 Million. Funding of approximately $3 Million from a FEMA Hazard Mitigatin Grant was

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
									used towards this project.
		x					Flood - Flash and Riverine	Dry Creek at Vine Drive Flood Control project - This project is currently in the design phase. This project includes the design of a detention pond at Vine Drive and Dry Creek. The purpose of the project is to provide a stormwater outfall for the areas around North College Avenue. The project will also provide flood control benefits along Dry Creek from Vine Drive south to the Cache la Poudre River.	Ongoing
		x					Flood - Flash and Riverine	During the summer of 2013, the City began the public outreach process related to adopting the State Rules and Regulations for Regulatory Floodplains in Colorado that were adopted in January 2011 by the Colorado Water Conservation Board. A website -- (http://www.fcgov.com/utilities/what-we-do/stormwater/flooding/floodplain-regulations#stateregs was established for communicating about the changes. Presentations were made to various Boards and	Completed

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								Commissions and community organizations. Because the City already had adopted many of these rules, there are relatively minor changes that are needed. These rules were adopted by City Council on November 5th, 2013.	
		x					Flood - Flash and Riverine	Flood Awareness Week was held July 12-19, 2014. Stormwater's efforts included mailings of an updated flood awareness brochure to each City floodplain resident and property owner. Stormwater also set up flood awareness displays in 12 public buildings, placed flood awareness messages on bus benches, hung banners from Utility poles in four downtown locations, and broadcast flood awareness videos on the City Cable Channel 14. A separate mailer about floodplain management services offered by the City of Fort Collins will be sent to local realtors, insurance agents and lenders.	Ongoing
		x					Flood - Flash and Riverine	Floodplain maps and rain gauge data are available for iPhones, Android and Windows Smartphones. Users can search by address or zoom to a specific location to see the floodplain map. Rain gauge data can be viewed in real-time.	Completed

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
		x					Flood - Flash and Riverine	Fossil Creek Stream Stability – The design for the Fossil Creek stream stability project is underway. The project includes laying back vertical eroded banks and planting hundreds of native plants and shrubs along the section of Fossil Creek immediately west of Lemay Avenue.	Ongoing
		x					Flood - Flash and Riverine	Fox Meadows Detention basin – Improved appearance and maintenance accessibility by removing a deteriorating fence.	Completed
		x					Flood - Flash and Riverine	In May of 2012, the Physical Map Revision to Spring Creek became effective. This new FEMA mapping reflected four flood mitigation projects and resulted in 120 homes and businesses being removed from the floodplain and reduced risks for 850 properties. City stormwater fees, along with a $2.7 million FEMA Pre Disaster Mitigation (PDM) grant, paid for these improvements.	Completed
		x					Flood - Flash and Riverine	In response to water quality concerns after the Hewlett Gulch and High Park Fires in Poudre Canyon, two new rain gages and a water quality gage were installed. These gages will be used by the Fort Collins Utilities Water Treatment Plant staff to monitor water quality and determine if intakes should	Completed

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
								be shut down. In addition, in a cooperative agreement with CDOT, the USGS has installed four new rain gages flanking the Poudre Canyon, and in a cooperative agreement with Loveland, has installed one rain gage between Buckhorn and Redstone Canyons.	
		x					Flood - Flash and Riverine	In the Canal Importation Basin, the $21.5 million Canal Importation Ponds and Outfall project has been completed. Final remapping is in process and it is expected that there will be over 150 homes removed from the 100 year floodplain. Three (3) stormwater detention ponds were constructed (Glenmoor, Red Fox and Kane ponds) and three other detention ponds were modified (Avery, Fairbrooke, and Plum ponds). Groundwork on this project was initiated in 2008.	Completed
		x					Flood - Flash and Riverine	In the Canal Importation Basin, the Windsor Court stormwater overflow channel in the Lexington Greens subdivision was completed.	Completed
		x					Flood - Flash and Riverine	In the Foothills basin at the Sailors Reef subdivision, rehabilitation of the stormwater drainage system was completed using cured-in-place pipe technology.	Completed

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
		x					Flood - Flash and Riverine	In the Mail Creek basin, the Manhattan detention pond was enlarged to add capacity and create wetlands habitat. Subdrains were replaced in the Mountain Ridge Subdivision detention pond to enhance extended detention.	Completed
		x					Flood - Flash and Riverine	In the Old Town Basin, the Linden Street Improvements included $250,000 of stormwater piping & drainage infrastructure that coincided with water and wastewater improvements. An outfall to the Poudre River was constructed that included a water quality component. This project was part of the Downtown River District Improvements, which covered two blocks of urban redevelopment, and local flooding issues in the area were mitigated with its completion.	Completed
		x					Flood - Flash and Riverine	In the Poudre River basin, the 2013 cleanup effort was completed. Downed trees and debris that could threaten bridge piers were removed from the channel corridor.	Completed
		x					Flood - Flash and Riverine	In the Spring Creek basin, at the Pleasant Valley and Lake (PV&L) irrigation ditch through the Rossborough subdivision, regrading of the stormwater inflow and outflow channel	Completed

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
								across the PV&L irrigation ditch was completed.	
		x				Stormwater MP/FP Administration Staff assisted CWCB and FEMA staff	Flood - Flash and Riverine	initiating the RiskMAP process to update the floodplains for the Cache La Poudre (Poudre) River and identified and secured local funding for Fort Collins' local match. Staff coordinated efforts and assisted with aerial mapping in advance of hydrologic modeling.	Ongoing
		x					Flood - Flash and Riverine	LOMR will be initiated before the end of 2014 as a change order to previous work associated with the new Mason Corridor MAX bus rapid transit system. This dedicated public transportation guideway crosses the Spring Creek SFHA in the same reach affected by the Choice Center LOMR. The closure of all construction at the end of the summer 2014 season triggered the LOMR process, and as of the writing of this document, all change order approvals were being routed through the Fort Collins Purchasing department for fiscal review and approval. It is anticipated the LOMR funding will be approved, and the LOMR is expected to be approved and effective at the end of 2015 or beginning of 2016.	Ongoing

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
		x					Flood - Flash and Riverine	Low Impact Development (LID) – The City adopted regulations that require new public infrastructure projects as well as new development and redevelopment sites to provide a treatment system that will capture at least 50% of the Water Quality Capture Volume (WQCV) as defined by the City's Stormwater Criteria Manual and treat it in an "LID-type" device or technology. In addition, a minimum of 25% of new pavement is to be permeable to promote stormwater infiltration. The goals of these new regulations are to reduce the impact of pollutants discharged from developed areas on our "receiving waters, reduce stormwater volume for smaller storm events, and reduce the risk of flooding by distributing and infiltrating stormwater runoff from developed areas locally before reaching major drainageways.	Completed
							Flood - Flash and Riverine	Mail Creek – Sloped back the bank and installed new concrete wingwalls to allow access for loader to clean concrete pad in mail creek at the trash skimmer. Removed trash storage area and catwalk. Replaced head gate.	Completed

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
		x					Flood - Flash and Riverine	Maintained the City Flood Warning System's (FWS) network of 75 gage installations, comprising 57 rain gages, 43 stream gages, six weather stations, three repeaters and two base stations.	FWS OnCall staff conducted a tabletop exercise and training session focused on flood response operations for a dam breach that included local emergency response agency (PFA) and a representative from the State Office of Dam Safety. Stormwater OnCall season included a rain and hail event on June 15 that flooded an apartment complex and damaged cars and buildings. Spring high flow on the Poudre required

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
									LETA-911 autodialer notifications to low-lying residents and businesses. The City's Facebook and Twitter social media outlets were used to update the public of rainfall events with the capability of causing local flooding. On September 12-15, 2013 the City responded to flooding on the Poudre River. The flood warning system worked extremely well and provided critical data for emergency response efforts. A variety of notification

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
									tools, including the autodialer, web page, and social media were used to notify the public of evacuations and road closures.
		x					Flood - Flash and Riverine	Maintenance activities were performed on existing LID facilities including a Permeable Interlocking Concrete Pavement project in downtown Fort Collins.	Completed
		x					Flood - Flash and Riverine	McClellands Creek Stream Stability - Phase 2 of the McClellands Creek stream rehabilitation project was completed in Spring 2013 which completed rehabilitation work on a 2/3- mile section of McClellands Creek. The rehabilitation project included laying back vertical eroded banks, installing new stream meanders and planting	Completed

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
								hundreds of native plants and shrubs along the stream banks.	
		x					Flood - Flash and Riverine	McClellands Creek Stream Stability - Phase 2 of the McClellands Creek stream rehabilitation project was completed in Spring 2013 which completed rehabilitation work on a 2/3- mile section of McClellands Creek. The rehabilitation project included laying back vertical eroded banks, installing new stream meanders and planting hundreds of native plants and shrubs along the stream banks.	Completed
		x					Flood - Flash and Riverine	Meldrum and Myrtle Intersection – Replaced and rehabbed the storm water infrastructure including replacing all laterals and intakes and one manhole top section.	Completed
x		x		x		Boxelder Creek Regional Alliance	Flood - Flash and Riverine	Middle Boxelder Creek stream improvements.	With the revisions to the ESDF facility and updated BBRSA Master Plan Improvements, the Middle Boxelder Creek stream improvement

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
									s were eliminated.
		x					Flood - Flash and Riverine	Monitored runoff at nine sampling locations throughout the city. Monitored winter runoff that assessed the impact of deicing products on Spring Creek. Participated in the design of a new Low Impact Development (LID) test site to be located at 215 N. Mason St. Partnered with other City Departments on conceptual plans for locating and designing a Green Streets Demonstration Project.	Completed
		x					Flood - Flash and Riverine	New regulations related to requiring emergency response and preparedness plans for non-residential structures were adopted by City Council in March 2013.	Completed
		x					Flood - Flash and Riverine	Old Town Basin – remapping of the flood plain has shifted Centennial High School at 300 East Laurel St. to moderate risk. The Fort Collins Police annex has been redeveloped for other government use and is no longer considered a critical facility. One additional property was not included in the 2008 Plan as a critical facility: Fort Collins City Hall, 300 LaPorte, west building.	Completed

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
		x					Flood - Flash and Riverine	One additional stream stage monitoring point was added on the Poudre River. The Stormwater Utility made arrangements for assessing river flow conditions well upstream of the Poudre @ Mouth gage, which is two hours upstream of the College Avenue Bridge. Working through the Poudre Fire Authority, Stormwater OnCall requested personnel at the Colorado State Bureau of Wildlife Fish Hatchery below Kinikinik make daily observations of river stage at their diversion dam (shown below) , and to contact Stormwater OnCall in the case of rapid rise in river stage. The Fish Hatchery observations added approximately four (4) hours of lead time to the City's flood preparedness effort, and improved flood response lead time for Larimer County emergency management officials as well.	Ongoing
		x					Flood - Flash and Riverine	One new gage was added to the City Floodwarning System (FWS) in 2011. Streamflow and rainfall are now being monitored upstream (west) of the BNRR railroad where it crosses Fossil Creek. This gage was located to assess any backwater ponding due to obstruction of flow through the	Completed

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
								RR trestle to the east. Alarm thresholds and notification procedures for this location will be added to the Stormwater OnCall manual for the 2012 flood season. This is an area that was recently annexed into the City.	
		x					Flood - Flash and Riverine	Participated in the planning and visioning for the Downtown Core River Project on the Cache la Poudre River near College Avenue. Provided technical review and comments for the Block One Bank Remediation project on the Cache la Poudre River near Linden Street	Completed
		x				Stormwater MP/FP Administration Staff	Flood - Flash and Riverine	Participated in the planning and visioning for the Downtown Core River Project on the Cache la Poudre River near College Avenue. The project will result in flood reduction benefits for the areas around North College Avenue and the Cache la Poudre River. Overtopping of College Avenue will also be eliminated in the 100-year flood event.	Ongoing
		x					Flood - Flash and Riverine	Performed public outreach to the community informing them of the benefits and costs of various stormwater treatment methods including the soon to be adopted LID-type technologies.	Completed

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
		x					Flood - Flash and Riverine	Pitkin/Stover to Spring Creek Improvement Project - Design has been completed and the construction crew has installed the first 800' of 42" RCP with only 280' left in this first phase of the project. The project will continue with Phase two in the Spring of 2015 in coordination with the Street Department's pavement replacement program.	Ongoing
		x					Flood - Flash and Riverine	Poudre River bank repairs - Several areas of bank erosion along the Cache la Poudre River have been repaired or are in the repair design process. Many of these sites were eroded during the September 2013 flood with additional erosion occurring during the 2014 Spring Runoff.	Ongoing
		x					Flood - Flash and Riverine	Poudre River Basin - 2014 cleanup effort was completed. Downed trees and debris that could threaten bridge piers were removed from the channel corridor.	Completed
		x					Flood - Flash and Riverine	Prospect and Overland – Installed two new inlet banks and two manhole access points. Replaced all existing stormline mains and continue piping channel north along Overland Trail to Lake Street. Eliminates standing water in	Completed

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
								the intersection of Prospect and Overland.	
		x					Flood - Flash and Riverine	Provided technical expertise to the CDOT North I-25 Widening project regarding flooding impacts from Boxelder Creek and the Cache la Poudre River. Provided technical expertise to develop rating curves for a new flood warning gage on Fossil Creek west of College. Provided coordination and technical support in the planning efforts for the Boxelder Creek improvements in the vicinity of Prospect Road.	Ongoing
		x					Flood - Flash and Riverine	Riverbend Pond area - Repaired erosion that exposed a district sewer main.	Completed
		x					Flood - Flash and Riverine	Selected an engineering consultant team to assist City staff in designing the rehabilitation of streams throughout the City. Initiated preliminary design of the first stream reach (Fossil Creek Reach 4, Subreach 1) and conducted public outreach on the conceptual design. For McClelland's Creek: 1) Provided design, permitting, and project management services (McClellands Creek, Reach 2, Subreaches 1 and 2). 2) Developed permanent	Ongoing

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
								educational signage for the McClellands Creek rehabilitation project.	
		x					Flood - Flash and Riverine	Spring Creek Basin – three facilities are now out of the 100 year floodplain due to capital improvement projects remapping: the Poudre Fire Authority Station at 200 Mathews Street, the Platte River Power Authority Timberline substation at 2000 E. Horsetooth Road, and the Orthopedic Center of the Rockies at 2500 E. Prospect Road.	Completed
		x					Flood - Flash and Riverine	Spring Creek Basin – three facilities are now out of the 100 year floodplain due to capital improvement projects remapping: the Poudre Fire Authority Station at 200 Mathews Street, the Platte River Power Authority Timberline substation at 2000 E. Horsetooth Road, and the Orthopedic Center of the Rockies at 2500 E. Prospect Road.	Completed
		x				City of Fort Collins	Flood - Flash	Staff prepared a letter sent by the City of Fort Collins to U.S. Congressional Representatives in support of the continuation	Completed

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
							and Riverine	of FEMA Pre-Disaster Mitigation Grants	
		x					Flood - Flash and Riverine	Staff worked on developing a set of standard details for LID installations in the City of Fort Collins to be completed in 2015. Staff also performed an audit of existing BMP construction and inspection practices and developed construction and inspection checklists for use by contractors and engineers during the installation of stormwater BMP facilities.	Ongoing
		x					Flood - Flash and Riverine	Stormwater MP/FP Administration Staff developed and promulgated new methodologies and design guidance to help consulting engineers and City departments complete capital improvements in floodways and floodplains.	Completed
		x					Flood - Flash and Riverine	The 1997 flood marker at Creekside Park along Spring Creek was replaced with a new marker that identifies not only the 1997 flood, but also other recurrence intervals. The marker was designed in cooperation with Art in Public Places. Additional interpretive signage about flooding and the stormwater utility are being developed for display at the park.	Ongoing

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
		x				Colorado State University (CSU)	Flood - Flash and Riverine	The City contracted with Colorado State University (CSU) on the design and installation of monitoring equipment at various stormwater treatment and capture locations. The City and CSU Partnered on the design of retrofit BMP structures to improve the performance of existing stormwater treatment and control structures	Ongoing
		x					Flood - Flash and Riverine	The list of critical facilities in the floodplain are being updated as part of the Flood Warning System On-Call manual review. Critical facilities are also being assessed for areas subject to dam inundation.	Ongoing
		x					Flood - Flash and Riverine	The Poudre River floodplain regulations were reviewed. A working committee comprising citizens, business owners and consultants provided feedback. New regulations related to requiring emergency response and preparedness plans for non-residential structures were adopted by City Council in March 2013.	Completed

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
		x					Flood - Flash and Riverine	The State of Colorado Department of Public Safety made available in late 2012 additional grant funding for infrastructure capable of providing early warning of flooding conditions related to runoff from 2012 Colorado wildfire burn areas (High Park and Waldo Canyon). In 2013, in the lower Cache la Poudre watershed below the area of the High Park Fire, City Stormwater installed one additional rain and streamflow gage to its Flood Warning System (FWS) at a location on the Poudre River approximately two hours travel time upstream of the existing Mouth of the Canyon gage. Utilizing the backbone of the City's existing FWS telemetry network, Larimer County installed four (4) new rain and streamflow gages in smaller watersheds west of Fort Collins that are subject to High Park burn area runoff. In addition, City Stormwater developed and hosted a one-day functional training exercise to improve communication and response among City, County, State and Federal agencies responding to flood and debris-generation from the High Park fire burn area that would threaten City	Completed

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
								and County residents and public infrastructure.	
		x					Flood - Flash and Riverine	Water quality retrofits were included on several street capital improvements projects including the North College corridor improvements, the Pitkin/Stover Storm Sewer project, the Horsetooth and Timberline intersection improvements and the Vine and Shields intersection improvements.	Completed
		x					Flood - Flash and Riverine	West Vine Outfall - The West Vine Basin Outfall Channel is currently under construction. This is a Master Plan project to alleviate 100-year flooding in the older, northwest portion of the City.	Ongoing
		x					Flood - Flash and Riverine	Work was initiated in Summer 2013 to update the hydrology and hydraulics models in the Canal Importation Basin. This modeling effort will build upon and finalize the modeling completed with the Canal Importation Ponds and Outfall (CIPO) project and will result in updated floodplain mapping	Ongoing

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
								for the entire Canal Importation basin using the best and most accurate modeling software. Additional areas that are in the process of being remapped due to modeling updates and development projects include the West Vine Basin, Stone Creek Basin, McClellands Creek Basin, and Old Town Basin.	
			x				Flood - Flash and Riverine	All storm water ways are reviewed for compliance with applicable laws. All new subdivisions must meet Standards and go through Planning Department and Engineering Department review processes. All drainage systems, culverts and detention basins must be designed with good engineering practices. (NFIP COMPLIANCE)	On going Strom water ways compliant
			x				Flood - Flash and Riverine	Review of all commercial and residential construction within the Town of Estes Park for compliance with floodplain regulations. (NFIP COMPLIANCE)	On going Commercial/ residential review compliant
		x					Hail Storm	n/a	
		x					Hazardous Materials - Fixed Facility	Primary means for mitigation in commercial occupancies is through fire code inspection programs administered by the local fire department. This	Ongoing

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
								includes a hazardous materials mitigation program. Many of these occupancies also participate in the OSHA Voluntary Partnership Program. A few of these occupancies also are required to report through the EPA EPCRA and CERCLA programs.	
x	x	x	x	x	x	Local Emergency Response Agencies	Hazardous Materials - Transportation	Develop response plans for transportation-related hazardous materials incidents in proximity to heavily populated areas and identified critical facilities. Examples of areas of concern include, but are not limited to, shopping mall areas along major transportation routes, hospitals, and large-scale public assembly areas.	LEPC is getting back together to start working through planning elements. HazMat Teams work closely annually. LRFA has HM specific response plan.
x	x	x	x	x	x	Local Emergency Response Agencies	Hazardous Materials - Transportation	Improve early warning and emergency notification capabilities.	Yes and ongoing. Reverse 911 system enhanced in 2009. Roadway flashing notification signs on major roads. Transmission issues on AM radio station

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
									repaired. Enhanced social media and website procedures.
x	x	x	x	x	x	Local Emergency Response Agencies	Hazardous Materials - Transportation	Improve hazardous materials recognition and inspection programs within the local fire departments.	Yes and ongoing. Loveland just completed an An Arc Map layer was created to show target hazards, hazardous materials storage, hazardous activities, populations densities,and property values. This mapping layer is currently being integrated into the CAMEO program along with Marplot/ALOHA files for use in the field, the mobile command

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
									center, and in the EOC.
x	x	x	x	x	x	Local Emergency Response Agencies	Hazardous Materials - Transportation	Maintain adequate supplies of emergency equipment to appropriately respond to a moderate sized event.	HazMat Team has a HazMat cache stocked and the team is equipped with what is required for an event. Additional materials are available from mutual aid partner agencies in the Haz Mat Consortium.
x	x	x	x	x	x	Local Emergency Response Agencies	Hazardous Materials - Transportation	Maintain trained and equipped hazardous materials response team, consisting of technicians and specialists.	Larimer has a HazMat Consortium existing of technicians. Has an IGA that is active. HazMat trains regularly.

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
		x					Hazardous Materials - Transportation	Poudre Fire maintains a trained and equipped hazardous materials response team consisting of technicians and specialists. They provide emergency preparedness education to their citizens. Evacuation and safe refuge areas have been identified and provided during incidents. All first responders receive recognition training in hazardous materials. Hazardous material routes have also been established and enforced within the City of Fort Collins. Emergency notification systems have been upgraded over the last several years and are continually tested.	Ongoing
x	x	x	x	x	x	Local Emergency Response Agencies	Hazardous Materials - Transportation	Provide areas of safe refuge for their citizens.	We have a shelter program and a partnership with the American Red Cross. Short term sheltering is also part of existing planning processes.
x	x	x	x	x	x	Local Emergency Response	Hazardous Materials -	Provide emergency preparedness education to their citizens.	Loveland and Fort Collins has a Safety and Outreach campaign

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
						Agencies	Transportation		that includes education to residents on HazMat.
x	x	x	x	x	x	Local Emergency Response Agencies	Hazardous Materials - Transportation	Provide hazardous materials recognition training to all first responders.	Ongoing
							Lanslide / Rockslide	n/a	
		x				Colorado State University	Lighting	Colorado State University installed and continually tests their Thor Guard Lightning Prediction Warning System which covers a majority of the main campus.	Completed
		x					Lighting	Fort Collins OEM utilizes a weather satellite system to assist with prediction of strikes.	Ongoing
		x					Lighting	Many new facilities have placed grounding systems at their facilities to assist with mitigation efforts.	Ongoing
x	x	x	x	x	x		Terrorism / WMD	Develop and/or maintain emergency operations plans involving all local emergency responders, including annual emergency training exercises.	Done and ongoing.

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
x	x	x	x	x	x		Terrorism / WMD	Encourage local law enforcement officers to attend terrorism/WMD-related coursat the FEMA Emergency Management Institute.	Done and ongoing.
x	x	x	x	x	x		Terrorism / WMD	Ensure that local law enforcement agencies have sufficient weapons to respond to a moderate incident.	Done and ongoing.
x	x	x	x	x	x		Terrorism / WMD	Maintain active and well-trained SWAT teams, incorporating fire and EMS agencies into the SWAT training to improve intra-agency working relations.	Done and ongoing.
x	x	x	x	x	x		Terrorism / WMD	Provide National Incident Management System (NIMS) training to personnel whomay be involved in responding to a terrorism/WMD incident.	Done and ongoing.
x	x	x	x	x	x		Terrorism / WMD	Provide terrorism/WMD awareness training and equipment to all first responders.	Done and ongoing. PFA just got a number of RIDs and PRDs for the Radiological Program. Also participated in a training course.
x	x	x	x	x	x		Terrorism / WMD	Work with local school district safety committees to plan for and be prepared for possible	Done and ongoing.

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
								incidents involving school district facilities.	
				x			Tornado	Currently exploring the possibility of adding tornado sirens. This proposed action item is medium priority. Funding would have to be obtained through grants and a tentative timeline is within the next five years.	Loveland has looked at sirens in 2008 and there is now discussion about bringing it back to council. Fort Collins got rid of sirens years ago and is no longer looking at this as a tool. Larimer County is not looking at sirens due to the large geographical area. All jurisdictions are looking at other avenues of notification that are consistent for tornadoes and other fast-moving weather events.

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
x	x	x	x	x	x		Tornado	Improving the early warning capabilities within the local communities.	Done and ongoing. Reverse 911 system enhanced in 2009. Installed roadway flashing notifications signs on all major roads. Transmission issues on AM radio station repaired. Loveland became a NWS Storm Ready Community.
x	x	x	x	x	x		Tornado	Incorporating building collapse training into the Special Operations Team training requirements.	Done and ongoing. Regular component of SOT training.
x	x	x	x	x	x		Tornado	Installing emergency generators in many public buildings and critical facilities.	Loveland has installed generators in all critical facilities and looking at putting one in the Chilson Facility for an employee care center.

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
									All other jurisdictions this is an ongoing item. All LCSO facilities and many county buildings also have generators.
x	x	x	x	x	x		Tornado	Promoting the inclusion of tornado shelters in new construction.	Done and ongoing.
x	x	x	x	x	x		Tornado	Providing areas of safe refuge for affected people.	Done and ongoing.
x	x	x	x	x	x		Tornado	Providing emergency preparedness education to the community.	Done and ongoing. In Loveland all city-owned buildings have shelter areas and evac routes ID'd. Each building and floor has an assigned monitor to assist.
x	x	x	x	x	x		Tornado	Providing specialized rescue training to first responders, including developing and maintaining Urban Search and Rescue (USAR) teams.	Done and ongoing. We participate in CO Task Force 1 USAR program. Regular component

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
									of LFRA and SOT training. Local team maintained that responds with mutual aid to other jurisdictions.
x	x	x	x	x	x		Utility Interruption	Establish and/or continue the process of placing all existing utilities underground.	Slow progress but ongoing. Loveland Completed. W/WW and power lines are installed UG and electric transformers and switchgears are installed UG unless circumstances dictate differently. Substations are installed aboveground for safety and security reasons.
x	x	x	x	x	x		Utility Interruption	Install emergency generators in many public buildings and critical facilities.	Loveland has installed generators in all critical facilities and looking at

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
									putting one in the Chilson Facility for an employee care center. All other jurisdictions this is an ongoing item. All LCSO facilities and many county buildings also have generators.
x	x	x	x	x	x		Utility Interruption	Maintain an adequate supply of emergency equipment to appropriately respond to a moderate sized event.	Ongoing. Loveland Completed. City power division maintains emergency response equipment and materials in a secured warehouse along with emergency vehicles being stored in a secure fenced-in area.
x	x	x	x	x	x		Utility Interruption	Provide emergency preparedness education to the community.	Ongoing. Loveland provides educational

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
									materials for residential and commerical customers through the website, social media, print and e-mail.
x	x	x	x	x	x		Utility Interruption	Provide specialized training to local emergency responders.	Ongoing. Loveland Not Started. Line crews and electrical engineering staff can give hazardous recognition training to first reponsders dictated by individual entities. (Police, fire and others identified by the EMS team). This can also include response to chlorine gas leaks at water treatment plant.

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
x	x	x	x	x	x		Utility Interruption	Require all utilities for new construction projects to be installed underground.	Yes and ongoing. Loveland will evaluate that policy on a case-by-case basis. Electric lines are installed underground unless site constraints don't allow.
x	x	x	x	x	x		Utility Interruption	Take measures to protect above-ground utilities from falling or flying debris.	Ongoing. Loveland Completed. Currently we have no plans to alter the installation and maintenance of the power system. Loveland W&P power operations follows closely the industry standards for installation of both the overhead and underground infrastructure.

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
				x			Utility Interruption	Wellington is currently working on burying all lines within town boundaries. They are also working on requiring al new lines to be buried. This proposed action item is a medium priority tem that will be addressed through codes and regulations. The Town of Wellington hopes to mplement this change within the next year.	Ongoing
			x				Utility Interruption	Beaver Point and Peakview Circuit Upgrades	Complete Beaver Point and Peakview circuit upgrades
			x				Utility Interruption	Take measures to protect above-ground utilities from falling or flying debris	On going Measures to protect utilities
		x					Wind Storm - Severe	Emergency preparedness is the primary mitigation action item. This is done through education, training and exercises.	Ongoing
		x					Wind Storm - Severe	Public works departments and utility providers maintain on-call crews to assist during high wind events.	Ongoing
		x					Wind Storm - Severe	Transportation departments maintain traffic control devices for detouring/re-routing or closing traffic through the hazardous areas.	Ongoing

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
			x				Wind Storm - Severe	Establish and/or continue process of placing all existing utilities underground	On going Correction – Harden infrastructure as opposed to underground placement
		x				City of Fort Collins	Winter Storm - Severe	Fort Collins has upgraded its EOC to provide WEBEOC for better tracking of resources and the overall incident, additional ICS training, upgrading of our emergency notification system, offering NOAA "Weather Spotter" courses, certification as a "Storm Ready Community", hosting an annual emergency preparedness fair, and ongoing public education through direct delivery presentations, pamphlets, calendars and website upgrades.	Ongoing.
		x					Winter Storm - Severe	Identification of the special needs population which will require special assistance and acquiring temporary snow storage sites that provide proper draining.	Ongoing.
x	x	x	x	x	x		Winter Storm - Severe	Local public works and public safety agencies have established schedules to refine, revise, and adapt their preparedness and response plans at least once annually.	Ongoing. Loveland has a stand-alone Severe Weather Plan and a Snow Removal Plan. These

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
									plans along with the LEOP, COOP, and dept level em plans all have defined plan maintenance schedules.
		x					Winter Storm - Severe	Maintaining adequate fleets of snow moving equipment	Ongoing.
		x					Winter Storm - Severe	Maintaining and updating the Snow Removal Plans	Ongoing.
		x					Winter Storm - Severe	Plans are reviewed, updated and exercised for this event. Several courses at the Emergency Management Institute (IEMC) have been attended by City of Fort Collins personnel who focused on preparedness and response to a winter storm event. Public education programs focus on preparedness for severe winter storms.	Ongoing.
		x					Winter Storm - Severe	Providing safe refuge for affected citizens	Ongoing.
			x				Winter Storm - Severe	Police, fire and emergency medical service professionals train frequently to be prepared to respond to a wide variety of emergency situations, including wind storms	On going Police, Fire and EMS train and prepare

Larimer	Loveland	Fort Collins	Estes Park	Wellington	Berthoud	Lead	Hazard	Action	Status
			x				Winter Storm - Severe	Maintain and update Winter Storm, Ice Storm, and snow removal plans	On going Public Works maintain and update plans
			x				Winter Storm - Severe	Provide emergency preparedness education to the community	On going OEM (Estes Park) provides edu/preparedness to the community

Appendix F - FEMA Approval Documents & Jurisdictional Adoptions

U.S. Department of Homeland Security
Region VIII
Denver Federal Center, Building 710
P.O. Box 25267
Denver, CO 80225-0267

FEMA

R8-MT

August 2, 2016

The Larimer County Commission
P.O. Box 1190
Fort Collins, Colorado 80522

Dear County Commissioners:

We are pleased to announce the approval of the **Larimer County Multi-Jurisdictional Hazard Mitigation Plan** as meeting the requirements of the Stafford Act and Title 44 Code of Federal Regulations 201.6 for a local hazard mitigation plan. The plan approval extends to the following participating jurisdictions that has adopted the plan: **Larimer County; the Cities of Fort Collins and Loveland; The Townes of Estes Park and Windsor; and the Districts of Crystal Lakes Fire Protection, Estes Valley Recreation and Park, Platte River Power Authority, Poudre Canyon Fire Protection, Upper Thompson Sanitation and Wellington Fire Protection.**

The approved jurisdictions are eligible for FEMA Hazard Mitigation Assistance grant programs. All requests for funding will be evaluated individually according to the specific eligibility and other requirements of the particular programs under which the application is submitted. Approved mitigation plans may be eligible for points under the National Flood Insurance Program Community Rating System.

This plan is approved through August 1, 2021. A local jurisdiction must revise its plan to reflect changes in development, progress in local mitigation efforts, changes in priorities, and resubmit for approval within five years to continue to be eligible for mitigation project grant funding.

We have provided comments and recommendations on the enclosed Plan Review Tool. We wish to thank the jurisdictions for participating in the planning process and commend their continued commitment to reducing future disaster losses. Please contact Steve Boand, Acting State Hazard Mitigation Officer, Colorado Department of Emergency Services, at Steven.Boand@state.co.us or (303) 915-6063 with any questions on the plan approval or mitigation grant programs.

Sincerely,

Jeanine D. Petterson

Jeanine D. Petterson
Mitigation Division Director

Enclosures: Plan Review Tool

cc: Steve Boand, Acting State Hazard Mitigation Officer.

LOCAL MITIGATION PLAN REVIEW TOOL

The *Local Mitigation Plan Review Tool* demonstrates how the Local Mitigation Plan meets the regulation in 44 CFR §201.6 and offers States and FEMA Mitigation Planners an opportunity to provide feedback to the community.

- The Regulation Checklist provides a summary of FEMA's evaluation of whether the Plan has addressed all requirements.
- The Plan Assessment identifies the plan's strengths as well as documents areas for future improvement.
- The Multi-jurisdiction Summary Sheet is an optional worksheet that can be used to document how each jurisdiction met the requirements of the each Element of the Plan (Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption).

The FEMA Mitigation Planner must reference this *Local Mitigation Plan Review Guide* when completing the *Local Mitigation Plan Review Tool*.

Jurisdiction: Larimer County, Colorado	**Title of Plan:** Larimer County 2016 Multi-Jurisdictional Hazard Mitigation Plan	**Date of Plan:** February 2016
Local Point of Contact: Lori Hodges	**Address:** 200 West Oak Street, 2nd Floor PO Box 1190 Fort Collins, CO 80522	
Title: Director of Emergency Management		
Agency: Larimer County		
Phone Number: 970.498.7147	**E-Mail:** lrhodges@larimer.org	

State Reviewer:	**Title:**	**Date:**
Patricia L. Gavelda Stephany Juneau	Local Mitigation Planning Program Manager DHSEM/MARS	March 3, 2016

FEMA Reviewer:	**Title:**	**Date:**
Margaret Doherty	Community Planner	April 11 and May 19, 2016
Date Received in FEMA Region VIII	**March 4 and May 10, 2016**	
Plan Not Approved	**April 15, 2016**	
Plan Approvable Pending Adoption	**May 19, 2016**	
Plan Approved	**August 2, 2016**	

SECTION 1:
MULTI-JURISDICTION SUMMARY SHEET

MULTI-JURISDICTION SUMMARY SHEET									
#	Jurisdiction Name	Jurisdiction Type	Jurisdiction Contact	Email	Requirements Met (Y/N)				
					A. Planning Process	B. HIRA	C. Mitigation Strategy	D. Update Rqtms.	E. Adoption Resolution
1	Larimer	County	Lori Hodges, Director OEM	hodgeslr@co.larimer.co.us	Y	Y	Y	Y	Y
2	Berthoud	Town	Alisa Darrow, Asst. Town Administrator	adarrow@berthoud.org	Y	Y	Y	Y	Y
3	Berthoud Fire Protection	District	Steve Charles, Chief	scharles@berthoudfire.org	Y	Y	Y	NA	Y
4	Crystal Lakes Fire Protection	District	Marian Kelly, Chief	mkelly@clvfd.org	Y	Y	Y	NA	Y
5	CSU	University	Ken Quintana, Emergency Manager	ken.quintana@colostate.edu	Y	Y	Y	NA	N
6	Estes Park	Town	Frank Lancaster, Town Manager	flancaster@estes.org	Y	Y	Y	Y	Y
7	Estes Park Medical Center	District	Mike Bielmaier, EMS Director	MBielmaier@epmedcenter.com	Y	Y	Y	NA	Y
8	Estes Valley Fire Protection	District	Scott Dorman, Chief	sdorman@estesvalleyfire.org	Y	Y	Y	NA	Y
9	Estes Valley Recreation and Park	District	Mary Davis, Interim Executive Director	mary@evrpd.com	Y	Y	Y	NA	Y
10	Fort Collins	City	Wade Troxell, Mayor	wtroxell@fcgov.com	Y	Y	Y	Y	Y
11	Glacier View Fire Protection	District	Todd Westfall, Chief	gvfdchief1@gmail.com	Y	Y	Y	NA	Y
12	Johnstown	Town	Tom Hellen, Public Works Director	thellen@townofjohnstown.com	Y	Y	Y	NA	Y
13	Livermore Fire Protection	District	Donn Maynard, Chief	livermorechief@gmail.com	Y	Y	Y	NA	Y

MULTI-JURISDICTION SUMMARY SHEET									
#	Jurisdiction Name	Jurisdiction Type	Jurisdiction Contact	Email	Requirements Met (Y/N)				
					A. Planning Process	B. HIRA	C. Mitigation Strategy	D. Update Rqtms.	E. Adoption Resolution
14	Loveland	City	Cecil Gutierrez, Mayor	Mayor@cityofloveland.org	Y	Y	Y	Y	Y
15	Loveland Fire Rescue Authority	District	Pat Mialy, Emergency Manager	pat.mialy@cityofloveland.org	Y	Y	Y	NA	Y
16	Northern CO Water Conservation	District	Jim Struble, Security and Emergency Manager	jstruble@northernwater.org	Y	Y	Y	NA	Y
17	Pinewood Springs Fire Protection	District	Richard Wilcox, Chief	chief@pinewoodspringsfire.org	Y	Y	Y	NA	Y
18	Platte River Power Authority	District	Jim Boizot, Safety Officer	BoizotJ@prpa.org	Y	Y	Y	NA	Y
19	Poudre Canyon Fire Protection	District	Hugh Collins, Chief	H.Collins@poudrecanyonfiredistrict.org	Y	Y	Y	NA	Y
20	Poudre Fire Authority	District	Mike Gavin, Battalion Chief / OEM	migavin@poudre-fire.org	Y	Y	Y	NA	Y
21	Thompson Valley EMS	District	Randy Lesher, Chief	rlesher@tvems.com	Y	Y	Y	NA	Y
22	Timnath	Town	April Getchius, Town Manager	agetchius@timnathgov.com	Y	Y	Y	NA	Y
23	Upper Thompson Sanitation	District	Chris Bieker, District Manager	chris@utsd.org	Y	Y	Y	NA	Y
24	Wellington	Town	Jack Brinkhoff, Mayor	brinkhjd@co.larimer.co.us	Y	Y	Y	Y	Y
25	Wellington Fire Protection	District	Gary Green, Chief	ggreen@wfpd.org	Y	Y	Y	NA	Y
26	Windsor	Town	John Vazquez, Mayor	jvazquez@windsorgov.com	Y	Y	Y	NA	Y
27	Windsor Severance Fire Rescue	District	Herb Brady, Chief	hbrady@wsfr.us	Y	Y	Y	NA	Y

SECTION 2:
REGULATION CHECKLIST

REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or	Met	Not Met
ELEMENT A. PLANNING PROCESS			
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	Section 3, pp. 11-36; Appendix A, pp. 254-283	X	
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §))	Section 3.6, pp. 24-34; Appendix C, pp. 831-840	X	
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Section 3.6, pp. 24-32	X	
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Section 3.8, pp. 34-36	X	
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Section 7.1.2, pp. 252-253; Appendix B, pp. 284 -Each individual Community profile under Plan Maintenance and Implementation	X	
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	Section 3.8, pp. 34; Section 7.1.2 , pp. 252-253; Appendix B, pp. 284 -Each individual Community profile under Plan Maintenance and Implementation	X	
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT			
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	Section 5.3, pp. 58-62; Appendix B, pp. 284 -Each individual Community profile under Hazard Identification and Risk Assessment	X	
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))	Appendix B, pp. 284 – each individual Community profile under Previous Occurrences and Probability of Future Occurrences	X	

REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or	Met	Not Met
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))	Appendix B, pp. 284 – each individual Community profile under Hazard Identification & Risk Assessment and Vulnerability Assessment	X	
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	Section 5.3.6, pp. 157, Community Profile: City of Fort Collins, p. 482	X	
ELEMENT C. MITIGATION STRATEGY			
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	Appendix B, pp. 284 – each individual Community profile under Capabilities Assessment	X	
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	Appendix B, pp. 284 – each individual Community profile under the Land Use Planning and Codes table	X	
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	Section 6.2, pp. 233-235	X	
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	Section 6.4, pp. 236-250; Appendix B, pp. 284 – each individual Community profile lists a number of Mitigation Actions Guides	X	
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	Section 6.4, pp. 236-250; Appendix B, pp. 284 – each individual Community profile under Integrating Hazard Mitigation into Local Planning and Mitigation Action Guides	X	
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))	Appendix B, pp. 284 – each individual Community profile under Land Use Planning & Codes and Integrating Hazard Mitigation into Local Planning; Appendix C, pp.	X	

REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or	Met	Not Met
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION			
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))	Section 4.5, pp. 43-46	X	
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	Section 6, pp. 231-250 and Appendix E	X	
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	Section 6, pp. 231-250 and Appendix E	X	
ELEMENT D: REQUIRED REVISIONS			
ELEMENT E. PLAN ADOPTION			
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))			NA
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	Section 2, p. 10; Section 3.7, pp. 33-34	X	
ELEMENT E: REQUIRED REVISIONS E2. As of December 8, 2016, all jurisdictions, except Colorado State University, have adopted the plan.			
ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)			
F1.			
F2.			
ELEMENT F: REQUIRED REVISIONS			

SECTION 3:
PLAN ASSESSMENT

A. Plan Strengths and Opportunities for Improvement

This section provides a discussion of the strengths of the plan document and identifies areas where these could be improved as part of the next plan update.

Element A: Planning Process

The kick-off meeting was very well attended; attendance appears to have dropped off as the process continued. Although it appears that every jurisdiction participated in the process; the message of how each jurisdiction should assess its unique risks and develop mitigation strategies seems to have not gotten through.

Element B: Hazard Identification and Risk Assessment

The County risk assessment is very well done. The plan does a good job of identifying the potential impacts of climate change. This provides a good baseline for the County that can be improved upon as the plan is updated. The community profile risk assessment appear repetitive and the methodology does not address the unique vulnerabilities of each jurisdiction. It may be appropriate to only analyze the high priority hazards (particularly when the county risk assessment is so thorough); however, if the analyses do not result in key issues or specific problems that need mitigating, the mitigation strategy for each jurisdiction will not include any true mitigation actions. For instance, in the case of the Town of Berthoud, the community profile only included the winter storm and HazMat hazards. This left little for the Town to consider in terms of mitigation. Additionally, the fire protection districts can only be responsible for assets they own or operate. Their risk assessment should consider the impacts of natural hazard events on these facilities, not the structures located throughout their district boundaries for which they have no land use authority or ownership. Their mitigation strategies should include actions to prevent the loss or damage to their assets or programs to promote wildfire mitigation. A couple of the jurisdictions noted that they would like to assess their risks and develop mitigation actions—wasn't that the point of this process?

Element C: Mitigation Strategy

The County and the larger municipalities include many excellent mitigation actions. It is also acceptable to include preparedness actions and county-wide mitigation projects that will benefit multiple communities in the plan; however, each participating jurisdiction must have specific mitigation actions for which they are responsible for implementing. Many of the mitigation actions submitted are terribly vague. The point of the mitigation planning process is to identify specific mitigation projects that will reduce losses to each community's assets. When funding becomes available, the jurisdictions would be better situated to take advantage of the opportunity, if they had developed action plans for specific projects that are eligible for FEMA funding.

Element D: Plan Review, Evaluation, and Implementation

This plan is a marked improvement over the previous plan in every aspect, particularly in regards to the vulnerability assessment. With the next update, continue to be more specific per the comments above.

B. Resources for Implementing Your Approved Plan

Congratulations on completing your local mitigation plan. Below are suggestions for moving the mitigation plan forward and continuing the relationship with your stakeholders:

- The mitigation strategy includes projects that may be eligible for FEMA's grant programs. Contact your State Hazard Mitigation Officer for application information.
- Each year, FEMA partners with the State on training courses designed to help communities be more successful in their applications for grants, including the Unified Hazard Mitigation Grant Assistance Application Development Course and the Benefit Cost Analysis (BCA) course. Contact your State Hazard Mitigation Officer for course offering schedules.
- It may be appropriate to set up a Community Assistance Visit with FEMA to provide technical assistance to communities in the review and/or updating of their floodplain ordinances to meet the new model ordinance. Consider contacting your State NFIP Coordinator for more information.
- The US Department of Transportation's Hazardous Materials Emergency Preparedness (HMEP) grant program provides financial and technical assistance as well as national direction and guidance to enhance State, Territorial, Tribal, and local hazardous materials emergency planning and training. See this website for more information: http://www.phmsa.dot.gov/grants-state-programs

BERTHOUD FIRE PROTECTION DISTRICT

RESOLUTION NO. 2016 – 20160920-1

A RESOLUTION ADOPTING THE LARIMER COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

WHEREAS, the Berthoud Fire Protection District ("District") has experienced past incidents to include, but not limited to: a tornado, flooding, wildfires and other natural and human-caused events and recognizes the threat that various natural and human-caused events pose to people and property within the District; and

WHEREAS, undertaking certain hazard mitigation actions may reduce the potential for injury or death to people and destruction of property from future hazard occurrences; and

WHEREAS, the State of Colorado and the Federal Emergency Management Agency (FEMA) provided mitigation funds to Larimer County to support development of a multi-jurisdictional hazard mitigation plan; and

WHEREAS, a Mitigation Planning Committee including personnel from twenty-seven (27) different jurisdictions within Larimer County, including the District, has prepared a Multi-Jurisdictional Hazard Mitigation Plan ("Plan"), attached hereto as Exhibit A (electronically / Thumb Drive) and incorporated herein, based on data collection, stakeholder input, community asset/vulnerability analysis and identification of preferred mitigation alternatives (the "Plan"); and

WHEREAS, the Plan was developed per the requirements of the FEMA-prescribed mitigation planning process; and

WHEREAS, the Colorado Office of Emergency Management and FEMA, has reviewed the Plan and approved it contingent upon the official adoption of the Plan by all participating governmental bodies.

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the Berthoud Fire Protection District, Larimer County, Colorado as follows:

1. **Adoption of Plan.** The Board of Directors hereby adopts the Larimer County Multi-Jurisdictional Hazard Mitigation Plan, as an official plan for the District.

2. **Submittal to State and Federal Authorities and to Take Necessary Actions.** The Board of Directors hereby authorizes the Fire Chief to submit this Adoption Resolution to the Colorado Division of Emergency Management and Federal Emergency Management to enable the Plan's final approval, and to take such actions as are recommended and assigned to the District in the Plan.

3. **Guidance Policy; No Third Party Liability.** The Plan constitutes a guidance policy regarding future service and hazard mitigation recommendations, for use by the Board in its sole discretion regarding planning, development and operation of the District's resources, and does not establish absolute requirements or funding commitments for any item not identified in the current fiscal year budget. All identified items are expressly subject to budget and appropriation of funds therefor. The Plan shall not be deemed to give rise to any mandated appropriations, claim or cause of action by any officer, employee, or official of the District, or any other person or entity.

4. **Severability.** If any part, section, subsection, sentence, clause or phrase of this Resolution or the adopted Plan is for any reason held to be invalid, such invalidity shall not affect the validity of the remaining provisions.

5. **Effective Date.** This Resolution shall take effect and be enforced immediately upon its approval by the Board.

ADOPTED this 20th day of September, 2016

Berthoud Fire Protection District

By: _____
Gary Maggi, Secretary

Attest:

By: _____
Stephen Charles, Fire Chief

RESOLUTION 2016 - 2

RESOLUTION OF THE CRYSTAL LAKES FIRE PROTECTION DISTRICT TO ADOPT THE LARIMER COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

WHEREAS, Crystal Lakes Fire Protection District recognizes the threat that natural hazards pose to people and property within our community; and,

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

WHEREAS, an adopted hazard mitigation plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and,

WHEREAS, the Larimer County Multi-Jurisdictional Hazard Mitigation Plan has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6; and,

WHEREAS, the Crystal Lakes Fire Protection District Board has reviewed the Plan, participated as necessary in the process to create the Plan, and agrees with its provisions.

NOW THEREFORE, BE IT RESOLVED by the Crystal Lakes Fire Protection District Board that the Crystal Lakes Fire Protection District adopts the Larimer County Multi-Jurisdictional Hazard Mitigation Plan as this jurisdiction's Multi-Jurisdictional Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

ADOPTED this 16th day of June, 2016 at the meeting of the Crystal Lakes Fire Protection District Board.

CRYSTAL LAKES FIRE PROTECTION DISTRICT

David DeFibaugh
President

Attest:

Secretary

555 Prospect Avenue
PO Box 240
Estes Park, Colorado 80517
(970) 586-2317

BEFORE THE BOARD OF Park Hospital District dba Estes Park Medical Center

RESOLUTION ADOPTING THE LARIMER MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

WHEREAS, Larimer County has experienced past flooding, wildfires and other natural and human-caused hazard events that pose risks to public health and safety and which may cause serious property damage; and

WHEREAS, the State of Colorado and the Federal Emergency Management Agency (FEMA) provided mitigation funds to the County to support development of a multi-jurisdictional mitigation plan; and

WHEREAS, the planning process fostered by all participating Larimer County jurisdictions and agencies offers the opportunity to consider natural and human-caused hazards and risks, and to identify mitigation actions to reduce future impacts of such hazards; and

WHEREAS, a Multi-Jurisdictional Hazard Mitigation Plan has been developed by the Mitigation Planning Committee, including personnel from twenty-seven different jurisdictions within Larimer County, and partner organizations; and

WHEREAS, the Multi-Jurisdictional Hazard Mitigation Plan recommends several mitigation actions that will help minimize and reduce safety threats and damage to private and public property; and

WHEREAS, two public meetings were held on July 27, 2015 and December 2, 2015 to present draft planning documents and to solicit input during the development of the plan; and

WHEREAS, the draft plan was made available for public comment from December 10, 2015 through January 10, 2016 to solicit questions and comments and to present the plan and the proposed mitigation actions.

NOW, THEREFORE, BE IT RESOLVED by the Board of Park Hospital District, Colorado, that:

1. The Multi-Jurisdictional Hazard Mitigation Plan is hereby adopted as an official plan of Larimer County.
2. The offices identified in the Plan are hereby directed to pursue implementation of the recommended priority actions that are assigned to their respective departments / divisions.
3. Any action proposed in the Plan shall be subject to and contingent upon budget approval, if funding is required and this resolution shall not be interpreted so as to mandate any such appropriations.

Estes Park Medical Center

555 Prospect Avenue
PO Box 240
Estes Park, Colorado 80517
(970) 586-2317

BE IT FURTHER RESOLVED, that the Office of Emergency Management will be administering and monitoring the Larimer Multi-Jurisdictional Hazard Mitigation Plan, in collaboration with all community partners, and will provide revisions and updates to the Board of Commissioners as needed to remain current.

DATED THIS 25 DAY OF OCTOBER, 2016.

Board of Park Hospital District, COLORADO

By: D VanDerPloeg
President

ATTEST:

____
County Clerk

ESTES VALLEY FIRE PROTECTION DISTRICT

RESOLUTION NO. 2016-03

A RESOLUTION ADOPTING THE LARIMER MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

WHEREAS, the Estes Valley Fire Protection District ("District") has experienced past flooding, wildfires and other natural and human-caused events and recognizes the threat that various natural hazards pose to people and property within the community; and

WHEREAS, undertaking certain hazard mitigation actions may reduce the potential for harm to people and property from future hazard occurrences; and

WHEREAS, the State of Colorado and the Federal Emergency Management Agency (FEMA) provided mitigation funds to the County of Larimer to support development of a multi-jurisdictional mitigation plan; and

WHEREAS, a Mitigation Planning Committee including personnel from twenty-seven different jurisdictions in Larimer County, including the District, has prepared a Multi-Jurisdictional Hazard Mitigation Plan, attached hereto as Exhibit A and incorporated herein, based on data collection, stakeholder input, community asset/vulnerability analysis and identification of preferred mitigation alternatives (the "Plan"); and

WHEREAS, the Plan was developed per the requirements of the FEMA-prescribed mitigation planning process; and

WHEREAS, the Colorado Office of Emergency Management and FEMA, has reviewed the Plan and approved it contingent upon the official adoption of the Plan by all participating governmental bodies.

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the Estes Valley Fire Protection District, Larimer County, Colorado as follows:

1. **Adoption of Plan.** The Board of Directors hereby adopts the Larimer County Multi-Jurisdictional Hazard Mitigation Plan, as an official plan for the District.

2. **Submittal to State and Federal Authorities and to Take Necessary Actions**. The Board of Directors hereby authorizes the Fire Chief to submit this Adoption Resolution to the Colorado Division of Emergency Management and Federal Emergency Management Agency to enable the Plan's final approval, and to take such actions as are recommended and assigned to the District in the Plan.

3. **Guidance Policy; No Third Party Liability.** The Plan constitutes a guidance policy regarding future service and hazard mitigation recommendations, for use by the Board in its sole discretion regarding planning, development and operation of the District's resources, and does not establish absolute requirements or funding commitments for any item not identified in the current fiscal year budget. All identified items are expressly subject to budget and appropriation of funds therefor. The Plan shall not be deemed to give rise to any mandated appropriation, claim or cause of action by any officer, employee, or official of the District, or any other person or entity.

4. **Severability**. If any part, section, subsection, sentence, clause or phrase of this Resolution or the adopted Plan is for any reason held to be invalid, such invalidity shall not affect the validity of the remaining provisions.

5. **Effective Date**. This Resolution shall take effect and be enforced immediately upon its approval by the Board.

ADOPTED this 22 day of JUNE, 2016.

Estes Valley Fire Protection District

By _____
Doug Klink, Chairman

Attest:

_____
Secretary

ESTES VALLEY RECREATION AND PARK DISTRICT
RESOLUTION 2016-03
LARIMER COUNTY 2016 MULTI-JURISDICTIONAL HAZARD AND MITIGATION PLAN

A RESOLUTION OF THE ESTES VALLEY AND PARK DISTRICT ACCEPTING AND APPROVING THE LARIMER COUNTY 2016 MULTI-JURISDICTIONAL HAZARD AND MITIGATION PLAN.

WHEREAS, Estes Valley Recreation and Park District has experienced past flooding, wildfires and other natural and human-caused hazard events that pose risks to public health and safety and which may cause serious property damage; and

WHEREAS, the State of Colorado and the Federal Emergency Management Agency (FEMA) provided mitigation funds to Larimer County to support development of a multi-jurisdictional mitigation plan; and

WHEREAS, the planning process fostered by all participating Larimer County jurisdictions and agencies offers the opportunity to consider natural and human-caused hazards and risks, and to identify mitigation actions to reduce future impacts of such hazards; and

WHEREAS, a Multi-Jurisdictional Hazard Mitigation Plan has been developed by the Mitigation Planning Committee, including personnel from twenty-seven different jurisdictions within Larimer County, and partner organizations; and

WHEREAS, the Multi-Jurisdictional Hazard Mitigation Plan recommends several mitigation actions that will help minimize and reduce safety threats and damage to private and public property; and

WHEREAS, two public meetings were held on July 27, 2015 and December 2, 2015 to present draft planning documents and to solicit input during the development of the plan; and

WHEREAS, the draft plan was made available for public comment from December 10, 2015 through January 10, 2016 to solicit questions and comments and to present the plan and the proposed mitigation actions.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE ESTES VALLEY RECREATION AND PARK DISTRICT, COLORADO, THAT:

1. The Multi-Jurisdictional Hazard Mitigation Plan is hereby adopted as an official plan of Estes Valley Recreation and Park District.
2. The offices identified in the Plan are hereby directed to pursue implementation of the recommended priority actions that are assigned to their respective departments / divisions.
3. Any action proposed in the Plan shall be subject to and contingent upon budget approval, if funding is required and this resolution shall not be interpreted so as to mandate any such appropriations.

BE IT FURTHER RESOLVED, that the Office of Emergency Management will be administering and monitoring the Larimer County 2016 Multi-Jurisdictional Hazard Mitigation Plan, in collaboration with all community partners, and will provide revisions and updates to the Board of Directors of The Estes Valley Recreation and Park District as needed to remain current.

Adopted this 19th day of July, 2016.

Ken Czarnowski, President

Ronald Duell, Vice-President

David Kiser, Treasurer

Stanley Gengler, Secretary

Marie Richardson, Director At-Large

RESOLUTION 2016-048
OF THE COUNCIL OF THE CITY OF FORT COLLINS
ADOPTING THE 2016 LARIMER COUNTY
MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

WHEREAS, the City has experienced flooding, wildfires and other natural and human-caused hazard events that pose risks to public health and safety and may cause serious property damage; and

WHEREAS, on June 1, 2010, the City adopted the Northern Colorado Regional Hazard Mitigation Plan; and

WHEREAS, a Multi-Jurisdictional Hazard Mitigation Plan ("Mitigation Plan") has been developed as an update to the 2010 Northern Colorado Regional Hazard Mitigation Plan by the Mitigation Planning Committee, including personnel from twenty-seven different jurisdictions within Larimer County and partner organizations; and

WHEREAS, the Mitigation Plan recommends several mitigation actions that will help minimize and reduce safety threats and damage to private and public property; and

WHEREAS, the City Council has determined that it is in the best interests of the City that the Mitigation Plan be adopted.

NOW, THEREFORE, BE IT RESOLVED BY THE COUNCIL OF THE CITY OF FORT COLLINS as follows:

Section 1. That the City Council hereby makes and adopts the determinations and findings contained in the recitals set forth above.

Section 2. That the Mitigation Plan, dated June 21, 2016, a copy of which is on file in the office of the City Clerk, and available for public inspection, is hereby approved and adopted, thereby replacing and superseding the Northern Colorado Regional Hazard Mitigation Plan.

Passed and adopted at a regular meeting of the Council of the City of Fort Collins this 21st day of June, A.D. 2016.

CITY OF FORT COLLINS SEAL COLORADO

Mayor

ATTEST:

City Clerk

RESOLUTION NO. 12-16

RESOLUTION ADOPTING THE LARIMER COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

WHEREAS, Larimer County, including the Town of Estes Park, has experienced past flooding, wildfires and other natural and human-caused hazard events that pose risks to public health and safety and which may cause serious property damage; and

WHEREAS, the Larimer County Multi-Jurisdictional Hazard Mitigation Plan has been developed by the Mitigation Planning Committee, including personnel from twenty-seven different jurisdictions within Larimer County, including the Town of Estes Park, and partner organizations; and

WHEREAS, the planning process by all participating Larimer County jurisdictions and agencies offered the opportunity to consider natural and human-caused hazards and risks, and to identify mitigation actions to reduce future impacts of such hazards; and

WHEREAS, the Larimer County Multi-Jurisdictional Hazard Mitigation Plan recommends mitigation actions that will help minimize and reduce safety threats and damage to private and public property; and

WHEREAS, the Town of Estes Park desires to formally adopt the Larimer County Multi-Jurisdictional Hazard Mitigation Plan.

NOW THEREFORE, BE IT RESOLVED BY THE BOARD OF TRUSTEES OF THE TOWN OF ESTES PARK:

1. The Town of Estes Park hereby adopts the May 2016 Larimer County Multi-Jurisdictional Hazard Mitigation Plan for the Town of Estes Park.

2. The appropriate officials of the Town of Estes Park are authorized to submit this Resolution and any related documents to the Colorado Division of Emergency Management and Federal Emergency Management Agency.

INTRODUCED, READ, AND PASSED BY THE BOARD OF TRUSTEES OF THE TOWN OF ESTES PARK on this 28 day of June, 2016.

TOWN OF ESTES PARK, COLORADO

Mayor

ATTEST:

Town Clerk

BEFORE THE BOARD OF COMMISSIONERS
OF THE COUNTY OF LARIMER, STATE OF COLORADO

RESOLUTION ADOPTING THE LARIMER MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

WHEREAS, Larimer County has experienced past flooding, wildfires and other natural and human-caused hazard events that pose risks to public health and safety and which may cause serious property damage; and

WHEREAS, the State of Colorado and the Federal Emergency Management Agency (FEMA) provided mitigation funds to the County to support development of a multi-jurisdictional mitigation plan; and

WHEREAS, the planning process fostered by all participating Larimer County jurisdictions and agencies offers the opportunity to consider natural and human-caused hazards and risks, and to identify mitigation actions to reduce future impacts of such hazards; and

WHEREAS, a Multi-Jurisdictional Hazard Mitigation Plan has been developed by the Mitigation Planning Committee, including personnel from twenty-seven different jurisdictions within Larimer County, and partner organizations; and

WHEREAS, the Multi-Jurisdictional Hazard Mitigation Plan recommends several mitigation actions that will help minimize and reduce safety threats and damage to private and public property; and

WHEREAS, two public meetings were held on July 27, 2015 and December 2, 2015 to present draft planning documents and to solicit input during the development of the plan; and

WHEREAS, the draft plan was made available for public comment from December 10, 2015 through January 10, 2016 to solicit questions and comments and to present the plan and the proposed mitigation actions.

NOW, THEREFORE, BE IT RESOLVED by the Board of County Commissioners of Larimer County, Colorado, that:

1. The Multi-Jurisdictional Hazard Mitigation Plan is hereby adopted as an official plan of Larimer County.
2. The offices identified in the Plan are hereby directed to pursue implementation of the recommended priority actions that are assigned to their respective departments / divisions.
3. Any action proposed in the Plan shall be subject to and contingent upon budget approval, if funding is required and this resolution shall not be interpreted so as to mandate any such appropriations.

BE IT FURTHER RESOLVED, that the Office of Emergency Management will be administering and monitoring the Larimer Multi-Jurisdictional Hazard Mitigation Plan, in collaboration with all community partners, and will provide revisions and updates to the Board of Commissioners as needed to remain current.

DATED THIS 31st DAY OF May, 2016.

BOARD OF COMMISSIONERS
LARIMER COUNTY, COLORADO

LARIMER COUNTY CLERK SEAL COLORADO

By: _____
Chairman

ATTEST:

_____
County Clerk

RESOLUTION # R-067

A RESOLUTION APPROVING AND ADOPTING THE LARIMER COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

WHEREAS, in accordance with section C.R.S. §29-1-203 governmental entities may cooperate or contract one with another to provide any function, service or facility lawfully authorized to each of the respective units of governments; and

WHEREAS, in accordance with C.R.S. §29-1-201, governmental entities are permitted and encouraged to make the most efficient and effective use of their powers and responsibilities by cooperating and contracting with other governments; and

WHEREAS, Loveland Fire Rescue Authority ("Authority") and Larimer County are independent governmental entities duly organized and existing in accordance with Colorado law and are called upon to respond to emergency hazards contained within their respective jurisdictions; and

WHEREAS, the Authority recognizes the threat that natural hazards pose to people and property within our community; and

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

WHEREAS, adoption of Multi-Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

WHEREAS, the Authority is located within Larimer County and the City of Loveland Planning Area, and fully participated in the mitigation planning process to prepare this Multi-Hazard Mitigation Plan; and

WHEREAS, the Colorado Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency, Region VIII officials have reviewed the Multi-Hazard Mitigation Plan and approved it contingent upon official adoption by the participating governments and entities; and

WHEREAS, it is the intent and desire of the Authority to adopt the Multi-Hazard Mitigation plan in the interest of the health, safety and welfare of the greater Loveland area residents; and

WHEREAS, the LFRA Board finds that it is in the best interests of the LFRA and the citizens served to adopt the "Larimer County Multi-Hazard Mitigation Plan" attached hereto as **Exhibit A** and incorporated by reference (the "Plan").

NOW THEREFORE BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE LOVELAND FIRE RESCUE AUTHORITY AS FOLLOWS:

Section 1. That the Plan as set forth in Exhibit A is hereby adopted.

Section 2. That the Fire Chief is hereby authorized and directed to submit this resolution adopting the Plan to the Colorado Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency, Region VIII officials to secure final approval of the Multi-Hazard Mitigation Plan.

Section 3. That this Resolution shall go into effect as of the date and time of its adoption.

ADOPTED this 29th day of June, 2016.

Jeffrey M. Swanty, Chairperson

Mark Miller, Fire Chief

ATTEST:

Secretary

RESOLUTION # R-47-2016

A RESOLUTION APPROVING AND ADOPTING THE LARIMER COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

WHEREAS, in accordance with section C.R.S. §29-1-203 governmental entities may cooperate or contract one with another to provide any function, service or facility lawfully authorized to each of the respective units of governments; and

WHEREAS, in accordance with C.R.S. §29-1-201, governmental entities are permitted and encouraged to make the most efficient and effective use of their powers and responsibilities by cooperating and contracting with other governments; and

WHEREAS, City of Loveland ("City") and Larimer County are independent governmental entities duly organized and existing in accordance with Colorado law and are called upon to respond to emergency hazards contained within their respective jurisdictions; and

WHEREAS, the City of Loveland recognizes the threat that natural hazards pose to people and property within our community; and

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

WHEREAS, adoption of a Multi-Jurisdictional Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

WHEREAS, the City of Loveland is located within Larimer County and the City of Loveland Planning Area, and fully participated in the mitigation planning process to prepare this Multi-Jurisdictional Hazard Mitigation Plan; and

WHEREAS, the Colorado Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency, Region VIII officials have reviewed the Multi-Jurisdictional Hazard Mitigation Plan and approved it contingent upon official adoption by the participating governments and entities; and

WHEREAS, it is the intent and desire of the City to adopt the Multi-Jurisdictional Hazard Mitigation plan in the interest of the health, safety and welfare of City residents; and

WHEREAS, the Council of City of Loveland finds that it is in the best interests of the City to adopt the "Larimer County Multi-Jurisdictional Hazard Mitigation Plan" attached hereto as **Exhibit A** and incorporated by reference (the "Plan").

NOW THEREFORE BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF LOVELAND, COLORADO AS FOLLOWS:

Section 1. That the Plan as set forth in Exhibit A is hereby adopted.

Section 2. That the City Manager is hereby authorized and directed to submit this resolution adopting the Plan to the Colorado Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency, Region VIII officials to secure final approval of the Multi-Hazard Mitigation Plan.

Section 3. That this Resolution shall go into effect as of the date and time of its adoption.

ADOPTED this 5th day of July, 2016.

Cecil A. Gutierrez, Mayor

ATTEST:

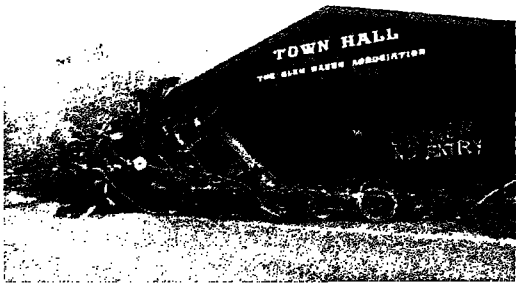
City Clerk

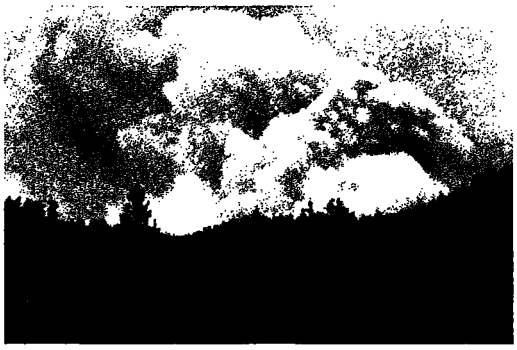
CITY OF LOVELAND SEAL COLORADO

Approved as to form:

Teresa Ablao
Assistant City Attorney

Larimer County
Multi-Jurisdictional





The following Larimer County Jurisdictions, Special Districts, and Organizations have collaboratively participated in this Hazard Mitigation Planning Process.

Larimer County

Town of Berthoud
Berthoud Fire Protection District
Crystal Lakes Fire Protection District
Colorado State University (CSU)
Town of Estes Park
Estes Park Medical Center
Estes Valley Fire Protecion District
Estes Valley Recreation and Park District
City of Fort Collins
Glacier View Fire Protection District
City of Johnstown
Livermore Fire Protection District
Town of Wellington

City of Loveland
Loveland Fire Rescue Authority
Northern Colorado Water Conservancy District
Pinewood Springs Fire Protection District
Platte River Power Authority
Poudre Canyon Fire Protection District
Poudre Fire Authority
Thompson Valley EMS
Town of Timnath
Town of Windsor
Upper Thompson Sanitation District
Wellington Fire Protection District
Windsor Severance Fire Rescue

City of Loveland

Michael Baker INTERNATIONAL

NORTHERN COLORADO WATER CONSERVANCY DISTRICT
and
MUNICIPAL SUBDISTRICT,
NORTHERN COLORADO WATER CONSERVANCY DISTRICT

RESOLUTION
D-1283-10-16
MS-350-10-16

ADOPTION OF THE LARIMER COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

WHEREAS

1. The NORTHERN COLORADO WATER CONSERVANCY DISTRICT, in partnership with the U.S. Bureau of Reclamation, is responsible for the operation and maintenance of the Colorado-Big Thompson (C-BT) Project. The C-BT Project collects water from the upper Colorado River basin in Grand County and delivers the water via the Alva B. Adams Tunnel and other C-BT facilities located partially in Larimer County to over 30 municipal and industrial water users serving more than 800,000 people, and 640,000 irrigable acres within its boundaries in eight northeastern Colorado counties, including Larimer County.

2. The MUNICIPAL SUB-DISTRICT, NORTHERN COLORADO WATER CONSERVANCY DISTRICT, owns and operates the Windy Gap Project, which collects water from the upper Colorado River basin in Grand County and delivers it via Windy Gap and C-BT facilities located partially in Larimer County to ten municipal and industrial water users within its boundaries in northeastern Colorado.

3. The East Slope Distribution System for the C-BT and Windy Gap is partially located within Larimer County, and Larimer County facilities include Mary's Lake, Lake Estes, Pinewood Reservoir, Flatiron Reservoir, Carter Lake Reservoir, Horsetooth Reservoir, the East Portal of the Alva B. Adams Tunnel, several diversions, canals, tunnels, penstocks, power plants, control and measurement facilities, and other appurtenant facilities.

4. C-BT facilities are owned by the Bureau of Reclamation and Northern Water, and approximately three-fourths of C-BT and Windy Gap watersheds are under management by the U.S. Forest Service, National Park Service, or other federal and state agencies.

5. NORTHERN WATER and the MUNICIPAL SUB-DISTRICT desire to protect C-BT and Windy Gap facilities and water supplies, its employees and the public from the threat that natural hazards pose, and is undertaking hazard mitigation actions to reduce the potential for harm to people, property, and water supplies from future hazard occurrences.

6. NORTHERN WATER has entered into the C-BT Headwaters Partnership through a Memorandum of Understanding with the Bureau of Reclamation, U.S. Forest Service, and Colorado State Forest Service to proactively restore forest and watershed health, and preplan post-wildfire response to protect C-BT infrastructure and water supplies.

7. NORTHERN WATER and the MUNICIPAL SUB-DISTRICT desire to comply with the requirements of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (P.L. 93-288), as amended by the Disaster Mitigation Act of 2000, which requires development and adoption of a Multi-Hazard Mitigation Plan as a condition of eligibility for FEMA Hazard Mitigation Assistance programs.

8. Larimer County, with assistance from Michael Baker International, has gathered information and prepared the Larimer County Multi-Jurisdictional Hazard Mitigation Plan, dated May 2016 (Plan).

9. The Plan has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6.

10. NORTHERN WATER and the MUNICIPAL SUB-DISTRICT have participated in the development of the Plan as a jurisdiction, provided information for the Plan as described in Appendix C, reviewed the Plan, and affirms that its portions the Plan will be updated no less than every five years.

11. NORTHERN WATER will transmit a letter to Larimer County, dated October 13, 2016, which comments on various aspects of the document, primarily clarifying NORTHERN WATER and MUNICIPAL SUB-DISTRICT jurisdictional boundaries and their authorities within those boundaries.

12. Adoption of the Plan by NORTHERN WATER and the MUNICIPAL SUB-DISTRICT demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in the Plan for the jurisdiction.

13. Adoption of the Plan helps to coordinate the responsible agencies to carry out their responsibilities under the Plan.

NOW, THEREFORE, BE IT RESOLVED

1. NORTHERN WATER and the MUNICIPAL SUB-DISTRICT adopt the Larimer County Multi-Jurisdictional Hazard Mitigation Plan as a component of its overall multi-hazard mitigation plan strategy.

CERTIFICATE

I, Eric W. Wilkinson, do hereby certify that the above is a true and correct copy of a Resolution unanimously adopted by the Board of Directors of Northern Colorado Water Conservancy District and the Municipal Sub-District, Northern Colorado Water Conservancy District, at regular meetings of said Boards held in Berthoud, Colorado, on October 13, 2016.

Secretary

Resolution 2016-1

Resolution of the Livermore Fire Protection District to adopt the Larimer Multi-Jurisdictional Hazard Mitigation Plan of 2016

Whereas, Livermore Fire Protection District recognizes the threat of wildfires and other natural and human-caused hazard events that pose risks to public health and safety and which may cause serious property damage within our community; and

Whereas, the Larimer County Multi-Jurisdictional Hazard Mitigation Plan has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6; and

Whereas, a Multi-Jurisdictional Hazard Mitigation Plan has been developed by the Mitigation Planning Committee, including personnel from twenty-seven different jurisdictions within Larimer County, and partner organizations; and

Whereas, the Board of Directors has reviewed the Plan and affirms that the Plan will be updated no less than every five years; and

NOW, THEREFORE, BE IT RESOLVED by the Livermore Fire Protection District Board that the Livermore Fire Protection District adopts the Larimer County Multi-Jurisdictional Hazard Mitigation Plan as this jurisdiction's Multi-Jurisdictional Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

ADOPTED this 20th day of October, 2016 at the meeting of the Board of Directors of the LIVERMORE FIRE PROTECTION DISTRICT

LIVERMORE FIRE PROTECTION DISTRICT

By: _____

LFPD Board President

ATTEST:

_____

LFPD Secretary

Adoption Resolution

Poudre Canyon Fire Protection District

Board of Directors

PO Box 370, Laporte, CO 80535

RESOLUTION

WHEREAS, Larimer County Emergency Management, with the assistance from Poudre Canyon Fire Protection District, has gathered information and prepared the Larimer Hazard Mitigation Plan and,

WHEREAS, the Larimer Hazard Mitigation Plan has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6; and,

WHEREAS, Poudre Canyon Fire Protection District is a local unit of government that has afforded the citizens an opportunity to comment and provide input to the Plan and the actions in the Plan; and

WHEREAS, Poudre Canyon Fire Protection District Board of Directors has reviewed the Plan and affirms that the Plan will be updated no less than every five years;

NOW THEREFORE, BE IT RESOLVED by Poudre Canyon Fire Protection District Board of Directors that Poudre Canyon Fire Protection District adopts the Larimer Hazard Mitigation Plan as this jurisdiction's Multi-Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

ADOPTED this 13th day of July, 2016 at the meeting of the Poudre Canyon Fire Protection District Board of Directors.

Brett Ridges, President

Resolution 16-8
Board of Directors
Poudre Fire Authority

A RESOLUTION ADOPTING THE LARIMER MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

WHEREAS, Larimer County, City of Fort Collins and Poudre Fire Authority has experienced past flooding, wildfires and other natural and human-caused hazard events that pose risks to public health and safety and which may cause serious property damage; and

WHEREAS, the State of Colorado and the Federal Emergency Management Agency (FEMA) provided mitigation funds to the County to support development of a multi-jurisdictional mitigation plan; and

WHEREAS, the planning process fostered by all participating Larimer County jurisdictions and agencies offers the opportunity to consider natural and human-caused hazards and risks, and to identify mitigation actions to reduce future impacts of such hazards; and

WHEREAS, a Multi-Jurisdictional Hazard Mitigation Plan has been developed by the Mitigation Planning Committee, including personnel from twenty-seven different jurisdictions (including Poudre Fire Authority) within Larimer County, and partner organizations; and

WHEREAS, the Multi-Jurisdictional Hazard Mitigation Plan recommends several mitigation actions that will help minimize and reduce safety threats and damage to private and public property; and

WHEREAS, two public meetings were held on July 27, 2015 and December 2, 2015 to present draft planning documents and to solicit input during the development of the plan; and

WHEREAS, the draft plan was made available for public comment from December 10, 2015 through January 10, 2016 to solicit questions and comments and to present the plan and the proposed mitigation actions.

NOW, THEREFORE, BE IT RESOLVED by the Poudre Fire Authority Board that:

1. The Multi-Jurisdictional Hazard Mitigation Plan is hereby adopted as an official plan of Poudre Fire Authority.

2. The offices identified in the Plan are hereby directed to pursue implementation of the recommended priority actions that are assigned to their respective departments / divisions.
3. Any action proposed in the Plan shall be subject to and contingent upon budget approval, if funding is required and this resolution shall not be interpreted so as to mandate any such appropriations.

BE IT FURTHER RESOLVED, that the Fort Collins Office of Emergency Management will be administering and monitoring the Larimer Multi-Jurisdictional Hazard Mitigation Plan, in collaboration with all community partners, and will provide revisions and updates to the Poudre Fire Authority Board as needed to remain current.

DATED THIS 24th DAY OF May, 2016.

Poudre Fire Authority Board, Larimer County, Colorado

By: Kristin Stephens
Poudre Fire Authority Board Chair

ATTEST:

Kristen A. Howard

Resolution 2016-07

A RESOLUTION OF THE PINEWOOD SPRINGS FIRE PROTECTION DISTRICT, LYONS, COLORADO, ACCEPTING AND APPROVING THE 2016 LARIMER COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

Whereas, the Pinewood Springs Fire Protection District, with assistance from Larimer County, has gathered information and prepared input to the Larimer County Multi-Jurisdictional Hazard Mitigation Plan; and

Whereas, the Larimer County Multi-Jurisdictional Hazard Mitigation Plan has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6; and

Whereas, the Pinewood Springs Fire Protection District approves any minor changes to the plan providing that it meets the FEMA requirements as set forth in 44 C.F.R. 201.6; and

Whereas, the Pinewood Springs Fire Protection District is a local government that has afforded the citizens an opportunity to comment and provide input in the Plan and the actions in the Plan; and

Whereas, the Pinewood Springs Fire Protection District has reviewed the Plan and affirms that the Plan will be updated no less than every five years;

NOW, THEREFORE, BE IT RESOLVED by the Pinewood Springs Fire Protection District Board of Directors that the Pinewood Springs Fire Protection District adopts the Larimer County Multi-Jurisdictional Hazard Mitigation Plan as this jurisdiction's Multi-Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

ADOPTED this 12 day of October, 2016 at a meeting of the Pinewood Springs Fire Protection District Board of Directors.

[signature], President

Ardean D Johnson, Secretary

RESOLUTION NO. 15-16

WHEREAS, Platte River Power Authority ("Platte River"), with the assistance from Larimer County, has gathered information and participated in the preparation of the Larimer County Hazard Mitigation Plan; and

WHEREAS, the Larimer County Hazard Mitigation Plan has been prepared in accordance with the FEMA requirements set forth at 44 C.F.R. 201.6; and

WHEREAS, Larimer County is a local unit of government that has afforded the citizens an opportunity to comment and provide input to the Plan and the actions in the Plan; and

WHEREAS, the management of Platte River has reviewed the Plan and affirms that its participation in the Plan will be updated no less than every five years.

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of Platte River Power Authority that Platte River Power Authority recognizes the Larimer County Hazard Mitigation Plan as this jurisdiction's Multi-Hazard Mitigation Plan, and resolves to execute the actions required of the Platte River Power Authority under the Plan.

AS WITNESS, I have executed my name as Assistant Secretary and have affixed the corporate seal of the Platte River Power Authority this 28 day of July, 2016.

Assistant Secretary

Adopted: July 28, 2016
Voted: 7-0

RESOLUTION 2016 - 1

RESOLUTION OF THE GLACIER VIEW FIRE PROTECTION DISTRICT TO ADOPT THE LARIMER MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN OF 2016

WHEREAS, Glacier View Fire Protection District recognizes the threat of wildfires and other natural and human-caused hazard events that pose risks to public health and safety and which may cause serious property damage within our community; and

WHEREAS, the Larimer County Multi-Jurisdictional Hazard Mitigation Plan has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6; and

WHEREAS, a Multi-Jurisdictional Hazard Mitigation Plan has been developed by the Mitigation Planning Committee, including personnel from twenty-seven different jurisdictions within Larimer County, and partner organizations; and

WHEREAS, the Board of Directors has reviewed the Plan and affirms that the Plan will be updated no less than every five years; and

NOW, THEREFORE, BE IT RESOLVED by the Glacier View Fire Protection District Board that the Glacier View Fire Protection District adopts the Larimer County Multi-Jurisdictional Hazard Mitigation Plan as this jurisdiction's Multi-Jurisdictional Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

ADOPTED this 19th day of September, 2016 at the meeting of the Board of Directors of the GLACIER VIEW FIRE PROTECTION DISTRICT.

GLACIER VIEW FIRE PROTECTION DISTRICT

By: _____
GVFPD Board President

ATTEST:

_____
GVFPD Secretary

RESOLUTION NO. 2016-002

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE THOMPSON VALLEY HEALTH SERVICES DISTRICT ADOPTING THE 2016 LARIMER COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

WHEREAS, the Thompson Valley Health Services District ("District") recognizes the threat that natural hazards pose to people and property within our community; and

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

WHEREAS, the 2016 Larimer County Multi-Jurisdictional Hazard Mitigation Plan ("Plan") has been prepared in accordance with FEMA requirements contained in 44 C.F.R. 201.6; and

WHEREAS, the District is a local unit of government that fully participated in the process to prepare the Plan and agrees with its provisions; and

WHEREAS, the District's Board of Directors has reviewed the Plan and affirms that the Plan will be updated no less than every five years.

NOW THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE THOMPSON VALLEY HEALTH SERVICES DISTRICT THAT:

The Board hereby adopts the 2016 Larimer County Multi-Jurisdictional Hazard Mitigation Plan as this jurisdictions Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

Adopted this 29 day of Sept., 2016.

THOMPSON VALLEY HEALTH SERVICES DISTRICT

By: Patricia Farnham
Patricia Farnham, President

ATTEST:

By: _____
Secretary

TOWN OF TIMNATH, COLORADO
RESOLUTION NO. 104, SERIES 2016

RESOLUTION ADOPTING THE LARIMER MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

WHEREAS, Larimer County, as well as the Town of Timnath, have experienced past flooding, wildfires and other natural and human-caused hazard events that pose risks to public health and safety and which may cause serious property damage; and

WHEREAS, the State of Colorado and the Federal Emergency Management Agency (FEMA) provided mitigation funds to the County to support development of a multi-jurisdictional mitigation plan; and

WHEREAS, the planning process fostered by all participating Larimer County jurisdictions and agencies offers the opportunity to consider natural and human-caused hazards and risks, and to identify mitigation actions to reduce future impacts of such hazards; and

WHEREAS, a Multi-Jurisdictional Hazard Mitigation Plan has been developed by the Mitigation Planning Committee, including personnel from twenty-seven different jurisdictions within Larimer County, and partner organizations; and

WHEREAS, the Multi-Jurisdictional Hazard Mitigation Plan recommends several mitigation actions that will help minimize and reduce safety threats and damage to private and public property; and

WHEREAS, two public meetings were held on July 27, 2015 and December 2, 2015 to present draft planning documents and to solicit input during the development of the plan; and

WHEREAS, the draft plan was made available for public comment from December 10, 2015 through January 10, 2016 to solicit questions and comments and to present the plan and the proposed mitigation actions.

NOW, THEREFORE, BE IT RESOLVED BY THE TOWN COUNCIL OF THE TOWN OF TIMNATH, COLORADO AS FOLLOW:

1. The Larimer County Multi-Jurisdictional Hazard Mitigation Plan is hereby adopted as the official plan of the Town of Timnath.

Approval
The Plan is hereby approved in substantially the form as attached hereto, subject to technical or otherwise non-substantive modifications, as deemed necessary by the Town Manager in consultation with the Town Planner, Engineer, Legal Counsel, and other applicable staff or consultants.

INTRODUCED, MOVED, AND ADOPTED BY THE TOWN COUNCIL OF THE TOWN OF TIMNATH, ON DECEMBER 7, 2016.

TOWN OF TIMNATH, COLORADO

Jill Grossman-Belisle, Mayor

ATTEST:

Milissa Peters, CMC
Town Clerk

TOWN OF TIMNATH SEAL COLORADO

TOWN OF BERTHOUD

RESOLUTION NO. 16-16

A RESOLUTION ADOPTING AND AFFIRMING THE LARIMER COUNTY AND WELD COUNTY 2016 MULTI-AGENCY HAZARD MITIGATION PLANS.

WHEREAS, the Town of Berthoud ("Town") is a Colorado municipality with all powers and authority provided by Colorado law; and

WHEREAS, the Town recognizes the threat that natural hazards pose to people and property within the community; and

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

WHEREAS, a fully-adopted Multi-Jurisdictional Hazard Mitigation Plan is a requirement for future funding of mitigation projects by the Federal Emergency Management Agency; and

WHEREAS the Town of Berthoud is located within both Larimer and Weld county Emergency Managers Planning Area; and

WHEREAS, the Town of Berthoud, through Police Chief Jim Anderson, is a full participant in the Larimer County and Weld County 2016 Multi-Jurisdictional Hazard Mitigation Plans; and

WHEREAS, the Colorado Office of Emergency Management and the Federal Emergency Management Agency, Region VIII have reviewed and approved both of the Larimer County 2016 and Weld County 2016 Multi-Jurisdictional Hazard Mitigation Plans.

NOW, THEREFORE, BE IT RESOLVED BY THE TOWN BOARD OF THE TOWN OF BERTHOUD, COLORADO AS FOLLOWS:

1. The Larimer County 2016 Multi-Jurisdictional Hazard Mitigation Plan is hereby incorporated into the Resolution as if set forth fully.

2. The Weld County 2016 Multi-Jurisdictional Hazard Mitigation Plan is hereby incorporated into the Resolution as if set forth fully.

3. Both the Larimer County 2016 and Weld County Multi-Jurisdictional Hazard Mitigation Plans are adopted as the official Plans of the Town of Berthoud.

4. The Town Clerk is hereby authorized and empowered to notify such persons or entities as may be necessary of the Town's adoption of the Larimer County 2016 and Weld County 2016 Multi-Jurisdictional Hazard Mitigation Plan, and to provide all interested persons with copies of this Resolution.

TOWN OF BERTHOUD, COLORADO

Steve Mulvihill, Mayor

ATTEST:

Alisa Darrow, Town Clerk

this Agreement and shall not be construed to affect in any manner the terms and provisions herein.

XVIII. Becoming a Party to this Agreement

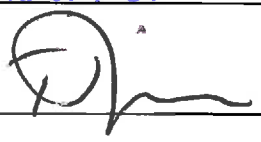
Each Party agrees to allow any other entity, including government and non-government emergency response and recovery partners, to join in this Agreement after formal approval by the prospective Party and notification by the Larimer County Office of Emergency Management of such action to each of the other Parties to this Agreement. To the extent that entities outside of Larimer County choose to join in this Agreement, notification shall also be provided to the office of emergency management in the county in which the entity is located.

XIX. Execution

This Agreement shall be executed by each Party on a separate signature page. This Agreement and the original signature pages shall be filed with and held by Larimer County Emergency Management or its successor agency, at 200 West Oak Street, Fort Collins, CO 80522. Copies of signature pages shall be provided to each Party, and such copies shall have the full force and effect as if they were originals. A copy of the full Agreement will be provided to the Colorado State Division of Homeland Security and Emergency Management.

As outlined in the foregoing Mutual Aid Agreement, the below Party executes this Agreement on the most recent date indicated below.

PARTY: Town of Estes Park

By: 

Title: Mayor

Date: June 28, 2016

ATTEST AS TO SIGNATURES:

Title: TOWN CLERK

Date: JUNE 28, 2016

TOWN OF WINDSOR

RESOLUTION NO. 2016-29

A RESOLUTION ADOPTING AND REAFFIRMING THE LARIMER COUNTY AND WELD COUNTY 2016 MULTI-JURISDICTIONAL HAZARD MITIGATION PLANS

WHEREAS, the Town of Windsor ("Town") is a Colorado home rule municipality with all powers and authority provided by Colorado law; and

WHEREAS, the Town recognizes the threat that natural hazards pose to people and property within the community; and

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

WHEREAS, a fully-adopted Multi-Jurisdictional Hazard Mitigation Plan is a requirement for future funding of mitigation projects by the Federal Emergency Management Agency; and

WHEREAS, the Town of Windsor is located within both the Larimer County and the Weld County Emergency Managers Planning Area; and

WHEREAS, the Town of Windsor, through Police Chief John Michaels, is a full participant in the Larimer County and Weld County mitigation planning processes, and the preparation of the Larimer County 2016 and Weld County 2016 Multi-Jurisdictional Hazard Mitigation Plans; and

WHEREAS, on September 13, 2010, the Town previously adopted the 2009 Northeast Colorado emergency Managers Multi-Hazard Mitigation Plan, which has since been changed from an eleven county area to Weld and Larimer Counties adopting their own plans; and

WHEREAS, the Colorado Office of Emergency Management and the Federal Emergency Management Agency, Region VIII have reviewed and approved both of the Weld County 2016 and Larimer County 2016 Multi-Jurisdictional Hazard Mitigation Plans.

NOW, THEREFORE, BE IT RESOLVED BY THE TOWN BOARD OF THE TOWN OF WINDSOR, COLORADO, AS FOLLOWS:

1. The Weld County 2016 Multi-Jurisdictional Hazard Mitigation Plan is hereby incorporated into this Resolution as if set forth fully.

2. The Larimer County 2016 Multi-Jurisdictional Hazard Mitigation Plan is hereby incorporated into this Resolution as if set forth fully.

3. Both the Weld County 2016 and the Larimer County 2016 Multi-Hazard Mitigation Plans are hereby adopted as official plans of the Town of Windsor, Colorado.

4. The Town Clerk is hereby authorized and empowered to notify such persons or entities as may be necessary of the Town's adoption of the Larimer County 2016 Multi-Jurisdictional Hazard Mitigation Plan and of the Weld County 2016 Multi-Jurisdictional Hazard Mitigation Plan, and to provide all interested persons with copies of this Resolution.

TOWN OF WINDSOR, COLORADO

By: Kristie Melendez
Kristie Melendez, Mayor

ATTEST:

Patti Garcia, Town Clerk

P.O. Box 568 • Estes Park, CO 80517
Ph: 970-586-4544 • Fax: 970-586-1049
www.utsd.org

UPPER THOMPSON SANITATION DISTRICT

RESOLUTION NO. 2016-06-03

A RESOLUTION ADOPTING THE LARIMER COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

WHEREAS, the Upper Thompson Sanitation District ("District") has experienced past flooding, wildfires and other natural and human-caused events and recognizes the threat that various natural hazards pose to people and property within the community; and

WHEREAS, undertaking certain hazard mitigation actions may reduce the potential for harm to people and property from future hazard occurrences; and

WHEREAS, the State of Colorado and the Federal Emergency Management Agency (FEMA) provided mitigation funds to the County of Larimer to support development of a multi-jurisdictional mitigation plan; and

WHEREAS, a Mitigation Planning Committee including personnel from twenty-seven different jurisdictions in Larimer County, including the District, has prepared a Multi-Jurisdictional Hazard Mitigation Plan, attached hereto as Exhibit A and incorporated herein, based on data collection, stakeholder input, community asset/vulnerability analysis and identification of preferred mitigation alternatives (the "Plan"); and

WHEREAS, the Plan was developed per the requirements of the FEMA-prescribed mitigation planning process; and

WHEREAS, the Colorado Office of Emergency Management and FEMA, has reviewed the Plan and approved it contingent upon the official adoption of the Plan by all participating governmental bodies.

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the Upper Thompson Sanitation District, Larimer County, Colorado as follows:

1. **Adoption of Plan.** The Board of Directors hereby adopts the Larimer County Multi-Jurisdictional Hazard Mitigation Plan, as an official plan for the District.

2. **Submittal to State and Federal Authorities and to Take Necessary Actions**. The Board of Directors hereby authorizes the District Manager to submit this Adoption Resolution to the Colorado Division of Emergency Management and Federal Emergency Management Agency to enable the Plan's final approval, and to take such actions as are recommended and assigned to the District in the Plan.

3. **Guidance Policy; No Third Party Liability.** The Plan constitutes a guidance policy regarding future service and hazard mitigation recommendations, for use by the Board in its sole discretion regarding planning, development and operation of the District's resources, and does not establish absolute requirements or funding commitments for any item not identified in the current fiscal year budget. All identified items are expressly subject to budget and appropriation of funds therefor. The Plan shall not be deemed to give rise to any mandated appropriation, claim or cause of action by any officer, employee, or official of the District, or any other person or entity.

4. **Severability**. If any part, section, subsection, sentence, clause or phrase of this Resolution or the adopted Plan is for any reason held to be invalid, such invalidity shall not affect the validity of the remaining provisions.

5. **Effective Date**. This Resolution shall take effect and be enforced immediately upon its approval by the Board.

ADOPTED this 21st day of June, 2016.

Upper Thompson Sanitation District

By _____
Jack Reed, Chairman

Attest:

_____
Ron Duell, Secretary

RESOLUTION 28–2016

A RESOLUTION OF THE TOWN OF WELLINGTON, COLORADO ADOPTING THE LARIMER COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

WHEREAS, Larimer County and Municipalities within Larimer County have experienced past flooding, wildfires and other natural and human-caused hazard events that pose risks to public health and safety and which may cause serious property damage; and

WHEREAS, the State of Colorado and the Federal Emergency Management Agency (FEMA) provided mitigation funds to the County to support development of a multi-jurisdictional mitigation plan; and

WHEREAS, the planning process fostered by all participating Larimer County jurisdictions and agencies offers the opportunity to consider natural and human-caused hazards and risks, and to identify mitigation actions to reduce future impacts of such hazards; and

WHEREAS, a Multi-Jurisdictional Hazard Mitigation Plan has been developed by the Mitigation Planning Committee, including personnel from twenty-seven different jurisdictions within Larimer County, and partner organizations; and

WHEREAS, the Multi-Jurisdictional Hazard Mitigation Plan recommends several mitigation actions that will help minimize and reduce safety threats and damage to private and public property; and

WHEREAS, two public meetings were held on July 27, 2015 and December 2, 2015 to present draft planning documents and to solicit input during the development of the plan; and

WHEREAS, the draft plan was made available for public comment from December 10, 2015 through January 10, 2016 to solicit questions and comments and to present the plan and the proposed mitigation actions.

NOW, THEREFORE BE IT RESOLVED BY THE BOARD OF TRUSTEES OF THE TOWN OF WELLINGTON, LARIMER COUNTY, COLORADO.

1. The Larimer County Multi-Jurisdictional Hazard Mitigation Plan is adopted as the Town of Wellington's Multi-Hazard Mitigation Plan

2. This Board resolves to execute the actions in the Plan and directs staff to pursue implementation of the actions identified in the Plan for the Town of Wellington.

JACK ERISKHOFF, MAYOR

LARRY LORENTZEN, TOWN ADMINISTRATOR/CLERK

RESOLUTION 2016-04
ADOPTION
LARIMER COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

WHEREAS, ,WELLINGTON FIRE PROTECTION DISTRICT (DISTRICT) with the assistance from LARIMER COUNTY, OFFICE OF EMERGENCY MANAGEMENT and MICHAEL BAKER INTERNATIONAL, INC., has gathered information and prepared the LARIMER COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN (PLAN); and,

WHEREAS, the PLAN has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6; and,

WHEREAS, the DISTRICT is a local unit of government that has afforded the citizens an opportunity to comment and provide input in the PLAN and the actions in the PLAN; and

WHEREAS, BOARD OF DIRECTORS of the DISTRICT has reviewed the PLAN and affirms that the PLAN will be updated no less than every five years;

NOW THEREFORE, BE IT RESOLVED by the BOARD OF DIRECTORS that the DISTRICT adopts the PLAN as this jurisdiction's Multi-Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

ADOPTED this 1st day of JUNE, 2016 at the meeting of the BOARD OF DIRECTORS of the DISTRICT.

WELLINGTON FIRE PROTECTION DISTRICT

Board President, Kenneth Pettit

Attest:

Board Secretary, Carol Story

A RESOLUTION OF THE WINDSOR-SEVERANCE FIRE PROTECTION DISTRICT BOARD OF DIRECTORS ADOPTING THE LARIMER COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

RESOLUTION NO. 2016-04

WHEREAS, the Board of Directors of the Windsor-Severance Fire Protection District recognizes the Larimer County Multi-Jurisdictional Hazard Mitigation Plan as the Windsor-Severance Fire Protection District Multi-Hazard Mitigation Plan:

WHEREAS, the Larimer County Multi-Jurisdictional Hazard Mitigation Plan has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6; and,

WHEREAS, Windsor-Severance Fire Protection District is a local unit of government that has afforded the citizens an opportunity to comment and provide input in the Plan and the actions in the Plan; and

WHEREAS, the Board of Directors has reviewed the Plan and affirms that the Plan will be updated no less than every five years;

NOW THEREFORE, BE IT RESOLVED by the Board of Directors that Windsor-Severance Fire Protection District adopts the Larimer County Multi-Jurisdictional Hazard Mitigation Plan as this jurisdiction's Multi-Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

ADOPTED this 14 day of July, 2016 at the meeting of the Board of Directors of the Windsor-Severance Fire Protection District.

Jim Abbott, President, Board of Directors
Windsor-Severance Fire Protection District

Attest

Michael Young, Secretary, Board of Directors
Windsor-Severance Fire Protection District