Lefthand

Fire Protection District

Community Wildfire Protection Plan

March, 2015

Prepared For

LEFTHAND FIRE PROTECTION DISTRICT

900 Lefthand Canyon Drive

Boulder, CO 80302

Originally Prepared By

GREENWOOD SUSTAINABILITY LLC (2011)

2015 Update Prepared By

Baer Mountain and Urban Forestry LLC.

TABLE OF CONTENTS

Forward:

This document serves as an update to the originally prepared CWPP from 2011. In the time since the implementation of the 2011 CWPP, there have been changes to the Lefthand Fire Protection District boundary layout, as well as changes to the science behind hazardous fuels reduction and defensible space project layout. This document was constructed with the objective of bringing outdated information up to current, as well as making minor improvements to help the readability and understandability of the underlining principles. Below is a list of changes to look for in the 2015 Lefthand Fire Protection District CWPP Update:

-Migration from Wildfire Defensible Space layout guidelines as noted in CSFS 6.302, to CSFS FIRE 2012-2.

-Removal of Conifer Hill from the CWPP, as it has been removed from the Lefthand Fire Protection District jurisdictional area, except to illustrate original findings of the 2011 CWPP.

-Incorporation of Colorado Wildfire Risk Assessment portal

-Improved quality to some (not all) GIS generated maps

-Maps to include recent fuels treatment project (since 2011 CWPP implementation).

-Updating of interagency personnel

-Update of Station apparatus and personnel information/location.

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1 CERTIFICATION

Declaration of Agreement

The Lefthand Fire Protection District Community Wildfire Protection Plan was developed in accordance with the guidelines set forth by the Healthy Forests Restoration Act (2003) and the Colorado State Forest Service's Minimum Standards for Community Wildfire Protection Plans (2004/2009).

This plan;

- Was collaboratively developed – interested parties and federal land management agencies managing land in the region of the Lefthand Fire Protection District have been consulted; and
- Identifies and prioritizes areas for hazardous fuels reduction treatments and recommends the types and methods of treatment to reduce the wildfire threat to values at risk in the county; and
- Recommends measures to reduce the ignitability of structures throughout the area addressed by the plan.

The following entities mutually agree with the contents of this Community Wildfire Protection Plan:

Colorado State Forest Service

Allen Owen, Boulder District Forester, CSFS — Date

Allen Owen - CSFS Boulder District Forester — 5/19/11

Lefthand Fire Protection District

Tom Stoffel, Chief, LHFPD — Date

Tom Stoffel, Fire Chief, Lefthand Fire Protection District — May 19 2011

Boulder County Parks and Open Space

Chad Julian, Senior Resource Specialist, Forestry and Fire, BCPOS — Date

BCPOS — 5/25/11

City of Boulder OSMP — 5/20/2011

Boulder Open Space and Mountain Parks

Chris Wanner, Forest Ecologist, BOSMP — Date

USDA Forest Service

Christine Walsh, District Ranger, Boulder Ranger District, Arapaho Roosevelt National Forests and Pawnee National Grassland — Date

Christine Walsh — 6/13/11

2 THE PURPOSE

The Community Wildfire Protection Plan (CWPP) is a strategic plan that identifies wildland fire risks and hazards facing Wildland-Urban Interface (WUI) communities and neighborhoods. The plan provides prioritized mitigation recommendations designed to reduce those risks and hazards. The plan is collaboratively developed with input and direction provided by the Lefthand Fire Protection District (LHFPD), affected neighborhoods and community associations, as well as local, state, and federal land management agencies. A certified CWPP positions recommended treatments for National Fire Plan funding priority to support project implementation.

Once the CWPP is certified and adopted, it is each community or neighborhood's responsibility to move forward and implement the action items identified in the plan. This may require further planning at the project level, collaboration with the fire district, public land management agencies, acquisition of funds, or simply motivating individual homeowners.

The Community Wildfire Protection Plan concept is defined and authorized in Title I of the Healthy Forests Restoration Act (HFRA) passed by Congress on November 21, 2003 and signed into law by President Bush on December 3, 2003.

The Need

Historically, wildfire is a naturally occurring and important component of the ecosystems that dominate much of the LHFPD. Native species common to these ecosystems are resilient to, and in some cases dependent on wildfire to maintain health or even trigger reproduction processes. Decades of aggressive fire suppression practices have removed this critical natural cleansing process from the vegetation life cycle. Fire exclusion has altered historic forest and shrubland conditions and contributed to an unprecedented buildup of naturally occurring flammable woody fuels. Recent years of persistent drought have compounded this situation, resulting in stressed and weakened trees susceptible to widespread epidemics of disease and insect infestation. Figure 1 graphically depicts the impact of a fire exclusion policy to vegetation density.

Figure 1. Historic vs current conditions

Source: Carnegie Branch Library for Local History, Boulder Historical Society Collection

At the same time, our nation's demographic profile is changing, shifting growth centers into these same fire-prone and ecologically stressed regions. The potential consequences are devastating, costly, increasing, and in recent years have attracted the attention of the U.S. Congress in the pursuit of an effective solution.

Federal Directives

Business as usual for the fire management world ended in the year 2000, following the most devastating and costly fire season ever witnessed in the U.S. Several reports were submitted to the president in the months that followed, shedding light on the deteriorating conditions of our forests, the growing threat wildfires pose to communities, the need to change land management and suppression policies, and the need to adequately fund these efforts.

The National Fire Plan was drafted and submitted by the Bureau of Land Management (BLM) and the United States Department of Agriculture – Forest Service (USFS). The plan provided guidance and recommendations concerning response to severe wildfires, methods to reduce the impacts of fire on rural communities, the environment, and firefighting resources.

In 2003 The Bush administration implemented the Healthy Forest Restoration Act (HFRA) providing federal legislation to improve forest and rangeland management practices, reduce hazardous fuels on federal land, and provide a framework for wildfire assessment and strategic planning at the community level.

HFRA refers to this level of planning as the CWPP process. This includes a framework for wildfire hazard and risk evaluation, strategic mitigation planning, prioritized access to federal grants supporting hazard reduction projects, and a basis for collaboration with federal, state, and local land management agencies. HFRA also provides minimum requirements for CWPP certification.

In order to meet these requirements, this CWPP provides:

- ***Collaboration*** between local and state government representatives, in consultation with federal agencies, stakeholders, and other interested parties.
- ***Prioritized fuel reduction*** in identified areas, as well as recommendations for the type and methods of treatment, including identifying and prioritizing fuels reduction opportunities across the landscape.
- Recommendations and treatment measures to ***reduce structural ignitability*** for homeowners and communities within the study area.

Additionally this CWPP addresses the revised recommendations the Colorado State Forest Service (CSFS) released in Colorado Senate Bill 09-001. These revised guidelines were implemented in the Fall of 2009, support the original recommendations outlined in the HFRA, while accommodating the unique characteristics and wide ranging aspects of Colorado's WUI communities. These recommendations include increased collaboration and stakeholder involvement at the local community level, consideration of recent large fire behavior and spread in community risk analysis, level of project detail

required for larger scale plans that include multiple communities and neighborhood associations, and the adaptation of existing plans.

Project Goals and Objectives

Wildfire is a natural process within the forests, shrublands, and grasslands of the LHFPD. While the risk of wildfire ignition cannot be eliminated, definitive measures can be taken to significantly reduce the hazards and risks that contribute wildfire related losses. The primary goals of this CWPP are:

- Indentify critical wildfire hazards and risks affecting identified WUI communities, subdivisions, and other values at risk within LHFPD through a standardized comprehensive assessment methodology;
- Develop prioritized mitigation recommendations to effectively reduce those hazards; and
- Motivate residents to create and maintain effective defensible environments in and around their homes, and influence neighbors and homeowner associations to do the same.

Supporting Objectives Include:

- Facilitate community outreach and education;
- Coordinate and collaborate CWPP development with affected federal, state, and local agencies;
- Coordinate and collaborate mitigation recommendation development with identified homeowner associations, rural neighborhoods, and areas of special interest within the fire district;
- Conduct comprehensive wildfire hazard and risk assessments for each identified WUI in accordance with methodologies developed and approved by the National Fire Protection Association (NFPA);
- Establish an approximate level of risk for each surveyed WUI based on assessment results;
- Identify and prioritize effective and achievable mitigation and wildfire hazard reduction projects at the landscape, community, and homeowner level; and
- Promote an improved level of emergency response.

Boulder County Mitigation Regulations

Boulder County has developed wildfire mitigation regulations for any new construction. Since 1993, a Wildfire Mitigation Plan must be submitted to, and be approved by, the Wildfire Mitigation Coordinator in the Boulder County Land Use Department, before a building permit is issued. Any new structure requires a Site Plan Review, which triggers the Wildfire Mitigation Plan. A foundation inspection will not be done until the mitigation work is completed. Prior to the final inspection, all remaining items of the Wildfire Mitigation Plan must be addressed. Any homeowner or private contractor can write a mitigation plan for the builder, but the final check has to come from either Colorado State Forest Service or the Land Use Department. Additionally, since 1993, the County requires that any new structure of 1000 square feet or more must have defensible space, and since 1990, all new roofs must be Class A fire retardant. This is for all new buildings as well as any new roof covering 30% or more. Since 1992, sprinklers are required in houses of 3,600+ square feet. Reference http://www.bouldercounty.org/lu/wildfire/index.htm for program details and contact information

3 LEFTHAND FIRE PROTECTION DISTRICT PROFILE

District Overview

The LHFPD is located in north central Boulder County, Colorado. The County encompasses 741 square miles and is situated on the eastern slope of the Rocky Mountains in north-central Colorado. Elevations within the County range from the eastern 5,000' plains to the 14,000' peaks of the Continental Divide on the western margin. The Denver Regional Council of Governments estimates Boulder County's population at approximately 294,000, with about 103,100 in the City of Boulder, another 84,636 in the City of Longmont, 26,453 in Lafayette, 19,000 in Louisville and the remainder dispersed throughout the smaller towns of Lyons, Nederland, Ward, Jamestown, Superior and Erie and unincorporated areas, including the communities of Niwot, Gunbarrel and Allenspark. Figure 2 (Appendix B) illustrates the location of the LHFPD within Boulder County and the state of ColoradoFigure 2. Location of LHFPD, Boulder County, Colorado

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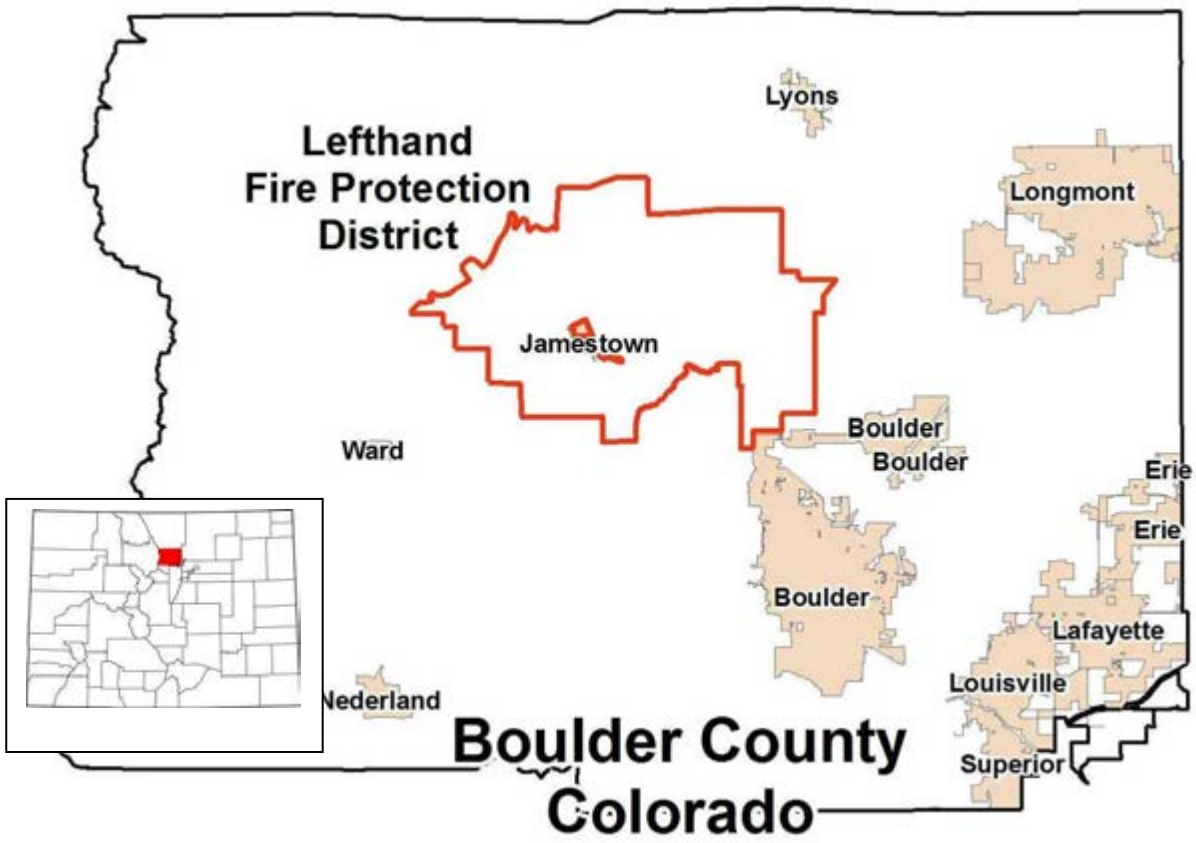
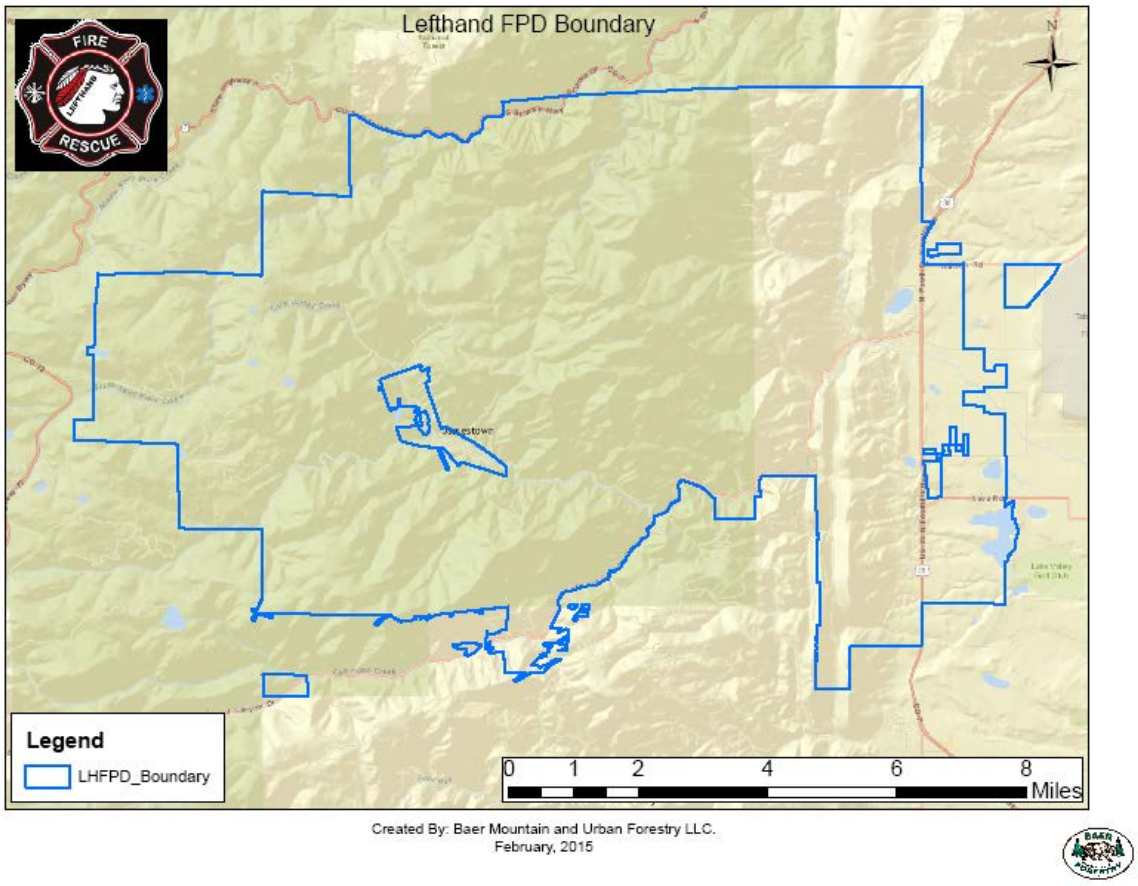


Figure 3. LHFPD Boundary



The LHFPD occupies 52 square miles of the Front Range foothills, situated between the South St Vrain Creek to the north and the Lefthand Canyon Creek to the south. Terrain and elevation varies greatly between the eastern plains at 5,500' and the mountainous western border at 8,800 near the Peak to Peak HWY 72.

The district borders the northwest margin of the City of Boulder and shares adjacent boundaries with eight other fire protection districts including; Boulder Rural, Lyons, Allenspark, Indian Peaks, Gold Hill, Sunshine, Boulder Mountain Fire Authority, and Jamestown.

The Fire Protection District serves approximately 2,000 residents. Concentrations of residential structures are located near the mouth of Lefthand Canyon in the North Foothills Ranch, Lake of the Pines, Crestview Estates, and Old Stages Road neighborhoods and subdivisions. Residential subdivisions are also located in the mountainous western portion of the district. Approximately 200 structures are located in the Sky Ranch Estates, Overland, Bar-K Ranch and Mattoon's Highlands subdivisions west of Jamestown, along west Overland Road.

Land Ownership and Natural Resource Management

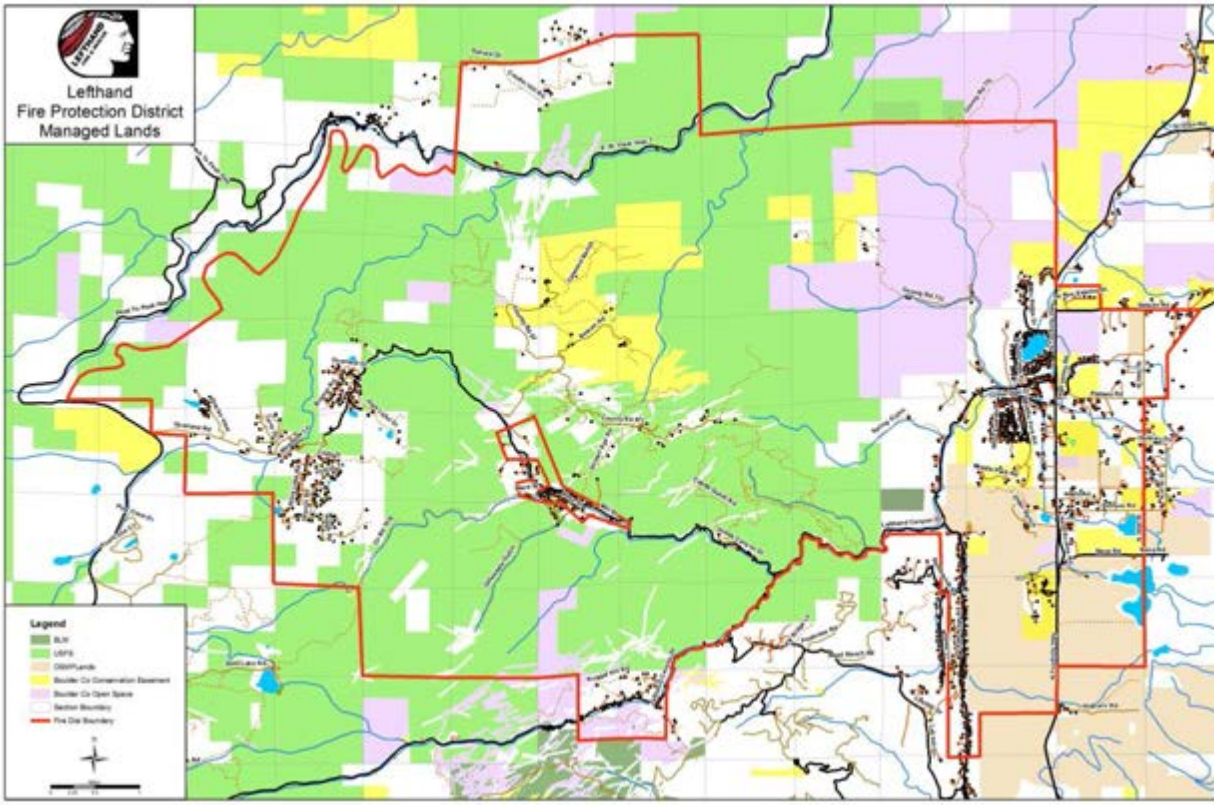
Land ownership throughout the district is characterized by a checkerboard of private holdings, national forest lands, and areas managed by local agencies. A recent tax study for the LHFPD found that 30% of the lands within the district are privately owned. With 70% of the remaining lands within the district managed by public agencies, year-round recreational use is significant, greatly increasing the risk of local wildfire ignition. Figure 3 outlines ownership details within the LHFPD. Figure 4 (See Appendix B for a larger version) provides mapping details.

Figure 4. LHFPD land ownership breakdown

LHFPD Taxable Lands Assessment		
Agency/Owner	**Acres**	**% of Total**
Boulder City	1497	4.53%
Boulder County	4187	12.68%
State	135	0.41%
Federal	15163	45.91%
Denver Schools	666	2.02%
Senior Trust	956	2.89%
Other Exempt	629	1.90%
Exempt Total	23233	70%
Non-Exempt/Private	9795	29.66%
Grand Total	33028	100%

Source: Greenwood Sustainability, LLC

Figure 5. LHFPD managed lands



Climate

Weather conditions play a critical role regarding the likelihood of wildfire ignition as well as the intensity of the resulting fire behavior. Figure 5 is compiled from several decades of weather data for Boulder, CO. Conditions at higher elevations within the district are typically cooler with slightly increased precipitation levels.

Figure 6. Local weather characteristics

Weather Attribute	MONTH											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Avg High Temp	46	49	56	63	72	82	87	85	77	67	53	46
Avg Low Temp	19	23	28	34	42	51	56	55	47	37	27	21
Mean	32	36	42	48	57	66	72	70	62	52	40	33
Avg Precip (in.)	0.7	0.75	1.78	2.88	3.05	1.99	1.88	1.63	1.79	1.28	1.42	0.78

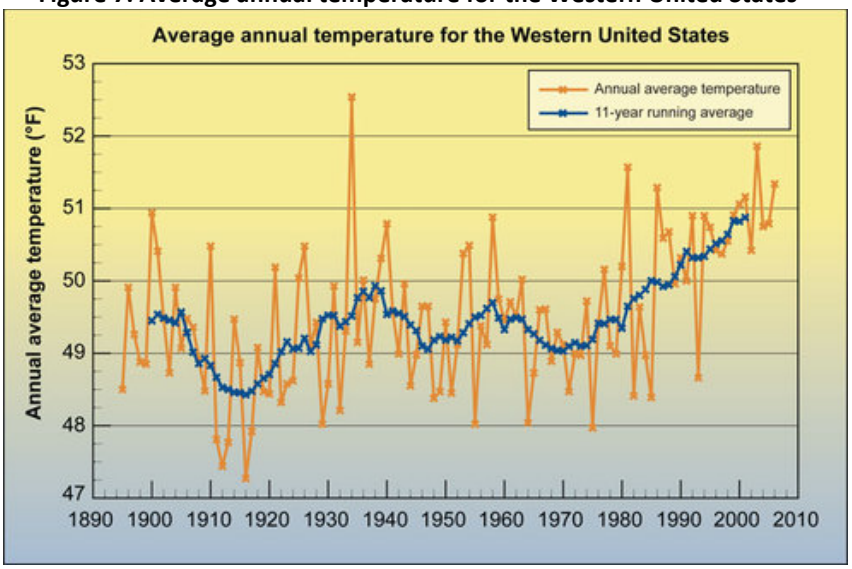
Source: National Oceanic and Atmospheric Administration National Weather Service

Boulder is characterized by a relatively mild, sunny, and dry climate. Historically Boulder receives an average of 20 inches of precipitation a year, occurring primarily during the spring and summer months.

While these data depict an average of historical conditions, a more detailed analysis of regional trends in the western United States highlight a gradual but potentially significant temperature trend (Figure 6). A 2 degree increase over a 30 year period may, at first, not seem significant, but widespread insect and pathogen infestations that have affected millions of acres of forested lands across the western US during

the same time frame are indicative to a forest ecosystem that is highly sensitive to even minor temperature fluctuations. Nearly 3.6 million acres have been severely affected since 1996 in Colorado and Southern Wyoming alone (USDA USFS, 2010). All weather models are indicating that this warming trend will continue for the next several decades (Westerling, Hildalgo, Cayan, Swetnam, 2006)

Figure 7. Average annual temperature for the Western United States



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

Corresponding to this recent landscape-level decline in forest health, data indicates that large wildfire activity increased markedly during the same period, reflecting higher large-wildfire frequency, longer wildfire durations, and longer wildfire seasons. The greatest increases have occurred in mid-elevation, Northern Rockies forests and are strongly associated with increased spring and summer temperatures and an earlier spring snowmelt (Westerling, Hildalgo, Cayan, Swetnam, 2006).

Terrain

The district is characterized by terrain that is typical of Colorado's eastern Front Range transitional zone, varying greatly between the high plains and agricultural lands to the east at an elevation 5,500', to the sub-alpine forests and canyons above 8,000' in the district's western extent. Terrain and elevation strongly influence local vegetation, wildland fuels, and directly impact wildfire behavior. Terrain features also often dictate community infrastructure design, further influencing overall wildfire hazard and risk factors

Vegetation

The district's geographical extent along the Front Range transitional zone supports several of Colorado's major ecosystems. The Grassland and Montane, ecosystems dominate most of the LHFPD. The Riparian and Subalpine ecosystems are also found within the district but are restricted to drainages and higher elevations. Each ecosystem is essentially a biological environment consisting of all the organisms living in a particular area, as well as all the nonliving, physical components of the environment with which they interact. Each ecosystem is comprised of unique plants and animals but boundaries are characterized by

gradual, not distinctive transitions. Along the Front Range ecosystem variations are influenced primarily by elevation but can also be affected by slope, aspect, available moisture, soil composition, as well as historical disturbances such as wildfire.

The eastern portion of the district, east of the Dakota Hogback, is dominated by open expanses of shortgrass prairie common to Colorado's **grassland ecosystem**. This same area supports irrigated pastures for grazing and hay production.

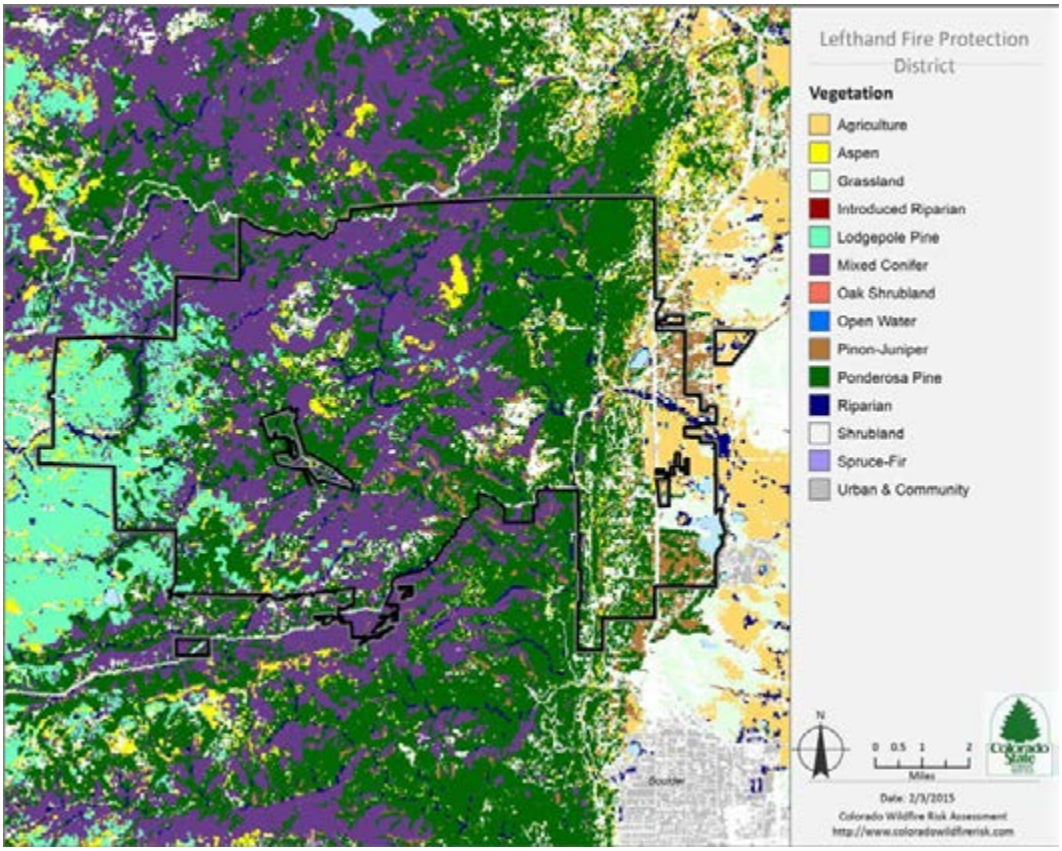
The **montane ecosystem** merges with shortgrass prairie species on the eastern slopes of the Dakota Hogback. Here, ponderosa pine punctuates grassy slopes with both isolated trees and dense stands. Tree spacing is dependent on soil moisture and slope aspect as well as fire disturbance history. Areas with a history of fire exclusion may support very dense stands of ponderosa pine as is evidenced by the forested slopes between North Foothills Ranch and Mountain Ridge subdivisions. These lower montane slopes also support stands of Mountain Mahogany shrub, as both overstory and shade tolerant understory mixed with shortgrass prairie species. Douglas fir, lodgepole pine, limber pine, Englemann spruce, and aspen are found on north-facing slopes and higher elevations within the district's montane ecosystem.

Riparian species are found along streams and seasonal drainages. These include various willows, mountain alder, and water birch.

The **subalpine ecosystem** is evidenced in the district's higher western elevations. Subalpine fir and Englemann spruce are common to this zone but may also contain stands of lodgepole pine.

Vegetation is the primary fuel source for wildland fire and each species supports unique fire behavior characteristics. Vegetation variations within the district are mapped in Figure 7 (See Appendix B for a larger version) utilizing data from the Landscape Fire and Resource Management Planning Tools Project (LANDFIRE). These data are derived from satellite imagery and displayed at a spatial resolution of 30-meters. Collection dates vary and in the case of Boulder County, predate the Overland Fire, 2003. To accommodate large-scale ground cover modifications due to frequent fires Boulder County is providing a revised data set in 2011. It is advised to update LANDFIRE data with the County's revised data when available. Understanding these fire behavior characteristics as well as the location of dominant species affecting an assessment area is an important component in predicting potential fire behavior and developing effective mitigation strategies.

Figure 8. LHFPD vegetation



Values at Risk

The aesthetics associated with rural and mountain living, like those found in the LHFPD, come at a potential price. The strategies outlined in this report provide achievable methods to lower significant wildfire hazard and risk factors inherent to a mountain lifestyle. Preservation of human welfare for both residents and emergency responders is the core priority driving the tactical and strategic recommendations outlined in this report. This directive is supported by developing fire-safe zones around homes, identifying methods to reduce structural ignition potential, and identifying safe community evacuation strategies. Personal interpretation of what constitute values at risk can vary greatly between individuals and communities. Some common values have been identified and discussed in Homeowner Association (HOA) and neighborhood meetings and include:

- Private residences
- Property values
- Supporting infrastructure
- Recreation
- Watershed
- Ecosystem/forest health
- View shed
- Wildlife habitat

4 COMMUNITY OUTREACH AND COLLABORATION

Strategic Planning

The development of a CWPP is defined by HFRA as a "collaborative process between local and state governmental representatives, in consultation with federal agencies and other interested parties." From this pool of resources a core operating/decision-making team is to be formed that will be responsible for the plan's development and mutually agree on the plan's final content. The LHFPD 2011 CWPP core team members are listed below.

Team Member	Agency
Chris Wanner	City of Boulder OSMP
Chad Julian	Boulder County POS
Allen Owen	CSFS
Seth Patterson/transitioned to Tom Stoffel	LHFPD

Since development of the original 2011 CWPP, some of the team members have changed. Below are the current members and their corresponding agencies.

Team Member	Agency
Chris Wanner	City of Boulder OSMP
Stefan Rienoldt	Boulder County POS
Allen Owen	CSFS
Russell Leadingham-Fire Chief and Chris Obrien-Asst Fire Chief	LHFPD

HFRA further directs the CWPP core team to consult with USFS agency representatives throughout the planning process. For the LHFPD, proximity of USFS lands to WUI communities makes this strategic collaboration extremely valuable.

Team Member	USFS Agency
Dave Neimi/Dave Buchanan	Fire Management Officer, Arapaho Roosevelt National Forest

The 2011 core team held a strategic planning meeting on May 25, 2009 at LHFPD Station 1 to review the scope of the project, desired outcomes, and available resources. The group reviewed existing documents, district maps, affected communities, project goals and objectives, and current and planned agency mitigation projects that could influence future planning strategies.

Figure 9. CSFS and LHFPD stakeholders

A CWPP that accurately addresses concerns, interests and priorities of the district's residents will have greater legitimacy and higher probability of successful long term implementation. To ensure the final plan reflects community priorities, input was sought from a broad range of stakeholders, including neighborhood associations, organizations involved with local forestry and land management, adjacent fire protection districts, and individuals committed to a creating a sustainable environment in the wild lands they call home.

A project kickoff meeting was held in LHFPD Station 4 on July 8, 2009 that brought together core team members and a wide range of stakeholders and interested individuals. Discussion focused on project goals and objectives, the CWPP development process, a district mapping overview, and collaboration with neighboring and adjacent agencies. The meeting provided attendees an active forum to provide suggestions, voice concerns, and initiate neighborhood planning efforts.

Community Outreach

In addition to strategic planning meetings, two open invitation community meetings were held with the intention of increasing public awareness of the project, explain general CWPP goals and objectives, promote proven methods to reduce risk of structural ignition through home construction and defensible space, solicit input, and encourage community action. Meetings were advertised via placards that were placed throughout the district. Due to low turnout at the first meeting, an additional announcement for the second meeting was emailed to fire department personnel.

- September 10th – LHFPD Station 1 - In addition to core team members, 3 residents attended
- September 14th – LHFPD Station 4 – In addition to core team members, 7 residents attended

Community and stakeholder input and recommendations collected during the course of these meetings and ongoing community contact were utilized in the development of the mitigation strategies outlined in the CWPP.

Draft Review

The 2011 draft report was presented to the LHFPD 4/1/2011 for preliminary review and approval for soliciting public comment. Based on low community turn-out to previous meetings, the fire department suggested that a more effective means of soliciting public comment would be through an on-line posting of the document and an emailed announcement to residents and stakeholders requesting review and comment. The document was posted to the fire department web site for public access the following week. An announcement of the availability of the report and a request for public comment was emailed to district residents, stakeholders, fire department personnel, and board members on 4/15/2011. Download statistics indicate number of downloads for each section during the public review and comment period.

Document	Downloads
Main report	35
Assessment Overview	20
Bar-K	67
Calwood	7
Conifer Hill	7
Crestview Estates	10
Glacier View Ranch	7
Jamestown	19
Lake of the Pines	14
Lower LH Canyon	9
Lower LH Canyon Complex	11
Mountain Ridge	9
North Foothills Ranch	5
Nugget Hill	6
Olde Stage Road	1
87j	11

Based on a comparison of download statistics to turnout numbers at previous meetings, the web posting was successful. Comments received by 5/1/2011 were reviewed and largely incorporated into the report. Review meetings were also held with Boulder County Open Space and the USFS on 4/19/2011. GIS updates and project text copy revisions were obtained for final report through these meetings. The report was reviewed with the City of Boulder on 4/26/2011. Based on stakeholder and public input, significant revisions and additions were incorporated for the Bar-K Ranch Community Assessment and the Cal-Wood/Balarat Area of Special Interest sections. Resident recommendations were also included for the Mountain Ridge and North Foothills Ranch Community Assessments. The final draft was compiled and submitted to the Colorado State Forest Service (CSFS) on 5/5/2011 for final review. A meeting with the CSFS was held on 5/16/2011 to review the document and discuss final modification recommendations. The final report was drafted 5/19/2011, and the completed document was circulated for signatures and certification.

5 WILDFIRE HAZARD AND RISK ASSESSMENT

Methodology

A comprehensive wildfire hazard and risk assessment is the cornerstone of developing effective mitigation solutions. The assessment methodology must take into account a wide variety of factors in order to identify potential hazards and risks and determine appropriate measures to mitigate those risks. The focus of a CWPP is "community" although many wildfire hazards facing WUI subdivisions are often landscape-scale. The most effective approach involves coupling detailed community hazard and risk surveys with a broader analysis of factors that contribute to wildfire behavior such as topography, weather, and fuel load characteristics.

Community Assessments

The primary assessment area is defined by the LHFPD boundary. Nine unique WUI subdivisions were identified and delineated within the fire district during the initial strategic planning meeting and reviewed during the initial community meeting. These interface communities areas are defined through a number of factors such as access characteristics, predominant vegetation, local geography, availability of emergency resources, and predominant construction characteristics.

Comprehensive wildfire hazard and risk surveys were conducted in fall 2009 and spring 2010, utilizing standardized methodologies developed by the National Fire Protection Association (NFPA). The NFPA Form 1144 *Standard for Protection of Life and Property from Wildfire* provides a solid framework to assess *predominant* characteristics within a WUI community that directly affect wildfire behavior, emergency response, and life safety. The following elements (Figure 9) were surveyed for each WUI community identified with within the LHFPD.

Figure 10. NFPA Form 1144 Survey Elements

NFPA Form 1144 Survey Element Summary	
Means of Access	Ingress and egress Road width Road condition Fire service access Street/address signage
Vegetation	Characteristics Fuel models
Topography	Slope
Additional factors	Topographic features that affect fire behavior Historical fire occurrence Fire weather potential Structure density
Roofing Assembly	Combustibility of material
Building construction	Combustibility of material Building set-back from slope

Fire Protection	Water source availability Emergency response resources Sprinklers
Gas and Electric	Above or below ground

Scores are assigned to each element and totaled for each individual community assessment. Based on the resulting score, a relative hazard ranking of low, moderate, high, or extreme is assigned to each assessed community. Survey results provide a solid basis for specific mitigation recommendations and implementation prioritization. Additionally, LHFPD community hazard ratings may be benchmarked against any other community assessment conducted with the NFPA form 1144. Comparative benchmarking is gaining importance as regional CWPP's are being developed, incorporating results of adjacent district surveys and related recommendations.

Individual community survey results, mitigation recommendations, and community treatment maps, are located in Appendix A of this report. The distribution of community hazard ratings are outline in Figure 10.

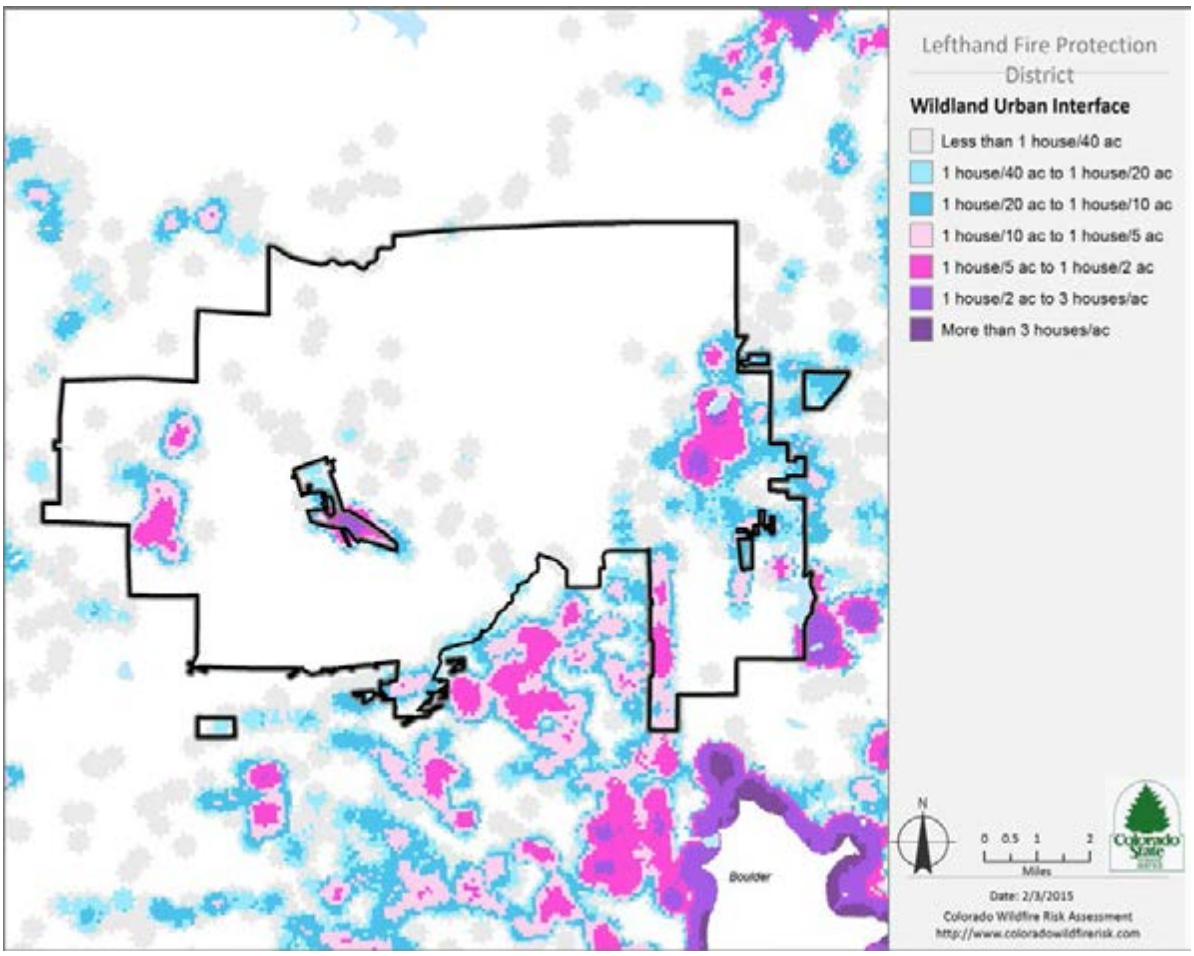
Figure 11. Community assessment survey results (2009/2010)

Lefthand Fire Protection District Survey Results		
Conifer Hill	124	EXTREME
Nugget Hill	107	HIGH
Bar-K Complex	105	
Crestview Estates	90	
Old Stage Road	74	
Lake of the Pines	72	
North Foothills Ranch	69	MODERATE
Mountain Ridge	64	
Lower Lefthand Canyon	58	
NFPA 1144 Survey Hazard Rating Scale		
< 40 LOW		
> 40 MODERATE		
> 70 HIGH		
> 112 EXTREME		

Several Areas of Special Interest (ASI) are also recognized in this report. ASI's typically represent potential response or evacuation challenges for the fire department in the event of a large-scale wildfire but fall outside the definition of a WUI community. In the case of the Jamestown, the ASI is a small independent fire district that is totally surrounded by the LHFPD. For this report areas of special interests include a commercial church camp, an outdoor educational center, a lightly populated single ingress/egress county road, and the town of Jamestown, CO. Isolated residences located outside of these designated interface communities are best served through individual home and property hazard

and risk assessments. Surveyed communities and hazard ratings are found in Figure 11 (See Appendix B for a larger version).

Figure 12. LHFPD WUI community hazard rating map



Wildfire Risk represents the possibility of loss or harm occurring from a wildfire. It is the primary output of the Colorado Wildfire Risk Assessment (Colorado WRA). Risk is derived by combining the Wildfire Threat and the Fire Effects assessment outputs. It identifies areas with the greatest potential impacts from a wildfire – i.e. those areas most at risk - considering all values and assets combined together.

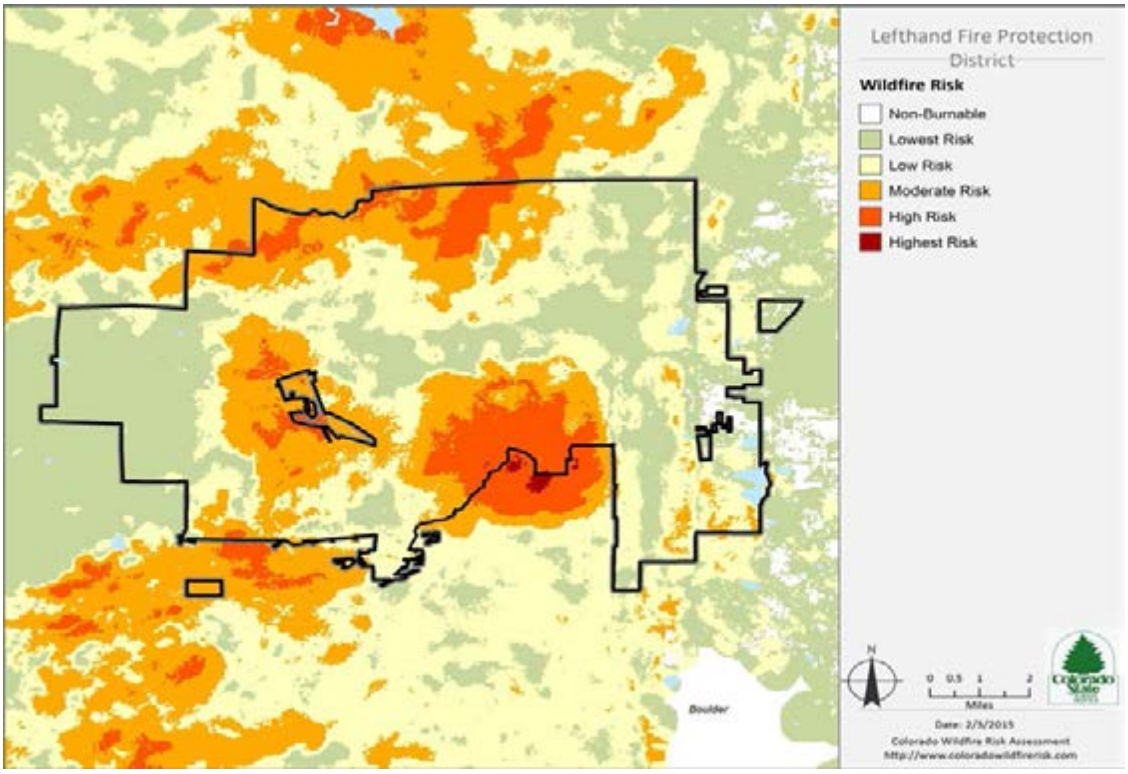
Wildfire Risk combines the likelihood of a fire occurring (threat), with those areas of most concern that are adversely impacted by fire (fire effects), to derive a single overall measure of wildfire risk.

Since all areas in Colorado have risk calculated consistently, it allows for comparison and ordination of areas across the entire state.

Fire Effects are a key component of Wildfire Risk. Fire Effects are comprised of several inputs focusing on values and assets at risk. The purpose of Fire Effects is to identify those areas that have important values or assets that would be adversely impacted by a wildfire. Fire Effects inputs include Wildland Urban Interface, Forest Assets, Riparian Assets and Drinking Water Importance Areas (watersheds). Refer to the Values Impacted Rating for more information about Fire Effects.

To aid in the use of Wildfire Risk for planning activities, the output values are categorized into five (5) classes. These are given general descriptions from Lowest to Highest Risk.

Figure 13. LHFPD Wildfire Risk Map



Wildfire Risk Class	Acres	Percent

	Non-Burnable	473	1.4%
	Lowest Risk	10,611	31.8%
	Low Risk	11,102	33.2%
	Moderate Risk	8,038	24.1%
	High Risk	3,180	9.5%
	Highest Risk	8	0.0%
	Total	**33,413**	**100.0%**

Predicting Fire Behavior

Understanding how a wildfire is likely to behave is an important factor in the development of effective mitigation measures. While the use computer-aided fire behavior modeling is growing, the basic supporting concepts were identified and defined over 50 years ago by J.S Barrows (1951) and are still valid today.

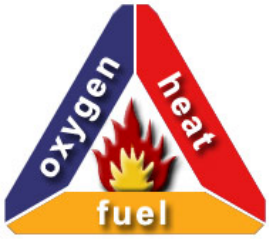
- Understanding the principals of **combustion**
  - What is necessary for combustion to occur?
  - What causes the rate of combustion to increase or decrease?
  - How may combustion be reduced or stopped?
- Understanding **forest characteristics**
  - Weather
  - Topography
  - Fuels
- **Utilize available aids** and guides to assist in evaluating weather, topography, and fuels.
  - Fire weather danger data, Remote Access Weather Station data (RAWS), belt weather readings
  - Topographic maps and digital elevation data
  - Fire behavior fuel model maps
- **Estimate of situation**
  - The probabilities for various patterns of fire behavior are systematically explored through an estimate of the situation based upon the combined effects of weather, fuels, and topography
- **Decision**
  - The end product of the fire behavior analysis is a decision outlining when, where and how to control the fire and spelling out any special safety measures required

While the system is geared for assisting tactical suppression decision making on an active fire, the same factors are considered when developing strategic mitigation or emergency response plans. Predicting wildland fire behavior is dependent upon understanding the combustion process, the factors that contribute to fire behavior, and how the environment plays a role in the fire process. All of these factors play a role in effective fire control, suppression, firefighter safety, and forest management.

Combustion

Three elements must be present for the fire to occur: heat, oxygen, fuel, and the chemical chain reaction. It is often referred to as the "fire triangle".

Figure 14. Fire triangle



Oxygen is in abundant supply for wildland fires.

Fuel can exist in three types of matter: solid, liquid, and gas. Only gases burn. The solids or liquids must convert into a gas form with the use of heat through the process of pyrolysis. The heat evaporates the moisture in the fuel and allows the ignition of the fuel. This is dependent on the type of fuel and the percentage of atmospheric moisture.

Heat transfer can take place by three methods: conduction, convection, and radiation.

> **Conduction** is not usually a concern with wildland fires. Conduction is the transfer of heat between two or more objects. The object with the heat transfers from the warmer one to the cooler object until the temperature is the same. Materials found in wildland fires are often poor conductors of heat.
>
> **Convection** is the transfer of heat through the movement of liquid or gas. In a wildland fire gases often rise in a column. Sparks, embers, and burning twigs are often carried in this column. These materials are often ignited and can be carried downwind of the fire, resulting in spot fires.
>
> **Radiation** is heat energy that can be transferred by short energy waves through air (Figure 13). These waves are often called infrared red rays. This heat preheats and dehydrates exposed fuels and establishes pyrolysis. Radiated heat is a major concern for wildland fires and the safety of firefighters.

Figure 15. Affects of radiant heat 30 feet from flame

Melted plastic and blistered paint. Source: B. Gibson, 2003

Controlling the combustion process can be accomplished by four different means:

- Removing fuel – mitigation
- Removing oxygen - smothering
- Removing heat energy – applying water
- Inhibiting chemical reactions - slurry

Of these strategies, only fuel removal through fuel reduction and mitigation provides a proactive solution *before* a fire starts.

Fire behavior is the manner in which a fire reacts to the following environmental influences:

1. **Topography**
2. **Fuel**
3. **Weather**

Figure 16.

Fire Behavior Triangle

Topography

Topographic maps and digital elevation models are presentations of the three dimensional surface of the earth on a printed map or computer screen.

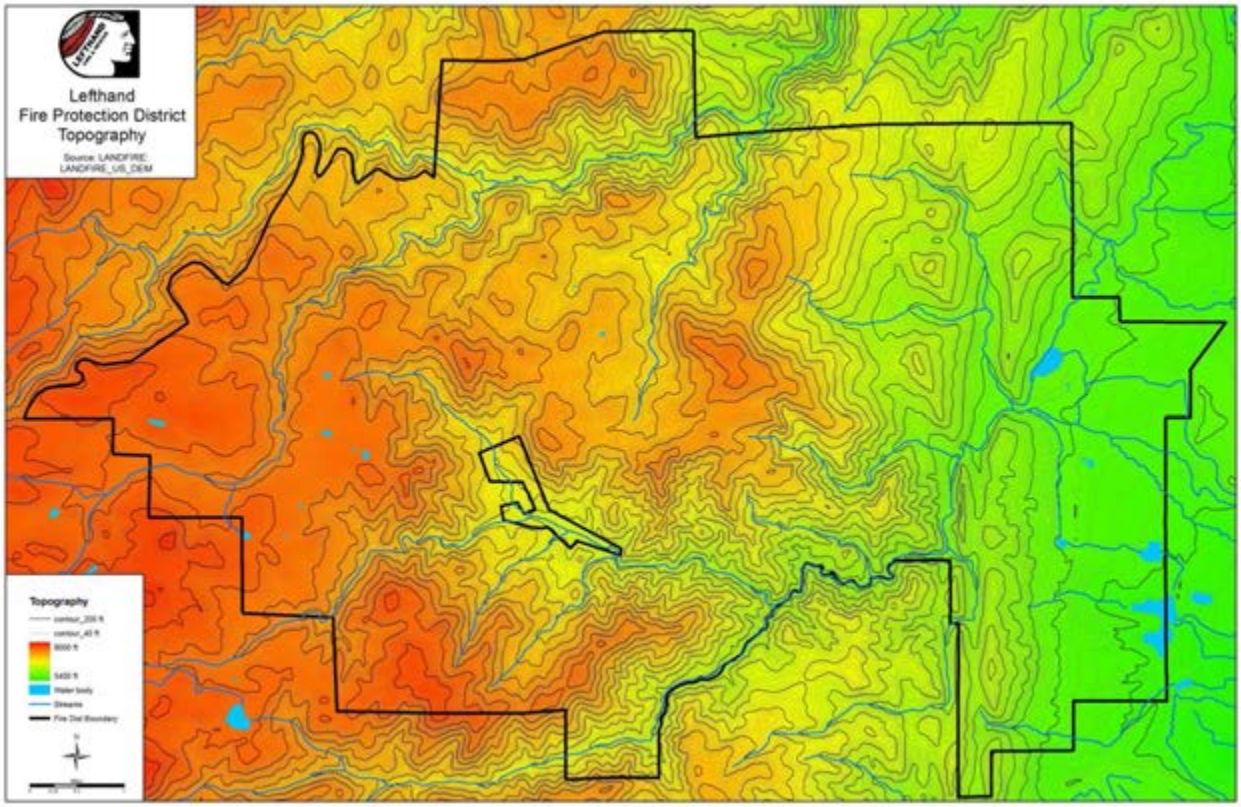
Understanding topography is a critical part of understanding the potential intensity, rate, and direction of spread of a fire. Slope and aspect are topographic characteristics that are often calculated to determine potential fire risk and behavior.

Slope is steepness and can be defined as height over distance, and then expressed in percentage. Slopes can range from slight to steep but the influence on wildland fire is substantial. The steeper the slope the faster a fire moves uphill. Flames are closer to the uphill fuel source and radiant heat increases preheats the vegetation, resulting in ignition sooner than on a slight slope or level ground.

Aspect is the direction the slope faces (north, east, south, and west). The aspect determines the effect of solar heating, air temperature, and available moisture. In the LHFPD, south and west facing slopes receive more solar heating which results in lower humidity, rapid moisture loss, and finer fuels such as grasses.

District topography varies greatly from plains to high mountains and steep canyons (Figure 14, see Appendix B for a larger version). The Lefthand Creek has carved a significant canyon along the district's southern boundary and a major gap in the Dakota Hogback ridge that rises from the plains near the eastern boundary. The Cerran Saint Vrain has shaped the canyons along the northern boundary. Drainages genearlly run west to east and may inhibit fire spread north or south. Steep slopes associated with canyon terrain support the development of up and down-slope diurnal winds. The subalpine plateau that divides these two drainages dominates the central and western portions of thedistrict.

Figure 17. LHFPD topography



Fuels

Unless structural density is high, existing vegetation is the primary fuel source for wildland fire and has a direct effect on fire behavior. Understanding the fire behavior characteristics of particular vegetation types is paramount in predictive fire behavior modeling. This is an evolving science and there are several systems for classifying fuel models. Historically the most commonly used fuel modeling methodology was developed by Hal E. Anderson (1982). Thirteen fire behavior fuel models (FBFM) are presented in four major fuel groups: grasslands, shrublands, timber litter and understory, and logging slash. Each

group comprises three or more fuel models. Of the 13 fuel models originally identified by Anderson, 8 are common to the LHFPD and detailed in Figure 15. A map of the fuel model distribution within the district is provided in Figure 16 (See Appendix B for a larger version) utilizing data from the Landscape Fire and Resource Management Planning Tools Project (LANDFIRE). These data are derived from satellite imagery and displayed at a spatial resolution of 30-meters. Collection dates vary and in the case of Boulder County, predate the Overland Fire, 2003 which greatly altered fuel models present. To accommodate large-scale ground cover modifications due to recent fires, Boulder County is providing a revised data set in late 2011. It is advised to update LANDFIRE data with the County's revised data when available.

Weather

Temperatures in the lower foothills may reach 105 degrees in June, July and August and 15 degrees cooler at the higher elevations. Relative humidity in the single digits and night-time recoveries may be minimal. The region experiences a drying trend from September through January. Chinook winds (50-100 mph) from the west occur in the fall and winter. Significant snow may fall in the high mountains in September. Snow at lower elevations melts; fuels dry quickly, and in combination with strong winds can create a very active fall and winter fire season.

Monitoring current and predictive weather conditions is a critical component driving resource deployment during fire weather conditions and tactical decision making on an active fire.

Online weather resources are extensive and growing in scope. **MesoWest** is an ongoing cooperative project, started in 1996, to provide access to current weather observations in the western United States. Weather observations of temperature, humidity, wind speed and direction, precipitation, etc. are collected from the weather stations of voluntarily participating weather observing networks or mesonets that are managed by federal, state, local agencies, and private firms. These data are then available for a multitude of uses. Over 15,000 weather stations actively report to the MesoWest database.

Parties involved in this project include researchers at the University of Utah, forecasters at the Salt Lake City National Weather Service Office, the National Weather Service Western Region Headquarters, and personnel of participating agencies, universities, and commercial firms. Support for this project is being provided by the National Weather Service. Local cooperating weather stations are summarized on the MesoWest link: http://mesowest.utah.edu/cgi-bin/droman/meso_base.cgi?stn=AP001

Local weather data may also be accessed through the **Remote Access Weather Station** (RAWS) network. This system is a network of weather stations run by the U.S. Forest Service and Bureau of Land Management and monitored by the National Interagency Fire Center, mainly to observe potential wildfire conditions.

Unlike the automated airport weather stations which are located at nearly every airport large and small, RAWS stations are often located in remote areas, particularly in national forests. Because of this, they usually are not connected to the electrical grid, but rather have their own solar panels, and a battery to

store power for overnight reporting. Some instead run on a generator. In both cases, data important to operating the station itself, such as battery voltage or fuel-level, is often included in the hourly reports.

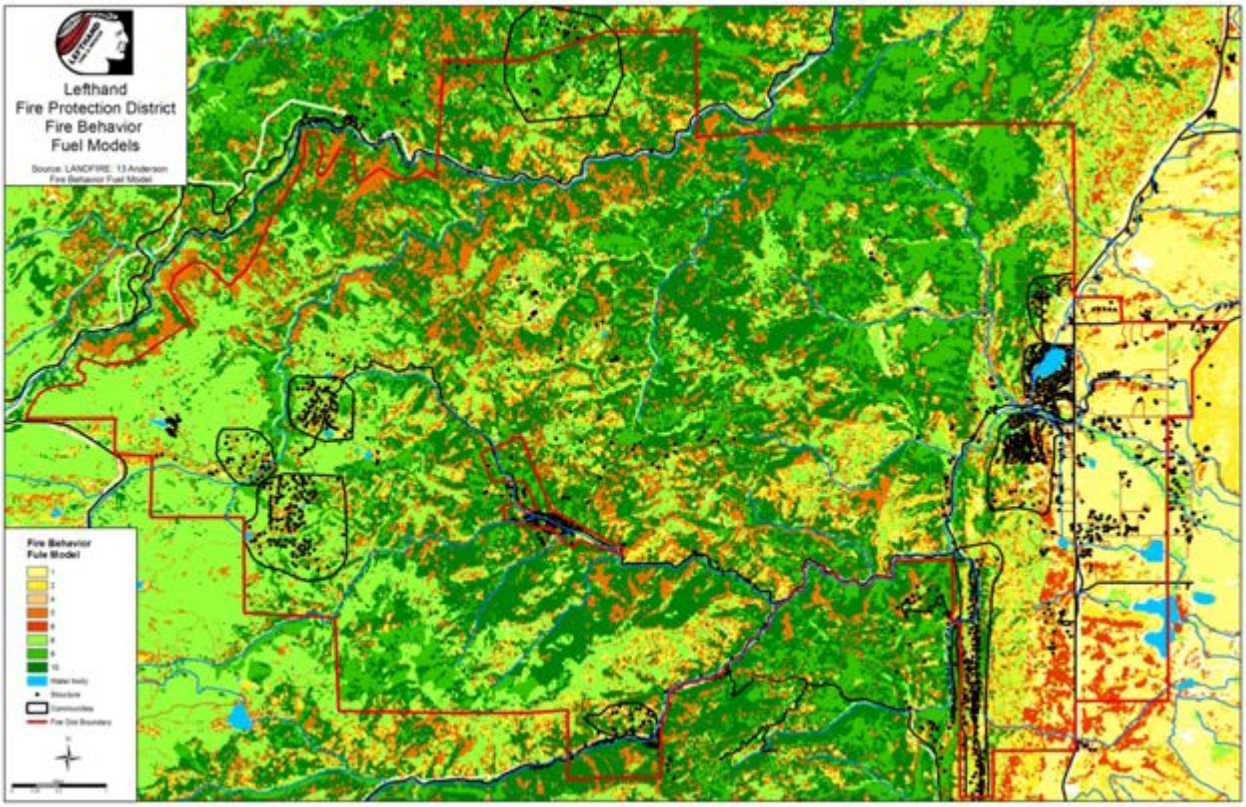
Boulder County's RAWS data is collected at the Sugarloaf Mountain site: http://raws.wrh.noaa.gov/cgi-bin/roman/meso_base.cgi?stn=BTAC2&time=GMT

Figure 18. Anderson 13 fuel models observed in LHFPD

FBFM	Description
1 Short Grass	**Grass Group** – Fire spread is determined by the fine, very porous, and continuous herbaceous fuels that have or are nearly cured. These are surface fires move rapidly through the cured grass and associated material. Very little shrub or timber is present, generally less than one-third cover of the area. Annual and perennial grasses occur in this model. Fire rate of spread can exceed 300 chains per hour with flame lengths over 8 feet.
2 Grass with Timber/Shrub Overstory	**Grass Group** – Fire spread occurs through curing of dead herbaceous fuels. These are surface fires where downed woody debris from the shrub and tree component adds to fire intensity. Open shrublands, pine stands, or oakbrush stands that cover from one- to two-thirds of the area generally fit this model.
4 Mature Brush	**Shrub Group** – High intensity and fast spreading fires involve the foliage and live and dead fine woody material in the crowns of a nearly continuous secondary overstory.
5 Young Brush	**Shrub Group** – Fire is generally carried in the surface fuels that are made up of litter cast by the shrubs and grasses or forbs in the understory. The live vegetation produces poor burning qualities.
6 Intermediate or Dormant Brush	**Shrub Group** – Fire spreads though the shrub layer with flammable foliage but requires moderate winds to maintain the foliage fire. Fire will drop to the ground in low wind situations. Shrubs are mature with heights less than 6 feet. These stands include oakbrush and mountain mahogany less than 6 feet tall. Fire rate of spread can be rapid with flame lengths of 6 to 10 feet.
8 Closed or Short-Needle Timber Litter–Light Fuel Load	**Timber Group** – These fuels produce slow-burning ground fires with low flame lengths. Occasional "jackpots" in heavy fuel concentrations may occur. These fuels pose a fire hazard only under severe weather conditions with high temperatures, low humidity, and high winds. These are mixed conifer stands with little undergrowth. Fire rate of spread is up to 106 feet per hour with flame lengths of 1 foot.
9 Hardwood or Long-Needle or Timber Litter–Moderate Ground Fuel	**Timber Group** – Fires run through the surface litter faster than in FBFM 8 and have longer flame lengths. These are semiclosed to closed canopy stands of long-needle conifers, such as ponderosa pine. The compact litter layer is mainly needles and occasional twigs. Concentrations of dead-down woody material contribute to tree torching, spotting, and crowning. Fire rate of spread is up to 27 chains per hour with flame lengths of 5 feet.
10 Mature/Overmature Timber and Understory	**Timber Group** – Surface fires burn with greater intensity than the other timber litter models. Dead and down are heavier than other timber models and the stands are more prone to hard-to-control fire behavior such as torching, spotting, and crown runs.

Source: Anderson (1982)

Figure 19. LHFPD fuel models



SURFACE FUELS

Figure 20. LHFPD Surface Fuels chart and table

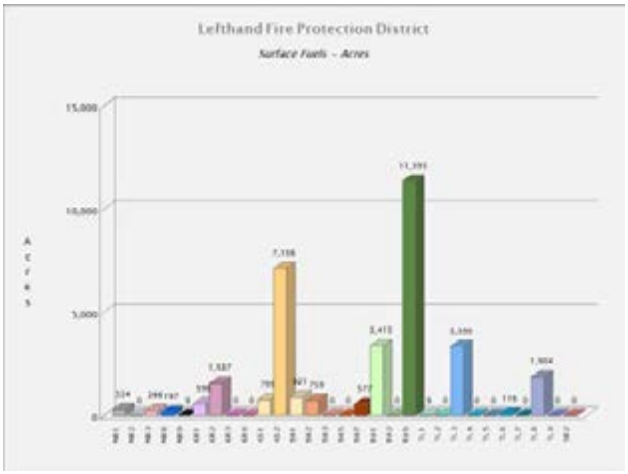
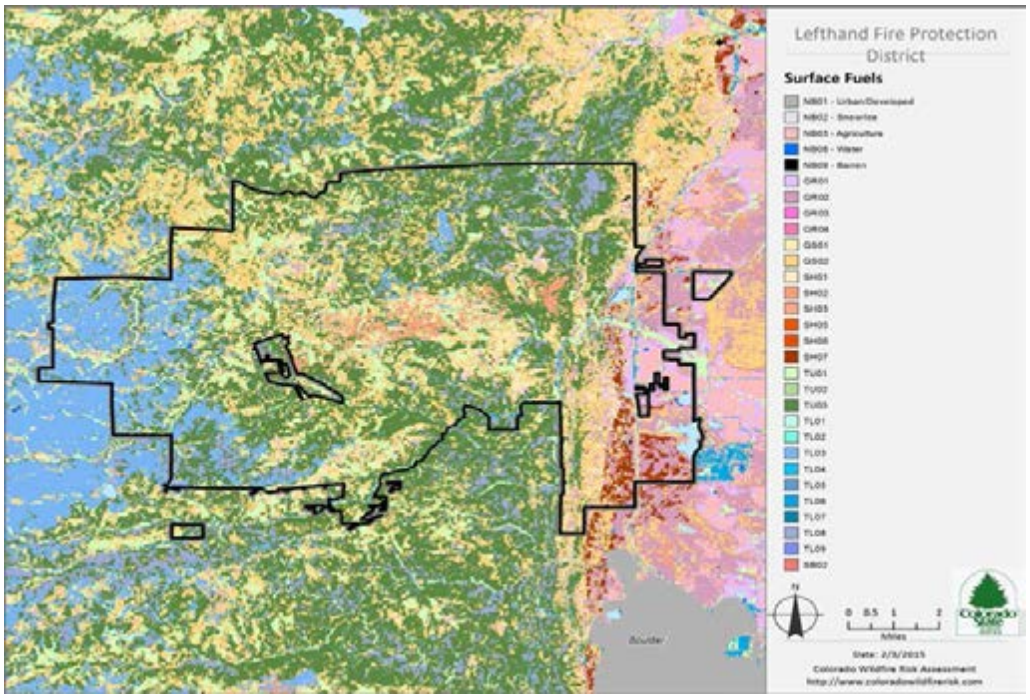


Figure 21. LHFPD Surface Fuels Map



Surface Fire

A fire that spreads through surface fuel without consuming any overlying canopy fuel. Surface fuels include grass, timber litter, shrub/brush, slash and other dead or live vegetation within about 6 feet of the ground.

Figure 22. Surface Fire


Passive Canopy Fire

A type of crown fire in which the crowns of individual trees or small groups of trees burn, but solid flaming in the canopy cannot be maintained except for short periods (Scott & Reinhardt, 2001).

Figure 23. Passive Canopy Fire


Active Canopy Fire

A crown fire in which the entire fuel complex (canopy) is involved in flame, but the crowning phase remains dependent on heat released from surface fuel for continued spread (Scott & Reinhardt, 2001).

Figure 24. Active Canopy Fire

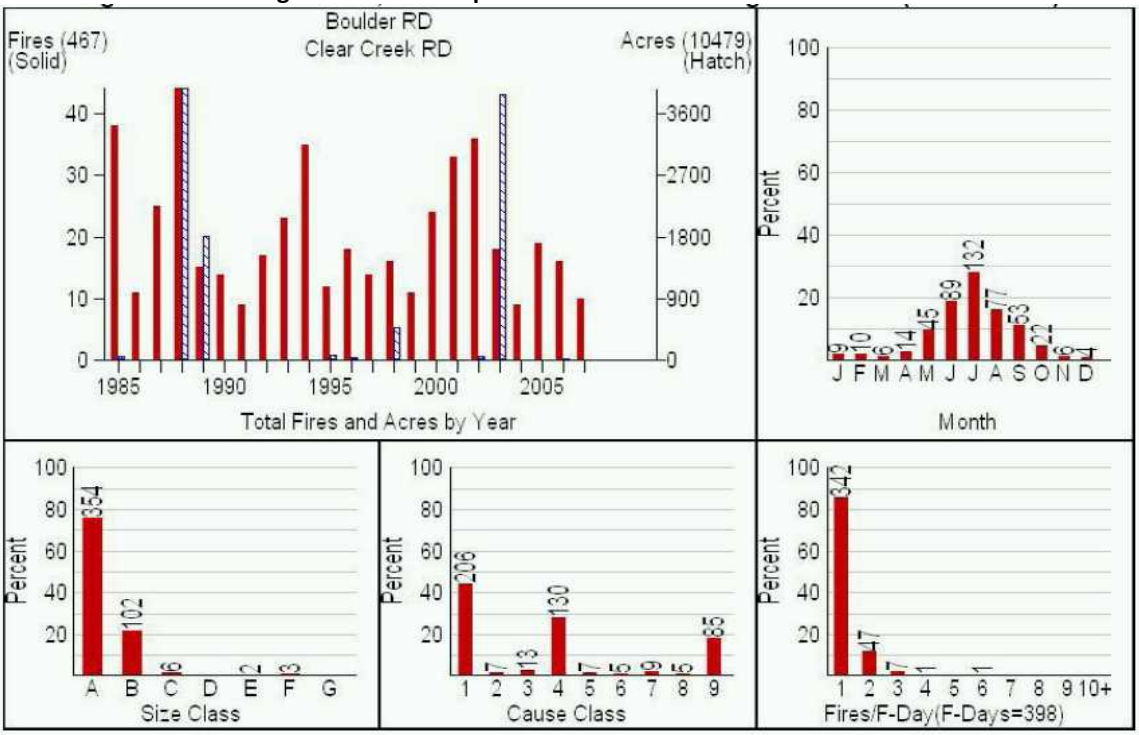
Source: Colorado Wildfire RAP

Fire Occurrence

There is no single source for comprehensive wildfire statistics in the Boulder County area. The USFS maintains records for federal lands in the Arapaho-Roosevelt National Forest lands (Figure 17). The CSFS compiles data from individual fire protection districts and private land holders, but only when available. Despite the incomplete nature of the data, a review of historical wildfire statistics from various sources provides insight into the seasonal likelihood of local and regional fires, as well as probable ignition sources. Data from the USFS is displayed in Figure 17. Figure 18 (See Appendix B for a larger version) depicts data from LHFPD and county records.

Peak fire season for the USFS Arapaho-Roosevelt National Forest is typically June through September, with July having the greatest occurrence of fire ignitions. Lightening is the primary ignition source during this period. Dry thunderstorms typically develop in June but bring little precipitation. Monsoonal moisture usually moves into the area by late July reducing the potential for lightening caused fire activity.

Figure 25. USFS Arapaho-Roosevelt National Forest fire data



Source: US Forest Service: http://famweb.nwcg.gov/kcfast.

Fire size class: A<1/4 acre, B= 1/4 to 9 acre, C= 10 to 99 acre, D= 100 to 299 acre, E= 300 to 999 acre, F= 1,000 to 4,999 acre, G> 5,000 acre

Fire cause class: 1=lightning, 2= equipment, 3= smoking, 4= campfire, 5= debris burning, 6= railroad, 7= arson, 8= juveniles, 9= misc

Figure 26. LHFPD Average Fire Reports (Month)

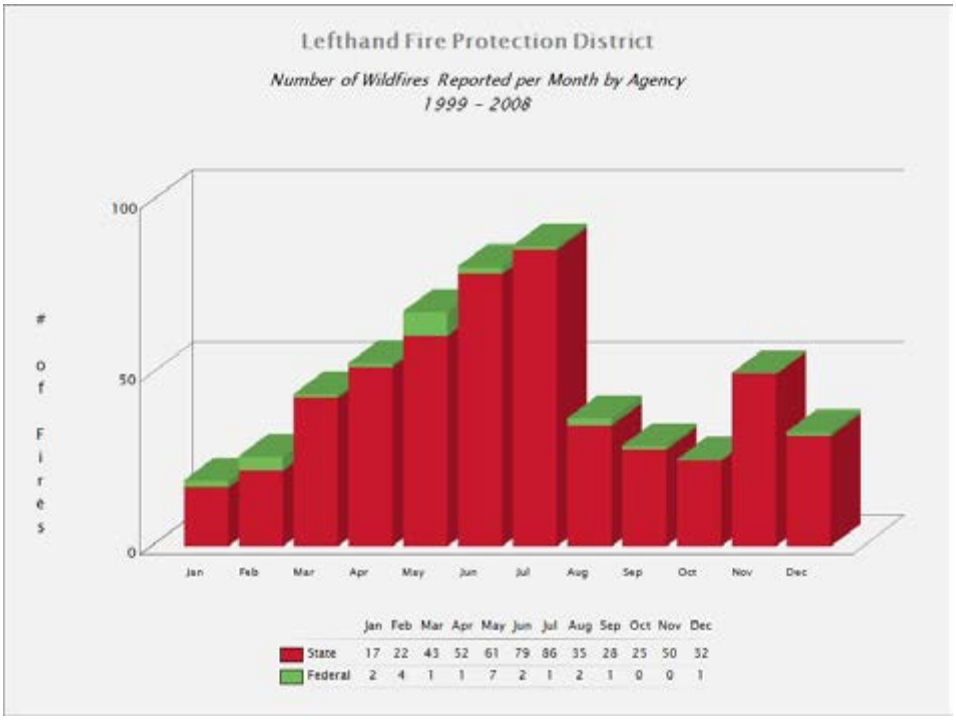
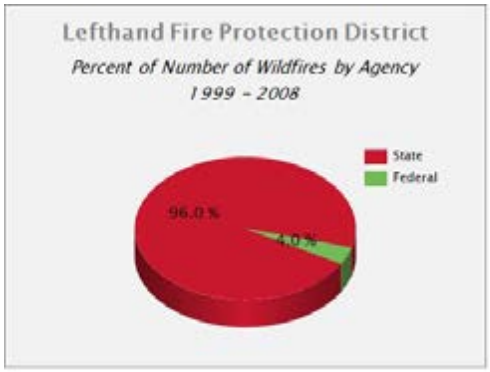


Figure 27. LHFPD Percent of Wildfire by Agency (Number and Acres)



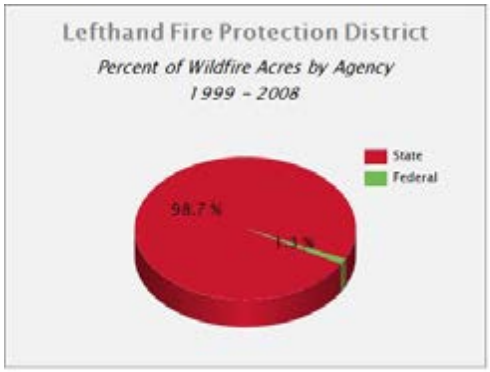
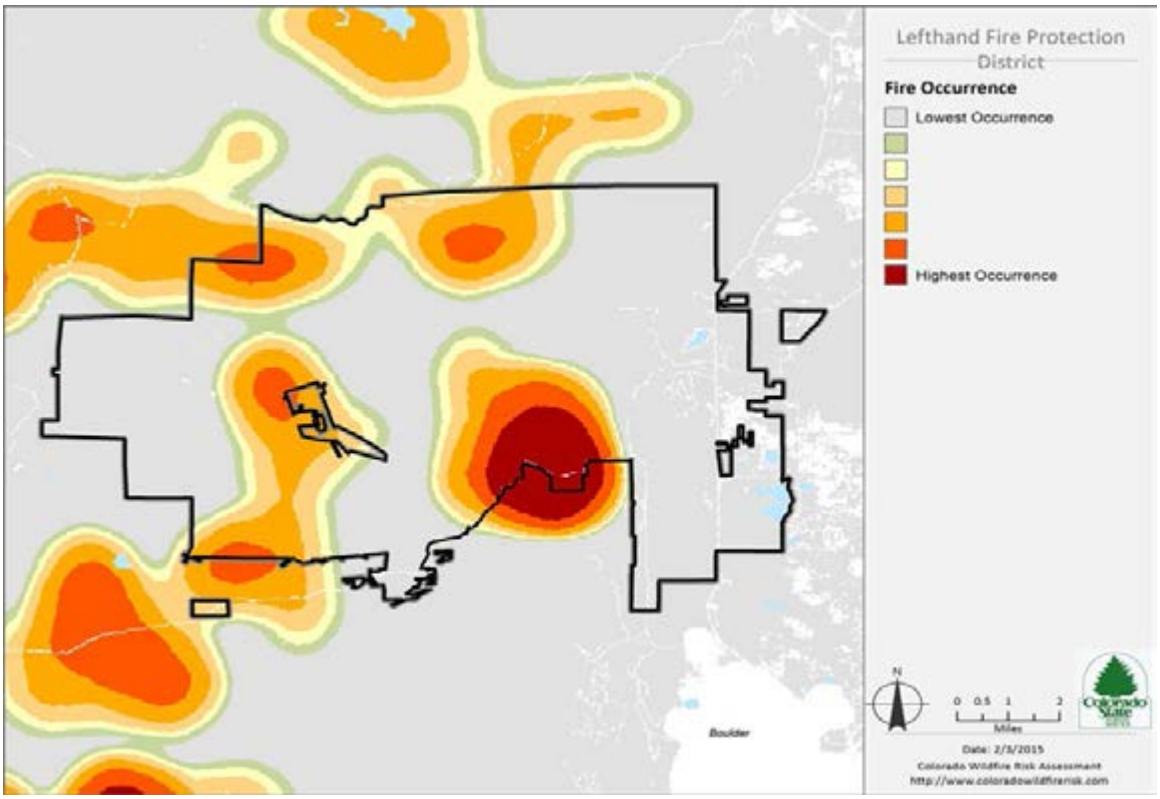


Figure 28. LHFPD Fire Occurrence



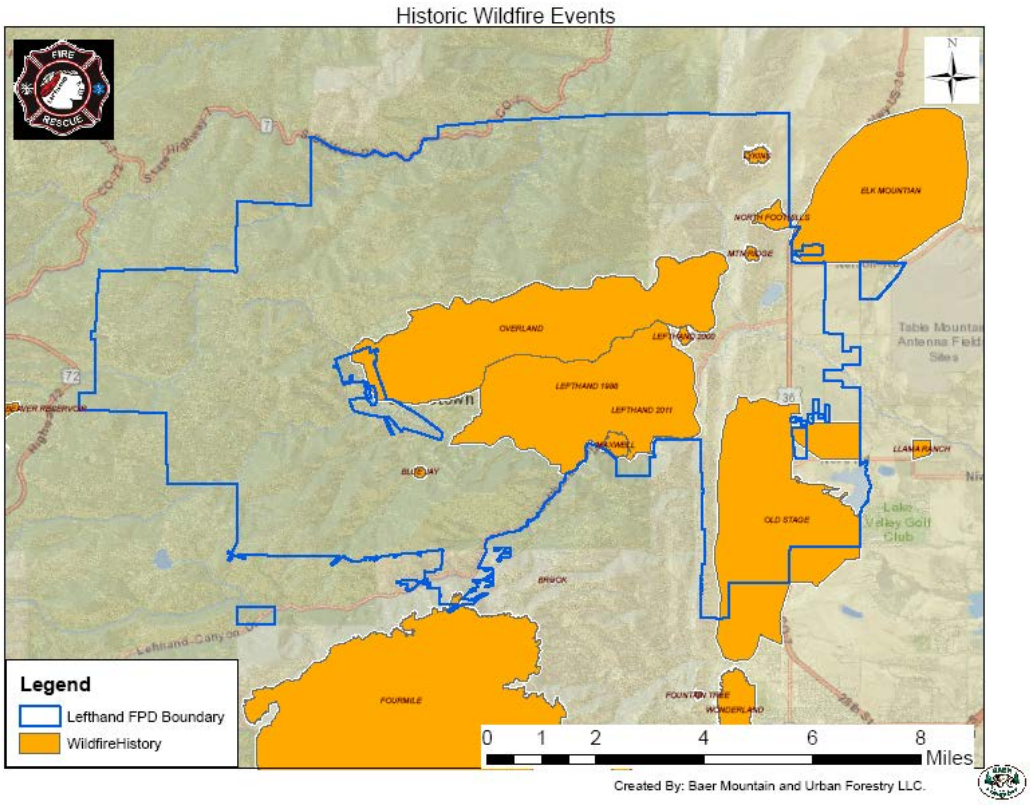
Within the district and surrounding regions the most aggressive burning typically takes place in the lower elevations that support ponderosa with grass understory. Most WUI development is typically found in the same zone. Above 7,500 feet closed canopy mixed conifer become more prevent. Fire occurrence here is lower and fire behavior is reduced. Lodgepole pine becomes predominant at 8,500 feet. Fire occurrence is rare at this elevation but can be significant if drought and wind are involved. Figure 19 provides details of large wildfires in the greater Boulder County area.

Figure29. Large wildfire history of the LHFPD area

LARGE WILDFIRE HISTORY OF THE LHFPD AREA			
INCIDENT NAME	**DATE**	**STRUCTURES LOST**	**ACRES**
Lefthand Canyon	July 1988	0	3,350
Black Tiger	July 1989	44	2,100
Olde Stage	November 1990	10	3,000
Overland	October 2003	12	3,439
Olde Stage II	January, 2009	4	3,000
Four Mile	September, 2010	169	6,181

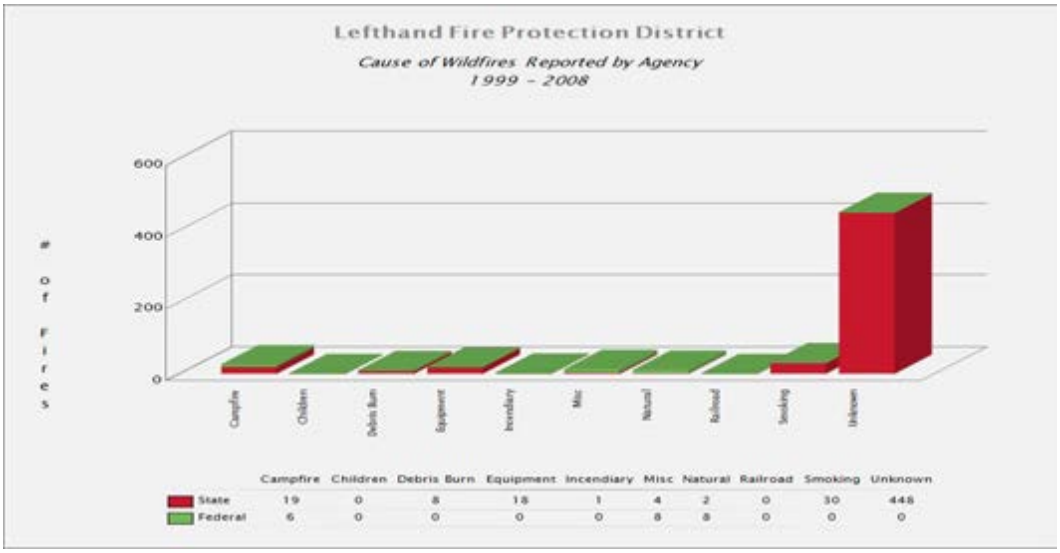
.

Figure 30. LHFPD Burned area fire history



It should be noted that of all the large fires recorded in the area, no ignitions were from natural causes, and most acreage was burned in seasons other than summer.

Figure 31. LHFPD Wildfire Causes (1999-2008)



For detailed historical wildfire statistics for state and private lands in Colorado visit

http://csfs.colostate.edu/pages/wf-historical-facts.html

Wildfire's Impact to Drinking Water

Drinking Water Importance Areas is the measure of quality and quantity of public surface drinking water categorized by watershed. This layer identifies an index of surface drinking water importance, reflecting a measure of water quality and quantity, characterized by Hydrologic Unit Code 12 (HUC 12) watersheds. The Hydrologic Unit system is a standardized watershed classification system developed by the USGS. Areas that are a source of drinking water are of critical importance and adverse effects from fire are a key concern.

The U.S. Forest Service Forests to Faucets (F2F) project is the primary source of the drinking water data set. This project used GIS modeling to develop an index of importance for supplying drinking water using HUC 12 watersheds as the spatial resolution. Watersheds are ranked from 1 to 100 reflecting relative level of importance, with 100 being the most important and 1 the least important.

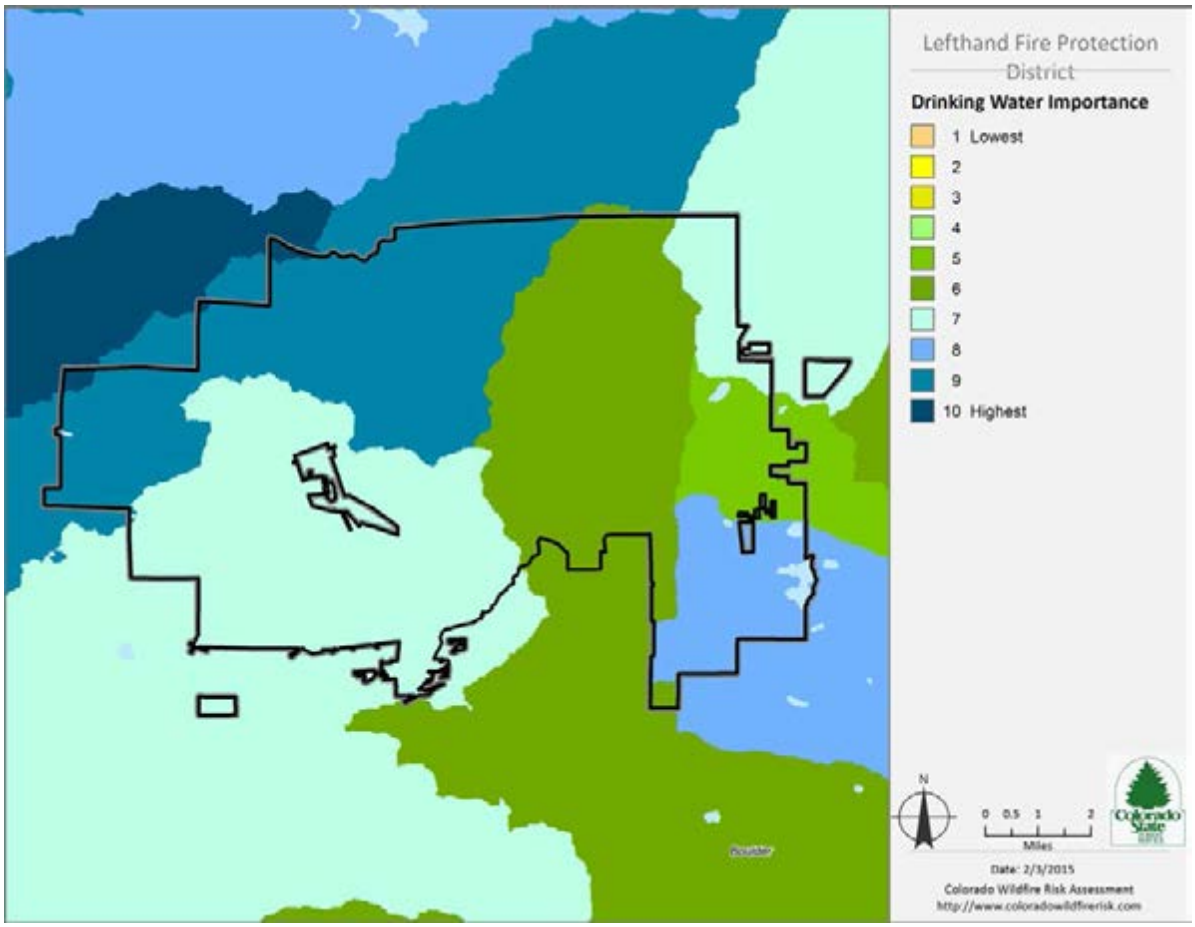
Several criteria were used in the F2F project to derive the importance rating including water supply, flow analysis, and downstream drinking water demand. The final model of surface drinking water importance used in the F2F project combines the drinking water protection model, capturing the flow of water and water demand, with a model of mean annual water supply.

Virtually all of Colorado's drinking water comes from snowmelt carried at some point by a river.

The headwaters of the Animas River begin near Silverton, CO at elevations greater than 12,000 feet.

The values generated by the drinking water protection model are simply multiplied by the results of the model of mean annual water supply to create the final surface drinking water importance index.

Figure 32. LHFPD Drinking Water Importance



Water is critical to sustain life. Human water usage has further complicated nature's already complex aquatic system. Plants, including trees, are essential to the proper functioning of water movement within the environment. Forests receive precipitation, utilize it for their sustenance and growth, and influence its storage and/or passage to other parts of the environment.

Four major river systems – the Platte, Colorado, Arkansas and Rio Grande – originate in the Colorado mountains and fully drain into one-third of the landmass of the lower 48 states. Mountain snows supply 75 percent of the water to these river systems.

Approximately 40 percent of the water comes from the highest 20 percent of the land, most of which lies in national forests. National forests yield large portions of the total water in these river systems. The potential is great for forests to positively and negatively influence the transport of water over such immense distances.

Riparian Assets

Riparian Assets are forested riparian areas characterized by functions of water quantity and quality, and ecology. This layer identifies riparian areas that are important as a suite of ecosystem services, including both terrestrial and aquatic habitat, water quality, water quantity, and other ecological functions. Riparian areas are considered an especially important element of the landscape in the west. Accordingly, riparian assets are distinguished from other forest assets so they can be evaluated separately.

The process for defining these riparian areas involved identifying the riparian footprint and then assigning a rating based upon two important riparian functions – water quantity and quality, and ecological significance. A scientific model was developed by the West Wide Risk Assessment technical team with in-kind support

from CAL FIRE state representatives. Several input datasets were used in the model including the National Hydrography Dataset and the National Wetland Inventory.

The National Hydrography Data Set (NHD) was used to represent hydrology. A subset of streams and water bodies, which represents perennial, intermittent, and wetlands, was created. The NHD water bodies data set was used to determine the location of lakes, ponds, swamps, and marshes (wetlands).

To model water quality and quantity, erosion potential (K-factor) and annual average precipitation was used as key variables. The Riparian Assets data is an index of class values that range from 1 to 3 representing increasing importance of the riparian area as well as sensitivity to fire-related impacts on the suite of ecosystem services

Figure 33. LHFPD Riparian Assets

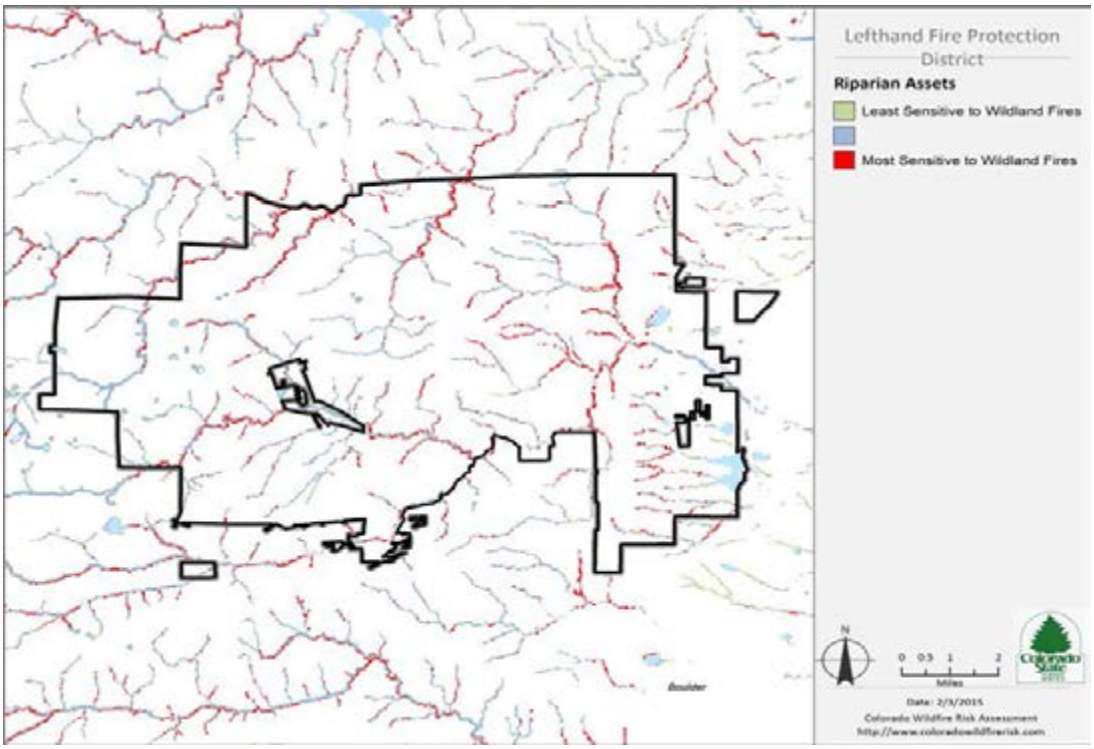
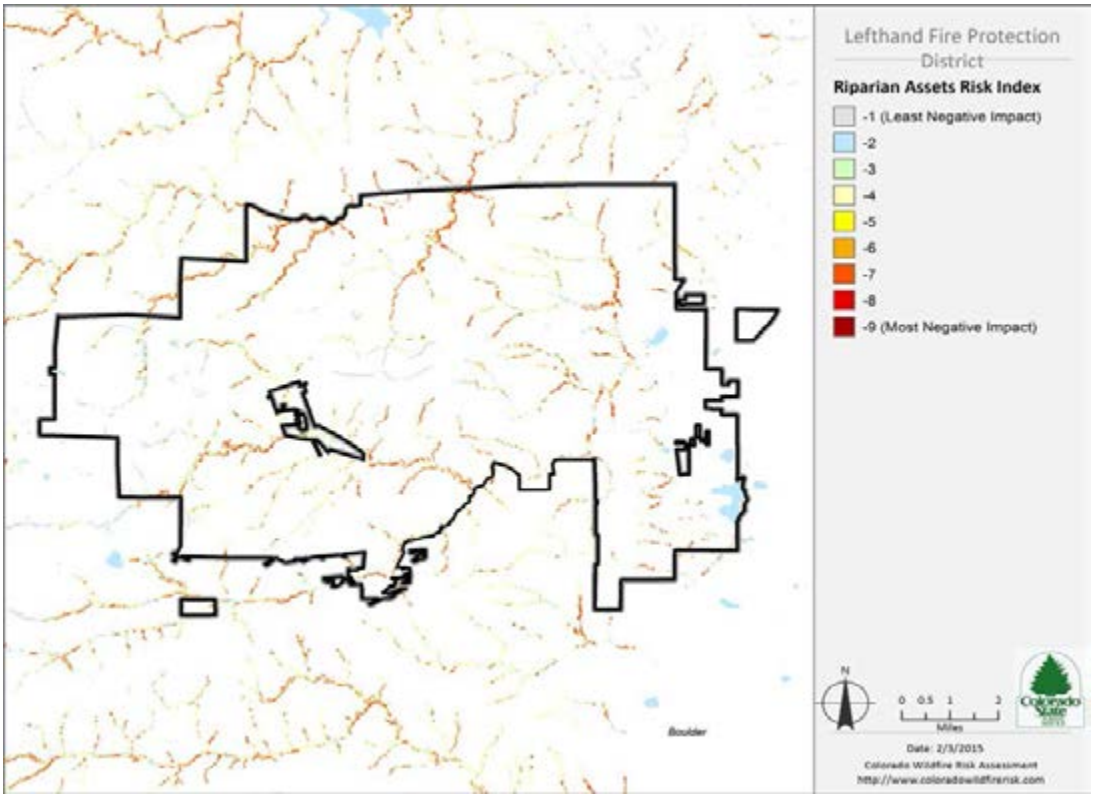


Figure 34. LHFPD Riparian Assets Risk Index



6 MITIGATION SOLUTIONS

Objective

The primary objective of wildfire mitigation is to reduce the potential of loss from a wildland fire. The protection of life safety for residents and emergency responders is the highest priority to be considered when developing specific mitigation recommendations.

Methodology

There are a variety of effective solutions that can be implemented to address the unique hazards and risks facing individual communities. The most effective solutions start right at home.

- Create defensible space around existing structures.
- Conduct seasonal maintenance including raking, mowing, and gutter cleaning.
- Upgrade exterior construction to non-flammable material.
- Ensure adequate access and addressing to the structure.
- Construct an accessible and visible emergency water supply.

When properly implemented, defensible space and structural improvements will minimize wildfire behavior, significantly reduce the risk of structural ignition, and create a safe and defensible operating environment for firefighters. The potential positive impacts significant and implementation is straight forward and can start today. Further, implementing effective home defense tactics on adjacent properties greatly increases the effectiveness of individual efforts as well as the effectiveness of larger surrounding landscape treatments. Because of these facts, homeowner action is stressed and prioritized throughout this CWPP.

Expanding beyond individual home and property improvements, community recommendations focus on a logical sequence of actions designed to enhance life-safety and reduce the risk of loss from a wildfire. These recommendations are carefully tailored for each assessed community using comprehensive community field surveys, geographical information system data, predicted fire behavior analysis, and input and review from local residents, fire and emergency response officials, and public agency fire and land management professionals. These expanded recommendations may include:

- Develop programs that foster community outreach and neighborhood activism.
- Ensure effective and safe evacuation routes.
- Conduct hazardous fuel removal along access routes, including seasonal mowing and timber thinning.
- Implement strategic landscape forest treatments including cross-boundary projects with adjacent agencies when possible.
- Enhance emergency preparedness and response capability.

Larger landscape scale solutions may involve building community consensus, cross agency collaboration, grant funding, and formal environmental impact review. These mitigation actions have a broader community positive impact but may pose greater logistical challenges and costs.

Community Outreach

Community and stakeholder involvement is a critical component of successful CWPP development, as well as implementing, sustaining, and monitoring the plan over time. The most effective means to initiate and maintain local action is through on-going community outreach and public education. Project stakeholders, community leaders, or any concerned resident can organize presentations, discussion forums, and community events to promote wildfire awareness, share information about effective mitigation measures, and coordinate events to support implementation. The premise is that knowledge will lead to action. Wide spread home owner involvement and aggressive implementation of defensible space on private land will do more to limit fire related losses than any other recommendation in this report.

Organizing annual spring clean ups or "slash days" are great venues designed to motivate homeowners and neighborhoods to collaborate and reduce hazardous fuels around homes. Such programs typically involve establishing a central collection center and contracting a chipping and hauling service. These are great events through which to engage Boy Scouts, Girl Scouts, church groups, or other organizations seeking community service projects. The LHFPD is an important resource for assistance and implementing neighborhood fuels reduction projects. Other support activities should include ongoing applications for grants, establishing and maintaining permanent slash collection sites, chipping and biomass utilization programs, and on-going collaboration and strategic planning with neighboring fire jurisdiction and public land management agencies.

Creating a Defensible Neighborhood

In the event of an approaching wildfire, the likelihood of a home's survival is dependent on two unrelated factors: 1) prevailing weather conditions, and 2) defensible space conditions around the threatened structure. Homeowners in rural areas like the LHFPD are strongly advised not to place responsibility of a home's capacity to survive a wildfire on emergency responders.

- Most rural fire departments are volunteer-based. Firefighters are not generally present at the fire stations. In addition, the number of firefighters able to respond may be limited, especially during daytime hours of the traditional work week.
- Response time may be quite long. Volunteers must reach the fire station from home or work, start the fire vehicles and drive to the fire scene. The fire scene may be quite far from the station.
- Water supplies and firefighting equipment are limited. Often, the only significant water supply is that which the fire trucks themselves carry. Water shuttles or refill locations must be established and coordinated.
- Access to the fire scene may be difficult. Narrow, steep roads and driveways may limit or even prevent access by emergency equipment. Bridges may have weight limitations that prevent large trucks and tankers from reaching the fire.

When wildfire does strike, it can occur with little warning and spread quickly. Fire crews and equipment often are overwhelmed by the task of fighting a rapidly advancing wildfire. There may simply not be enough personnel and equipment to defend every home. *Source: CSFS Publication Fire 2012-1*

Tactical decisions regarding wildfire suppression have to address both the expected behavior of the fire and the infrastructure at-risk. Wildfire crews are trained to make snap decisions regarding safe structure defense in the face of an approaching wildfire. The best case scenario is a structure and property that require minimal suppression intervention. These conditions are found in and around homes with minimal fuel loads, non-flammable construction, and property that is properly triaged regarding roof debris, deck condition, wood pile location, etc. Other factors include ease of access, emergency water availability, and address visibility. Homes that have taken no precautionary measures may be deemed unsafe and non-defensible (Figure 20).

Figure 35. Non-defensible home

In the face of an advancing wildfire, fire suppression crews are directed to follow the National Wildfire Coordinating Group's Guidelines regarding structure protection, as outlined below.

The Home Ignition Zone

Two factors have emerged as the primary determinants of a home's ability to survive a wildfire – the quality of the defensible space and a structure's ignitability. Together, these two factors create a concept called the **Home Ignition Zone** (HIZ), which includes the structure and the space immediately surrounding the structure. To protect a home from wildfire, the primary goal is to reduce or eliminate fuels and ignition sources within the HIZ. *Source: CSFS Publication Fire 2012-1*

Figure 36. The Home Ignition Zone (HIZ)

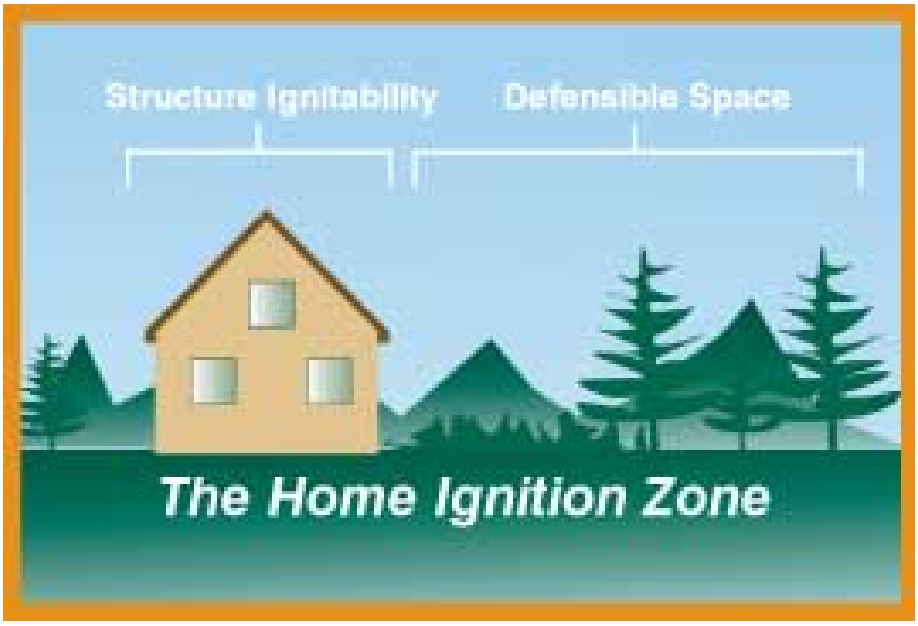


Figure 37. Defensible Space Zones

Structure Triage Checklist

DEFENSIBLE	STANDALONE
Determining factor:	Safety zone present
Sizeup:	Structure has very few tactical challenges
Tactics:	Firefighters may not need to be directly assigned to protect structure as it is not likely to ignite during initial fire front contact. However, no structure in the path of a wildfire is completely without need of protection. Patrol following the passage of the fire front will be needed to protect the structure.

DEFENSIBLE	PREP and HOLD
Determining factor:	Safety zone present
Sizeup:	Structure has some tactical challenges
Tactics:	Firefighters needed onsite to implement structure protection tactics during fire front contact.

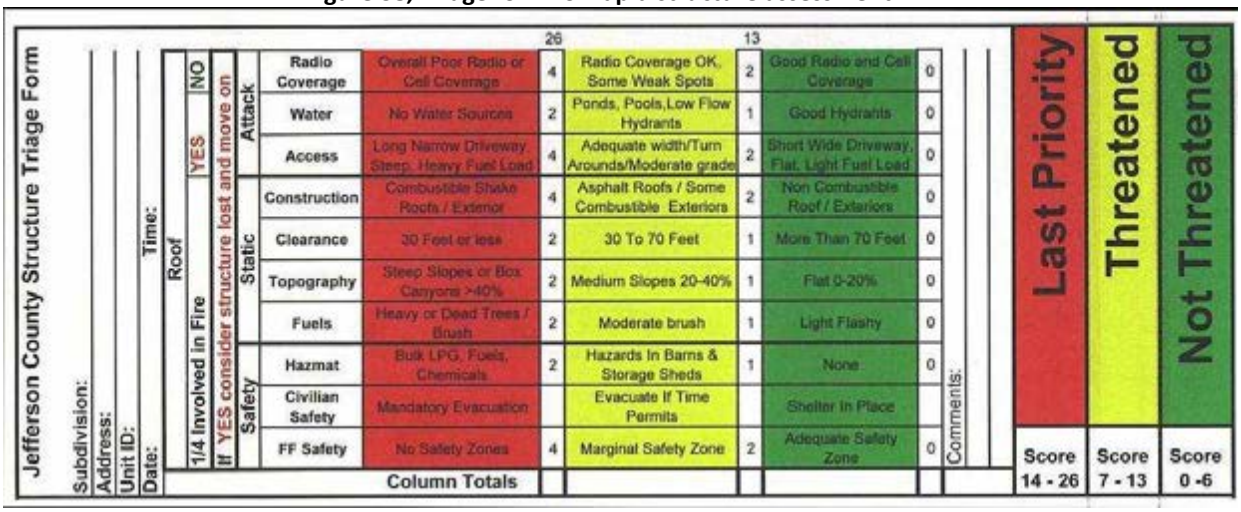
NON-DEFENSIBLE	PREP and LEAVE
Determining factor:	No safety zone present
Sizeup:	Structure has some tactical challenges
Tactics:	Firefighters not able to commit to stay and protect structure. If time allows, rapid mitigation measures may be performed. Set trigger point for safe retreat. *Remember, pre-incident preparation is the responsibility of the homeowner.* Patrol following the passage of the fire front will be needed to protect the structure.

NON-DEFENSIBLE	RESCUE DRIVE-BY
Determining factor:	No safety zone present
Sizeup:	Structure has significant tactical challenges
Tactics:	Firefighters not able to commit to stay and protect structure. If time allows, ensure people are not present in the threatened structure (especially children, elderly, and invalid). Set trigger point for safe retreat. Patrol following the passage of the fire front will be needed to protect the structure.

Source: National Wildfire Coordinating Group, PMS 461. NFES 1077

A structure tagging system developed by Jefferson County, CO provides firefighters a similar rapid triage assessment system with tear-off ID tags to assist strategic decision making for structure protection crews (Figure 21). It is recommended that Boulder County adopt a similar tagging protocol that could be combined with incident evacuation enforcement.

Figure 38, Triage form for rapid structure assessment



Jefferson County Structure Triage Form

Subdivision:
Address:
Unit ID:
Time:
Date:

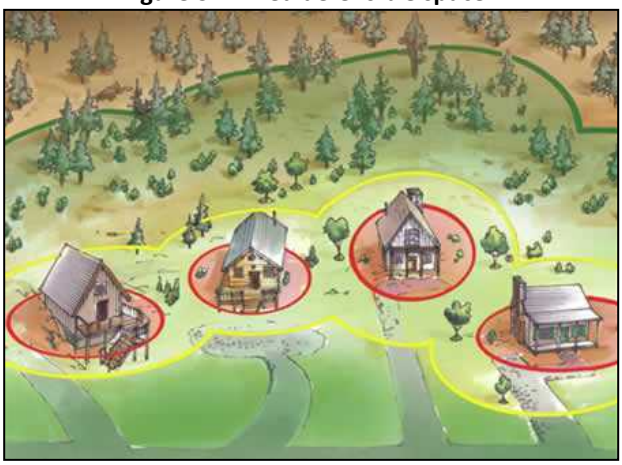
Roof
1/4 Involved in Fire
YES
NO
If YES consider structure lost and move on

				26			13		
Attack	Radio Coverage	Overall Poor Radio or Cell Coverage	4	Radio Coverage OK, Some Weak Spots	2	Good Radio and Cell Coverage	0		
	Water	No Water Sources	2	Ponds, Pools,Low Flow Hydrants	1	Good Hydrants	0		
	Access	Long Narrow Driveway, Steep, Heavy Fuel Load	4	Adequate width/Turn Arounds/Moderate grade	2	Short Wide Driveway, Flat, Light Fuel Load	0		
Static	Construction	Combustible Shake Roofs / Exterior	4	Asphalt Roofs / Some Combustible Exteriors	2	Non Combustible Roof / Exteriors	0		
	Clearance	30 Feet or less	2	30 To 70 Feet	1	More Than 70 Feet	0		
	Topography	Steep Slopes or Box Canyons >40%	2	Medium Slopes 20-40%	1	Flat 0-20%	0		
	Fuels	Heavy or Dead Trees / Brush	2	Moderate brush	1	Light Flashy	0		
Safety	Hazmat	Bulk LPG, Fuels, Chemicals	2	Hazards In Barns & Storage Sheds	1	None	0		
	Civilian Safety	Mandatory Evacuation		Evacuate If Time Permits		Shelter In Place			
	FF Safety	No Safety Zones	4	Marginal Safety Zone	2	Adequate Safety Zone	0		
		Column Totals						Comments:	

Last Priority	Threatened	Not Threatened
Score 14 - 26	Score 7 - 13	Score 0 -6

Adjacent properties with *linked defensible space* and other favorable factors are more likely to receive structure protection resrouces than isolated structures where defensibility is in question (Figure 22).

Figure 3. Linked defensible space



Defensible Space and Structural Ignitability

Creating effective defensible space involves the reduction of available fuels surrounding a structure. The composition of roofing material and the quality of surrounding defensible space are considered to be the two most important factors impacting a home's ability to survive a wildfire. Non-flammable roofing material, clean gutters, and screened roof vents and decks greatly inhibit the ignition ability of airborne embers fire brands (Figure 23). Non-flammable siding reduces the risk of radiant ignition from a passing fire front. Effectively implemented, defensible space can significantly reduce fire behavior around a home; reduce potential for radiant combustion, and provide a safer operating environment for fire

crews. Defensible space can also reduce the likelihood of a fire moving from a structure into the surrounding forest.

Figure 40. Eliminate woody debris on roofs

For existing homes developing defensible space is largely a voluntary endeavor although insurance companies are taking a more active role in providing strong incentives to clients to improve conditions around insured properties. Boulder and surrounding counties have enacted mitigation guidelines that apply to all new building and road grading permits. Visit the county web site for details. http://www.bouldercounty.org/property/forest/pages/wildfiremitigationfaq.aspx

Most Front Range guidelines are based on the Colorado State Forest Service's *Protecting Your Home from Wildfire: Creating Wildfire-Defensible Zones (CSFS FIRE 2012-1)*, as well as *Firewise Construction: Site Design and Building Materials (Bueche and Foley, 2012).* These publications outline practical and common sense guidelines for the creation of defensible space around values-at-risk and are outlined in the remainder of this section.

Use fire-resistive materials (Class C or better rating), not wood or shake shingles, to roof homes in or near forests and grasslands. When your roof needs significant repairs or replacement, do so with a fire-resistant roofing material. Check with your county building department. Some counties now restrict wood roofs or require specific classifications of roofing material.

The measure of fuel hazard refers to its continuity, both horizontal (across the ground) and vertical (from the ground up into the vegetation crown). Fuels with a high degree of both vertical and horizontal continuity are the most hazardous, particularly when they occur on slopes. Heavier fuels (brush and trees) are more hazardous (i.e. produce a more intense fire) than light fuels such as grass.

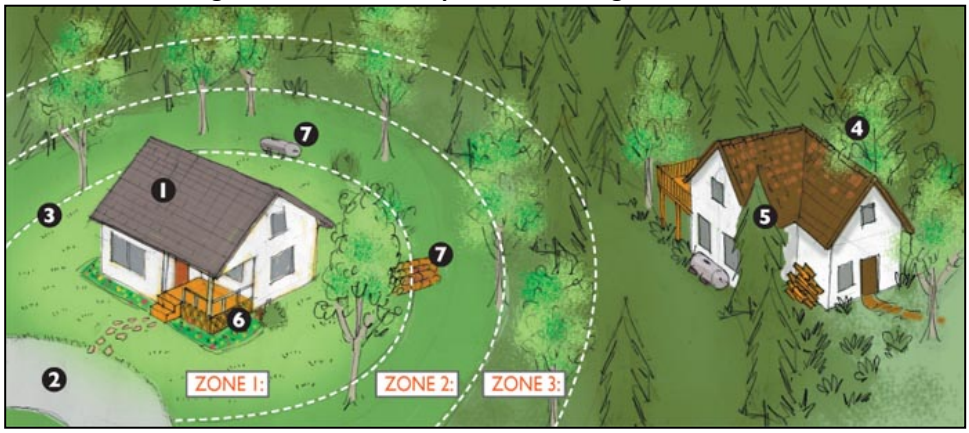
Mitigation of wildfire hazards focuses on breaking up the continuity of horizontal and vertical fuels. Additional distance between fuels is required on slopes.

Creating an effective defensible space involves developing a series of management zones in which different treatment techniques are used. See Figure 1 for a general view of the relationships among these management zones. Develop defensible space around each building on your property. Include detached garages, storage buildings, barns and other structures in your plan.

The actual design and development of your defensible space depends on several factors: size and shape of buildings, materials used in their construction, the slope of the ground on which the structures are built, surrounding topography and sizes and types of vegetation on your property. These factors all affect your design. You may want to request additional guidance from your local Colorado State Forest Service (CSFS) forester or fire department. (See the Special Recommendations section of this fact sheet for shrubs, lodgepole pine, Engelmann spruce, and aspen.)

Defensible Space Management Zones

Figure 41. Defensible space fuel management zones



Source: Firewise.org

Zone 1

The width of Zone 1 extends a minimum distance of 15-30 feet outward from a structure, depending on property size. Most flammable vegetation is removed in this zone, with the possible exception of a few low-growing shrubs or fire-resistant plants. Avoid landscaping with common ground junipers, which are highly flammable.

Increasing the width of Zone 1 will increase the structure's survivability. This distance should be increased 5 feet or more in areas downhill from a structure. The distance should be measured from the outside edge of the home's eaves and any attached structures, such as decks. Several specific treatments are recommended within this zone:

• Install nonflammable ground cover and plant nothing within the first 5 feet of the house and deck. This critical step will help prevent flames from coming into direct contact with the structure. This is particularly important if a building is sided with wood, logs or other flammable materials. Decorative rock creates an attractive, easily maintained, nonflammable ground cover.

Figure 4. Effective fuel-free zone along a home's exterior

Source: LHFPD mitigation

• If a structure has noncombustible siding (i.e., stucco, synthetic stucco, concrete, stone or brick), widely spaced foundation plantings of low-growing shrubs or other fire-resistant plant materials are acceptable. However, do not plant directly under windows or next to foundation vents, and be sure areas of continuous grass are not adjacent to plantings. Information on fire-resistant plants is available on the CSFS website at www.csfs.colostate.edu, as well as in Appendix C of this document

• Prune and maintain any plants in Zone 1 to prevent excessive growth. Also, remove all dead branches, stems and leaves within and below the plant.

• Irrigate grass and other vegetation during the growing season. Also, keep wild grasses mowed to a height of 6 inches or less.

• Do not store firewood or other combustible materials anywhere in this zone. Keep firewood at least 30 feet away from structures, and uphill if possible.

• Enclose or screen decks with 1/8-inch or smaller metal mesh screening (1/16-inch mesh is preferable). Do not use areas under decks for storage.

• Ideally, remove all trees from Zone 1 to reduce fire hazards. The more trees you remove, the safer your home will be.

• If you do keep any trees in this zone, consider them part of the structure and extend the distance of the entire defensible space accordingly.

• Remove any branches that overhang or touch the roof, and remove all fuels within 10 feet of the chimney.

• Remove all pine needles and other debris from the roof, deck and gutters.

• Rake pine needles and other organic debris at least 10 feet away from all decks and structures.

• Remove slash, wood chips and other woody debris from Zone 1.

Zone 2

Zone 2 is an area of fuels reduction designed to diminish the intensity of a fire approaching your home. The width of Zone 2 depends on the slope of the ground where the structure is built. Typically, the defensible space in Zone 2 should extend at least 100 feet from all structures. If this distance stretches beyond your property lines, try to work with the adjoining property owners to complete an appropriate defensible space.

The following actions help reduce continuous fuels surrounding a structure, while enhancing home safety and the aesthetics of the property. They also will provide a safer environment for firefighters to protect your home.

Tree Thinning and Pruning

• Remove stressed, diseased, dead or dying trees and shrubs. This reduces the amount of vegetation available to burn, and makes the forest healthier.

• Remove enough trees and large shrubs to create at least 10 feet between crowns. Crown separation is measured from the outermost branch of one tree to the nearest branch on the next tree. On steep slopes, increase the distance between tree crowns even more.

Figure 43. Zone 2 Tree Thinning

• Remove all ladder fuels from under remaining trees. Prune tree branches off the trunk to a height of 10 feet from the ground or 1/3 the height of the tree, whichever is less.

Figure 44. Zone 2 Tree/Shrub Pruning

• If your driveway extends more than 100 feet from your home, thin out trees within a 30 foot buffer along both sides of your driveway, all the way to the main access road. Again, thin all trees to create 10 foot spacing between tree crowns.

• Small groups of two or three trees may be left in some areas of Zone 2, but leave a minimum of 30 feet between the crowns of these clumps and surrounding trees.

• Because Zone 2 forms an aesthetic buffer and provides a transition between zones, it is necessary to blend the requirements for Zones 1 and 3. For example, if you have a tree in Zone 2 with branches extending into Zone 1, the tree can be retained if there is proper crown spacing.

• Limit the number of dead trees (snags) to one or two per acre. Be sure snags cannot fall onto the house, power lines, roads or driveways.

• As in Zone 1, the more trees and shrubs removed, the more likely your house will survive a wildfire.

Shrub Thinning/Pruning and Surface Fuels

• Isolated shrubs may be retained in Zone 2, provided they are not growing under trees.

• Keep shrubs at least 10 feet away from the edge of tree branches. This will prevent the shrubs from becoming ladder fuels.

• Minimum spacing recommendations between clumps of shrubs is 2 1/2 times the mature height of the vegetation. The maximum diameter of the clumps themselves should be twice the mature height of the vegetation. As with treecrown spacing, all measurements are made from the edge of vegetation crowns.

• Example – For shrubs 6 feet high, spacing between shrub clumps should be 15 feet or more (measured from the edge of the crowns of vegetation clumps). The diameter of these shrub clumps should not exceed 12 feet.

• Periodically prune and maintain shrubs to prevent excessive growth, and remove dead stems from shrubs annually. Common ground junipers should be removed whenever possible because they are highly flammable and tend to hold a layer of duff beneath them.

• Mow or trim wild grasses to a maximum height of 6 inches. This is especially critical in the fall, when grasses dry out.

• Avoid accumulations of surface fuels, such as logs, branches, slash and wood chips greater than 4 inches deep.

Firewood

• Stack firewood uphill from or on the same elevation as any structures, and at least 30 feet away.

• Clear all flammable vegetation within 10 feet of woodpiles.

• Do not stack wood against your home or on/under your deck, even in the winter. Many homes have burned as a result of a woodpile that ignited first. **Propane Tanks and Natural Gas Meters**

• Locate propane tanks and natural gas meters at least 30 feet from any structures, preferably on the same elevation as the house.

• The tank should not be located below your house because if it ignites, the fire would tend to burn uphill. Conversely, if the tank or meter is located above your house and it develops a leak, gas will flow downhill into your home.

• Clear all flammable vegetation within 10 feet of all tanks and meters.

• Do not visibly screen propane tanks or natural gas meters with shrubs, vegetation or flammable fencing. Instead, install 5 feet of nonflammable ground cover around the tank or meter.

Figure 45. Example of acceptable Firewood/Propane tank location

Zone 3

Zone 3 has no specified width. It should provide a gradual transition from Zone 2 to areas farther from the home that have other forest management objectives. Your local Colorado State Forest Service forester can help you with this zone. This zone provides an opportunity for you to improve the health of the forest through proper management. With an assortment of stewardship options, you can proactively manage your forest to reduce wildfire intensity, protect water quality, improve wildlife habitat, boost the health and growth rate of your trees, and increase tree survivability during a wildfire.

In addition, properly managed forests can provide income, help protect trees against insects and diseases, and even increase the value of your property. Typical forest management objectives for areas surrounding home sites or subdivisions provide optimum recreational opportunities; enhance aesthetics; improve tree health and vigor; provide barriers against wind, noise, dust and visual intrusions; support production of firewood, fence posts and other forest commodities; or cultivate Christmas trees or trees for transplanting.

Consider the following when deciding forest management objectives in Zone 3:
• The healthiest forest is one that includes trees of multiple ages, sizes and species, and where adequate growing room is maintained over time.

• Remember to consider the hazards associated with ladder fuels. A forest with a higher canopy reduces the chance of a surface fire climbing into the tops of the trees, and might be a priority if this zone has steep slopes.

• A greater number of snags – two or three per acre, standing or fallen – can be retained in Zone 3 to provide wildlife habitat. These trees should have a minimum diameter of 8 inches. Make sure that snags pose no threat to power lines or firefighter access roads.

• While tree pruning generally is not necessary in Zone 3, it may be a good idea from the standpoint of personal safety to prune trees along trails and firefighter access roads. Or, if you prefer the aesthetics of a well-manicured forest, you might prune the entire area. In any case, pruning helps reduce ladder fuels within tree stands, thus reducing the risk of crown fire.

• Mowing grasses is not necessary in Zone 3.

• Any approved method of slash treatment is acceptable, including piling and burning, chipping or lop and-scatter.

A high canopy forest reduces the chance of a surface fire climbing into the tops of the trees and might be a priority for you if this zone slopes steeply. The healthiest forest is one that has multiple ages, sizes, and species of trees where adequate growing room is maintained over time. Remember to consider the hazards of ladder fuels. Multiple sizes and ages of trees might increase the fire hazard from Zone 3 into Zone 2, particularly on steep slopes.

A greater number of wildlife trees can remain in Zone 3. Make sure that dead trees pose no threat to power lines or fire access roads.

While pruning generally is not necessary in Zone 3, it may be a good idea from the standpoint of personal safety to prune trees along trails and fire access roads. Or, if you prefer the aesthetics of a well-manicured forest, you might prune the entire area. In any case, pruning helps reduce ladder fuels within the tree stand, thus enhancing wildfire safety.

Figure 46. Before and after photos of a defensible space

Other Recommendations

Specific requirements will be dictated by your objectives for your land and the kinds of trees present. Forest management in Zone 3 is an opportunity for you to increase the health and growth rate of the forest in this zone. Keep in mind that root competition for available moisture limits tree growth and ultimately the health of the forest

Windthrow

In Colorado, some tree species, including lodgepole pine, Engelmann spruce and Douglas-fir, are especially susceptible to damage and uprooting by high winds or windthrow. If you see evidence of this problem in or near your home, consider making adjustments to the defensible space guidelines. It is highly recommended that you contact a professional forester to help design your defensible space, especially if you have windthrow concerns.

Water Supply

If possible, make sure that an on-site water source is readily available for firefighters to use, or that other water sources are close by. Lakes, ponds, swimming pools and hot tubs are all possible options. If there are no nearby water sources, consider installing a well-marked dry hydrant or cistern. If your primary water source operates on electricity, be sure to plan for a secondary water source. During wildfires, structures often are cut off from electricity. For more information on how to improve the accessibility of your water source, contact your local fire department.

Recommendations for Specific Forest Types

The above recommendations refer primarily to ponderosa pine, Douglas-fir and mixed-conifer ecosystems. For other forest types, please refer to the additional recommendations below:

Aspen

Tree spacing and ladder fuel guidelines do not apply to mature stands of aspen trees. Generally, no thinning is recommended in aspen forests, regardless of tree size, because the thin bark is easily damaged, making the tree easily susceptible to fungal infections. However, in older stands, numerous dead trees may be on the ground and require removal. Conifer trees often start growing in older aspen stands. A buildup of these trees eventually will increase the fire hazard of the stand, so you should remove the young conifers. Brush also can increase the fire hazard and should be thinned to reduce flammability.

Lodgepole Pine

Lodgepole pine management in the WUI is much different than that for lodgepole pine forests located away from homes, communities and other developments. Normally, it is best to develop fuels management and wildfire mitigation strategies that are informed and guided by the ecology of the tree species. This is not the case with lodgepole pine. Older lodgepole pine stands generally do not respond well to selective thinning, but instead respond better to the removal of all trees over a defined area to allow healthy forest regeneration. Selectively thinning lodgepole can open the stand to severe windthrow and stem breakage. However, if your home is located within a lodgepole pine forest, you may prefer selective thinning to the removal of all standing trees. To ensure a positive response to thinning throughout the life of a lodgepole pine stand, trees must be thinned early in their lives – no later than 20 to 30 years after germination. Thinning lodgepole pine forests to achieve low densities can best be accomplished by beginning when trees are small saplings, and maintaining those densities through time as the trees mature.

Thinning older stands of lodgepole pine to the extent recommended for defensible space may take several thinning operations spaced over a decade or more. When thinning mature stands of lodgepole pine, do not remove more than 30 percent of the trees in each thinning operation. Extensive thinning of dense, pole-sized and larger lodgepole pine often results in windthrow of the remaining trees. Focus on removing trees that are obviously lower in height or suppressed in the forest canopy. Leaving the tallest trees will make the remaining trees less susceptible to windthrow.

Another option is leaving clumps of 30-50 trees. Clumps are less susceptible to windthrow than solitary trees. Allow a minimum of 30-50 feet between tree crowns on the clump perimeter and any adjacent trees or clumps of trees. Wildfire tends to travel in the crowns of lodgepole pine. By separating clumps of trees with large spaces between crowns, the fire is less likely to sustain a crown fire.

Maintaining Your Defensible Space

Your home is located in a forest that is dynamic, always changing. Trees and shrubs continue to grow, plants die or are damaged, new plants begin to grow, and plants drop their leaves and needles. Like other parts of your home, defensible space requires maintenance. Use the following checklist each year to determine if additional work or maintenance is necessary.

Defensible Space and FireWise Annual Checklist

- ✓ Trees and shrubs are properly thinned and pruned within the defensible space. Slash from the thinning is disposed of.
- ✓ Roof and gutters are clear of debris.
- ✓ Branches overhanging the roof and chimney are removed.
- ✓ Chimney screens are in place and in good condition.
- ✓ Grass and weeds are mowed to a low height.
- ✓ An outdoor water supply is available, complete with a hose and nozzle that can reach all parts of the house.
- ✓ Fire extinguishers are checked and in working condition.
- ✓ The driveway is wide enough. The clearance of trees and branches is adequate for fire and emergency equipment. (Check with LHFPD.)
- ✓ Road signs and your name and house number are posted and easily visible.
- ✓ There is an easily accessible tool storage area with rakes, hoes, axes and shovels for use in case of fire.
- ✓ You have practiced family fire drills and your fire evacuation plan.
- ✓ Your escape routes, meeting points and other details are known and understood by all family members.
- ✓ Attic, roof, eaves and foundation vents are screened and in good condition. Stilt foundations and decks are enclosed, screened or walled up.
- ✓ Trash and debris accumulations are removed from the defensible space.
- ✓ A checklist for fire safety needs inside the home also has been completed. This is available from your local fire department.

Structural Ignitability

Structural ignitability is a term used to describe a structure's susceptibility to ignition. It is not enough to have defensible space without giving careful thought and effort toward improving the homes resistance ignition. Structures are often lost because they lack the ability to resist firebrand ignition. Wildfires are often fanned by very strong winds creating a blizzard of embers which are carried great distances ahead of active flames. These embers often land in a receptive fuel bed, typically made up of fine dead fuels, which allow new fires to readily start; including fires on, under and near homes. Aerial ignition from embers and fire brands can occur in the presence or absence of surrounding defensible space.

This fine dead fuel bed can include naturally occurring materials, such as needles and leaves that accumulate on, under and near your home, material stored on or near the home such as yard furniture or woodpiles, and some types of building materials. Building materials that lend themselves readily to "structural ignitability" include wood shake roofs, wood decks, and wood siding (Figure 26).

Figure 47. Significant combustible exterior fuel loads

It is incumbent upon property owners to evaluate their home, inside and out, regarding fire safety and start immediately to make needed improvements. Addressing structural ignitability concerns, in conjunction with effective defensible space implementation will make homes much less prone to loss from wildfire embers, radiated heat, or surface fire spread. Evaluation assistance can be sought from the LHFPD , the CSFS, and Boulder County mitigation specialists.

Prescriptions

- Replace wood shake shingle roofs with non-flammable material (Figure 27). Currently Boulder County prohibits wood shake construction on new or existing homes. Insurance companies, at their discretion, may require roofing material replacement. County permit guidelines could be modified to accelerate replacement of remaining flammable roofs.

Figure 48. Non-flammable roof

Source: sierraforestlegacy.org

- Screen gutters and regularly clear gutters and roof valleys of accumulated woody debris.
- Screen all vent openings with steel screens no greater than ¼ opening. Restricted openings will help prevent embers from blowing into attics and crawl spaces (Figure 28). Currently standards exist in the county and city for new construction, but not older structures.

Figure 49. Appropriate Window Well Screening

Source: LHFPD mitigation

- Clear flammable debris from under decks. Cover ground surface with non-flammable material such as gravel or dirt. Prevent plant and grass growth under and around deck base of deck. Screen open areas under decks. Restricted access will help prevent embers from accessing hidden spaces (Figure 29).

Figure 50. Screened decks restrict access from windblown debris

- Replace single pane windows and plastic skylights with tempered double-paned glass that is less likely to break or melt when exposed to radiant heat. Double pane glass will also absorb some of the radiant heat energy reducing the amount that enters the structure.
- Move wood piles from under eves and around decks to a location that is away from defensible space zone 1. See Defensible Space Zone 2 Prescriptions.
- Propane tanks should be located at least 30 feet from structures with 10 feet of clearance from flammable material. See Defensible Space Zone 2 Prescriptions.

Home Addressing

Home addressing that is clearly visible from the primary access road is a critical factor impacting effective emergency response and incident management. The lack of visible address numbers will delay the arrival of emergency personnel in all situations requiring emergency response. In the event of an extended wildfire incident, responding firefighters are typically from other regions unlikely to be familiar with the layout of local communities. Tactical decisions are based on a variety of factors, but effective suppression and structure protection crew deployment is dependent on local street and address maps and correlating verbal or written instructions to visible street and address signage. Compounding the situation is the fact that visibility is often limited due to smoke. If the fire front has already passed through the area, the landscape is often unrecognizable and any combustible signage is likely missing.

All signage should be standardized throughout the district. Street signage should be metallic, reflective and posted on metal posts at all intersections. Home addressing signage should be metallic, reflective, and posted on metallic posts or fence stakes at the base of the driveway. All signage should be clearly visible from the main road.

Access and Evacuation

The access characteristics of a subdivision or neighborhood have a great impact on the area's hazard profile. They directly affect the efficiency of evacuating residents and the effectiveness and safety of emergency responders. Optimal community design provides for multiple points of ingress and egress on

roads that are wide enough to support two-way traffic flow and sufficiently graded to allow access for large fire apparatus. Adequate turnarounds on dead ends and cul de sacs are essential.

Community surveys conducted for this report carefully assessed access characteristics for each identified WUI neighborhood. Such elements as number of access points, road width, surface condition, grade, and presence of restricted switchbacks were evaluated.

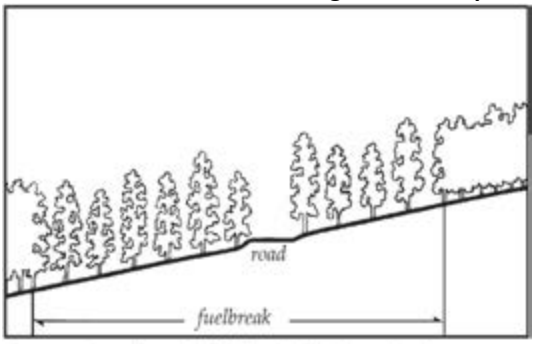
For primary evacuation and secondary access routes, roadside thinning and seasonal mowing are also recommended. Roadside thinning provides a cost effective means to interrupt forest continuity and at the same time enhance the safety of evacuation and emergency operations. Roadside fuel breaks also support suppression efforts with safe and accessible anchor points for fire line construction and firing operations.

Individual community assessments in Appendix A detail specific access improvement recommendations for each assessed subdivision.

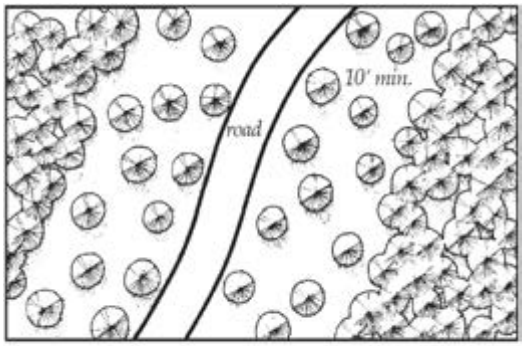
Roadside Thinning and Landscape Fuel Treatments

Just as defensible space practices reduce hazardous fuel loads and potential fire behavior around structures, landscape-scale treatments known as fuel breaks or shaded fuel breaks are implemented to strategically reduce hazardous fuels and potential fire behavior on a broader scale. Landscape treatments are implemented along community margins, access and evacuation route margins, and other locations that can significantly and strategically reduce expected fire behavior. Like defensible space, fuelbreaks are designed to reduced, not extinguish fire behavior. They are constructed to interrupt the continuity of the forest canopy, creating sufficient vertical and horizontal gaps in the fuel load to drive a crown fire out of the tree crowns and onto the ground, where direct attack suppression tactics will be most effective. Figure 30 details the principals of a roadside thinning to create a shaded fuel break.

Figure 5. Principals of shaded fuel breaks



Cross-section of a typical fuelbreak built in conjunction with a road.



Plan view of fuelbreak showing minimum distance between tree crowns.

The roadside treatment depicted in Figure 31 removed the conifer and left the Aspen, which will leaf out in the spring. Biomass was easily removed without necessitating burning in-place. The treated roadway now provides a safe evacuation route as well as a tactical suppression anchor in the event of a wildfire. Patch cutting is a landscape treatment method that restores natural meadow conditions and strategically breaks forest canopy continuity (Figure 31).

Figure 52. Roadside thinning and patch cut treatments

Ridge tops are often targeted for locating strategic landscape scale fuelbreaks based on expected fire behavior (Figure 32).

Figure 53. Ridge top fuelbreak in Boulder Heights, Boulder, CO

Landscape treatments that utilize shaded fuelbreak principals are recommended in the LHFPD where community margins come into contact with forest interfaces zones, where hazardous fuel loads and significant potential fire behavior exist, road margin treatments can be connected, or the proximity of existing or proposed treatments on public lands warrants a collaborative cross-boundary treatment.

Mountain Pine Beetle

The following mountain pine beetle information was presented to the Front Range Fuels Treatment Partnership Roundtable, Golden, CO, January 23, 2008.

More than a dozen leading research experts from the western US and Canada met over a three-day period last week, to assess the status of our scientific knowledge of Lodgepole pine ecology and fire behavior in relation to the mountain pine beetle epidemic. Their focus was on Colorado and southern Wyoming, but they also examined knowledge from many other Lodgepole pine areas where mountain pine beetle epidemics are occurring.

The science team, led by Dr. Merrill R. Kaufmann (emeritus scientist, Rocky Mountain Research Station) and Mike Babler (fire initiative program manager, The Nature Conservancy), reached consensus on a series of points:

- Not all Lodgepole pine forests are the same. Some forests are pure Lodgepole pine established after large fires decades or centuries ago. Others are mixtures with subalpine species such as Engelmann spruce, subalpine fir, and aspen at higher elevations, or with mixed conifer species such as Ponderosa pine, Douglas-fir, and aspen at lower elevations. Each type of forest has unique features of ecology and fire behavior. And Lodgepole pine trees in all three types are vulnerable to attack by mountain pine beetles.
- Forests are living systems subject to constant change. It is normal and expected that many natural agents change our forests over time, including mountain pine beetles, fire, and wind. While forests losing many trees to insect attack will never look the same in our lifetime, healthy and vigorous forests will undoubtedly return in most locations.
- Lodgepole pine will not disappear from the southern Rocky Mountains. The make-up of our forests will change where mountain pine beetle causes high mortality. But we will continue to have forests dominated by or including Lodgepole pine, and these forests will provide valuable ecological services and aesthetic and recreational benefits.
- Active vegetation management is unlikely to stop the spread of the current mountain pine beetle outbreak, because the beetles are so numerous and spreading so rapidly that they may simply overwhelm any of our efforts. However, judicious vegetation management between outbreak cycles may help mitigate future bark-beetle caused tree mortality in local areas.
- Though they are infrequent, large intense fires with extreme fire behavior are characteristic of Lodgepole pine forests, especially during very dry and windy conditions. Such fires are a natural way for Lodgepole pine to be renewed and are largely responsible for extensive pure Lodgepole pine forests.
- In forests killed by mountain pine beetles, future fires could be more likely than fires before the outbreak. Large intense fires with extreme fire behavior are again possible. While more research is needed to learn in what ways and how long the fuels and fire environment are altered by the beetles, protection of communities and other values at risk continues to be imperative.
- Mountain pine beetle outbreaks are not likely to cause increased erosion, because they do not disturb the soils or reduce protective ground cover. In areas of high tree mortality, streamflow may increase and the timing of water delivery may be changed for decades, because of reduced canopy interception of precipitation and reduced water uptake by the trees.

- Climate changes will most likely contribute to substantial forest changes in the decades ahead. Given the climate changes in the last 20 years and projected changes for the next several decades, large fires and other natural disturbances are anticipated in many forests of Colorado and southern Wyoming. These large disturbances and other changes in growing conditions will likely contribute to restructuring many forest lands

Source: Kaufmann M.R., G.H. Aplet, M. Babler, W.L. Baker, B. Bentz, M. Harrington, B.C. Hawkes, L. Stroh Huckaby, M.J. Jenkins, D.M. Kashian, R.E. Keane, D. Kulakowski, C. McHugh, J. Negron, J. Popp, W.H. Romme, T. Schoennagel, W. Shepperd, F.W. Smith, E. Kennedy Sutherland, D. Tinker, and T.T. Veblen. 2008. The status of our scientific understanding of lodgepole pine and mountain pine beetles – a focus on forest ecology and fire behavior. The Nature Conservancy, Arlington, VA. GFI technical report 2008-2.

Agency Treatments and Cross Boundary Collaboration

LHFPD, like much of the Rocky Mountain region, is home to significant public land holdings. As noted in Section 2, District Profile, nearly 70% of the district's 33,000 acres manage by public agencies. Every subdivision served by the LHFPD and assessed in this report shares a boundary with county or federal lands. Effective mitigation at the community level cannot be accomplished without agency collaboration to extend fuel reduction treatments into adjacent landscapes.

Similar forest management challenges face all land management agencies and include over-crowed even aged timber stands, hazardous fuel loading, drought stress, insect infestation, as well as the expansion of residential development to the margins of public lands.

Both Boulder County and the United States Forest Service are managing ongoing projects within the district boundaries that are directly benefiting district residents as well as forest health. HFRA directs federal agencies to recognize projects identified in a CWPP and give special consideration to prioritizing projects that facilitate those recommendations. By identifying planned agency treatments that directly support community mitigation efforts; this CWPP can help agencies prioritize and implement that project over others that may be located in more remote sections of the forest.

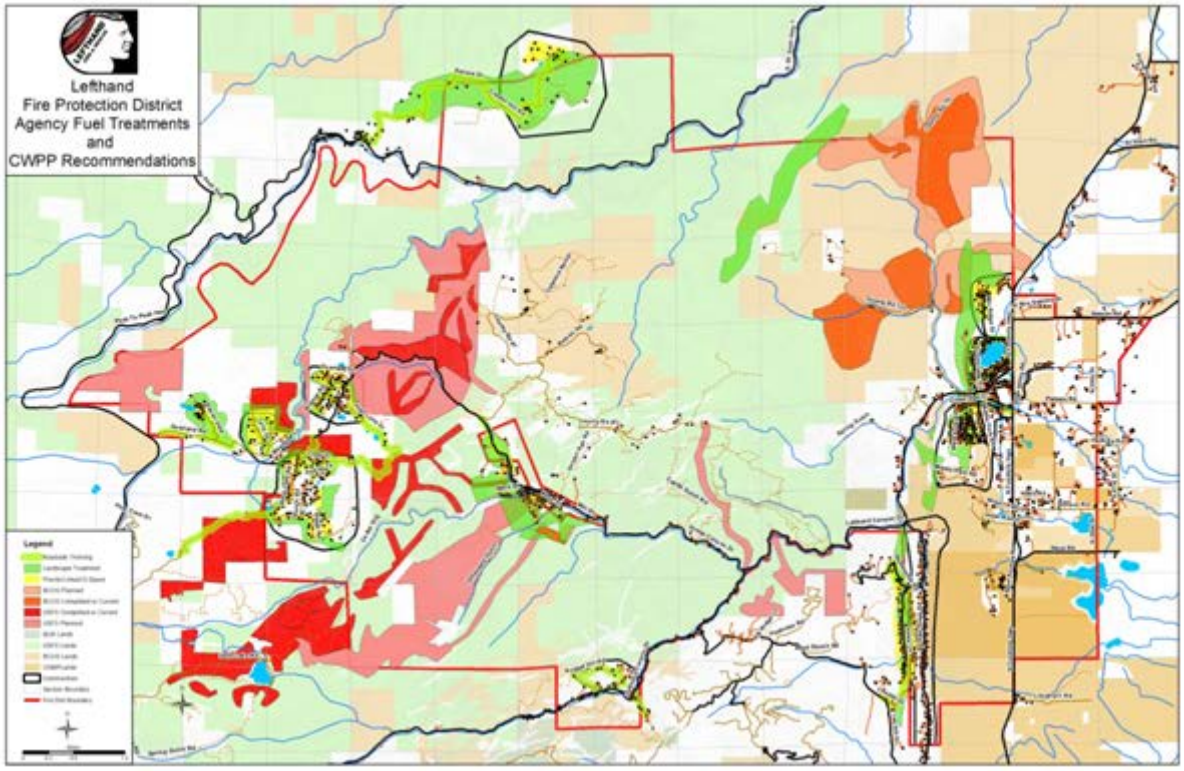
Heil Ranch is managed by Boulder County Open Space and has been the focus of county forest treatment projects since 1999. Treatments include landscape-scale thinning, patch cuts, chipping & hauling, and pile burning.

James Creek Fuel Reduction Project: The USFS has been treating federal lands around the Jamestown and Overland areas for several years. The primary purpose of the James Creek Fuel Reduction Project is to reduce the risk of crown fire initiation and spread by thinning forests and removing the ladder fuels needed for a ground fire to reach the tops of trees. Fuel reduction through vegetation management will help limit wildfire size and severity by directly affecting fire behavior and indirectly aiding fire suppression activities. A recent study of fire behavior on the 2002 Hayman Fire on the Pike National Forest showed that fuel reduction treatments including thinning and prescribed fire directly affected fire behavior by reducing fire intensity and severity, and the impacts to natural resources.

The purpose and need for the James Creek Fuel Reduction Project supports the proposed action of thinning and pruning overstocked stands to reduce the risk of wildfire, creating ridge fuel breaks to aid in fire suppression, restoring meadows and aspen communities, using prescribed fire to reduce fuels and remove vegetation and increasing the area of early-seral vegetation to provide structural diversity. *(Source:USFS James Creek Fuel Reduction Project – Decision Notice)*

In all cases, agency treatments that are developed in proximity to community assessment areas are reviewed for potential cross-boundary collaboration. Figure 33 (See Appendix B for a larger version) displays current and planned agency projects and the proximity of fuels treatments recommended in this report.

Figure 54. Public agency and recommended fuel treatment projects



Forest AG Program

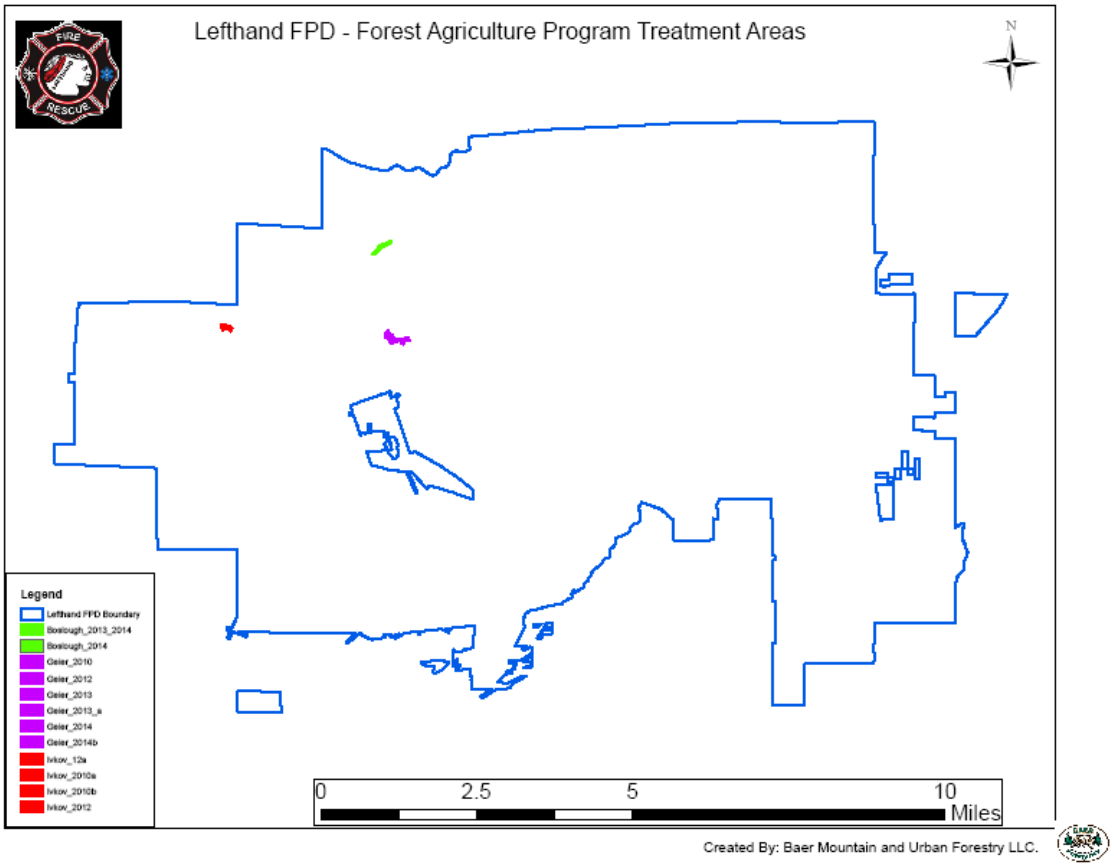
In addition to managing forests on state lands the CSFS manages a program designed to help landowners manage and treat larger forested parcels on private lands. The Forest Agriculture Tax Classification Program, or Forest Ag Program, is a property tax designation given to lands used for the primary purpose of producing tangible wood products. The program is mandated by state law, managed by CSFS and implemented by the Assessor's Office in each county. To be eligible for Forest Ag Program designation, a landowner must:

- Own at least 40 contiguous, forested acres
- Use the land to produce tangible wood products
- Have legal access to the property
- Obtain and work under a forest management plan

Landowners who participated in the Forest Ag Program on the Golden District in 2007 were dedicated to managing their forests. Following is a brief summary of program accomplishments:

The Forest Ag Program has several benefits. Obviously, landowners benefit through lower property taxes and a properly managed forest that generally is healthier and more resilient, productive and attractive than an unmanaged forest. Reduced property taxes help landowners avoid the need to subdivide due to financial pressures and keeps these 40-acre-plus tracts of land intact, which is ecologically important because development and fragmentation makes forest management difficult and expensive to achieve. Finally, producing and selling wood products from Forest Ag properties adds to the economic base of local communities.

Figure 55. Forest Agriculture Program Treatment areas in LHFPD



7 EMERGENCY PREPAREDNESS

Emergency Response Protocol

The LHFPD is responsible for emergency response within the district boundary. This includes support for trauma, medical, rescue, structure fire, and wildfire related incidents. Incidents requiring law enforcement intervention are handled by the Boulder County Sheriff's department. Significant public land holdings and heavy recreational use of those lands within the district necessitate the need for

formal arrangements with those agencies to outline roles and responsibilities to facilitate efficient incident management operations. These agreements provide guidelines for resource commitments, compensation, and incident management structure for wildfire and search and rescue incidents.

County dispatch protocol initiates response from LHFPD, and provides notification to CSFS, USFS, Boulder County Emergency Services, Boulder (city) Wildland Group, for any confirmed wildfire with the district. Boulder County Open Space resources are notified if the incident involves county open space property. The LHFPD is committed to providing initial and extended attack resources for all wildfire suppression within the district. This includes up to 12 hours of support for incidents located on public land holdings.

Routine involvement of additional agencies for specific incidents is referred to as “automatic mutual aid”, and saves valuable time mobilizing resources in the initial incident attack phase. In addition to wildfire response, automatic mutual agreements are in place with several surrounding districts. These agreements cover all forms of incident response for those areas on the periphery of the district where resources from adjacent districts could provide quicker and more efficient response.

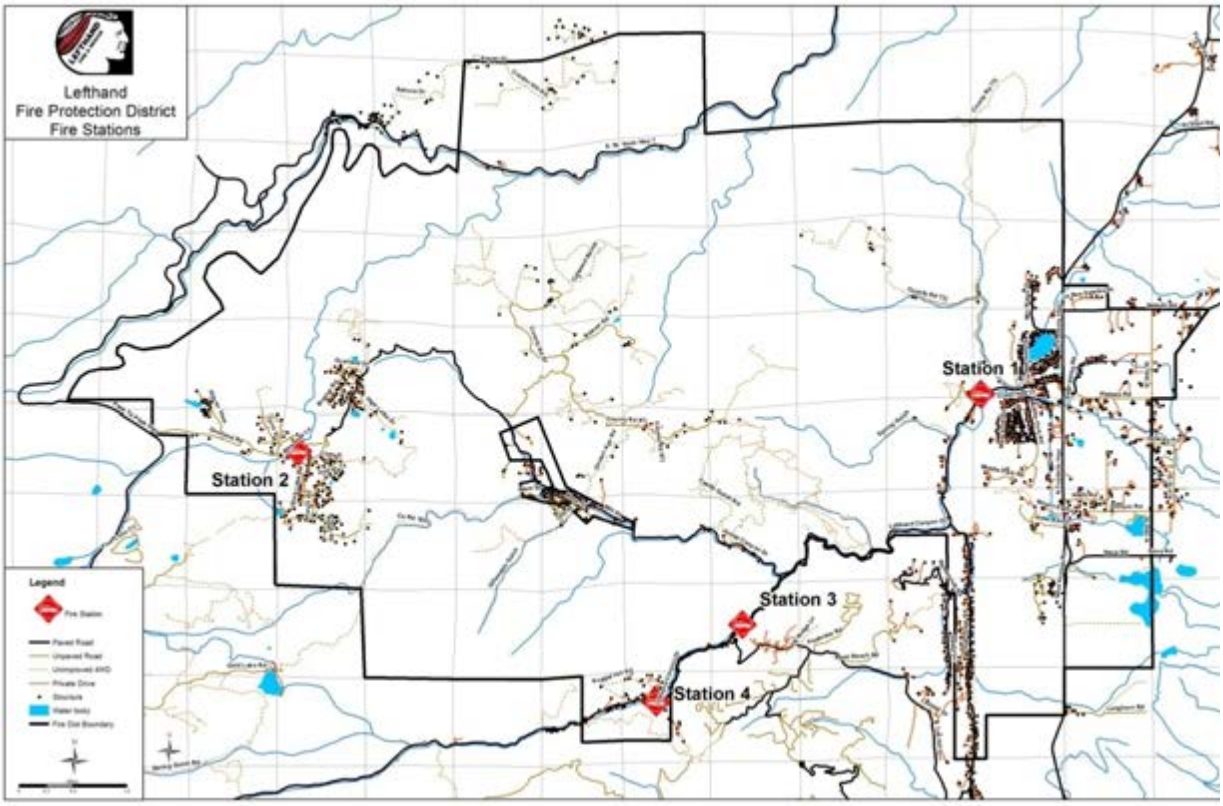
Automatic mutual aid is also activated with Rocky Mountain Rescue for all search and rescue operations in the district. This agreement automatically mobilizes joint resources and outlines incident command and operations protocol.

These reciprocal mutual aid agreements with surrounding districts allow participating agencies to tap each other’s resources if the incident resources that exceed local capacity.

District Resources

Emergency response from the LHFPD is based out of four fire stations that are strategically located throughout the district (Figure 34, See Appendix B for a larger version). Administrative offices are located at station 1, in the area of lower Lefthand Canyon. Training and conference space is located in station 4, 7 miles west on Lefthand Canyon Drive.

Figure 56. Fire station locations



Apparatus distribution is detailed in Figure 35.

Figure 6. Station inventories

LHFPD Station and Apparatus Resource Inventory
Station 1
900 Lefthand Canyon Drive Lat 40° 07' 53"" lon 105° 17' 58" District administrative office. Land line, internet, computer resources
1-type 1
1-type 3
1-type 6
1-tender
4-rescue vehicles
3-command vehicles
Station 2
7761 Overland Road Lat 40° 07' 21" lon 105° 26' 38"
1-type 2 Engine
1-type 3 Engine
1-type 6 Engine
1-UTV rescue
1-ambulance
1- pumper
Cistern
Station 3
5928 Lefthand Canyon Lat 40° 05' 39"lon 105° 21' 00"
1- type 6 Engine
1- type 7 Engine
Station 4
7300 Lefthand Canyon Lat 40° 04' 54" lon 105° 22' 06" Conference room/training center
1-type 1
2-type 3
1-type 6

Staffing

The department is staffed by 2 full time paid officers, a paid administrative assistant, and 37 volunteer firefighters. 2010 department qualifications include:

- 28 active red cards
- 17 First Medical Responders
- 17 Emergency Medical Technicians
- 6 Single Resource Engine Bosses

Training and Equipment

The LHFPD personnel policy dictates that all active firefighters maintain minimum qualification standards regarding medical training (Medical First Responder), wildland firefighter training. (FFT2), and structure firefighting training. All active firefighters are required to take the annual wildland refresher NWCG RT-130 and physical to maintain current seasonal red card status. All active firefighters are issued "personal protective equipment" in compliance with NFPA 1971 and NFPA 1977 standards for structural and wildland fire incident response.

The LHFPD holds two formal training sessions per month, one fire and one medical, in addition to the active fire fighter minimum standards outlined above. Active firefighters are required to log 24 hours of fire training and 12 hours of medical training in a twelve month period.

Water resources

Water availability varies greatly throughout the district. Detailed community water resource maps are located in Appendix A. Pressurized hydrants are strategically positioned in the lower portion of the district. Draft sites, some with dry hydrants installed, are located along Lefthand Canyon, James Canyon, and the South Saint Vrain Creek. Jamestown is equipped with several pressurized hydrants and several draft locations along James Creek. The Bar-K complex is supported with draft sites located on the South Saint Vrain Creek and Rock Lake, which is now a seasonal water supply. There is a high concentration of single-home cisterns in the Bar-K area to support small-scale initial attack efforts. Most responding fire apparatus carry limited stored mobile water supplies. Associated storage capacities are detailed in Figure 35 (above).

Emergency Resource Information

- **Lefthand Fire Protection District**
  900 Lefthand Canyon Drive
  Boulder, CO
  720-214-0560
  http://www.lefthandfire.org/

- **Colorado State Forest Service**
  5625 Ute Highway
  Lyons, CO
  303-823-5774
  http://csfs.colostate.edu/

- **Boulder County Sheriff Department Emergency Services**
  Justice Center
  1777 6th Street
  Boulder, CO 80302
  303-441-3600
  http://www.bouldercounty.org/sheriff/emergency/es_home.htm

- **United States Forest Service**
  Boulder Ranger District
  2140 Yarmouth Ave
  Boulder, CO
  303-541-2500
  http://www.fs.fed.us/r2/arnf/about/organization/brd/index.shtml

Mitigation Resources

Since 2007 the LHFPD has staffed a funded seasonal mitigation crew to conduct fuels reduction projects within the district. Projects range in scope from selective tree removal, defensible space implementation for individual homes, to landscape scale fuel breaks along WUI community margins (Figures 38, 39). The district purchased a chipper in 2007 to facilitate fuel dispersion and removal.

LHFPD residents may contact the fire department or the CSFS to arrange a professional wildfire hazard and risk assessment for their home.

Figure 58. LHFPD Mitigation projects

Figure 59. LHFPD mitigation results

LHFPD Recommendations

Firefighter Training

- Maintain current levels of required qualifications and monthly required department trainings.
- Enhance apparatus training and personnel requirements for “keyed” status.
- Increase joint training opportunities with adjacent agencies.
- Encourage and facilitate ongoing NWCG qualification enhancements, including single resource qualifications and out-of-district fire assignments.

Equipment, Apparatus, and Station Resources

- Acquire two additional attack tenders with 3,000 gallon capacity.
- Conversion to non-rechargeable programmable pack set radios models such as Bendix King brand for extended incident support.
- Redevelop a central fire station at the site of LHFPD Station 1 to house additional apparatus, official administrative offices and a training center with adequate capacity for joint agency classroom training exercises.

Water Resources

- Specific water resource recommendations for each community in Appendix A, Community Hazard and Risk Assessments and Mitigation Recommendations

Mitigation

- Maintain a funded seasonal mitigation crew.

Collaboration and Mutual Aid

- Maintain stakeholder status with the Front Range Roundtable.
- Collaborate with Boulder County Open Space for joint mitigation project opportunities in the Lower Lefthand Canyon complex area.
- Collaborate with the USFS to identify and implement strategic mitigation opportunities in the Bar-K complex area.
- Define and formalize mutual aid agreements with surrounding districts/agencies.
- Maintain automatic mutual aid arrangements with Allenspark Fire for HWY 7 and Conifer Hill. Pursue a trade/turnover of the area to Allenspark considering proximity to emergency resources.
- Identify and develop minimum department and training standards for potential mutual aid agencies to ensure a reciprocal and safe environment for resource sharing.
- Address the possibility of Jamestown being incorporated into the LHFPD.
- Actively participate with county wildfire cooperatives and collaborative other collaborative agency opportunities.

GIS and Mapping

- Collaborate with Boulder County mapbook project.
- Develop a GIS strategic plan, budget, and prioritized data collection and updates to track resource improvements, residential growth, and mitigation programs.

Community Outreach

- Develop community outreach programs designed for HOA-level education with a focus on activating community liaisons, increased wildfire behavior awareness, the basics of defensible space and structural ignitability, planned and current mitigation activity, evacuation planning, and fire department updates.

8 FUNDING AND GRANTS

This section provides information that may be helpful in planning and preparing for fuels mitigation projects.

Grant funding support is often a necessary component of a fuels treatment project and can facilitate fuel reduction on both private and public lands. Guidance on the application process and current information concerning grant availability is available through the CSFS.

CSFS Eligible Landowner Assistance Programs and contingencies:
For the funding opportunities listed below the following stipulations apply

- Landowners apply through CSFS District Offices unless noted below;
- Applications approved when funds are available throughout the year;
- Matching expenses or in-kind activities by landowner are generally required; and
- Grant availability is subject to continued funding from federal and state government.

Funding Opportunities

- **WUI Incentives:** Wildland Urban Interface for fuels reduction.
- **I & D Prevention and Suppression**: Bark Beetle – Forest Health.
- **FRFTP:** Front Range Fuels Treatment Partnership for fuels reduction.
- **STEVENS:** Stevens or "Companion" funds for fuels reduction projects on non-federal lands that may be threatened by burning on US Forest Service lands (these funds may be "no match" in some cases).

CSFS Assistance Programs – Communities and Agencies:
For the funding opportunities listed below the following stipulations apply

- Cooperators, communities, organizations, agencies – apply through CSFS District Offices;
- Applications received and approved during the identified funding windows;
- Matching expenses or in-kind activities by applicants are generally required
- Grant availability is subject to continued funding from federal and state government; and
- Applications for activities listed in current CWPPs are normally ranked highest for funding.

Additional Funding Opportunities

*See Appendix D for a list of *LANDOWNER & COMMUNITY ASSISTANCE PROGRAMS FOR FORESTRY/AGROFORESTRY IN COLORADO*, as well as information about *Wildfire Mitigation Tax Deductions*

For additional grants and grant application assistance visit: Rocky Mountain Wildland Fire Information - Grant Database: http://www.rockymountainwildlandfire.info/grants.htm

Grant Writing Handbook: http://www.theideabank.com/freeguide.html

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10 APPENDIX A

Community Hazard and Risk Assessments and Mitigation Recommendations

Community Wildfire Hazard and Risk Assessments

Community Resource

Assessment · Mitigation Recommendations · Maps

Methodology

LHFPD assessment and neighborhood hazard and risk surveys were initiated in fall, 2009 and completed in spring, 2010. Detailed and collaborative analysis of the assessment area resulted in the identification of nine unique communities, or wildland-urban interfaces (WUI) within the fire district. Additional Areas of Interest (AOI) were identified that represented unique land management zones, adjacent communities, or commercial enterprises warranting special mention. Each community assessment represents a unique response area with identifiable predominant characteristics, resources, and wildfire hazards/risks. Based on these criteria, a single WUI may span multiple neighborhoods, or a single neighborhood or HOA may be subdivided in multiple WUIs. Homes, structures, or infrastructure sites not located within a designated WUI are typically best served through individual home and property hazard and risk assessments that are available through the county, CSFS, and the local fire department.

A standardized survey process defined by the National Fire Protection Association (NFPA) was utilized as a component of the field surveys to assess the relative level of wildfire risk and hazard for each neighborhood. The NFPA Form 1144, *Standard for Protection of Life and Property from Wildfire* is a classification system that combines years of study, practical observation of fire behavior in the WUI, and spatial technology to address the relationship of a broad suite of factors affecting wildfire hazard and risks to interface communities. Surveys assess predominant characteristics within individual communities and subdivisions as they relate to structural ignitability, fuels, topography, expected fire behavior, emergency response, and ultimately human safety and welfare. Scores are assigned to each element and then totaled to determine the community's relative level of risk. Low, moderate, high, and extreme hazard ratings may be assigned based on the total community score. This classification system may serve as a starting point for project prioritization or a benchmark for community action plan implementation.

Mitigation recommendations are developed to specifically address the unique wildfire hazards and risks that face each individual community or subdivision. Recommendations take into account field survey observations, NFPA 1144 survey findings, expected fire behavior, as well as availability of community and emergency resources. Recommendations included in this report may be used to facilitate access to state and federal grants and guidance for future strategic mitigation planning and implementation.

Appendix A is designed to be a strategic planning resource for each identified community.

Mapping

The map data illustrated in this report has been generated from a number of resources. Most of the district infrastructure data was generated through the 2005 Lefthand Fire Hazard and Risks Assessment. Aerial imagery used in the report was collected in 2004 by the National Agricultural Imagery Program. Maps may not reflect current conditions.

Lefthand Fire Protection District Survey Results		
Conifer Hill	124	EXTREME
Nugget Hill	107	HIGH
Bar-K Complex	105	
Crestview Estates	90	
Old Stage Road	74	
Lake of the Pines	72	
North Foothills Ranch	69	MODERATE
Mountain Ridge	64	
Lower Lefthand Canyon	58	
NFPA 1144 Survey Hazard Rating Scale		
< 40 LOW		
> 40 MODERATE		
> 70 HIGH		
> 112 EXTREME		

Recommendations and Project Prioritization

The mitigation principals outlined in this report are based on practices that are proven to reduce potential fire behavior as well as the probability of structural ignition. Specific recommendations may vary from community to community but project prioritization always focuses on:

- Enhancing life safety through fostering community awareness;
- Implementation of effective defensible space;
- Securing safe community evacuation routes;
- Enhancing defensible space effectiveness with landscape-scale fuel reduction treatments; and
- Increasing the capability and effectiveness of LHFPD incident response.

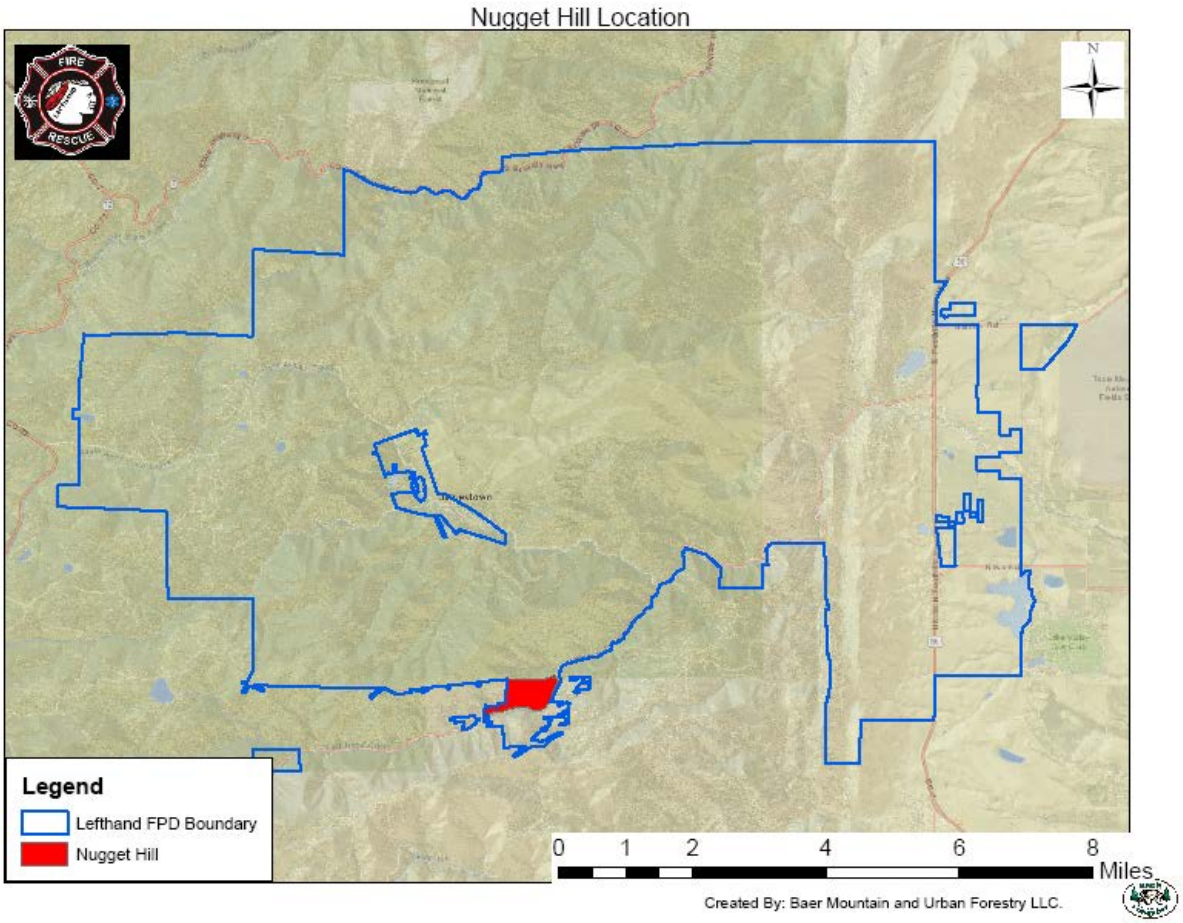
Nugget Hill

Nugget Hill

Community Resource

Assessment · Mitigation Recommendations · Maps

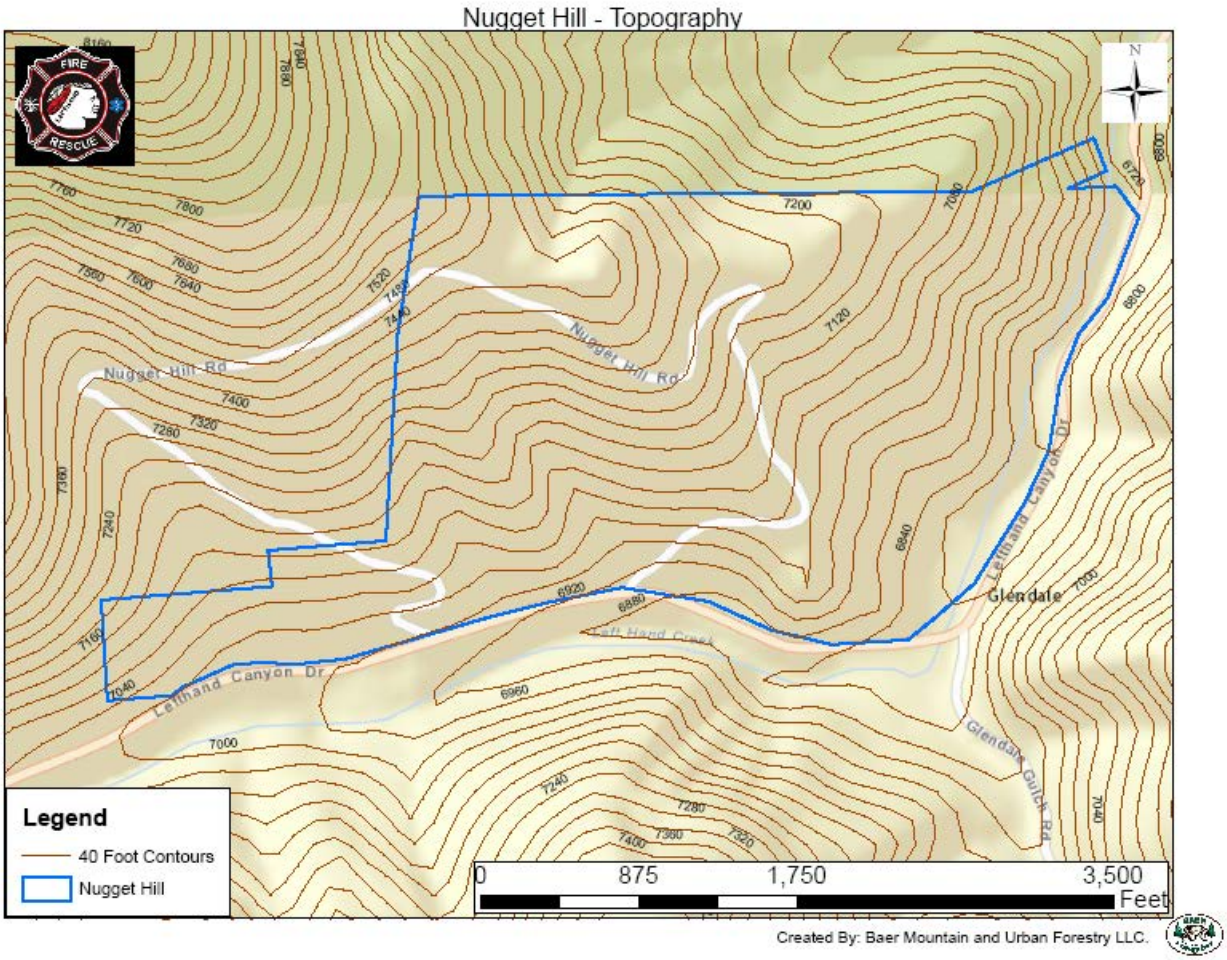
Wildfire Hazard and Risk Rating **HIGH**



Community Size-Up

Nugget Hill is located approximately 7.5 miles west of HWY 36 on the north slope Lefthand Canyon Drive, near the townsite of Glendale and Glendale Gulch Road. Residences in the vicinity along Lefthand Creek and lower Glendale Gulch Road have been included in the assessment area. Upper Glendale Gulch is served by the Boulder Mountain Fire Protection District. Approximately 25 structures are located on Nugget Hill Road. 6 of these homes are located in the Upper Glendale Gulch area. An additional; 18 structures are located in the area along Lefthand Canyon Drive and Glendale Gulch Road. Nugget Hill Road has two access points along Lefthand Canyon Drive f these approximately 750 feet apart. The road loops up the steep south facing slope of Nugget Hill which forms the divide between Lefthand Canyon and James Canyon to the north. The road is steep, 1 to 1 ½ lane, with several restrictive switchbacks, and no established turnarounds. 4WD is recommended in all seasons. The upper portion of the loop is unimproved, restricted single lane, constructed across an open steep south facing slope, but passable in good weather. The majority of structures are located on the eastern loop. The area borders USFS managed lands to the north and Boulder County Open Space and BLM managed lands to the west, south, and east. On the south side of Lefthand Canyon Drive is Glendale Gulch Road. There is a cluster of 10 structures along the lower portion that are included in the Nugget Hill assessment due to close proximity. Glendale Gulch Road is a steep single lane 4WD road that deadends into driveways and a

4WD trail that leads to subdivisions in Boulder Heights and Sunshine Canyon to the south. LHFPD Station 3 is located in the assessment area with an established drafting source in Lefthand Creek.



Wildfire Fire Risk and Hazard Severity Form NFPA 1144	
Nugget Hill	
Hazard Rating 107	HIGH
Means of Access	
Ingress and Egress	4
2 or more roads in & out	0
One road in & out	7
Road Width	4
> 24 ft	0
> 20 ft < 24 ft	2
< 20 ft	4
All-Season Road Condition	5
Surfaced Road, grade <5%	0
Surfaced Road, grade >5%	2
Non-surfaced Road, grade <5%	2
Non-surfaced Road, grade >5%	5
Other than all season	7
Fire Service Access	4
< 300 ft with turnaround	0
> 300 ft with turnaround	2
< 300 ft with no turnaround	4
> 300 ft with no turnaround	5
Street Signs (predominent)	0
Present - reflective	0
Not present	5
Vegetation (fire behavior fuel models)	
Characteristics of predominent veg w/in 300 ft	17
Light - 1, 2, 3	5
Medium - 5, 6, 7, 8, 9	10
Heavy - 4, 10	20
Slash - 11, 12, 13	25
Defensible Space - vegetation treatment around structure	20
> 100 ft around structure	1
> 70 ft < 100 ft around structure	3
> 30 ft < 70 ft around structure	10
< 30 ft around structure	25
Topography Within 300 ft of Structures	
Slope	7
< 9%	1
10% to 20%	4
21% to 30%	7
31% to 40%	8
> 41%	10
Additional Rating Factors (rate all that apply)	
Additional factors	10
Topographic feaures that adversely affect fire behavior (0 - 5)	4
Areas with a history of high fire occurance - ignition potential (0 - 5)	3
Severe fire weather potential (0 - 5)	2
Separation of adjacent structures contributing to fire spread (0 - 5)	1
Roofing Assembly	
Roofing	3
Class A	0
Class B	3
Class C	15
Unrated	25
Building construction	
Materials (predominent)	15
Non-combustible fire-resistive siding, eaves and deck	0
Non-combustible siding, eaves and combustible deck	5
Combustible siding and deck	15
Building set-back relative to slope of 30% or more	4
> 30 ft to slope	1
< 30 ft to slope	5
Available Fire Protection	
Water source availability	3
Hydrants 500 gpm < 1000 ft apart	0
Hydrants 250 gpm < 1000 ft apart	1
Non-pressurized water source > 250 gpm for 2 hours	3
Non-pressurized water source < 250 gpm for 2 hours	5
Water unavailable	10
Organized response resources	1
Station < 5 mi from structure	1
Station > 5 mi from structure	3
Fixed fire protection	5
NFPA 13, 13R, 13D sprinkler system	0
None	5
Placement of gas and Electric Utilities	
Utilities	5
Both underground	0
One above, one below	3
Both above ground	5
Totals for home or subdivision	107
Hazard Rating Scale	
< 40 LOW	
> 40 MODERATE	
> 70 HIGH	
> 112 EXTREME	

Topography

Nugget Hill rises over 2,000 feet in less than 1 linear mile to form the divide between Lefthand Canyon and James Canyon to the north. Elevation ranges from 6,500 at Glendale Gulch to over 8,500 at the summit. Nugget Hill Road is constructed across the south face of a ridge that runs up the slope of Nugget Hill from Lefthand Canyon. This ridge forms the divide between two distinct topographic chimneys that further dissect the slope of Nugget Hill. Structures are located low to mid-slope. Across the canyon, Glendale Gulch is a steep north facing chimney that gains 1,000 vertical feet in ¾ of a mile. The side slopes of the gulch are steep and inaccessible. Most structures are clustered at the base of the gulch but several are located midway to the saddle.

Vegetation/Fuels

Vegetation and corresponding fuel models contrast sharply between the north aspect of Glendale Gulch and the dryer south aspect of Nugget Hill. Nugget Hill Road is characterized by isolated stands (FBFM 8) of individual ponderosa pine and juniper and a grassy understory that will support rapid uphill spread of an ignition down slope (FBFM 1 & 2). The north aspect of the Gendale Gulch area supports much denser conifer growth, primarily ponderosa pine and spruce and riparian deciduous species along Lefthand Creek. These slopes are characterized by a continuous canopy, dense ladder fuels, and thick needle understory (FBFM 8).

Hazard and Risk Factors

Primary risk factors Nugget Hill Road residents involve access, slope, and potential rate of spread upslope in FBFM 1 & 2. Access hazards include steep grade, restricted traffic flow, and restricted turning on two switchbacks. The combination of steep south aspect, fuels with a high rate of spread, and a roadside ignition

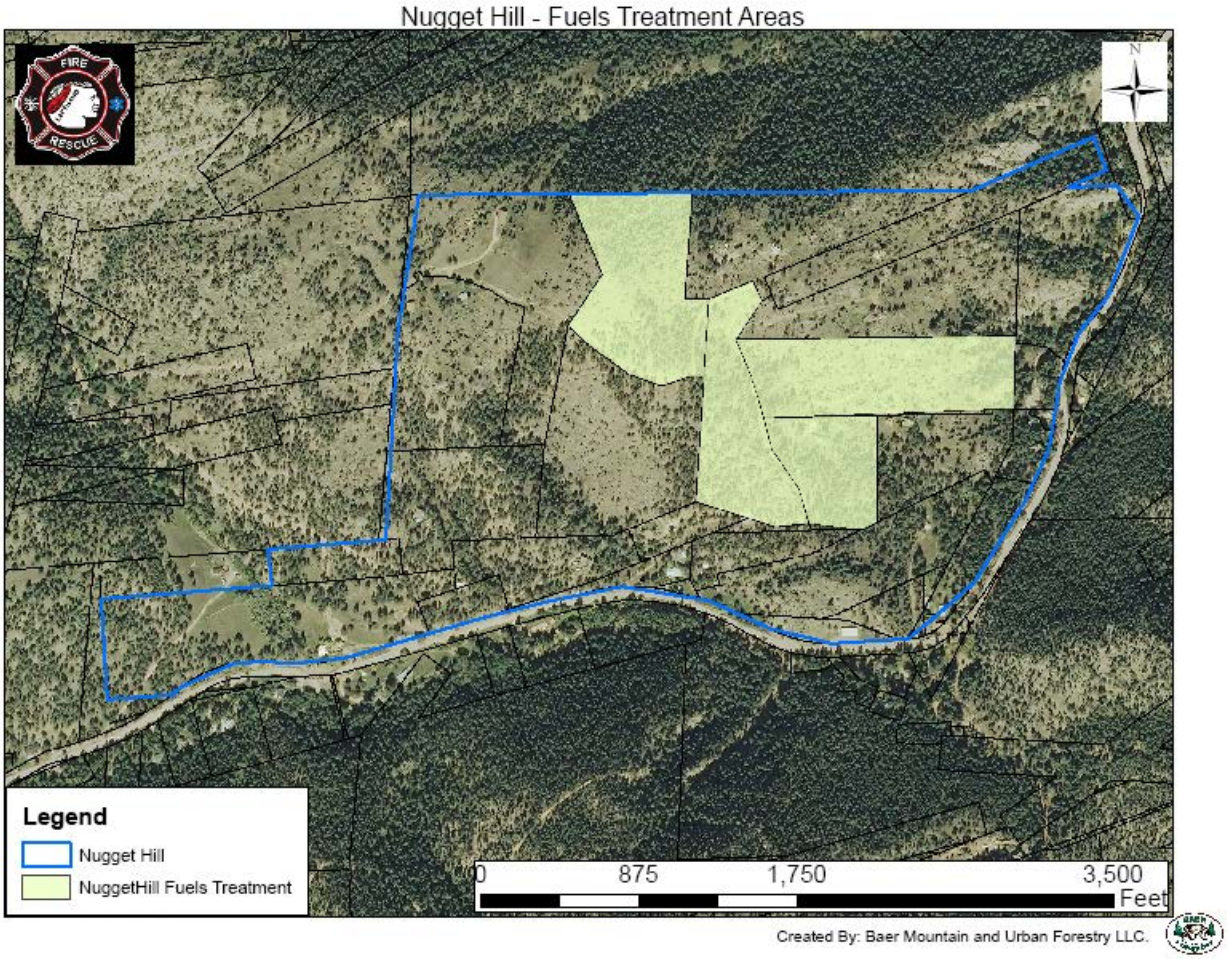
threat downhill posses a significant threat. Fortunately such fuel models are easily mitigated and if maintained, create a dependable defensible zone around any treated structure. The upper connecting loop of Nugget Hill Road provides a 4WD escape route if either access is blocked. The close proximity of both entrances to Lefthand Canyon Drive may pose an ingress/egress hazard in large-scale incident scenarios. Timber and vegetation encroach upon primary evacuation routes on both Nugget Hill Road and Glendale Gulch Road. Residences in Glendale Gulch lack adequate defensible space. Emergency water supply and emergency apparatus are located and positioned within the assessment area in the canyon.

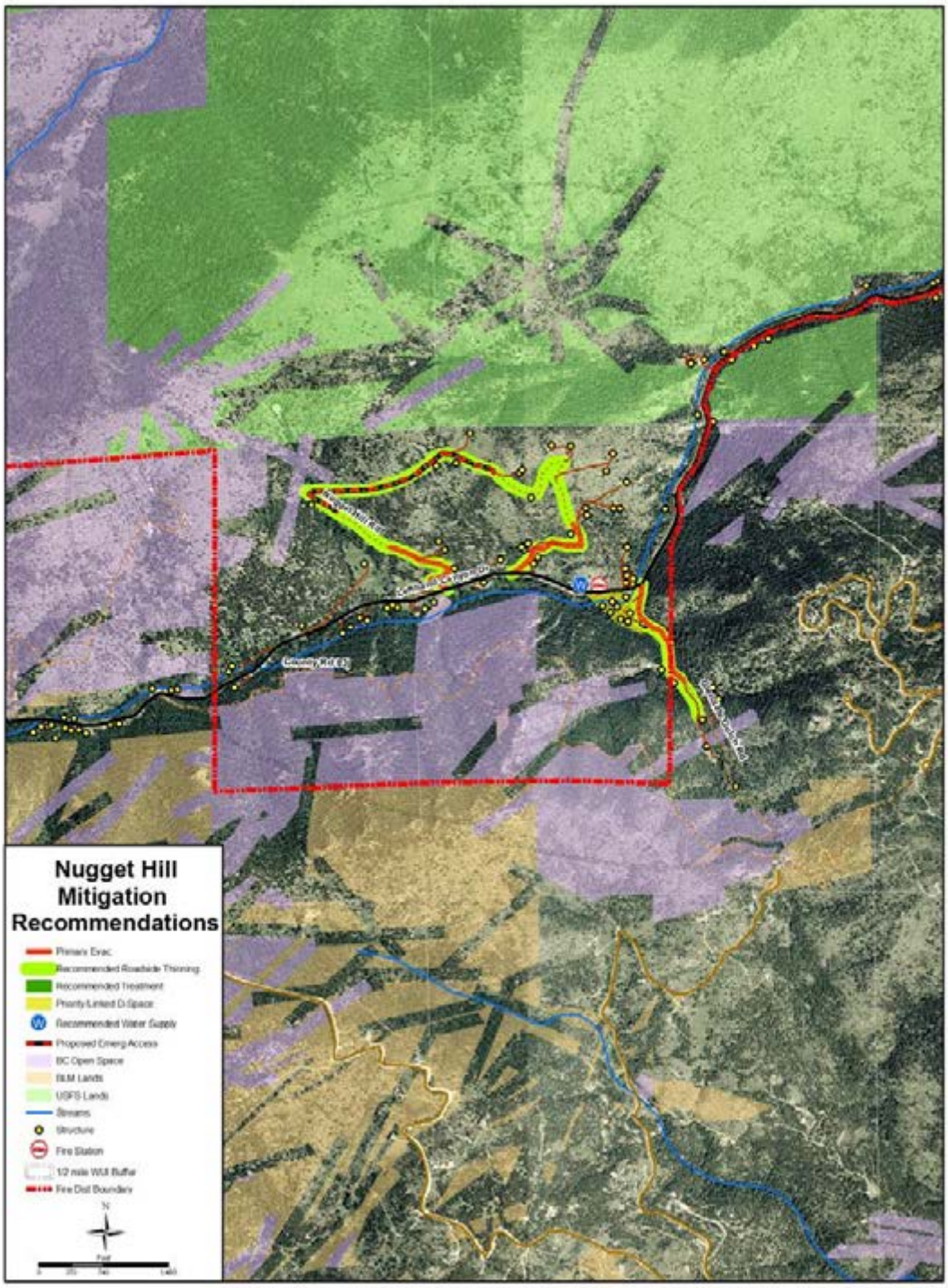
Mitigation Recommendations

- Engage residents through outreach and continuing education regarding wildfire hazards and risks, structure ignitability factors, defensible space, landscape mitigation, pine beetle options, emergency planning, evacuation, and involvement with the fire department.
- Reduce structural ignitability through construction and site upgrades, defensible space improvements, and seasonal maintenance.
- Improve and maintain adequate and effective defensible space around all residences. Coordinate mitigation efforts between adjacent parcels in lower Glendale Gulch to create greater fuel break continuity. Coordinate any mitigation on private land with current and planned mitigation on adjacent USFS property. Adequate space eliminates the possibility of all flames within 10 feet of the structure and large flames within 100 feet of the structure. Conduct seasonal mowing around structures on dry south facing slopes dominated by fast burning grassy fuels.
- Road side thinning is recommended along the length of Nugget Hill Road and lower Glendale Gulch Road. Minimum recommended fuelbreak width is 300 feet (150 feet on either side of the road) with a minimum of 10 feet crown separation on flat ground. Downhill width increases with slope.
- Improve access for emergency apparatus with construction of a turnaround on upper Glendale Gulch Road
- Construct a secondary emergency access route for residents of Upper Glendale Gulch to provide alternative ingess/egress if primary evacuation route is blocked. Current 4wd/trail access routes into Boulder Mountain Fire Protection District via CO Rd 83 or Mine Lane should be considered for improvement to serve as a secondary emergency access and evacuation route.
- Improve/maintain emergency water supply at LHFPD Station 3 drafting source from Lefthand Creek.
- Coordinate with adjacent County and Federal land managers concerning prospects of developing coordinated treatments on adjacent public lands.
- Construct a secondary emergency access route for the community to provide alternative ingess/egress if primary evacuation route is blocked. A decommissioned 4wd route from Rock Lake Road to Gates Camp and CO Rd 100 could be improved to support an emergency

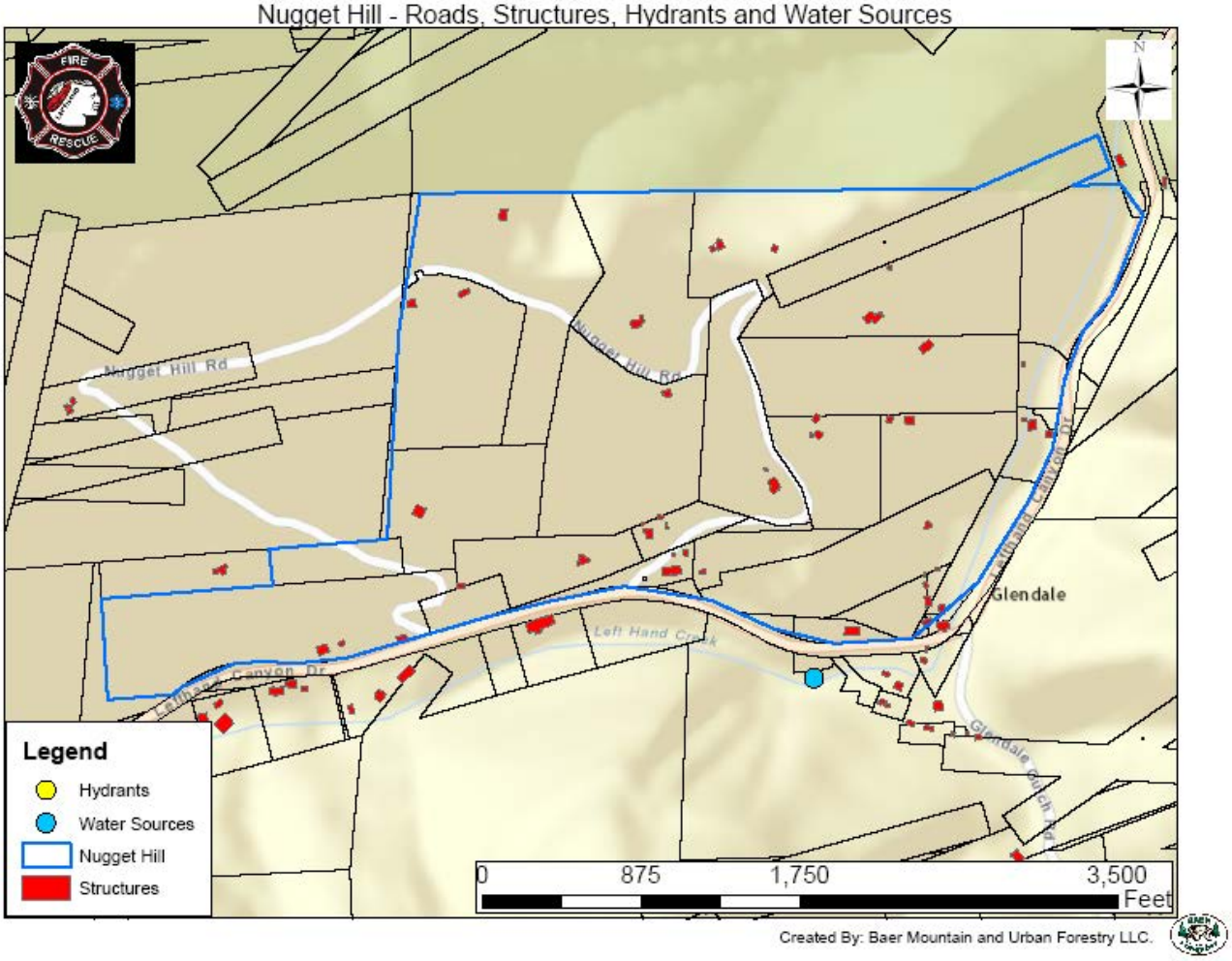
evacuation. An alternative secondary 4wd potential route exists from Cody Trail or Hickok Trail to High Lake Drive and the Overland subdivision. Both routes should be investigated for possible improvements. Any secondary emergency access route construction will require significant route improvement.

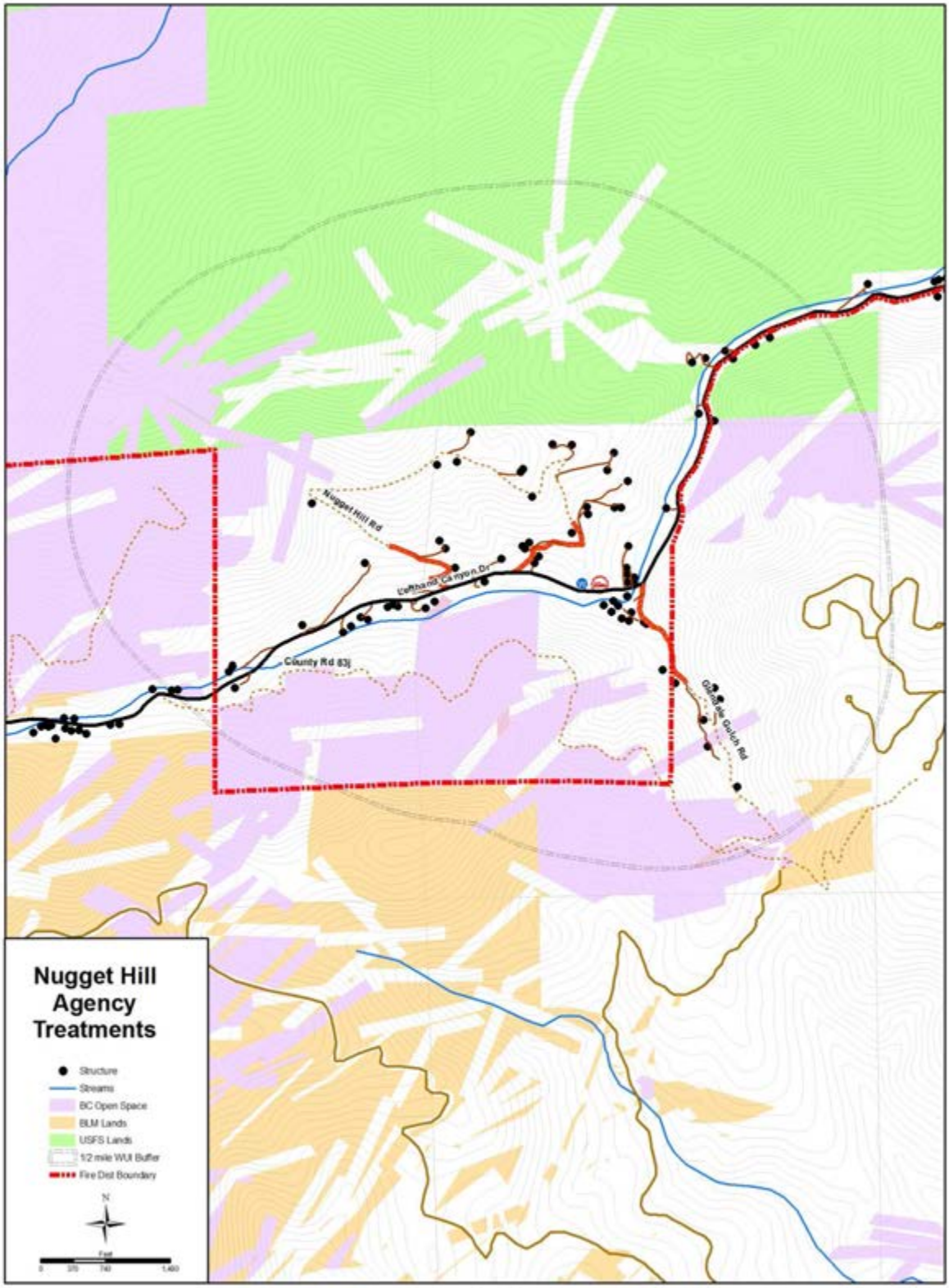
Current/Planned Projects:




Nugget Hill
Mitigation
Recommendations
Primary Evac
Recommended Roadside Thinning
Recommended Treatment
Priority Limited D.Space
Recommended Water Supply
Proposed Emerg Access
BC Open Space
BLM Lands
USFS Lands
Streams
Structure
Fire Station
1/2 mile WUI Buffer
Fire Dist Boundary
N

Nugget Hill - Roads, Structures, Hydrants and Water Sources




Nugget Hill Agency Treatments
Structure
Streams
BC Open Space
BLM Lands
USFS Lands
1/2 mile WUI Buffer
Fire Dist Boundary
N
Feet
0
370
740
1,480
Nugget Hill Rd
County Rd 83
Gamble Gulch Rd

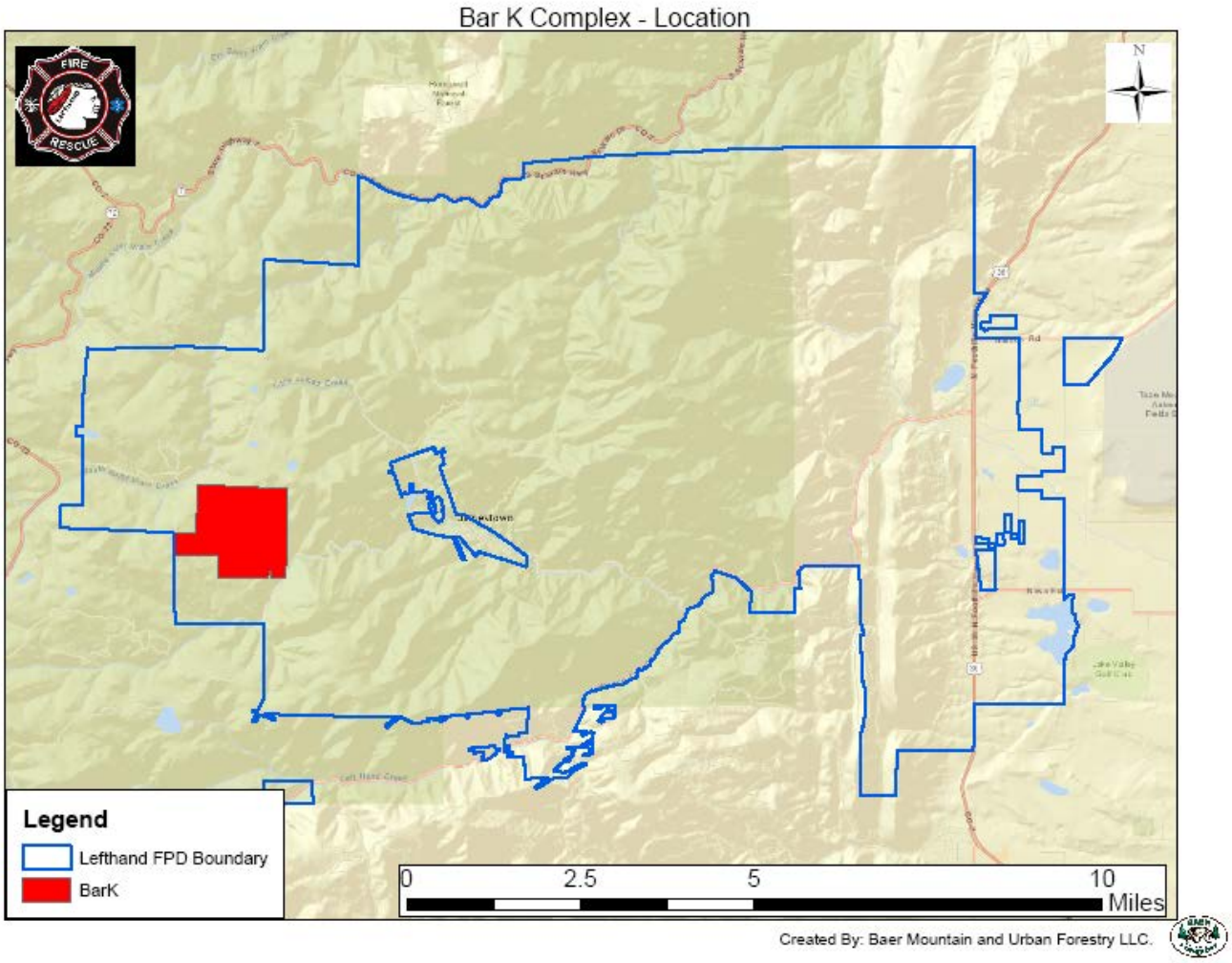
The Bar-K Complex

Bar-K Ranch · Mattoon Highlands · Sky Ranch Estates · Overland

Community Resource

Assessment · Mitigation Recommendations · Maps

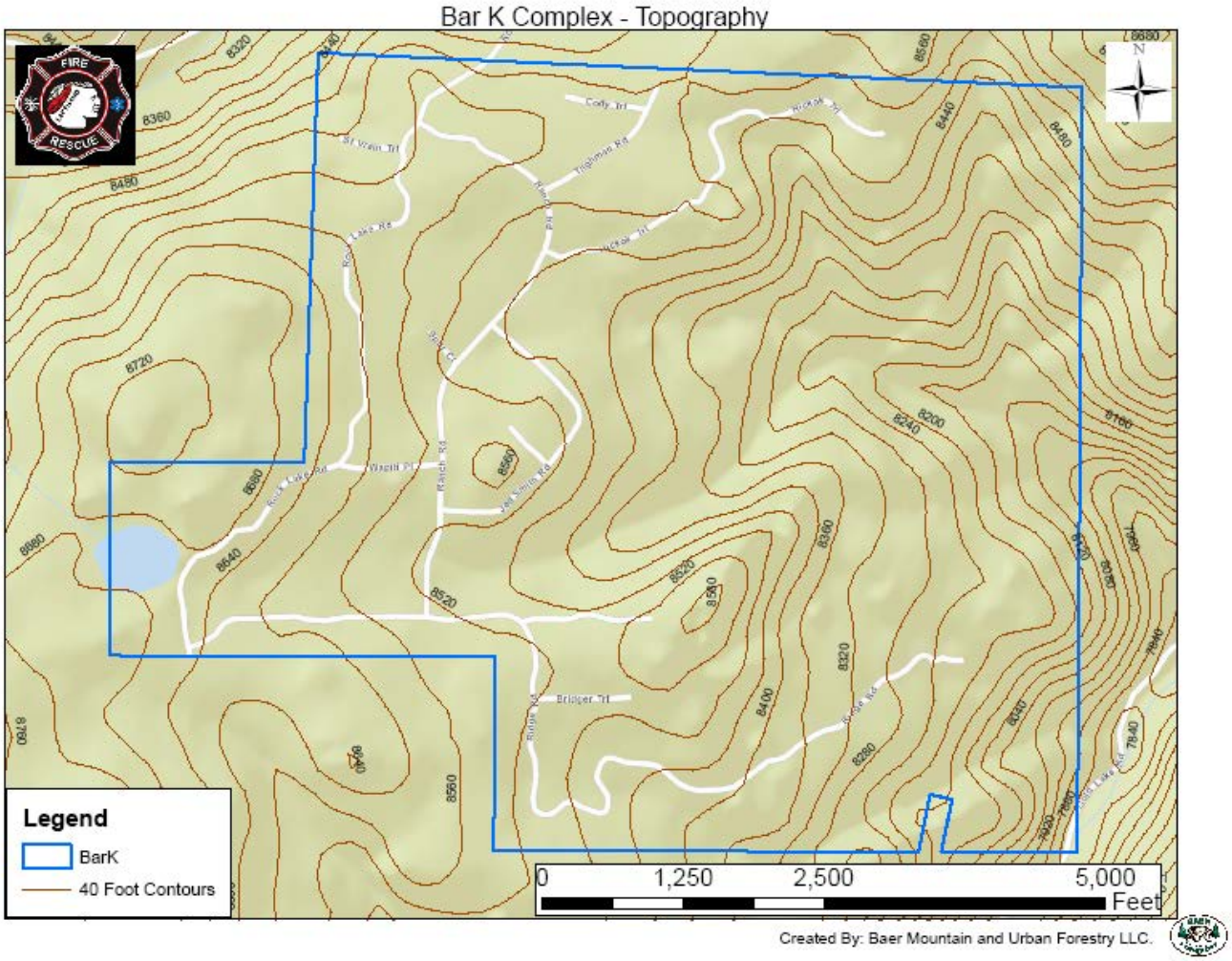
Wildfire Hazard and Risk Rating **HIGH**



Community Size-Up

The Bar-K Ranch complex is comprised of three separate subdivisions/HOAs approximately three linear miles west of Jamestown, CO, and two linear miles east of HWY 72. The subdivisions, Bar-K Ranch, Mattoon's Highlands, and Sky View Estates/Overland, are in close proximity and share similar wildland urban interface factors, including fuels/vegetation, topography, fire weather, access, emergency resources, and predominant construction and defensible space characteristics. The area is characterized by a broad rolling plateau at an elevation of 8,500 feet that is dissected by the upper South Saint Vrain

Creek and is bounded by steep terrain and deep canyons to the north, east, and south. Nearly 200 residences are located in the area. The Overland Road provides year-round access through the area, is paved to the east, groomed dirt to the west, and easily supports 2-way traffic flow. Primary subdivision roads are generally groomed dirt 2-lane. Secondary roads may be unimproved single lane. Bar-K Ranch and Mattoon's Highland area are both accessed via single ingress/egress. SkyView/Overland are accessed from open looped roads that intersect Overland Road within 1,000 feet of each other. Land ownership is checkerboard in nature with the USFS managing significant continuous holding south, east and north of the subdivision complex.



Wildfire Fire Risk and Hazard Severity Form NFPA 1144	
Bar-K Complex	
Hazard Rating 105	HIGH
Means of Access	
Ingress and Egress	7
2 or more roads in & out	0
One road in & out	7
Road Width	3
> 24 ft	0
> 20 ft < 24 ft	2
< 20 ft	4
All-Season Road Condition	4
Surfaced Road, grade <5%	0
Surfaced Road, grade >5%	2
Non-surfaced Road, grade <5%	2
Non-surfaced Road, grade >5%	5
Other than all season	7
Fire Service Access	2
< 300 ft with turnaround	0
> 300 ft with turnaround	2
< 300 ft with no turnaround	4
> 300 ft with no turnaround	5
Street Signs (predominent)	3
Present - reflective	0
Not present	5
Vegetation (fire behavior fuel models)	
Characteristics of predominent veg w/in 300 ft	17
Light - 1, 2, 3	5
Medium - 5, 6, 7, 8, 9	10
Heavy - 4, 10	20
Slash - 11, 12, 13	25
Defensible Space - vegetation treatment around structure	20
> 100 ft around structure	1
> 70 ft < 100 ft around structure	3
> 30 ft < 70 ft around structure	10
< 30 ft around structure	25
Topography Within 300 ft of Structures	
Slope	4
< 9%	1
10% to 20%	4
21% to 30%	7
31% to 40%	8
> 41%	10
Additional Rating Factors (rate all that apply)	
Additional factors	11
Topographic feaures that adversely affect fire behavior (0 - 5)	4
Areas with a history of high fire occurance - ignition potential (0 - 5)	3
Severe fire weather potential (0 - 5)	2
Separation of adjacent structures contributing to fire spread (0 - 5)	2
Roofing Assembly	
Roofing	3
Class A	0
Class B	3
Class C	15
Unrated	25
Building construction	
Materials (predominent)	15
Non-combustible fire-resistive siding, eaves and deck	0
Non-combustible siding, eaves and combustible deck	5
Combustible siding and deck	15
Building set-back relative to slope of 30% or more	2
> 30 ft to slope	1
< 30 ft to slope	5
Available Fire Protection	
Water source availability	3
Hydrants 500 gpm < 1000 ft apart	0
Hydrants 250 gpm < 1000 ft apart	1
Non-pressurized water source > 250 gpm for 2 hours	3
Non-pressurized water source < 250 gpm for 2 hours	5
Water unavailable	10
Organized response resources	1
Station < 5 mi from structure	1
Station > 5 mi from structure	3
Fixed fire protection	5
NFPA 13, 13R, 13D sprinkler system	0
None	5
Placement of gas and Electric Utilities	
Utilities	5
Both underground	0
One above, one below	3
Both above ground	5
Totals for home or subdivision	**105**
Hazard Rating Scale	
< 40 LOW	
> 40 MODERATE	
> 70 HIGH	
> 112 EXTREME	

Topography

The area is characterized by a broad rolling plateau at an elevation of 8,500 feet. The upper South Saint Vrain Creek cuts through the complex from west to north creating a canyon that separates Mattoon's Highlands from Bar-K and Sky View Ranch subdivisions. The drainage broadens into wide meadow in the central western section of the assessment area. Steep terrain drops off and deep canyons border the complex to the north, east, and south. Several topographic chimneys dissect the plateau's eastern perimeter.

Vegetation/Fuels

The Bar-K complex is situated in a transitional zone between the upper montane the lower subalpine ecosystems. Ponderosa pine (FBFM 8) that dominates the dryer lower elevations begins to give way to more continuous stands of lodgepole pine (FBFM 9), aspen (FBFM 8), and Subalpine fir (FBFM 9) at these higher elevations. Dominant timber species is highly dependent on slope aspect and available soil moisture. Ponderosa pine is more common on south and east facing aspects and flat terrain. Lodgepole pine stands and Douglas-fir are more common on north and west aspects, and areas that maintain high soil moisture. Timber canopy continuity is disrupted only in meadows (FBFM 1) and the open dryer grassy slopes (FBFM 1 & 2) on the eastern margin of the assessment area. Logging slash (FBFM 11 & 12) may be found in treated areas prior to removal.

Hazard and Risk Factors

Continuity of hazardous fuels from surrounding wildlands into residential areas, many designed with a single ingress/egress, represents a significant hazard for area residents. This scenario provides little opportunity for suppressing an advancing wildfire while greatly increasing the likelihood of entrapment if the only means of

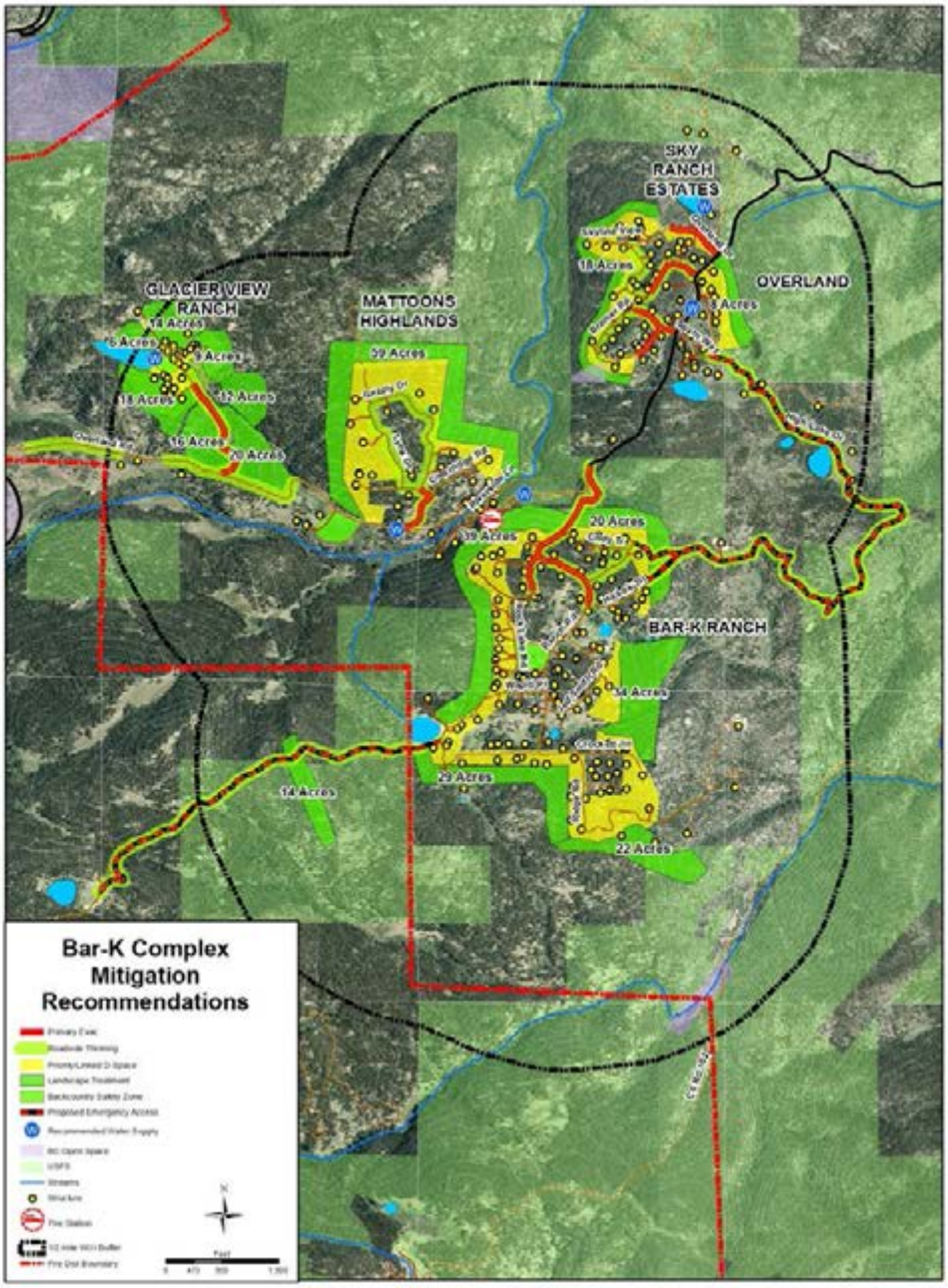
evacuation is blocked. While open meadows scattered throughout the area most structures are located in forested zones. Mitigation along sections of several primary access routes was noted. Defensible space was observed around a number of structures but most perimeter parcels were found to have an unmanaged forest interface with surrounding wildlands. Predominant construction and roofing materials are flammable. Flammable debris was noted in many gutters. Recreational camping is common along much of the base of the steep terrain that surrounds the subdivisions. Together with overgrown power distribution line right of ways that supply area utilities, and frequent lightening strikes, local ignition risk is high. The South Saint Vrain Creek and several standing water bodies provide local drafting sources. Dry hydrants are installed at Rock Lake (now seasonal) and at the Overland Rd/Saint Vrain bridge.

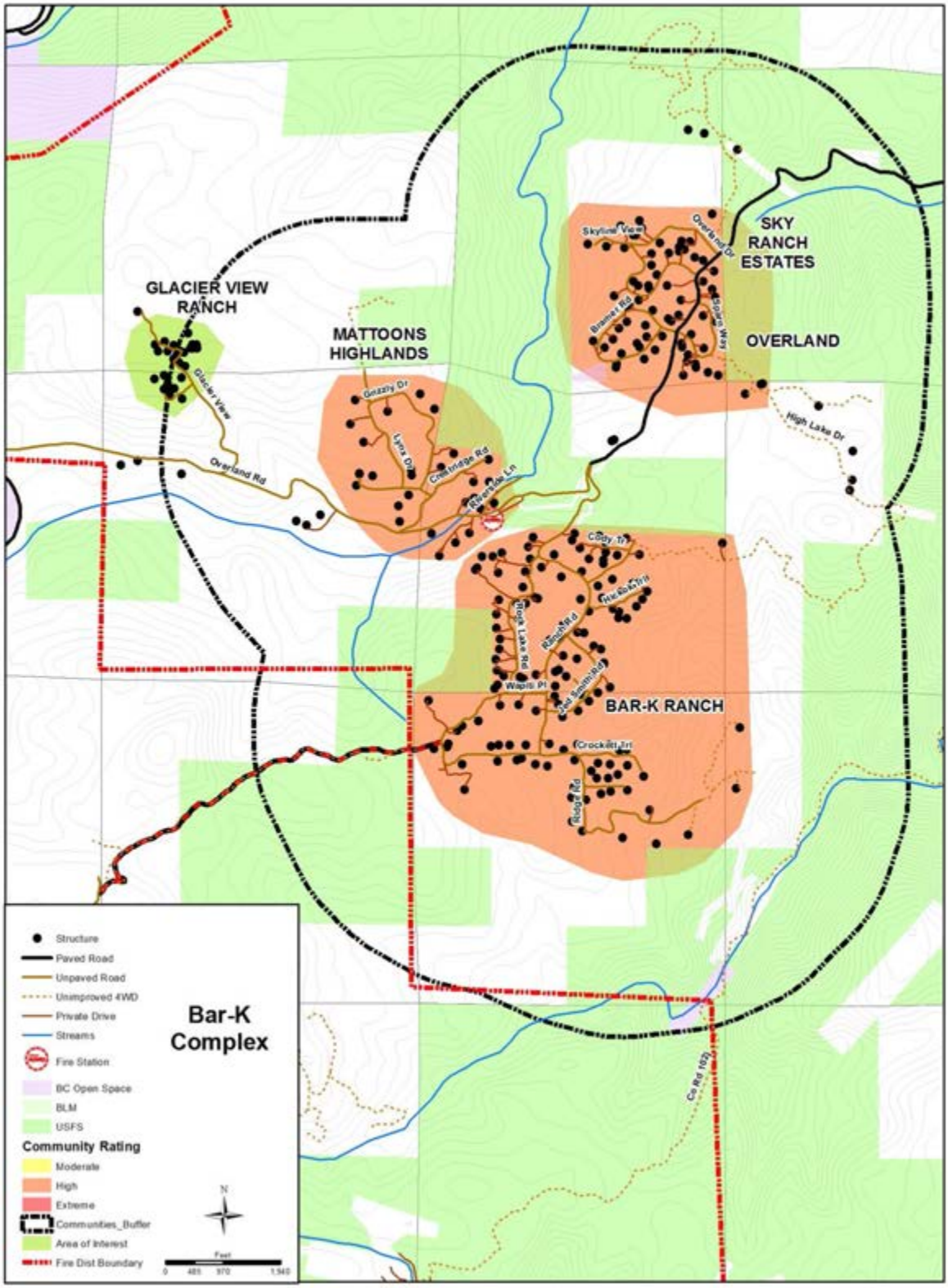
Mitigation Recommendations

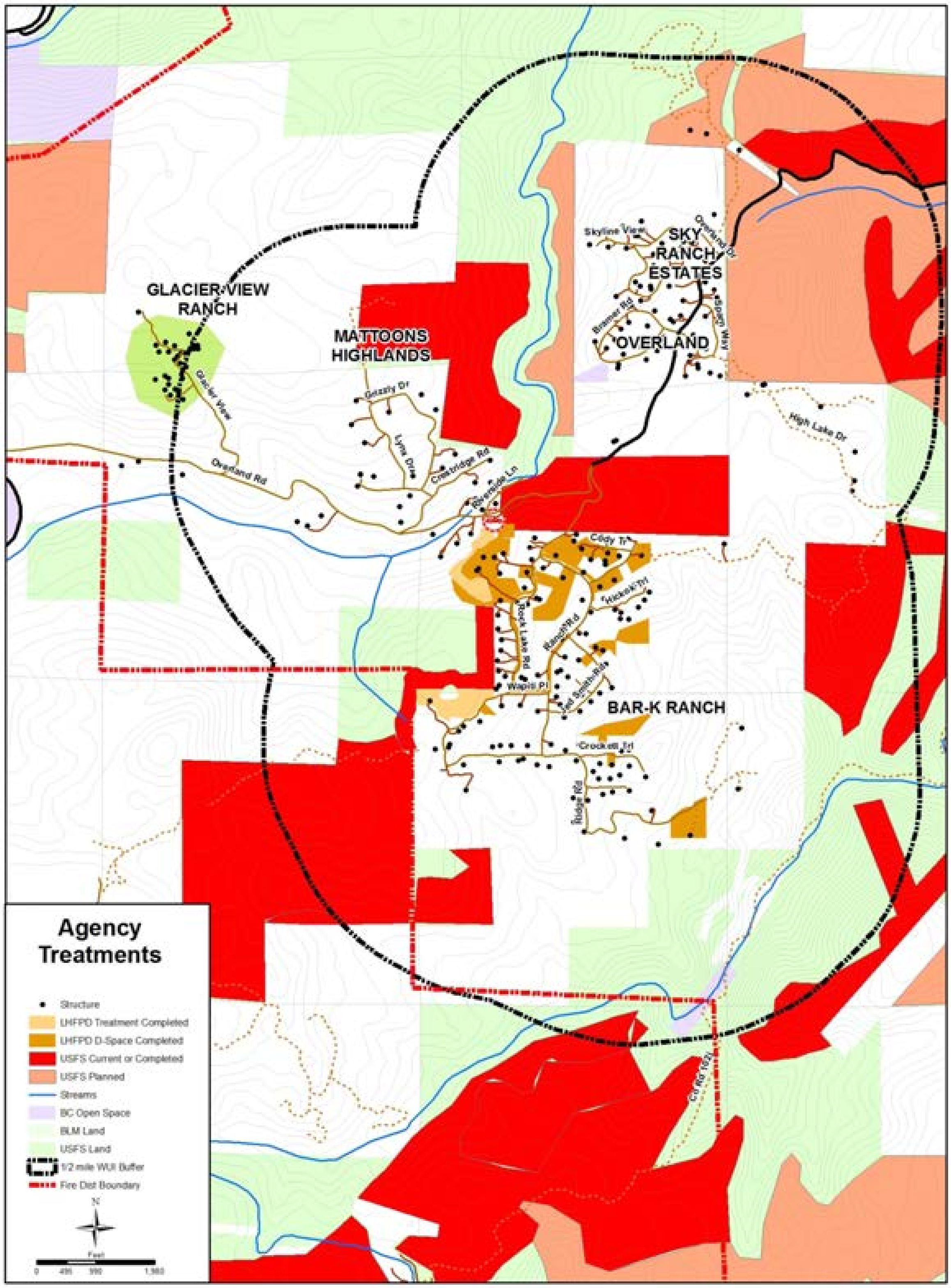
- Engage residents through outreach and continuing education regarding wildfire hazards and risks, structure ignitability factors, defensible space, landscape mitigation, pine beetle options, emergency planning, evacuation, and involvement with the fire department.
- Reduce structural ignitability through construction and site upgrades, defensible space improvements, and seasonal maintenance.
- Improve and maintain adequate and effective defensible space around all residences. Coordinate mitigation efforts between adjacent parcels, especially on perimeter lots, to create greater fuel break continuity. Coordinate any mitigation on private land with current and planned mitigation on adjacent USFS property. Adequate space eliminates the possibility of all flames within 10 feet of the structure and large flames within 100 feet of the structure.
- Road side thinning is recommended along all primary subdivision evacuation routes, secondary emergency access routes, and the access road leading to LHFPD Station 2. Seasonally maintain and improve existing roadside treatment areas. Minimum recommended fuelbreak width is 300 feet (150 feet on either side of the road) with a minimum of 10 feet crown separation on flat ground. Downhill width increases with slope.
- Recommended landscape scale treatments extend thinning from perimeter lots into the surrounding forested areas, incorporating current or planned USFS treatments where possible.
- Improve access for emergency apparatus with upgrades and maintenance of existing turnarounds and construction of new turnarounds along the lower Ridge Road extension and the Tilgham Road Extension (near the new large cistern).
- Increase water storage capacity at Station 2. Recommend buried gravity feed cistern at intersection of Overland road and station access road with expanded parking and thinning. Seasonal maintenance for drafting source at St. Vrain Creek and Overland Rd. Improve/construct drafting access to ponds in the Sky View Ranch/Overland community.
- Construct a secondary emergency access route for the community to provide alternative ingess/egress if primary evacuation route is blocked. A decommissioned 4wd route from Rock Lake Road to Gates Camp and CO Rd 100 could be improved to support an emergency evacuation. An alternative secondary 4wd potential route exists from Cody Trail or Hickok Trail

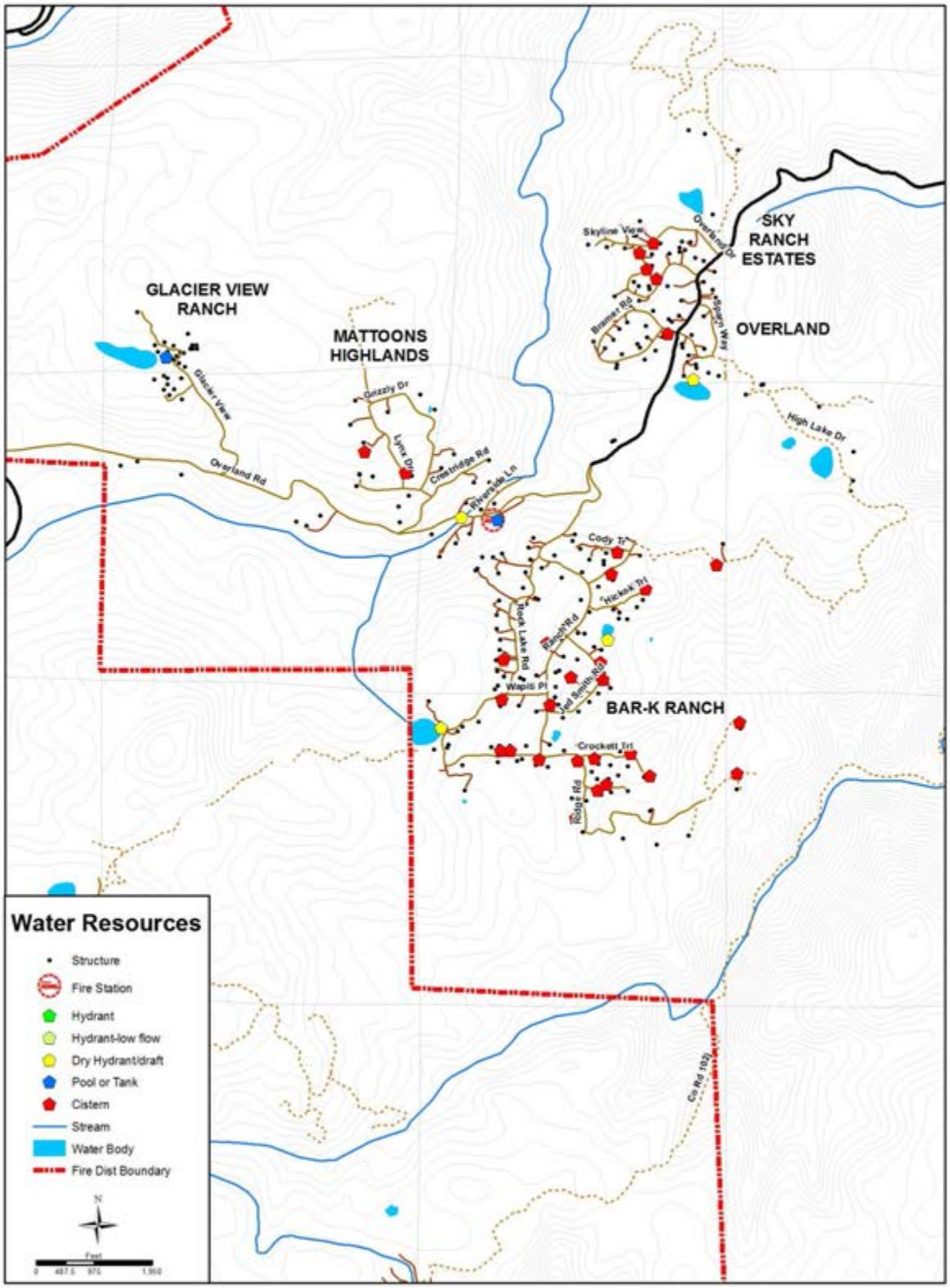
to High Lake Drive and the Overland subdivision. Both routes should be investigated for possible improvements. Any secondary emergency access route construction will require significant route improvement.

Current/Planned Projects: - The Bar-K assessment area has been the focus of ongoing mitigation efforts from both the USFS and LHFPD for several years. USFS is treating several thousand aces in the area as a part of the ongoing James Creek and Sugarloaf fuel reduction projects. Several treatment units are adjacent to private land in the Bar-K complex. From recommendations in the 2005 LHFPD CWPP/Hazard and Risk Assessment, cooperative land owners have utilized mitigation services offered through the fire department, including defensible space, hazardous stand treatment, and road margin thinning projects.




GLACIER VIEW RANCH
MATTOONS HIGHLANDS
SKY RANCH ESTATES
OVERLAND
BAR-K RANCH
Glacier View
Overland Rd
Grizzly Dr
Lynx Dr
Coalridge Rd
Riverside Ln
Skyline View
Overland Dr
Bramer Rd
Eagle Way
High Lake Dr
Cody Trl
Hawk Trl
Ridge Lake Rd
Ranch Rd
Wapiti Pl
Coal Summit Rd
Crockett Trl
Ridge Rd
Co Rd 102
Structure
Paved Road
Unpaved Road
Unimproved 4WD
Private Drive
Streams
Fire Station
BC Open Space
BLM
USFS
Community Rating
Moderate
High
Extreme
Communities_Buffer
Area of Interest
Fire Dist Boundary
Bar-K Complex
N
Feet
0
485
970
1,940


GLACIER VIEW RANCH
MATTOONS HIGHLANDS
SKY RANCH ESTATES
OVERLAND
BAR-K RANCH
Skyline View
Overland Dr
Bramer Rd
High Lake Dr
Grizzly Dr
Lynx Drive
Crabtridge Rd
Glacier View
Overland Rd
Riverside Ln
Cody Trl
Hickok Trl
Rock Lake Rd
Ranch Rd
Wapiti Pl
Crockett Trl
Agency Treatments
Structure
LHFPD Treatment Completed
LHFPD D-Space Completed
USFS Current or Completed
USFS Planned
Streams
BC Open Space
BLM Land
USFS Land
1/2 mile WUI Buffer
Fire Dist Boundary
N
Feet


GLACIER VIEW RANCH
MATTOONS HIGHLANDS
SKY RANCH ESTATES
OVERLAND
BAR-K RANCH
Glacier View
Overland Rd
Grizzly Dr
Lynx Dr
Cattridge Rd
Riverside Ln
Skyline View
Overland Dr
Bramer Rd
Cheyenne Way
High Lake Dr
Cody Tr
Hiawatha Tr
Rock Lake Rd
Ranch Rd
Wapiti Pl
Joel Smith Rd
Crockett Trl
Ridge Rd
Co Rd 103
Water Resources
Structure
Fire Station
Hydrant
Hydrant-low flow
Dry Hydrant/draft
Pool or Tank
Cistern
Stream
Water Body
Fire Dist Boundary
N
Feet
0
487.5
975
1,950

Crestview Estates

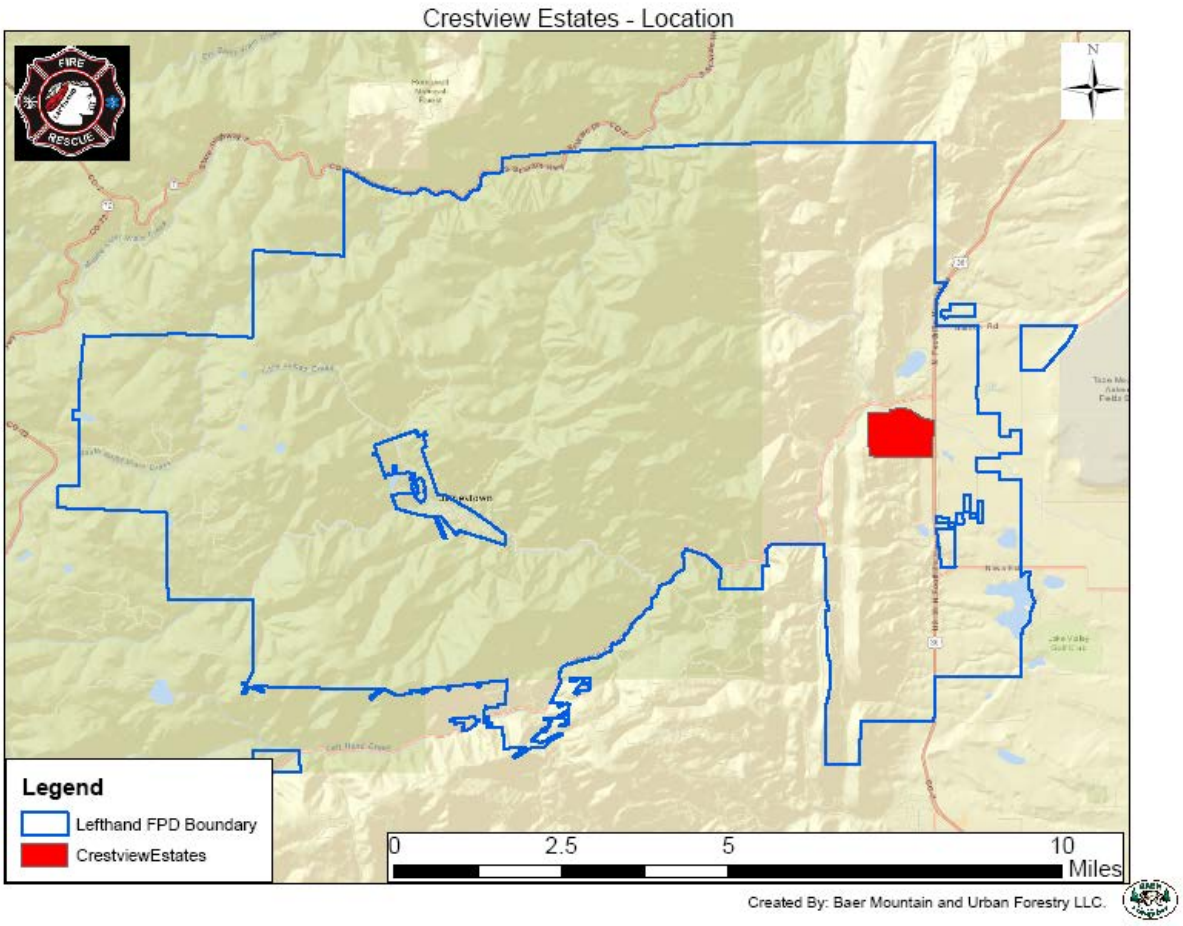
Crestview Estates

Lower Lefthand Canyon Complex

Community Resource

Assessment · Mitigation Recommendations · Maps

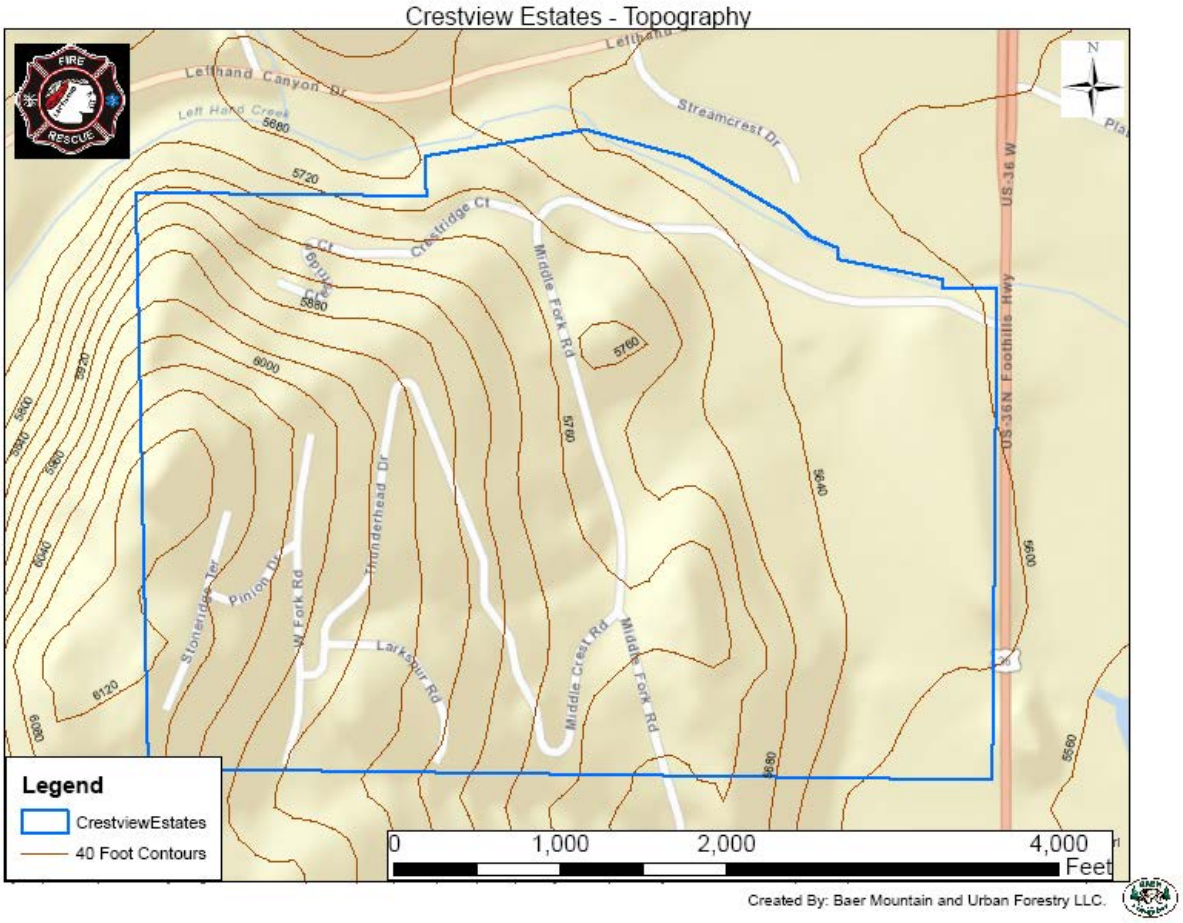
Wildfire Hazard and Risk Rating **HIGH**



Community Size-Up

The Crestview subdivision is one of several adjacent subdivisions situated at the mouth of Lefthand Canyon that that comprise the lower Lefthand Canyon assessment area. Subdivisions in this area are individually assessed but are also grouped into the Lower Lefthand Canyon Complex for landscape-scale strategic mitigation planning. Individual community assessments are utilized to generate a suite of recommendations that address the unique wildfire hazards that affect each subdivision. The Crestview Estates HOA includes homes located on Stream Crest Drive, which for the purposes of assessment continuity are included in the Lower Lefthand Canyon assessment. The main subdivision is situated on

the east facing aspect of the Dakota Hogback in the ecological transition zone between high prairie and lower elevation conifers to the west. Steep forested slopes flank the area to the north and west. Grass and grass understory are the primary wildland fuel. Single ingress/egress provides access to over 100 residences. Road is two lane, paved, with moderate to steep grade and several switchbacks. Dead ends are constructed with turnarounds. Boulder County manages adjacent land to the west and to the south of the subdivision.



Wildfire Fire Risk and Hazard Severity Form NFPA 1144	
Crestview	
Hazard Rating 90	HIGH
Means of Access	
Ingress and Egress	7
2 or more roads in & out	0
One road in & out	7
Road Width	1
> 24 ft	0
> 20 ft < 24 ft	2
< 20 ft	4
All-Season Road Condition	2
Surfaced Road, grade <5%	0
Surfaced Road, grade >5%	2
Non-surfaced Road, grade <5%	2
Non-surfaced Road, grade >5%	5
Other than all season	7
Fire Service Access	2
< 300 ft with turnaround	0
> 300 ft with turnaround	2
< 300 ft with no turnaround	4
> 300 ft with no turnaround	5
Street Signs (predominent)	0
Present - reflective	0
Not present	5
Vegetation (fire behavior fuel models)	
Characteristics of predominent veg w/in 300 ft	7
Light - 1, 2, 3	5
Medium - 5, 6, 7, 8, 9	10
Heavy - 4, 10	20
Slash - 11, 12, 13	25
Defensible Space - vegetation treatment around structure	15
> 100 ft around structure	1
> 70 ft < 100 ft around structure	3
> 30 ft < 70 ft around structure	10
< 30 ft around structure	25
Topography Within 300 ft of Structures	
Slope	4
< 9%	1
10% to 20%	4
21% to 30%	7
31% to 40%	8
> 41%	10
Additional Rating Factors (rate all that apply)	
Additional factors	14
Topographic feaures that adversely affect fire behavior (0 - 5)	3
Areas with a history of high fire occurance - ignition potential (0 - 5)	5
Severe fire weather potential (0 - 5)	3
Separation of adjacent structures contributing to fire spread (0 - 5)	3
Roofing Assembly	
Roofing	10
Class A	0
Class B	3
Class C	15
Unrated	25
Building construction	
Materials (predominent)	15
Non-combustible fire-resistive siding, eaves and deck	0
Non-combustible siding, eaves and combustible deck	5
Combustible siding and deck	15
Building set-back relative to slope of 30% or more	3
> 30 ft to slope	1
< 30 ft to slope	5
Available Fire Protection	
Water source availability	3
Hydrants 500 gpm < 1000 ft apart	0
Hydrants 250 gpm < 1000 ft apart	1
Non-pressurized water source > 250 gpm for 2 hours	3
Non-pressurized water source < 250 gpm for 2 hours	5
Water unavailable	10
Organized response resources	1
Station < 5 mi from structure	1
Station > 5 mi from structure	3
Fixed fire protection	3
NFPA 13, 13R, 13D sprinkler system	0
None	5
Placement of gas and Electric Utilities	
Utilities	0
Both underground	0
One above, one below	3
Both above ground	5
Totals for home or subdivision	87
Hazard Rating Scale	
< 40 LOW	
> 40 MODERATE	
> 70 HIGH	
> 112 EXTREME	

Topography

The area is characterized by a broad east facing slope that rises from the plains forming the Dakota Hogback. This is a prominent topographic feature that extends north/south through much of the state along the base of the Rocky Mountain foothills. Steep slopes border the subdivision to the north and west where Lefthand Creek cuts into the base of the slopes. The valley immediately west and south of the assessment area is the northern extension of the Old Stage Road valley.

Vegetation/Fuels

Vegetation and fuels within the assessment are characteristic of the ecotone between mixed grass prairie and montane woodland. Vegetation communities include mixed grass prairie (FBFM 1), ponderosa pine savanna (FBFM 2), ponderosa pine forest (FBFM 8), ponderosa pine/Douglas-fir mix (FBFM 8), riparian forest, riparian shrubland (FBFM 6). Grass and grass understory are the dominant fuel types in the subdivision. Ponderosa pine stem count/acre is low to moderate with isolated stands exhibiting higher density. Stands on the protected north slopes support a mix of Douglas-fir. Riparian and wetland communities are found along Lefthand creek. These conditions support low to moderate fire intensity but are characteristic of areas with frequent ignitions and high rates of spread.

Hazard and Risk Factors

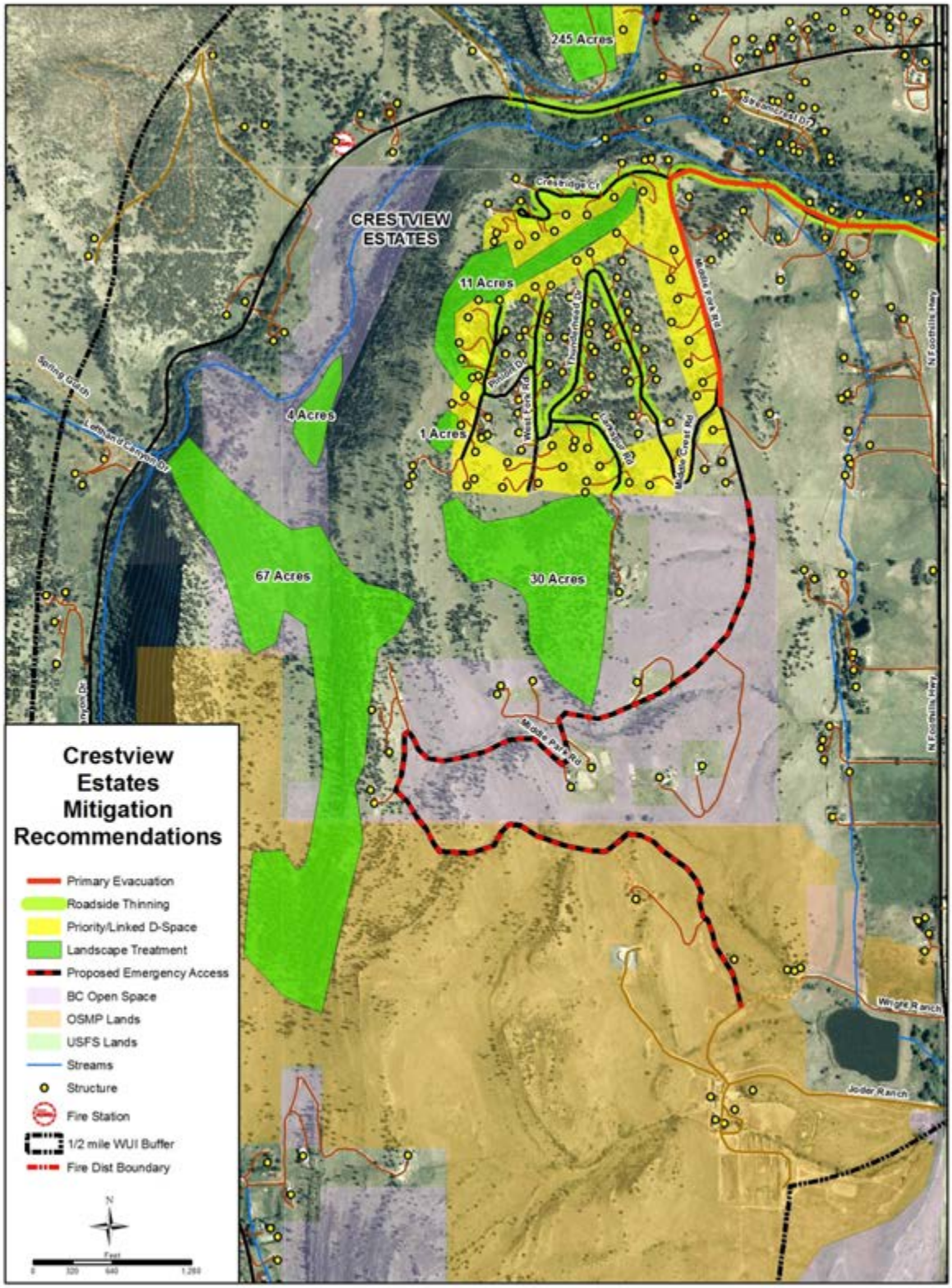
Primary hazard and risk factors for Crestview Estates include restricted single ingress/egress access for over 100 homes, structures positioned mid-slope, flammable construction, high rate of spread for dominant fuel type, lack of defensible space around a majority of homes, potential for roadside and power line failure ignitions. Ignition risk is also high in the off-road recreational complex on USFS lands to the west. In high-wind fire weather conditions wind-blown

embers from public lands to the west are likely to ignite spot fires to the east. Residents living in communities designed around a single point of access are at risk of entrapment should the road become blocked. Fire behavior is strongly affect by topography and exhibits higher intensity on slopes than flat ground. Most of the homes in Crestview Estates are situated on slopes of 10° to 20° which increases potential wildfire rates of spread. Most homes are constructed with flammable construction material, have exposed wooden decks on the downhill side, and utilize flammable landscaping within 30 feet of the structure. Many residences are surrounded by ponderosa pine and juniper adjacent to expanses of prairie grasses. This scenario supports a high rate of spread and a high probability of structural ignition. One pressurized hydrant is located at the subdivision entrance which serves as a water tender supply source.

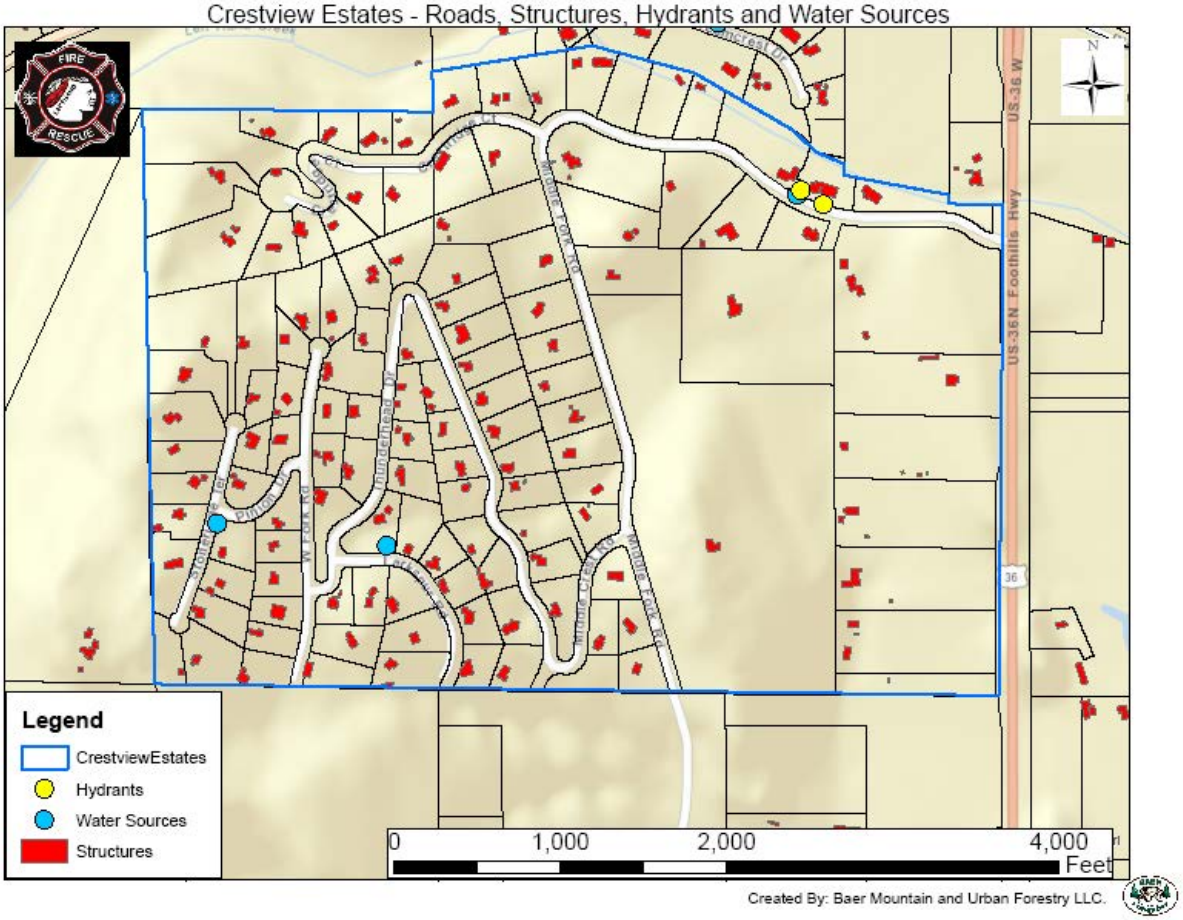
Mitigation Recommendations

- Engage residents through outreach and continuing education regarding wildfire hazards and risks, structure ignitability factors, defensible space, landscape mitigation, pine beetle options, emergency planning, evacuation, and involvement with the fire department.
- Reduce structural ignitability through construction upgrades, site improvement, defensible space improvements, and seasonal maintenance.
- Improve and maintain adequate and effective defensible space around all residences. Adequate treatment eliminates the possibility of all flames within 10 feet of the structure and large flames within 100 feet of the structure. Seasonal mowing is an effective mitigation treatment in areas where grass and grassy understory dominate the landscape. Coordinated mitigation between outer lots and road margin treatments to create an effective perimeter fuel break.
- Road side fall mowing/thinning is recommended along all roadside margins in the subdivision. Width of downhill treatment increases with slope.
- Roadside thinning is recommended for Valley Lane. Minimum recommended fuelbreak width is 300 feet (150 feet on either side of the road) with a minimum of 10 feet crown separation on flat ground
- Treatment is recommended for ponderosa pine stands adjacent to the subdivision to the south and on the steep slope south of Crestridge Court. Thinning should produce a minimum of 10 feet crown separation on flat ground, with greater separation on steeper slopes. Similar treatment is recommended for stands southwest of the subdivision on county maintained land.
- Installation of large capacity gravity-feed cistern for additional emergency supply near the top of the subdivision.
- Construct/maintain emergency access from south Middle Fork Road to the Joder Ranch maintenance Road.

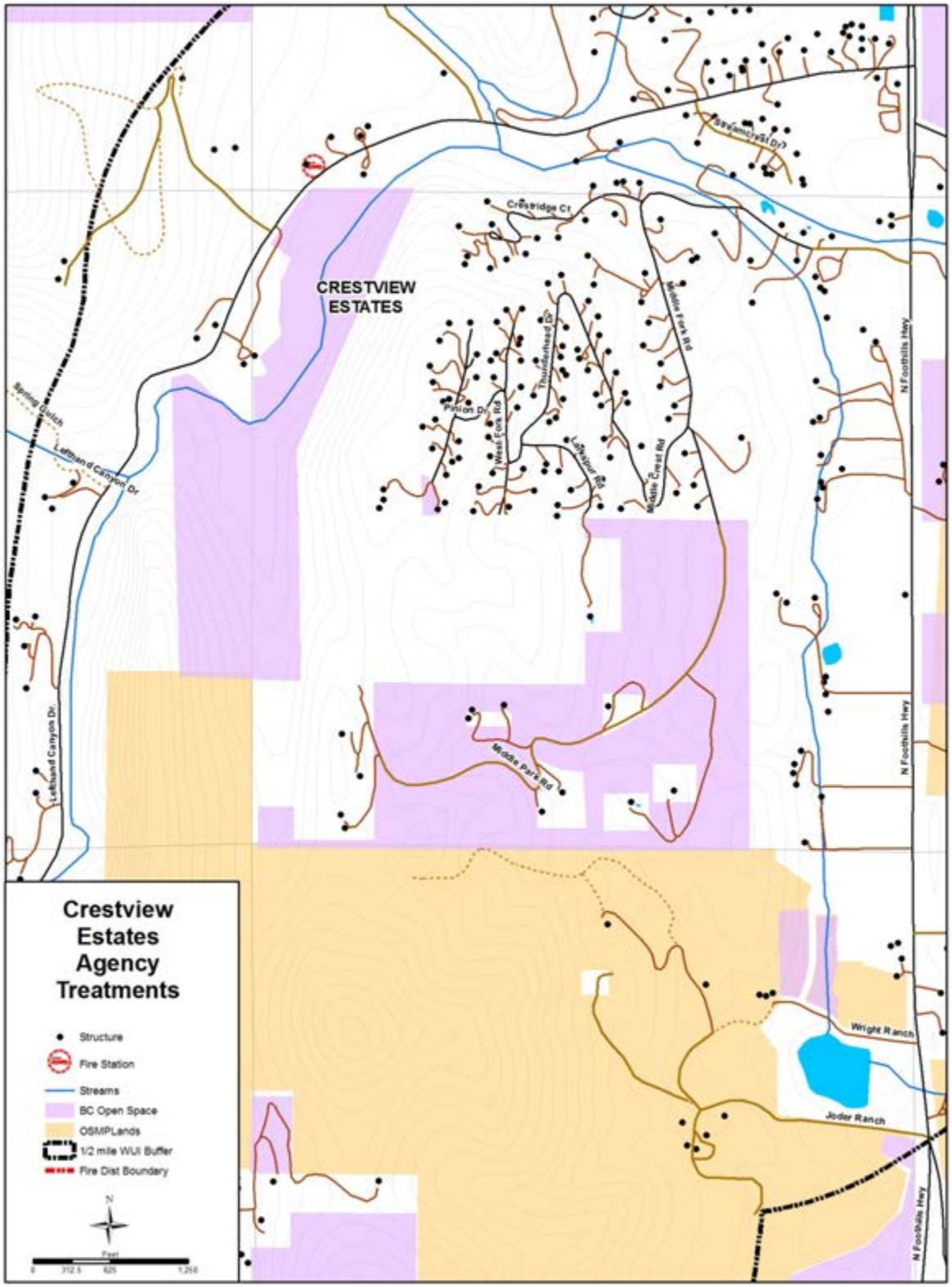
Current/Planned Projects: There are currently no active or planned projects in the assessment area.


245 Acres
CRESTVIEW ESTATES
11 Acres
4 Acres
1 Acres
67 Acres
30 Acres
Crestridge Cr
Middle Fork Rd
Thunderhead Dr
Middle Forest Rd
Middle Park Rd
Wright Ranch
Jeder Ranch
N Foothills Hwy
Crestview Estates Mitigation Recommendations
Primary Evacuation
Roadside Thinning
Priority/Linked D-Space
Landscape Treatment
Proposed Emergency Access
BC Open Space
OSMP Lands
USFS Lands
Streams
Structure
Fire Station
1/2 mile WUI Buffer
Fire Dist Boundary
N
Feet
0
320
640
1,280

Crestview Estates - Roads, Structures, Hydrants and Water Sources



Created By: Baer Mountain and Urban Forestry LLC.


CRESTVIEW ESTATES
Crestridge Ct
Thunderhead Dr
Middle Fork Rd
Pinion Dr
West Fork Rd
Lakestar Rd
Middle Crest Rd
Middle Park Rd
Spring Gulch
Lefthand Canyon Dr
N Foothills Hwy
Wright Ranch
Joder Ranch
Crestview Estates Agency Treatments
Structure
Fire Station
Streams
BC Open Space
OSMPLands
1/2 mile WUI Buffer
Fire Dist Boundary
N
0
312.5
625
1,250
Feet

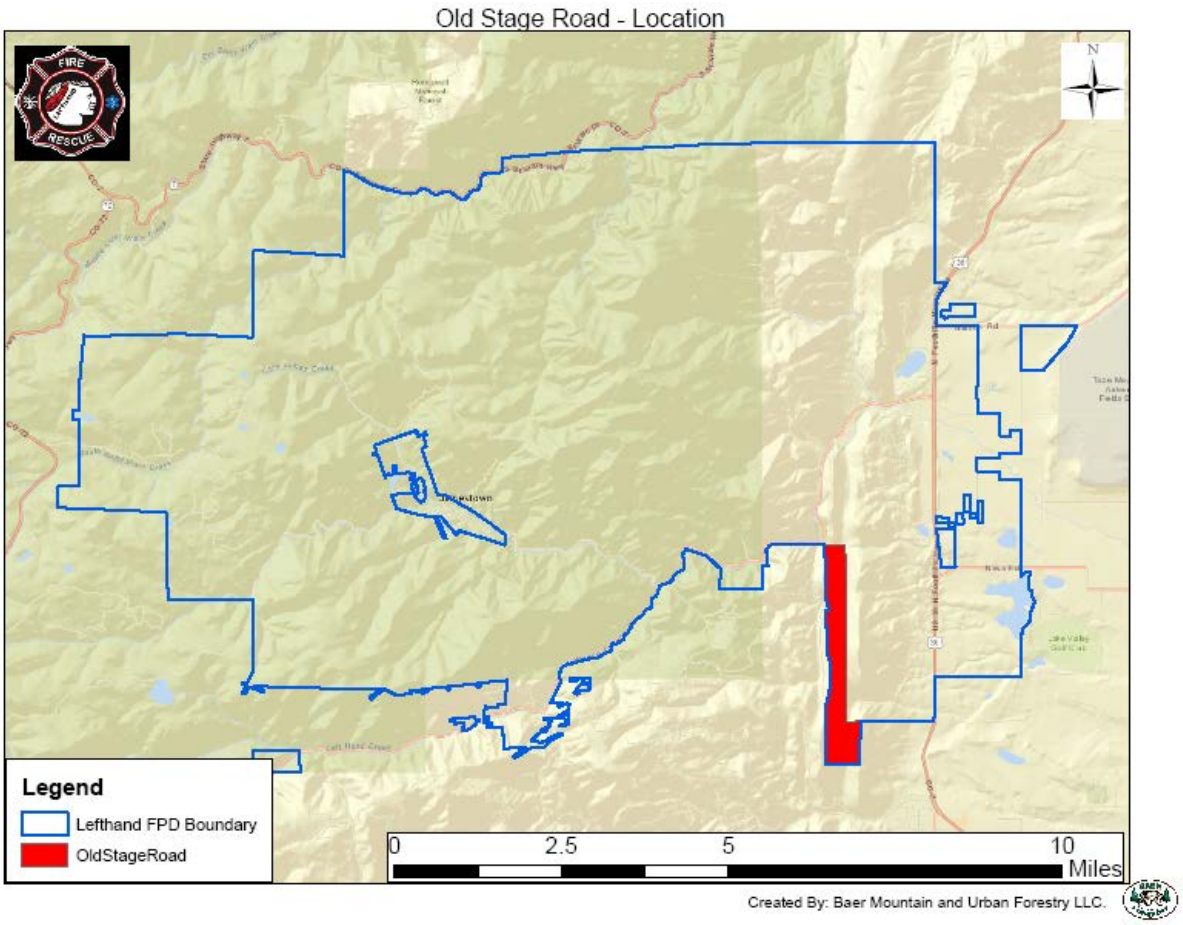
Old Stage Road

Old Stage Road

Community Resource

Assessment · Mitigation Recommendations · Maps

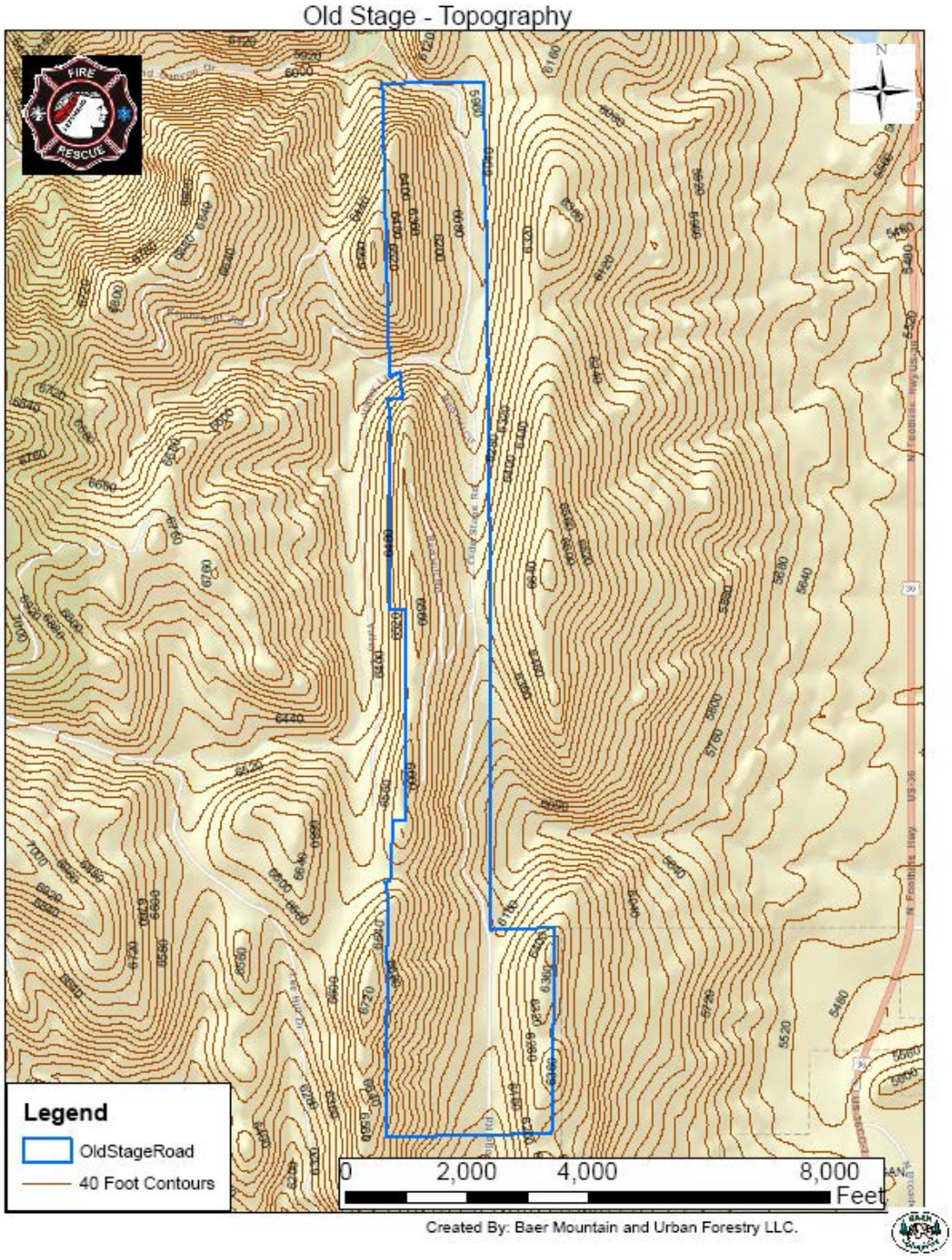
Wildfire Hazard and Risk Rating **HIGH**



Community Size-Up

Old Stage Road and the surrounding residences are situated in an elevated linear valley between the first two hogbacks of the front range foothills, just northeast of Boulder, CO. Old Stage Road is a paved, two lane county maintained road that provides two way access to approximately 150 local residences, and serves as a primary transportation and bike route between Boulder and Lefthand Canyon, James Canyon, the towns of Ward and Jamestown, and points beyond. The valley is flanked by steep slopes that are dominated by grass, isolated conifers, or isolated stands of conifer. Most homes are constructed close to the valley floor but several secondary roads provide dead end access to over 50

homes situated either on high steep slopes and ridge, or a densely forested parallel valley to the west. Red Hill Road is groomed, with steep grade, multiple switchbacks, and turnarounds that support limited turning radius. Valley Lane (Boulder Mountain Fire Protection District) is paved, low grade, 1 ½ lane, with a turnaround. Adjacent lands to the east are characterized by scattered conifer and open prairie and managed by Boulder County.



Wildfire Fire Risk and Hazard Severity Form NFPA 1144	
Old Stage Road	
Hazard Rating 74	HIGH
Means of Access	
Ingress and Egress	3
2 or more roads in & out	0
One road in & out	7
Road Width	2
> 24 ft	0
> 20 ft < 24 ft	2
< 20 ft	4
All-Season Road Condition	2
Surfaced Road, grade <5%	0
Surfaced Road, grade >5%	2
Non-surfaced Road, grade <5%	2
Non-surfaced Road, grade >5%	5
Other than all season	7
Fire Service Access	2
< 300 ft with turnaround	0
> 300 ft with turnaround	2
< 300 ft with no turnaround	4
> 300 ft with no turnaround	5
Street Signs (predominent)	0
Present - reflective	0
Not present	5
Vegetation (fire behavior fuel models)	
Characteristics of predominent veg w/in 300 ft	7
Light - 1, 2, 3	5
Medium - 5, 6, 7, 8, 9	10
Heavy - 4, 10	20
Slash - 11, 12, 13	25
Defensible Space - vegetation treatment around structure	8
> 100 ft around structure	1
> 70 ft < 100 ft around structure	3
> 30 ft < 70 ft around structure	10
< 30 ft around structure	25
Topography Within 300 ft of Structures	
Slope	6
< 9%	1
10% to 20%	4
21% to 30%	7
31% to 40%	8
> 41%	10
Additional Rating Factors (rate all that apply)	
Additional factors	14
Topographic feaures that adversely affect fire behavior (0 - 5)	4
Areas with a history of high fire occurance - ignition potential (0 - 5)	5
Severe fire weather potential (0 - 5)	3
Separation of adjacent structures contributing to fire spread (0 - 5)	2
Roofing Assembly	
Roofing	3
Class A	0
Class B	3
Class C	15
Unrated	25
Building construction	
Materials (predominent)	15
Non-combustible fire-resistive siding, eaves and deck	0
Non-combustible siding, eaves and combustible deck	5
Combustible siding and deck	15
Building set-back relative to slope of 30% or more	4
> 30 ft to slope	1
< 30 ft to slope	5
Available Fire Protection	
Water source availability	2
Hydrants 500 gpm < 1000 ft apart	0
Hydrants 250 gpm < 1000 ft apart	1
Non-pressurized water source > 250 gpm for 2 hours	3
Non-pressurized water source < 250 gpm for 2 hours	5
Water unavailable	10
Organized response resources	1
Station < 5 mi from structure	1
Station > 5 mi from structure	3
Fixed fire protection	2
NFPA 13, 13R, 13D sprinkler system	0
None	5
Placement of gas and Electric Utilities	
Utilities	3
Both underground	0
One above, one below	3
Both above ground	5
Totals for home or subdivision	74
Hazard Rating Scale	
< 40 LOW	
> 40 MODERATE	
> 70 HIGH	
> 112 EXTREME	

Topography

The area is characterized by a narrow open ended valley formed between two prominent hogback ridges. Elevation ranges from 5,800 ft to 6,600 ft. The valley floor rises to an elevation of over 6,200 feet mid way along Old Stage Road, the highpoint essentially forming two opposing valleys features. The most prominent topographic feature is the erosional gap in the eastern Dakota Hogback which creates an abrupt drop of over 600 vertical feet to the open prairie below. Terrain to the east of the Dakota Hogback is gently sloping prairie at 5,500 ft elevation. To the immediate west a second hogback valley has formed between the hogback ridge and the granitic foothills of the Rocky Mountains. All topographic structures in the area trend north/south.

Vegetation/Fuels

Vegetation and fuels within the assessment area vary according to slope aspect and available soil moisture. Due to the warmer dryer climate found at these lower elevations, prairie and meadow grasses (FBFM 1) with individual or isolated ponderosa pine stands (FBFM 2) dominate the landscape. Conifer density is highest on west facing slopes of the Valley Lane area (FBFM 8) at slightly higher elevations. These conditions support low to moderate fire intensity but are characteristic of areas with frequent ignitions and high rates of spread.

Hazard and Risk Factors

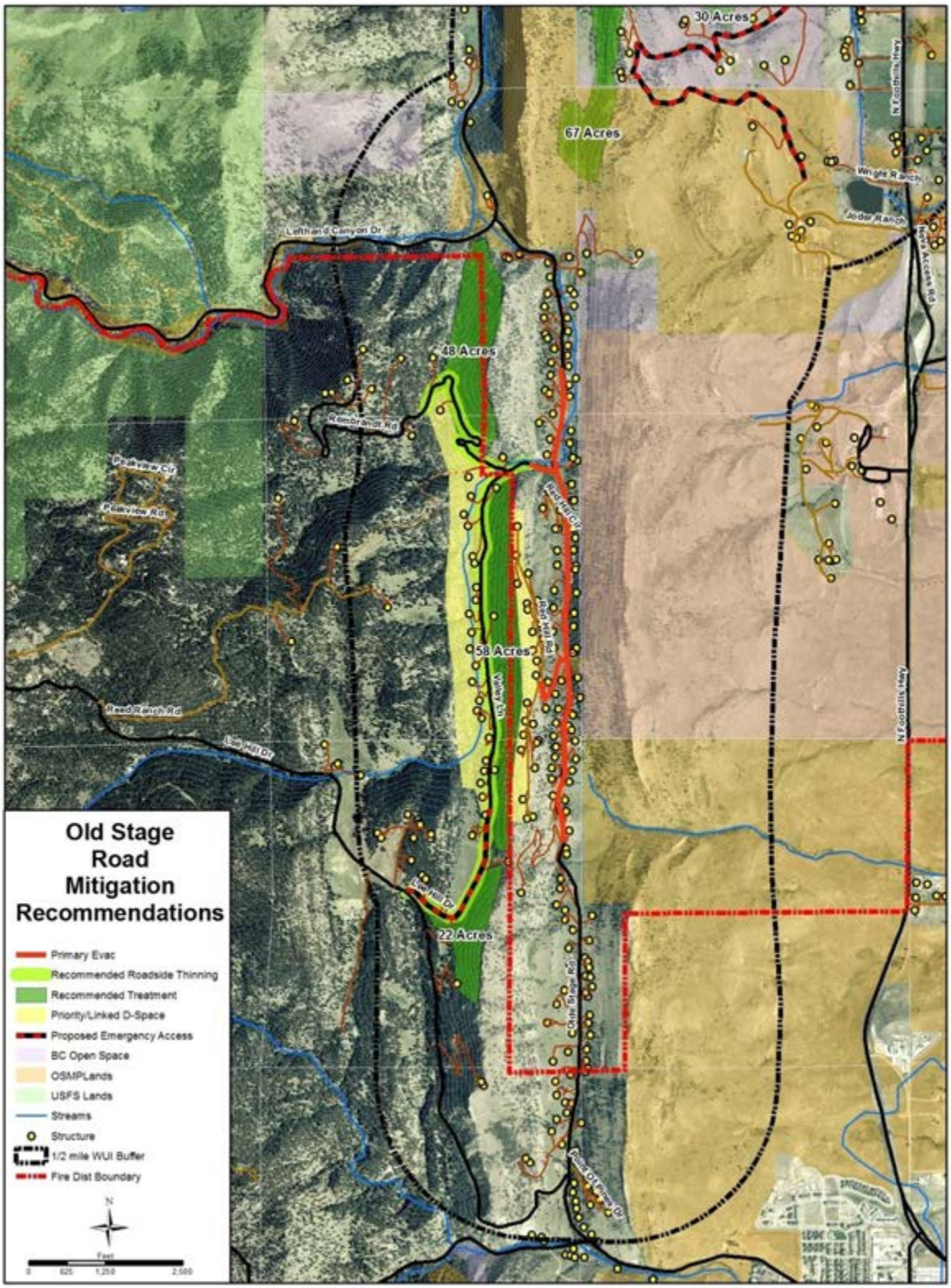
Steep topography, single access secondary roads, predominance of grass as the primary fuel for fire conveyance, its associated high rate of spread and historical fire return interval combine to create a significant wildfire threat for residents of Old Stage Road. The primary evacuation route, Old Stage Road, provides dual paved access to Lee Hill Drive to the south and Lefthand Canyon Drive to the north.

Secondary roads are constructed with turnarounds. A majority of the homes along Old Stage Road benefit from implementation of defensible space or naturally existing meadows and open forest conditions. Over ¾ of the homes are constructed with combustible siding and many have tall grass and shrub in direct contact with exterior walls. Old Stage Road is equipped with 9 pressurized hydrants that serve the northern half of the assessment area and Red Hill Road. Problematic infrastructure renders the system semi-reliable and rated as "low-flow". Other hydrants and draft sources are located within one mile of the community. Gas lines are buried and electric utilities are above ground. The presence of overhead power lines poses a credible ignition threat in areas like Old Stage Road that are prone to high winds.

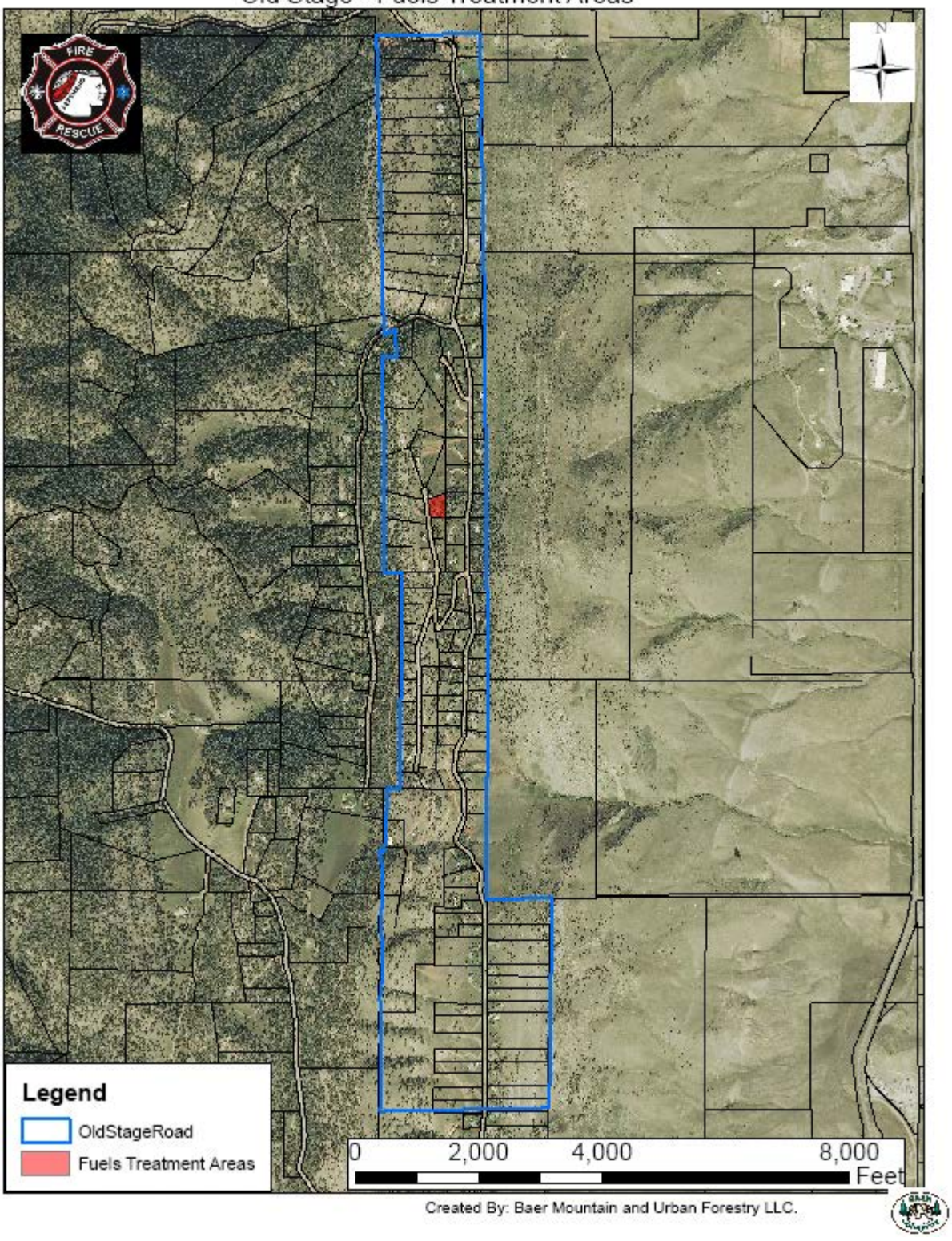
Mitigation Recommendations

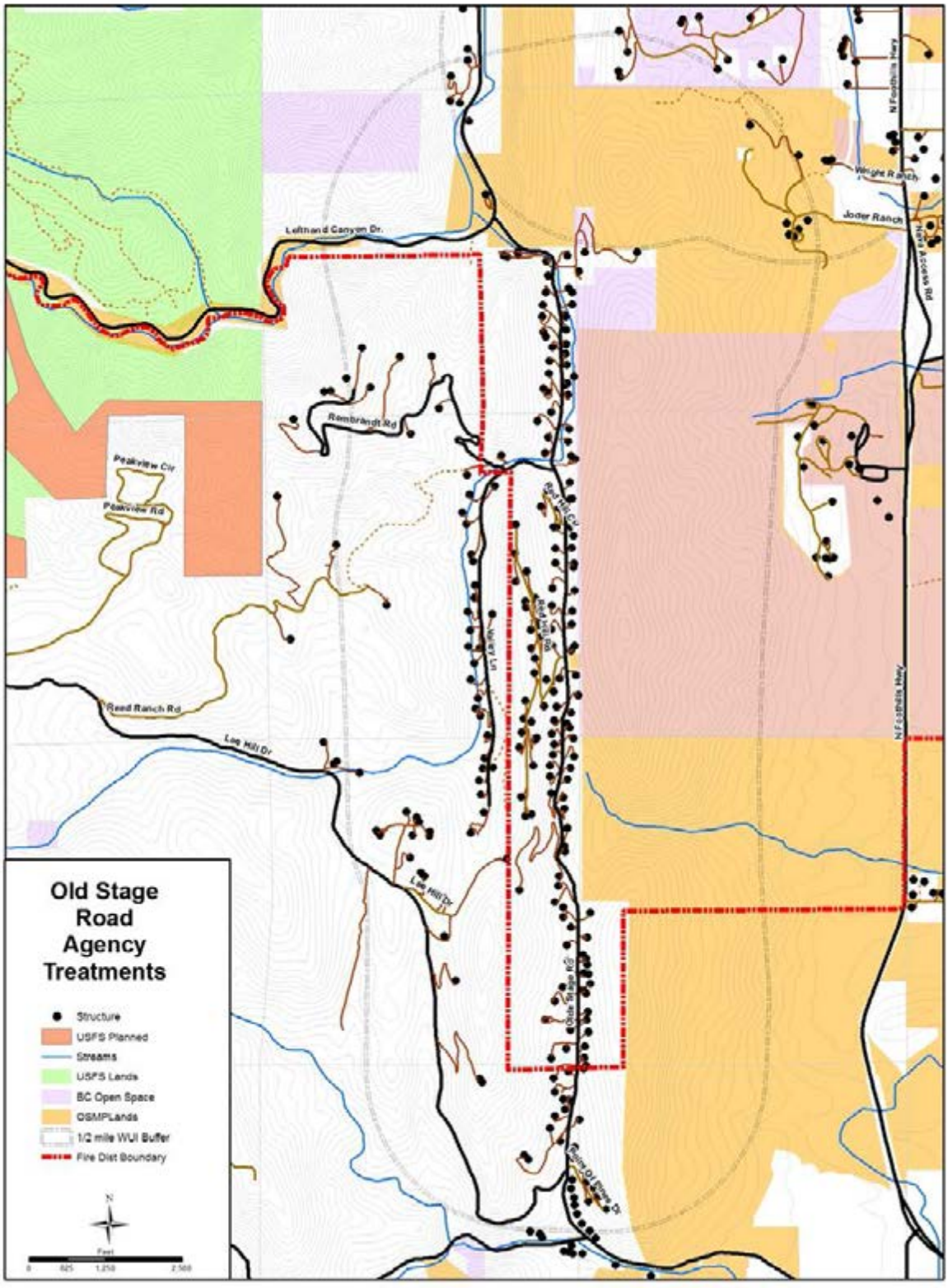
- Engage residents through outreach and continuing education regarding wildfire hazards and risks, structure ignitability factors, defensible space improvements, landscape mitigation, pine beetle options, emergency planning, evacuation, and involvement with the fire department.
- Reduce structural ignitability through construction upgrades, site improvement, defensible space improvements, and seasonal maintenance.
- Improve and maintain adequate and effective defensible space around all residences. Adequate treatment eliminates the possibility of all flames within 10 feet of the structure and large flames within 100 feet of the structure. Seasonal mowing is an effective mitigation technique in areas like Old Stage Road where grass and grassy understory dominate the landscape.
- Road side fall mowing/thinning is recommended along the length of Old Stage Road and Red Hill Road, focusing on downhill road margins where applicable. Width of downhill treatment increases with slope.
- Roadside thinning is recommended for Valley Lane. Minimum recommended fuelbreak width is 300 feet (150 feet on either side of the road) with a minimum of 10 feet crown separation on flat ground
- Landscape scale thinning treatment is recommended for the dense conifer stands east and upslope from Valley Lane to the top of the hogback. Valley Lane and the affected timber are situated in Boulder Mountain Fire Protection District jurisdiction, providing an opportunity for a collaborative project.
- Assess capacity of hydrants and supply infrastructure. Improve/replace components to meet minimum requirements as established by LHFPD.

Current/Planned Projects: Boulder Mountain Fire Protection District is planning thinning projects in and around the Valley Lane area. Project scope, extent and treatment perimeters will be added to treatment maps when available.

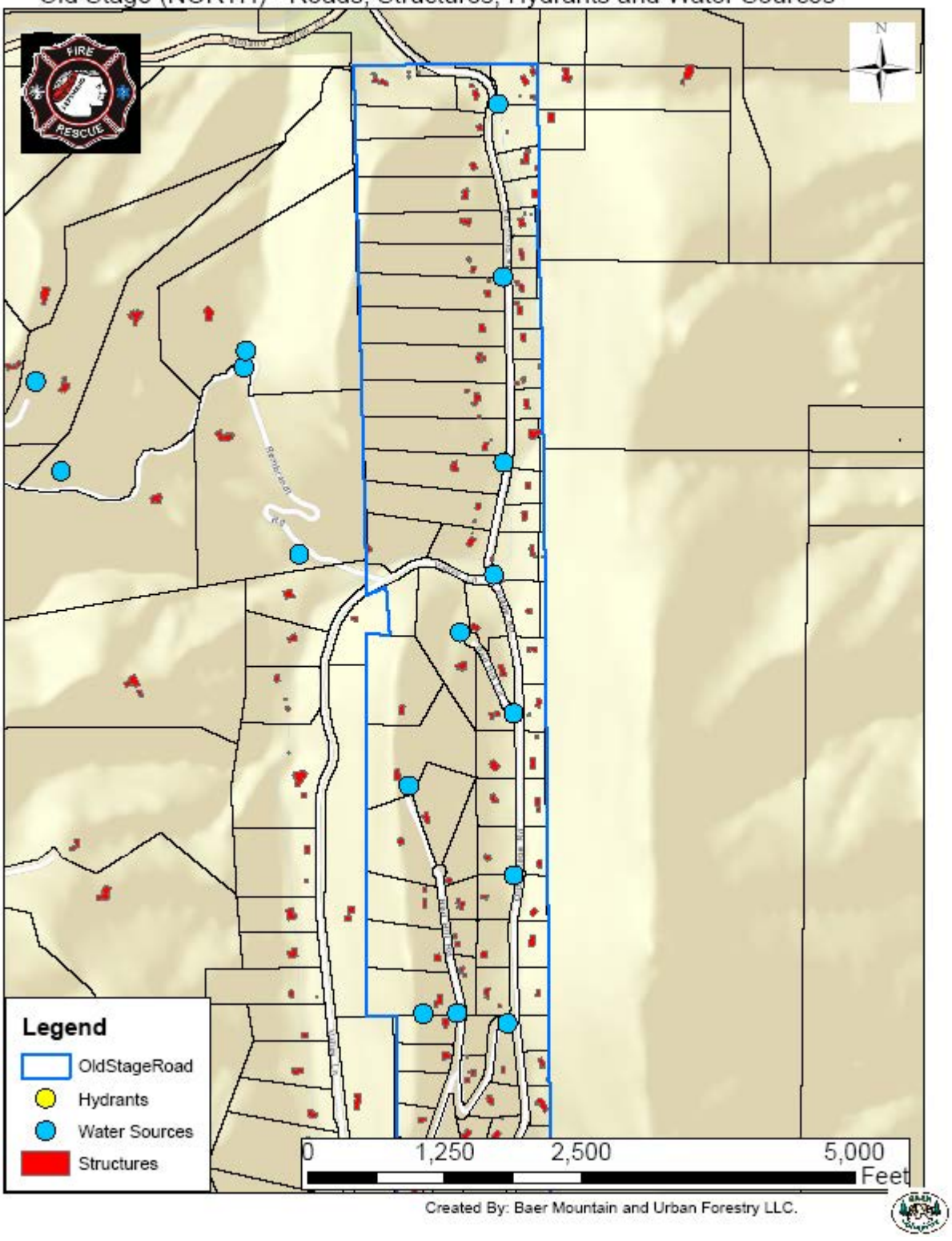

Old Stage Road Mitigation Recommendations
Primary Evac
Recommended Roadside Thinning
Recommended Treatment
Priority/Linked D-Space
Proposed Emergency Access
BC Open Space
OSMPLands
USFS Lands
Streams
Structure
1/2 mile WUI Buffer
Fire Dist Boundary
30 Acres
67 Acres
48 Acres
58 Acres
22 Acres
Lefthand Canyon Dr
Rembrandt Rd
Reed Ranch Rd
Lee Hill Dr
Valley Ln
Old Stage Rd
Wright Ranch
Joder Ranch
N Foothills Hwy

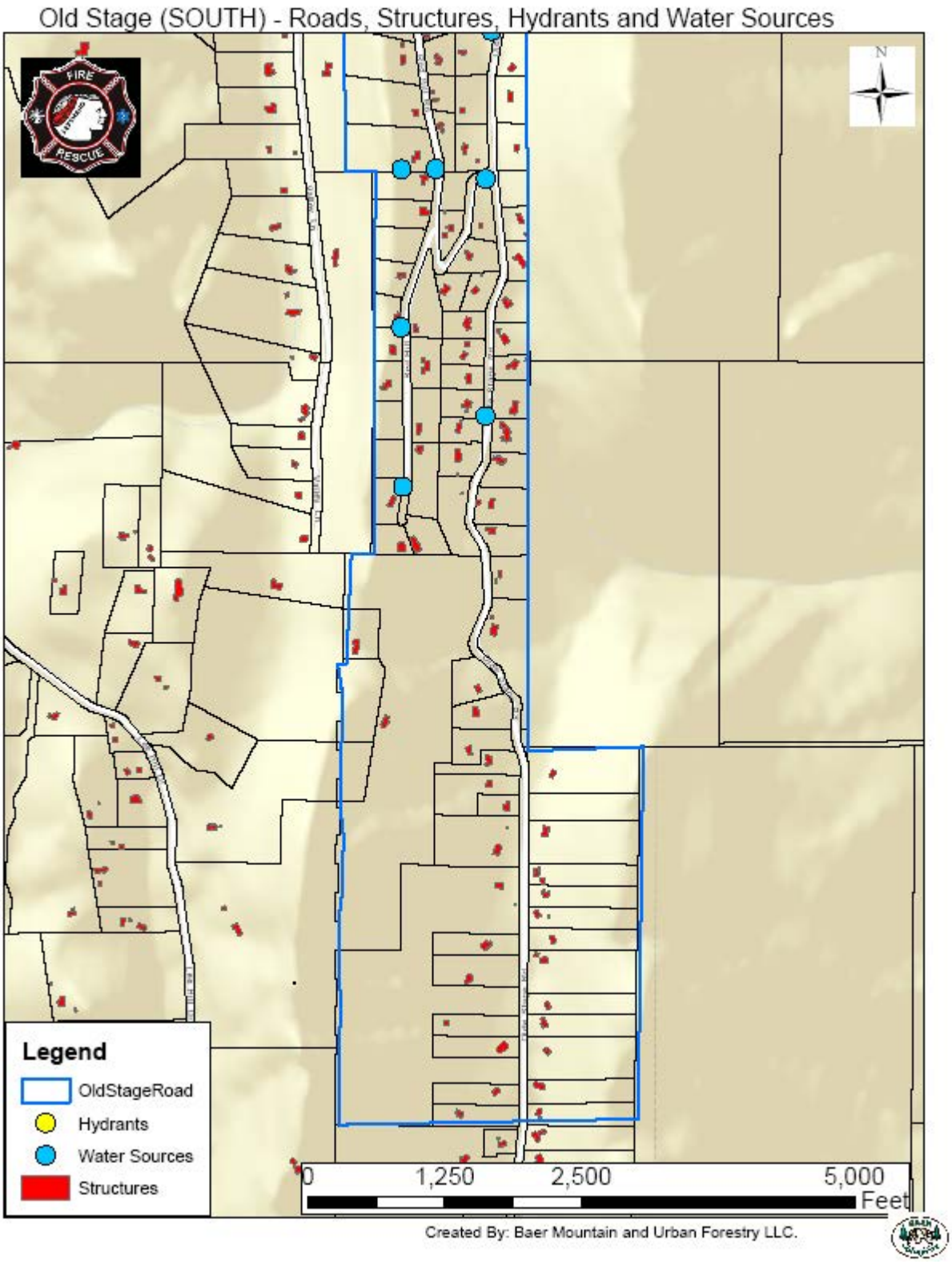
Old Stage - Fuels Treatment Areas




Old Stage Road Agency Treatments
Structure
USFS Planned
Streams
USFS Lands
BC Open Space
OSMPLands
1/2 mile WUI Buffer
Fire Dist Boundary
Lefthand Canyon Dr.
Rembrandt Rd
Peakview Cir
Peakview Rd
Reed Ranch Rd
Lee Hill Dr
Valley Ln
Old Stage Rd
Flagstaff View Dr
N Foothills Hwy
Wright Ranch
Joder Ranch
Hors Access Rd

Old Stage (NORTH) - Roads, Structures, Hydrants and Water Sources




Old Stage (SOUTH) - Roads, Structures, Hydrants and Water Sources
FIRE
RESCUE
N
Legend
OldStageRoad
Hydrants
Water Sources
Structures
0
1,250
2,500
5,000
Feet
Created By: Baer Mountain and Urban Forestry LLC.

Lake of the Pines

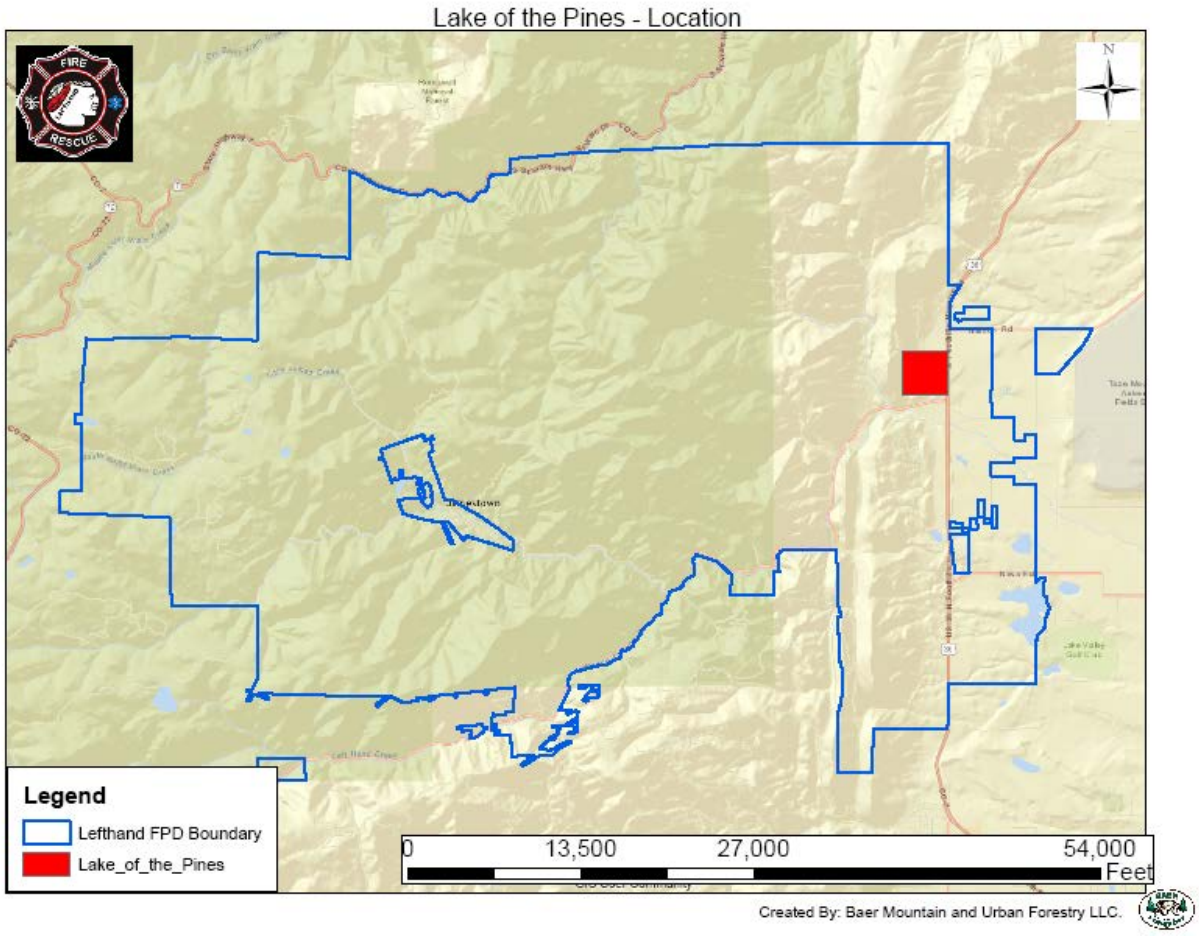
Lake of the Pines

Lower Lefthand Canyon Complex

Community Resource

Assessment · Mitigation Recommendations · Maps

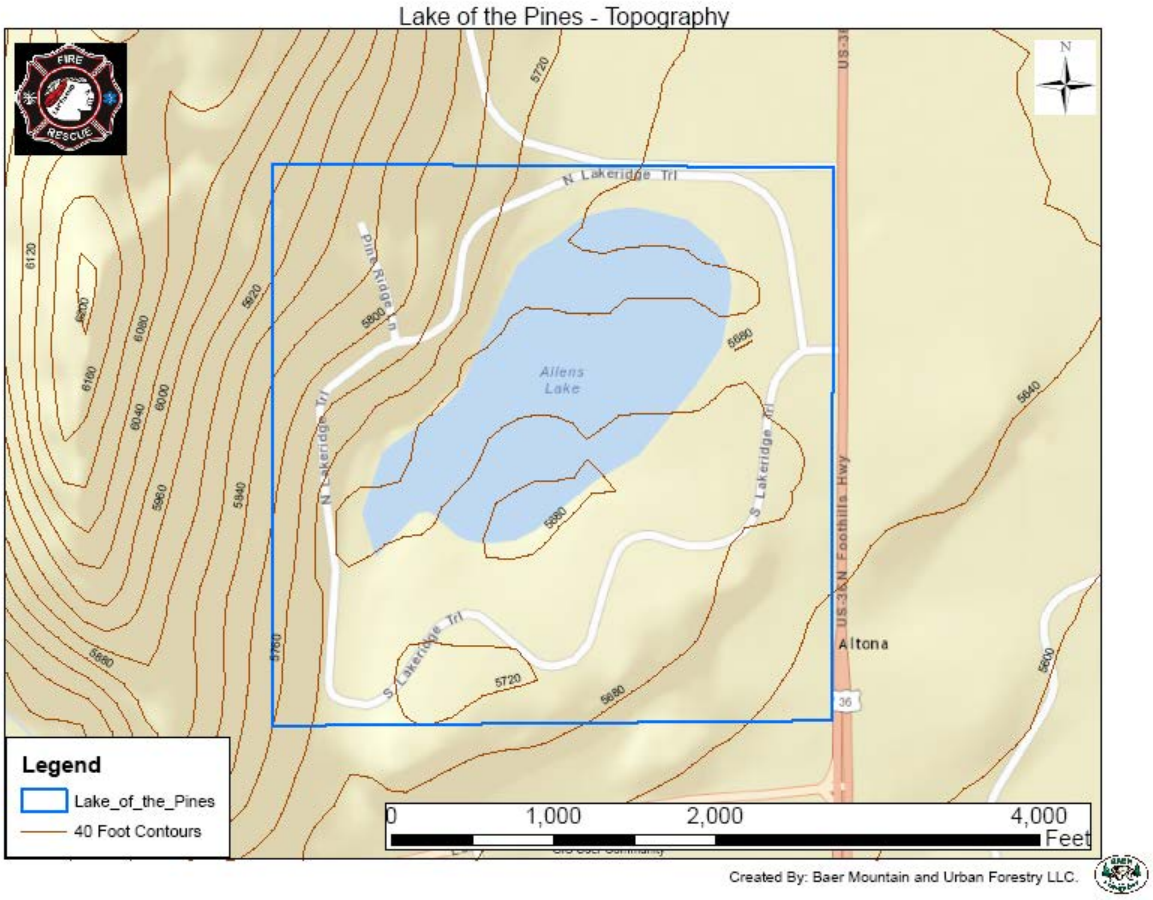
Wildfire Hazard and Risk Rating **HIGH**



Community Size-Up

The Lake of the Pines subdivision is one of several adjacent subdivisions situated at the mouth of Lefthand Canyon that that comprise the lower Lefthand Canyon assessment area. Subdivisions in this area are individually assessed but are also grouped into the Lower Lefthand Canyon Complex for landscape-scale strategic mitigation planning. Individual community assessments are utilized to generate a suite of recommendations that address the unique wildfire hazards that affect each subdivision. The Lake of the Pines assessment area is comprised of homes constructed around Allen's Lake on Lakeridge Trail, a narrow paved road that circles the lake and provides a single gated point of access to HWY 36. The majority of the homes are constructed on the flat plain east of the Dakota

hogback. Of the approximately 85 homes located in the subdivision, 15 are constructed along the lower slopes of the hogback. This is the ecological transition zone between high prairie and lower elevation conifers to the west. Dense ponderosa pine stands are located on the lower slopes adjacent to residences west of the lake on the slopes, while the lower portion of the subdivision is characterized by a mix of dense conifer stands, isolated trees, and open meadows. Many lots are landscaped and managed but also support closed canopy conditions. Private land borders the area to the north, west, and south. Boulder County manages prairie land to the east across HYW 36.



Wildfire Fire Risk and Hazard Severity Form NFPA 1144	
Lake of the Pines	
Hazard Rating 72	HIGH
Means of Access	
Ingress and Egress	7
2 or more roads in & out	0
One road in & out	7
Road Width	4
> 24 ft	0
> 20 ft < 24 ft	2
< 20 ft	4
All-Season Road Condition	0
Surfaced Road, grade <5%	0
Surfaced Road, grade >5%	2
Non-surfaced Road, grade <5%	2
Non-surfaced Road, grade >5%	5
Other than all season	7
Fire Service Access	2
< 300 ft with turnaround	0
> 300 ft with turnaround	2
< 300 ft with no turnaround	4
> 300 ft with no turnaround	5
Street Signs (predominent)	0
Present - reflective	0
Not present	5
Vegetation (fire behavior fuel models)	
Characteristics of predominent veg w/in 300 ft	10
Light - 1, 2, 3	5
Medium - 5, 6, 7, 8, 9	10
Heavy - 4, 10	20
Slash - 11, 12, 13	25
Defensible Space - vegetation treatment around structure	12
> 100 ft around structure	1
> 70 ft < 100 ft around structure	3
> 30 ft < 70 ft around structure	10
< 30 ft around structure	25
Topography Within 300 ft of Structures	
Slope	2
< 9%	1
10% to 20%	4
21% to 30%	7
31% to 40%	8
> 41%	10
Additional Rating Factors (rate all that apply)	
Additional factors	12
Topographic feaures that adversely affect fire behavior (0 - 5)	1
Areas with a history of high fire occurance - ignition potential (0 - 5)	5
Severe fire weather potential (0 - 5)	3
Separation of adjacent structures contributing to fire spread (0 - 5)	3
Roofing Assembly	
Roofing	5
Class A	0
Class B	3
Class C	15
Unrated	25
Building construction	
Materials (predominent)	15
Non-combustible fire-resistive siding, eaves and deck	0
Non-combustible siding, eaves and combustible deck	5
Combustible siding and deck	15
Building set-back relative to slope of 30% or more	1
> 30 ft to slope	1
< 30 ft to slope	5
Available Fire Protection	
Water source availability	2
Hydrants 500 gpm < 1000 ft apart	0
Hydrants 250 gpm < 1000 ft apart	1
Non-pressurized water source > 250 gpm for 2 hours	3
Non-pressurized water source < 250 gpm for 2 hours	5
Water unavailable	10
Organized response resources	1
Station < 5 mi from structure	1
Station > 5 mi from structure	3
Fixed fire protection	0
NFPA 13, 13R, 13D sprinkler system	0
None	5
Placement of gas and Electric Utilities	
Utilities	0
Both underground	0
One above, one below	3
Both above ground	5
Totals for home or subdivision	73
Hazard Rating Scale	
< 40 LOW	
> 40 MODERATE	
> 70 HIGH	
> 112 EXTREME	

Topography

The subdivision is characterized by the flat terrain surrounding Allen's Lake situated at the base of the east slope of the Dakota Hogback, a prominent topographic feature that extends north/south through much of the state along the base of the Rocky Mountain foothills. The continuity of the hogback extends north out of the assessment area and is eroded to the south by Lefthand Creek forming a narrow canyon mouth. A low eroded bluff overlooks the Lefthand Canyon plain where it widens dramatically to the east. Broad rolling plains extend east to the horizon.

Vegetation/Fuels

Vegetation and fuels within the assessment are characteristic of the ecotone between mixed grass prairie and montane woodland. Vegetation communities include mixed grass prairie (FBFM 1), ponderosa pine savanna (FBFM 2), ponderosa pine forest (FBFM 8), ponderosa pine/Douglas-fir mix (FBFM 8), riparian forest and shrubland (FBFM 6). Grass, grass understory and ponderosa pine overstory are the dominant fuel types found in the subdivision. Ponderosa pine stem count/acre is low on the northeast side of the lake, moderate on the southeast, and moderate to high to the west on the hogback slopes. A riparian meadow corridor, 200 – 300 feet wide, extends south to Lefthand Canyon Drive along the irrigation ditch that supplies the lake. These vegetation and ecological conditions are characteristic of areas with frequent ignitions, high rates of spread, and low to moderate fire intensity in natural historic conditions. Conifer density in the area deviates from these historic conditions and would support intense, localized crown fire activity in extreme weather conditions.

Hazard and Risk Factors

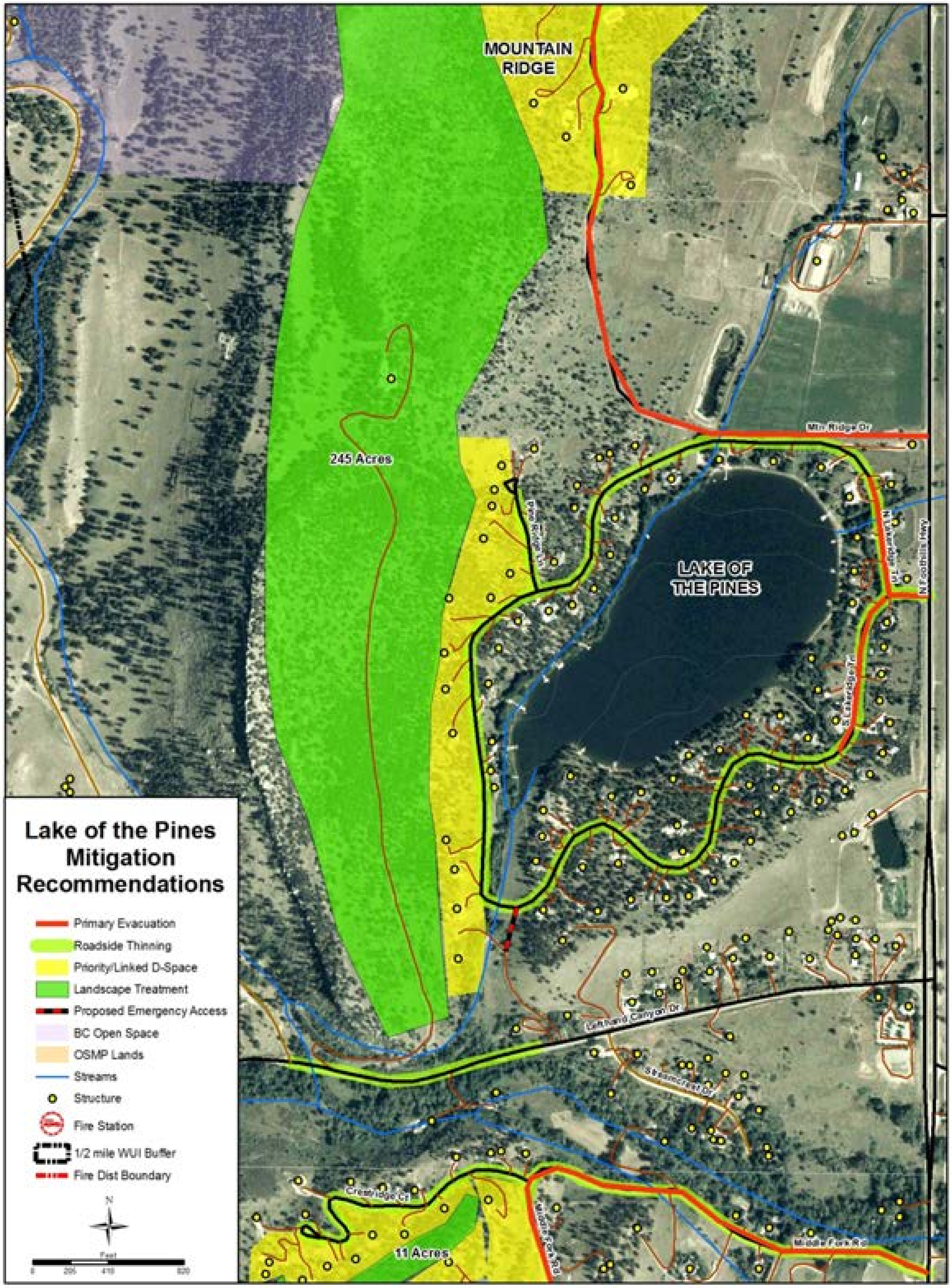
Primary hazard and risk factors for Lake of the Pines include a predominance of combustible

home construction Including the largest percentage of wood shake roofing of any subdivision in the fire district, hazardous fuels in close proximity to structures, and restricted access for evacuation and emergency apparatus. The community is designed around a gated single point of access but entrapment is unlikely due to the close proximity to Mountain Ridge Drive and HWY 36. Ingress/egress hazard is due to road width and restricted 2-way access. While over 75% of homeowners have undertaken some action to improve conditions through landscaping or timber management, less than half of those efforts have resulted in effective defensible space. Recent mitigation activity was observed on several parcels and roadside margins. Ignition potential within the area includes roadside ignition from HWY 36 and frequent seasonal lightening. Ignition risk is also high in the off-road recreational complex on national forest lands to the west. In high-wind fire weather conditions wind-blown embers from these public lands are likely to ignite spot fires to the east. Pressurized hydrants are present throughout the community. A draft site and dry hydrant is located at the community beach on the lakes' north shore.

Mitigation Recommendations

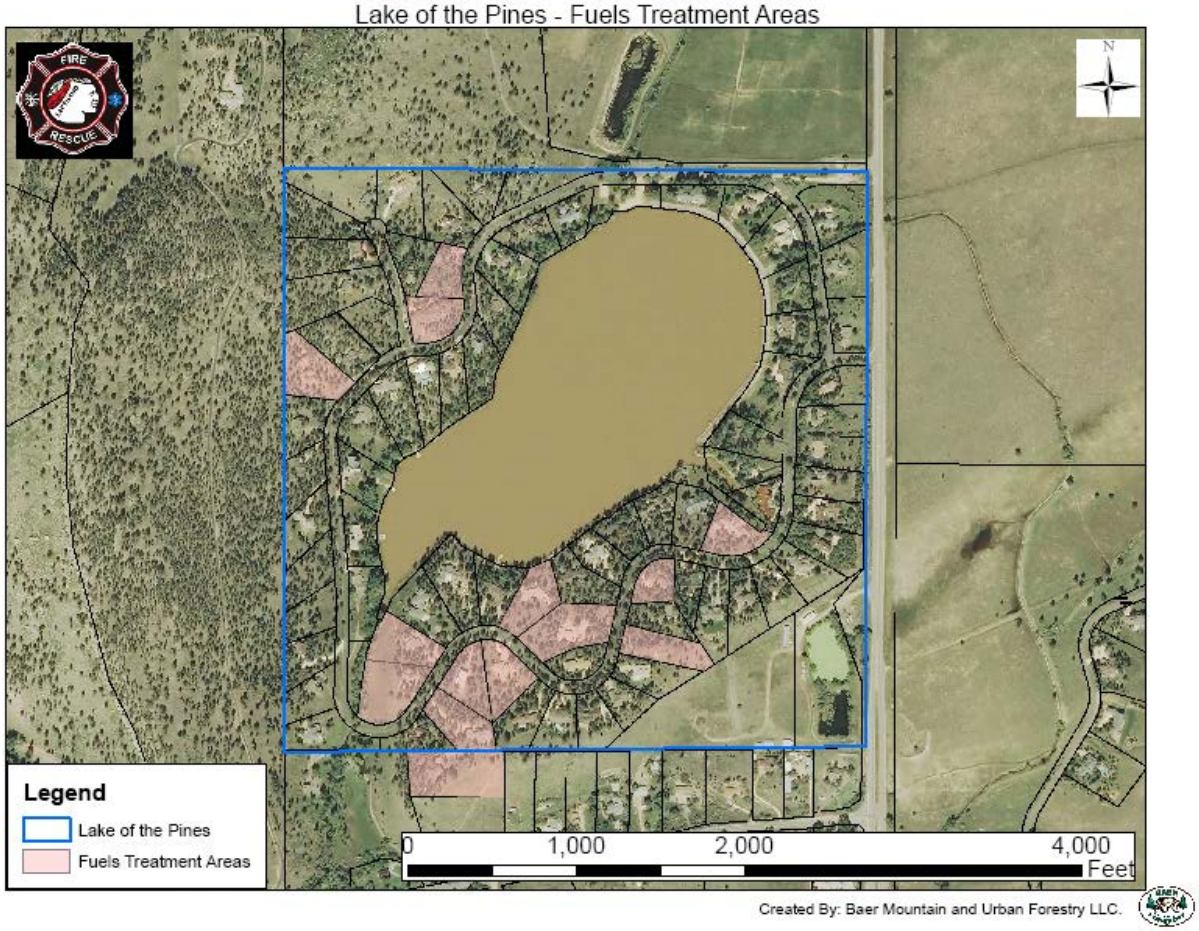
- Engage residents through outreach and continuing education regarding wildfire hazards and risks, structure ignitability factors, defensible space, landscape mitigation, pine beetle options, emergency planning, evacuation, and involvement with the fire department.
- Reduce structural ignitability through construction upgrades, roof replacements, site improvement, defensible space, and seasonal maintenance.
- Improve and maintain adequate and effective defensible space around all residences. Adequate treatment eliminates the possibility of all flames within 10 feet of the structure and large flames within 100 feet of the structure. Seasonal mowing is an effective mitigation treatment in areas where grass and grassy understory dominate the landscape. Coordinate mitigation between outer western lots adjacent to landscape treatments to create a contiguous perimeter fuel break.
- Fall mowing and continued thinning/limbing and maintenance is recommended along all roadside margins in the subdivision.
- Treatments west of subdivision should be expanded to ridge line and previously treated stands should be surveyed to determine adequate spacing of remaining trees. Thinning should produce a minimum of 10 feet crown separation on flat ground, with greater separation on steeper slopes.
- Construct emergency access from South Lakeridge Trail to Lefthand Canyon Drive.
- Upgrade private gate with siren activation and clearly mark.
- Upgrade private gate to neighboring Souder property with siren activation.

Current/Planned Projects: Defensible space improvement on individual lots. Landscape treatment areas to the west have had significant mitigation work completed but should be revisited to reduce remaining stem count.

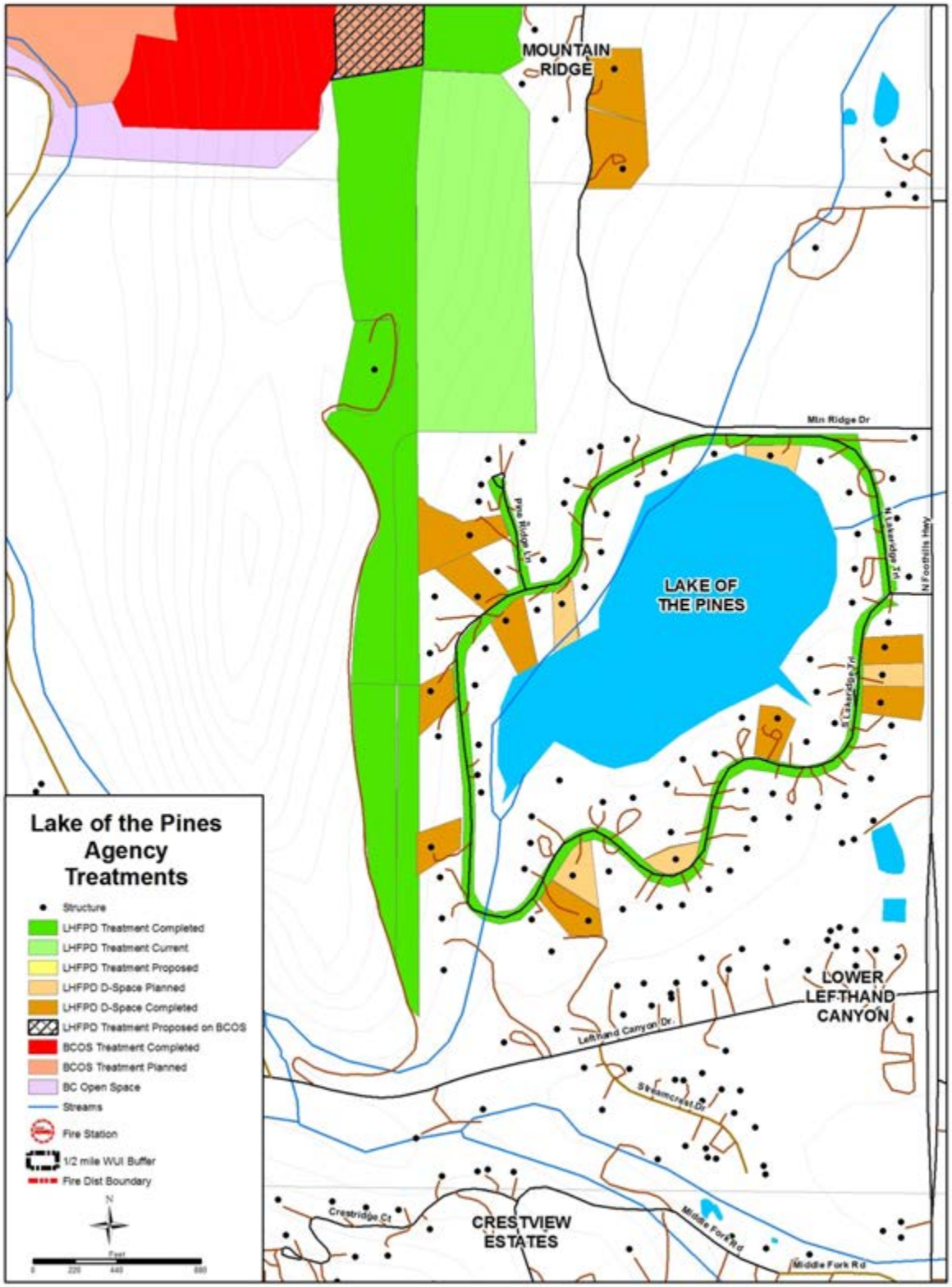


MOUNTAIN RIDGE
245 Acres
LAKE OF THE PINES
Mtn Ridge Dr
Lefthand Canyon Dr
11 Acres
Middle Fork Rd
Lake of the Pines Mitigation Recommendations
Primary Evacuation
Roadside Thinning
Priority/Linked D-Space
Landscape Treatment
Proposed Emergency Access
BC Open Space
OSMP Lands
Streams
Structure
Fire Station
1/2 mile WUI Buffer
Fire Dist Boundary

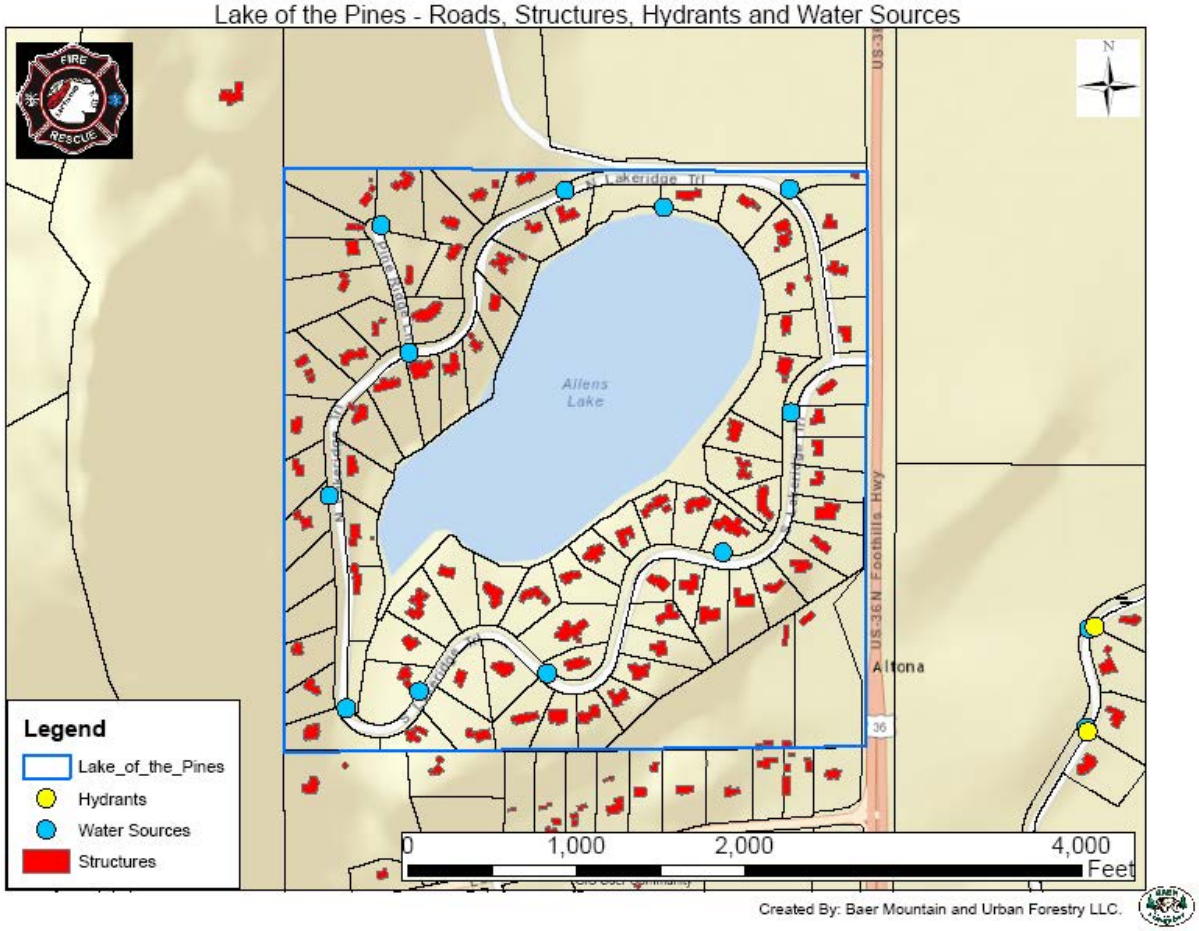
Lake of the Pines - Fuels Treatment Areas



Created By: Baer Mountain and Urban Forestry LLC.


MOUNTAIN RIDGE
Mtn Ridge Dr
LAKE OF THE PINES
LOWER LEFTHAND CANYON
Lefthand Canyon Dr
Steamcrest Dr
CRESTVIEW ESTATES
Crestridge Ct
Middle Fork Rd
Lake of the Pines Agency Treatments
Structure
LHFPD Treatment Completed
LHFPD Treatment Current
LHFPD Treatment Proposed
LHFPD D-Space Planned
LHFPD D-Space Completed
LHFPD Treatment Proposed on BCOS
BCOS Treatment Completed
BCOS Treatment Planned
BC Open Space
Streams
Fire Station
1/2 mile WUI Buffer
Fire Dist Boundary
N
Feet
0 220 440 880

Lake of the Pines - Roads, Structures, Hydrants and Water Sources



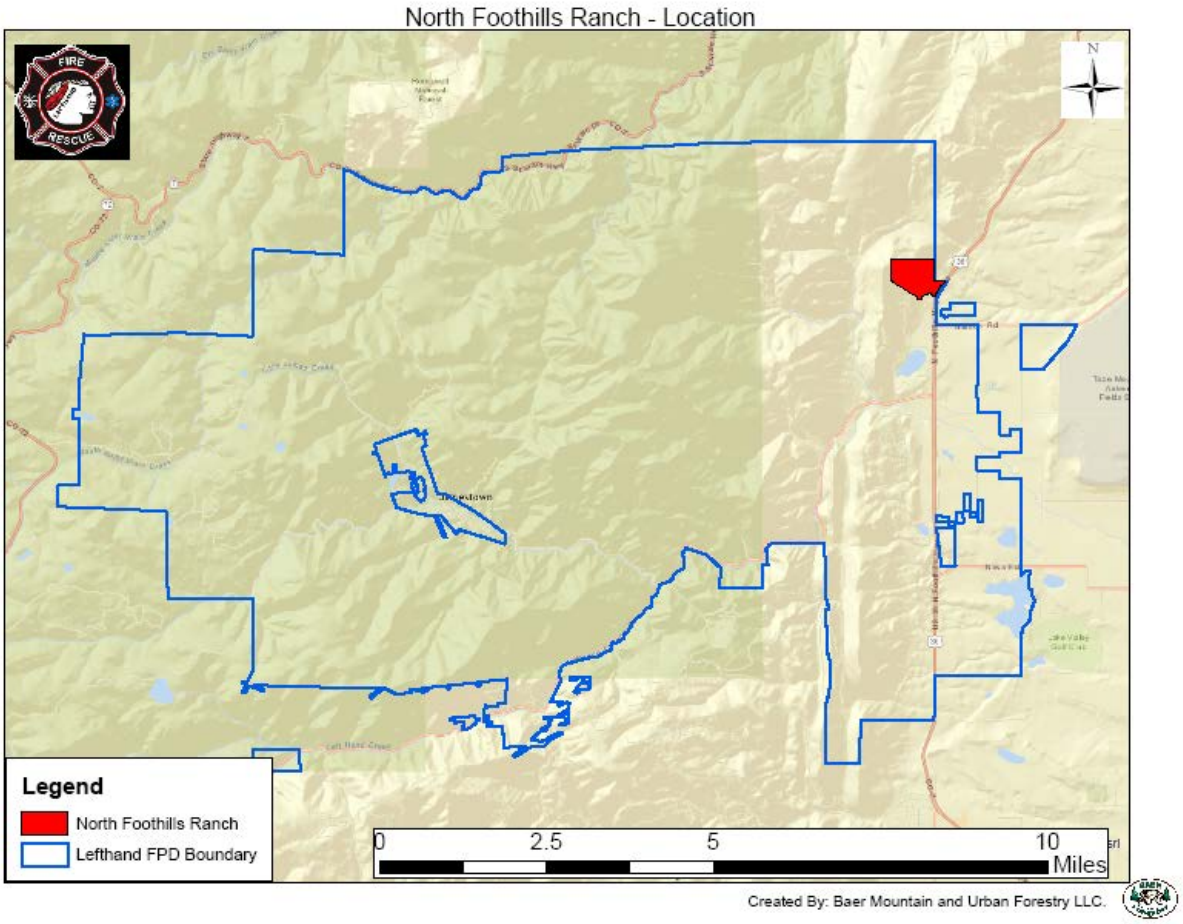
North Foothills Ranch

Lower Lefthand Canyon Complex

Community Resource

Assessment · Mitigation Recommendations · Maps

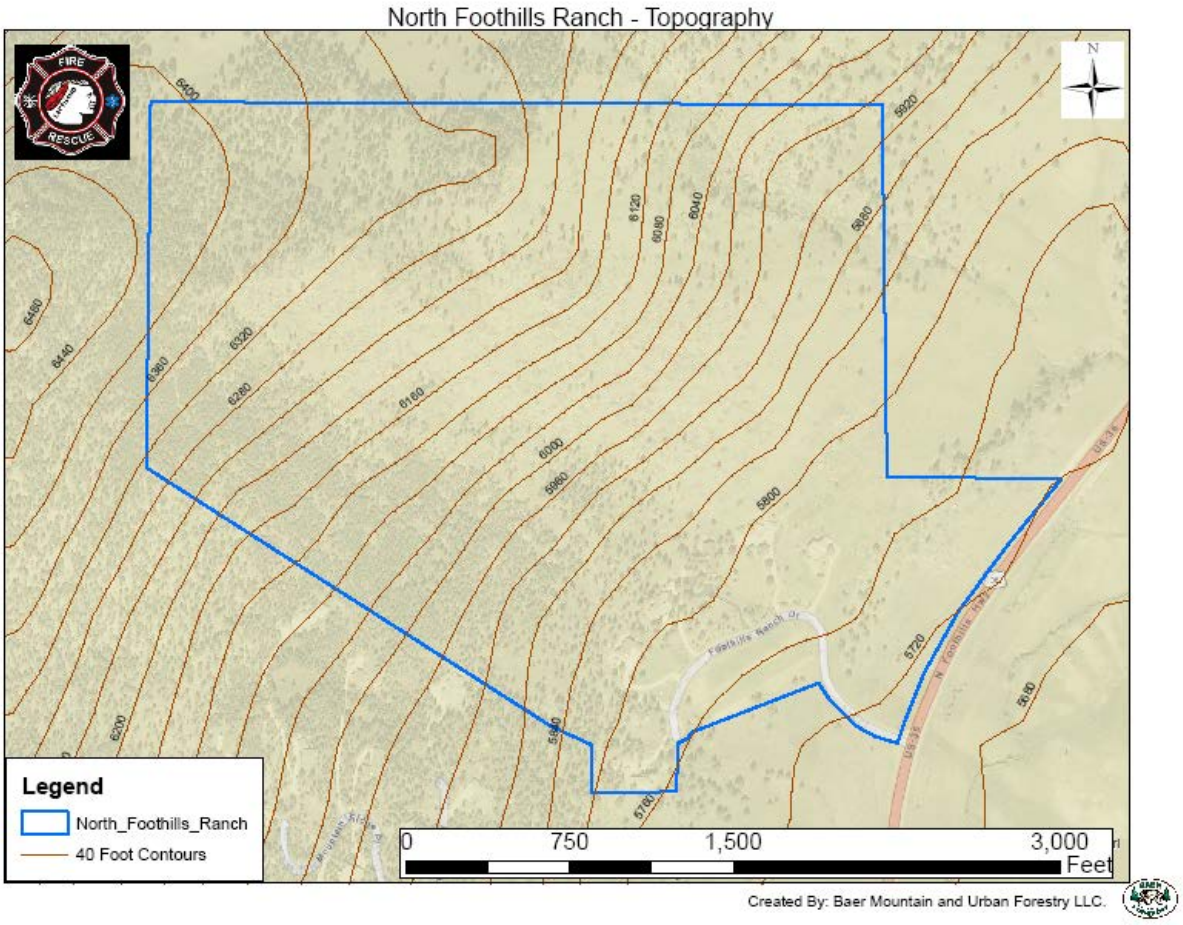
Wildfire Hazard and Risk Rating **MODERATE**



Community Size-Up

The North Foothills Ranch subdivision is one of several adjacent subdivisions situated at the mouth of Lefthand Canyon that that comprise the lower Lefthand Canyon assessment area. Subdivisions in this area are individually assessed but are also grouped into the Lower Lefthand Canyon Complex for landscape-scale strategic mitigation planning. Individual community assessments are utilized to generate a suite of recommendations that address the unique wildfire hazards that affect each subdivision. The assessment area includes 7 residences and community owned open space located along

North Foothills Ranch Drive, a gated, paved two lane road providing a single access route to CO HWY 36. The community is situated at the base of a steep forested slope in the ecological transition zone between high prairie to the east and lower elevation conifers to the west. Grass, grass understory, and ponderosa pine are the primary wildland fuels. Many pine stands directly west of the community are dense and overgrown. North Foothills Ranch Drive is a dead end access approximately 1,000 ft in length, constructed on a low grade with a wide terminus turnaround. Mountain Ridge subdivision is adjacent west and uphill slope from North Foothills Ranch. Approximately 70% of the 188 acres that comprise these two neighborhoods are undeveloped areas designated as common open space belonging to the residents. Boulder County manages adjacent land to the north and west and to the south of the subdivision and is collaborating with the fire department on mitigation planning and implementation to benefit the communities.



Wildfire Fire Risk and Hazard Severity Form NFPA 1144	
North Foothills Ranch	
Hazard Rating 69	MODERATE
Means of Access	
Ingress and Egress	7
2 or more roads in & out	0
One road in & out	7
Road Width	2
> 24 ft	0
> 20 ft < 24 ft	2
< 20 ft	4
All-Season Road Condition	0
Surfaced Road, grade <5%	0
Surfaced Road, grade >5%	2
Non-surfaced Road, grade <5%	2
Non-surfaced Road, grade >5%	5
Other than all season	7
Fire Service Access	2
< 300 ft with turnaround	0
> 300 ft with turnaround	2
< 300 ft with no turnaround	4
> 300 ft with no turnaround	5
Street Signs (predominent)	0
Present - reflective	0
Not present	5
Vegetation (fire behavior fuel models)	
Characteristics of predominent veg w/in 300 ft	10
Light - 1, 2, 3	5
Medium - 5, 6, 7, 8, 9	10
Heavy - 4, 10	20
Slash - 11, 12, 13	25
Defensible Space - vegetation treatment around structure	10
> 100 ft around structure	1
> 70 ft < 100 ft around structure	3
> 30 ft < 70 ft around structure	10
< 30 ft around structure	25
Topography Within 300 ft of Structures	
Slope	3
< 9%	1
10% to 20%	4
21% to 30%	7
31% to 40%	8
> 41%	10
Additional Rating Factors (rate all that apply)	
Additional factors	12
Topographic feaures that adversely affect fire behavior (0 - 5)	2
Areas with a history of high fire occurance - ignition potential (0 - 5)	5
Severe fire weather potential (0 - 5)	3
Separation of adjacent structures contributing to fire spread (0 - 5)	2
Roofing Assembly	
Roofing	3
Class A	0
Class B	3
Class C	15
Unrated	25
Building construction	
Materials (predominent)	7
Non-combustible fire-resistive siding, eaves and deck	0
Non-combustible siding, eaves and combustible deck	5
Combustible siding and deck	15
Building set-back relative to slope of 30% or more	2
> 30 ft to slope	1
< 30 ft to slope	5
Available Fire Protection	
Water source availability	3
Hydrants 500 gpm < 1000 ft apart	0
Hydrants 250 gpm < 1000 ft apart	1
Non-pressurized water source > 250 gpm for 2 hours	3
Non-pressurized water source < 250 gpm for 2 hours	5
Water unavailable	10
Organized response resources	1
Station < 5 mi from structure	1
Station > 5 mi from structure	3
Fixed fire protection	0
NFPA 13, 13R, 13D sprinkler system	0
None	5
Placement of gas and Electric Utilities	
Utilities	0
Both underground	0
One above, one below	3
Both above ground	5
Totals for home or subdivision	62
Hazard Rating Scale	
< 40 LOW	
> 40 MODERATE	
> 70 HIGH	
> 112 EXTREME	

Topography

The residences are constructed along the base of a broad east facing slope that rises from the plains to form the Dakota Hogback. This is a prominent topographic feature that extends north/south through much of the state along the base of the Rocky Mountain foothills. The continuity of the hogback feature extends north to Lichens Gulch and south out to Lefthand Canyon out of the immediate assessment area.

Vegetation/Fuels

Vegetation and fuels within the assessment are characteristic of the ecotone between mixed grass prairie and montane woodland. Vegetation communities include mixed grass prairie (FBFM 1), ponderosa pine savanna (FBFM 2), ponderosa pine forest (FBFM 8), and riparian shrubland (FBFM 6). Grass, grass understory and ponderosa pine overstory are the dominant fuel types found in the area. Conifer density is low to moderate around the structures. On 9/1/2005 the North Foothills Ranch Fire burned through 55 acres of ponderosa savanna directly north of the subdivision, further reducing wildland hazardous fuels. Extremely dense ponderosa stands are located 500 ft west of the structures and run continuously to the top of the hogback ridge. Isolated ponderosa and open prairie characterize the surrounding region to the north east, east, and south. These vegetation and ecological conditions are characteristic of areas with frequent ignitions, high rates of spread, and low to moderate fire intensity in natural historic conditions.

Hazard and Risk Factors

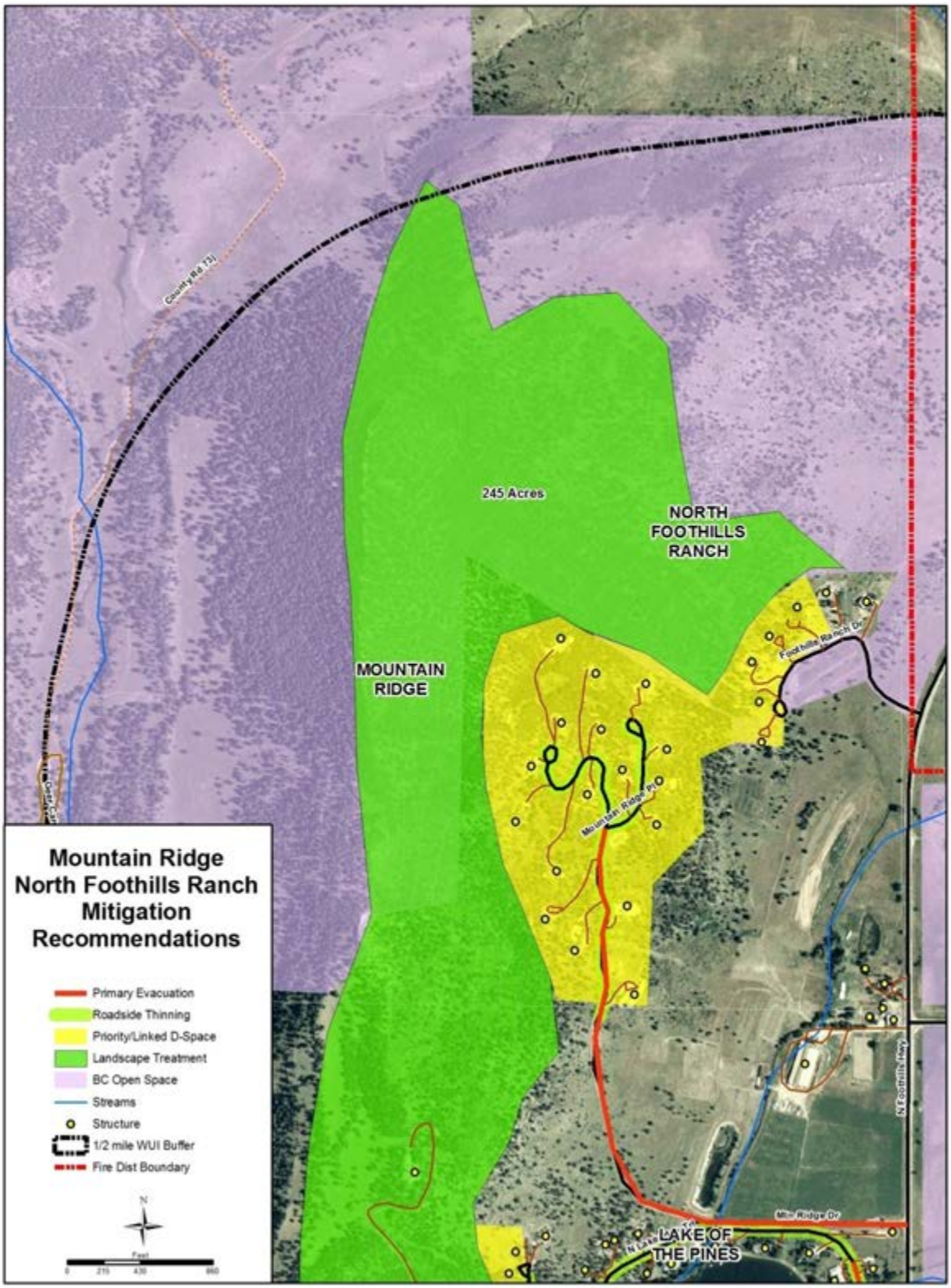
Primary hazard and risk factors affecting North Foothills Ranch include the condition of the surrounding prairie and forest, frequent wildfire occurrence, ineffective defensible space, single ingress/egress, and accessibility to emergency water supply. Half of the structures are located

within the forested margin and have not implemented effective defensible space. One at-risk structure is constructed with combustible wood-shake roof shingles. Road access is a single ingress/egress with low grade, paved, short length, supports two-way traffic flow, and is constructed with a large turn around at its dead end. HWY 36 represents a possible ignition source for a grass fueled fire but North Foothills Ranch Road and residential landscaping reduce the threat of structural ignition. Ignition risk is also high in the off-road recreational complex on national forest lands to the west. In high-wind fire weather conditions wind-blown embers from these public lands are likely to ignite spot fires to the east. Severe wildfire hazard persists in the heavily forested chimney separating North Foothills Ranch from Mountain Ridge subdivision. With no thinning, fuel breaks, or defensible space implementation, Chinook winds could drive a crown fire down-slope unimpeded into the southern portion of the residences. A large buried cistern is present but not clearly marked for emergency access.

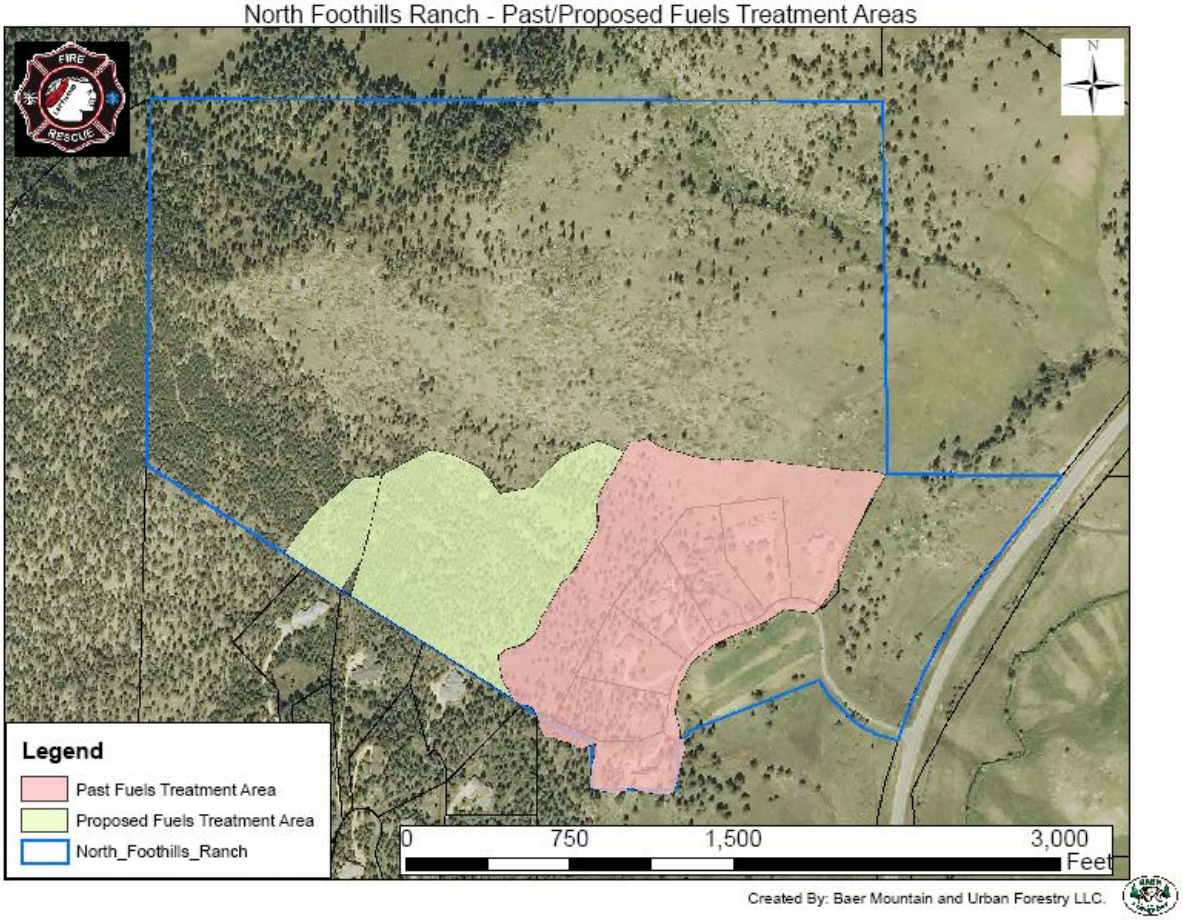
Mitigation Recommendations

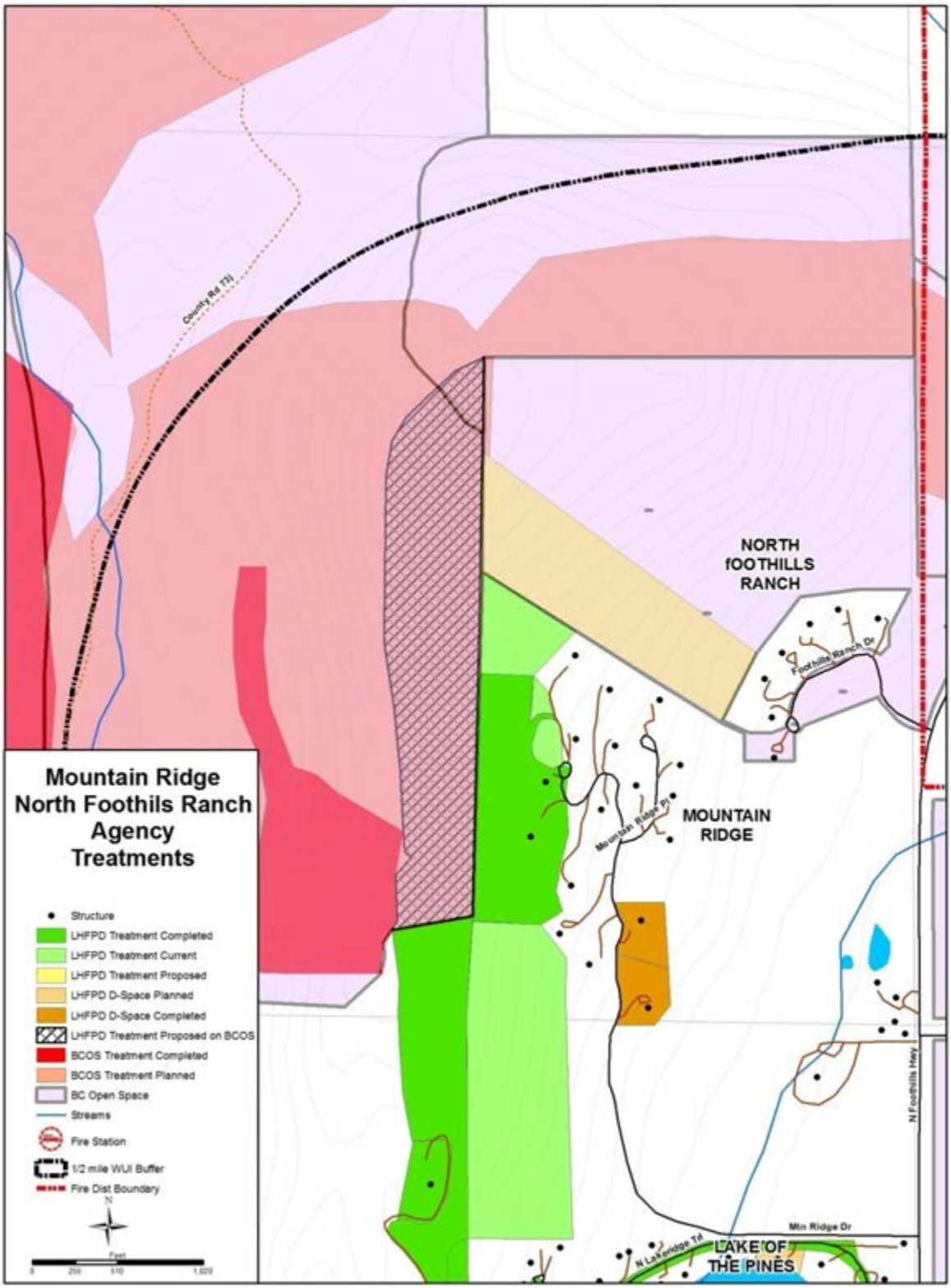
- Engage residents through outreach and continuing education regarding wildfire hazards and risks, structure ignitability factors, defensible space improvements, landscape mitigation, pine beetle options, emergency planning, evacuation, and involvement with the fire department.
- Reduce structural ignitability through construction upgrades, site improvement, defensible space, and seasonal maintenance.
- Improve and maintain adequate and effective defensible space around all residences. Adequate treatment eliminates the possibility of all flames within 10 feet of the structure and large flames within 100 feet of the structure. Seasonal mowing is an effective mitigation treatment in areas where grass and grassy understory dominate the landscape. Coordinated mitigation between all lots and road margin treatments to create an effective perimeter fuel break.
- Road side fall mowing/thinning is recommended along roadside margins of North Foothills Ranch Drive.
- Treatment is recommended for the dense ponderosa pine stands west of the residences in the unburned zone south of the North Foothills Ranch fire perimeter, north of Mountain Ridge. Treatment should cover the full extent of the draw to the Dakota Hogback Ridge. Thinning should produce a minimum of 10 feet crown separation on flat ground, with greater separation on steeper slopes.
- A neighborhood task force should be created to facilitate discussion between projects stakeholders, including Mountain Ridge, Boulder County Open Space, and the LHFPD.
- Clearly marked emergency access should be constructed for existing water supply.
- Upgrade private gate with siren activation and clearly mark.

Current/Planned Projects: Treatment of heavy timber west of the subdivision is being incorporated in the Mountain Ridge Treatment Project. Coordination with Boulder County land management is necessary.

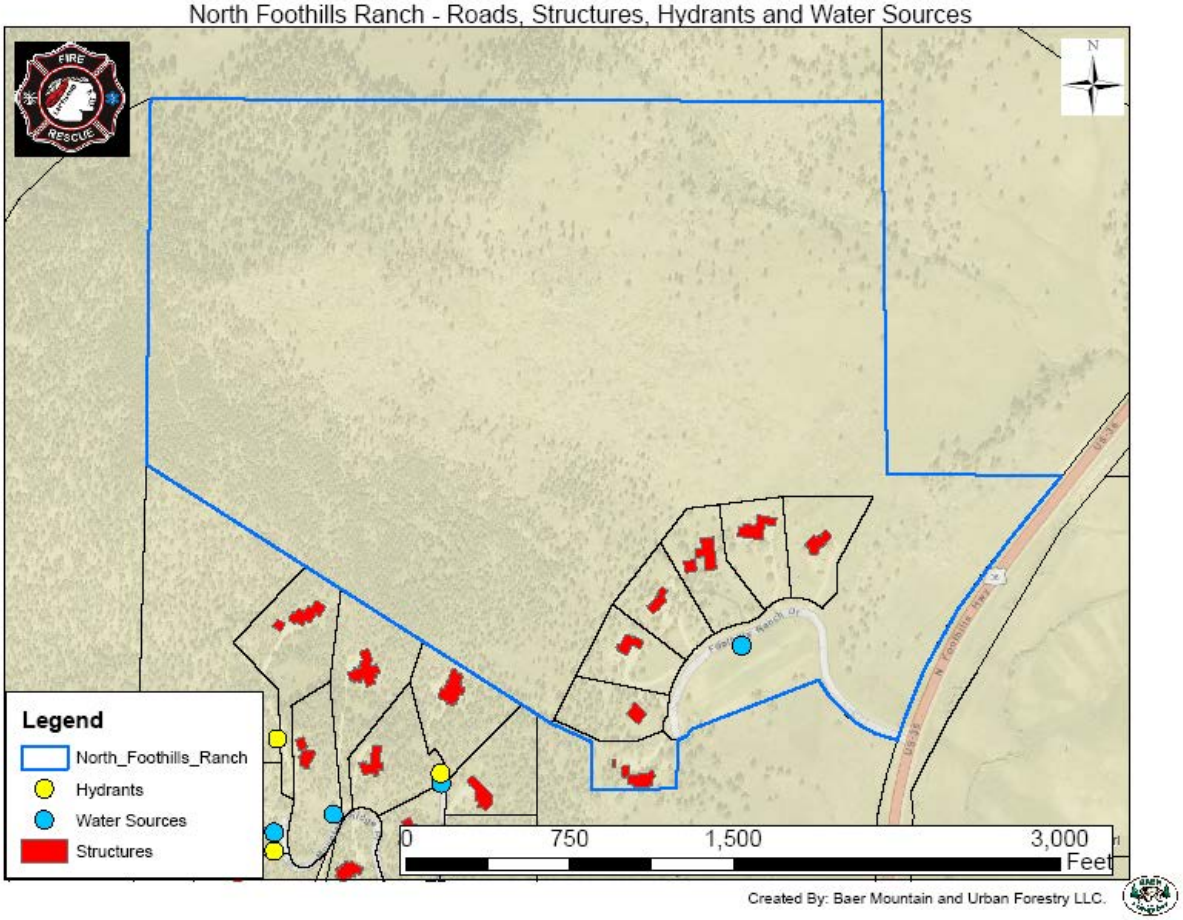

245 Acres
NORTH FOOTHILLS RANCH
MOUNTAIN RIDGE
LAKE OF THE PINES
Mountain Ridge North Foothills Ranch Mitigation Recommendations
Primary Evacuation
Roadside Thinning
Priority/Linked D-Space
Landscape Treatment
BC Open Space
Streams
Structure
1/2 mile WUI Buffer
Fire Dist Boundary
N
Feet
0
215
430
860

North Foothills Ranch - Past/Proposed Fuels Treatment Areas




Mountain Ridge
North Foothils Ranch
Agency
Treatments
Structure
LHFPD Treatment Completed
LHFPD Treatment Current
LHFPD Treatment Proposed
LHFPD D-Space Planned
LHFPD D-Space Completed
LHFPD Treatment Proposed on BCOS
BCOS Treatment Completed
BCOS Treatment Planned
BC Open Space
Streams
Fire Station
1/2 mile WUI Buffer
Fire Dist Boundary
N
Feet
0
255
510
1,020
County Rd 71j
NORTH
fOOTHILLS
RANCH
Foothills Ranch Dr
MOUNTAIN
RIDGE
Mountain Ridge Pl
N Foothills Hwy
Mtn Ridge Dr
N LaVeridge Trl
LAKE OF
THE PINES

North Foothills Ranch - Roads, Structures, Hydrants and Water Sources



Mountain Ridge

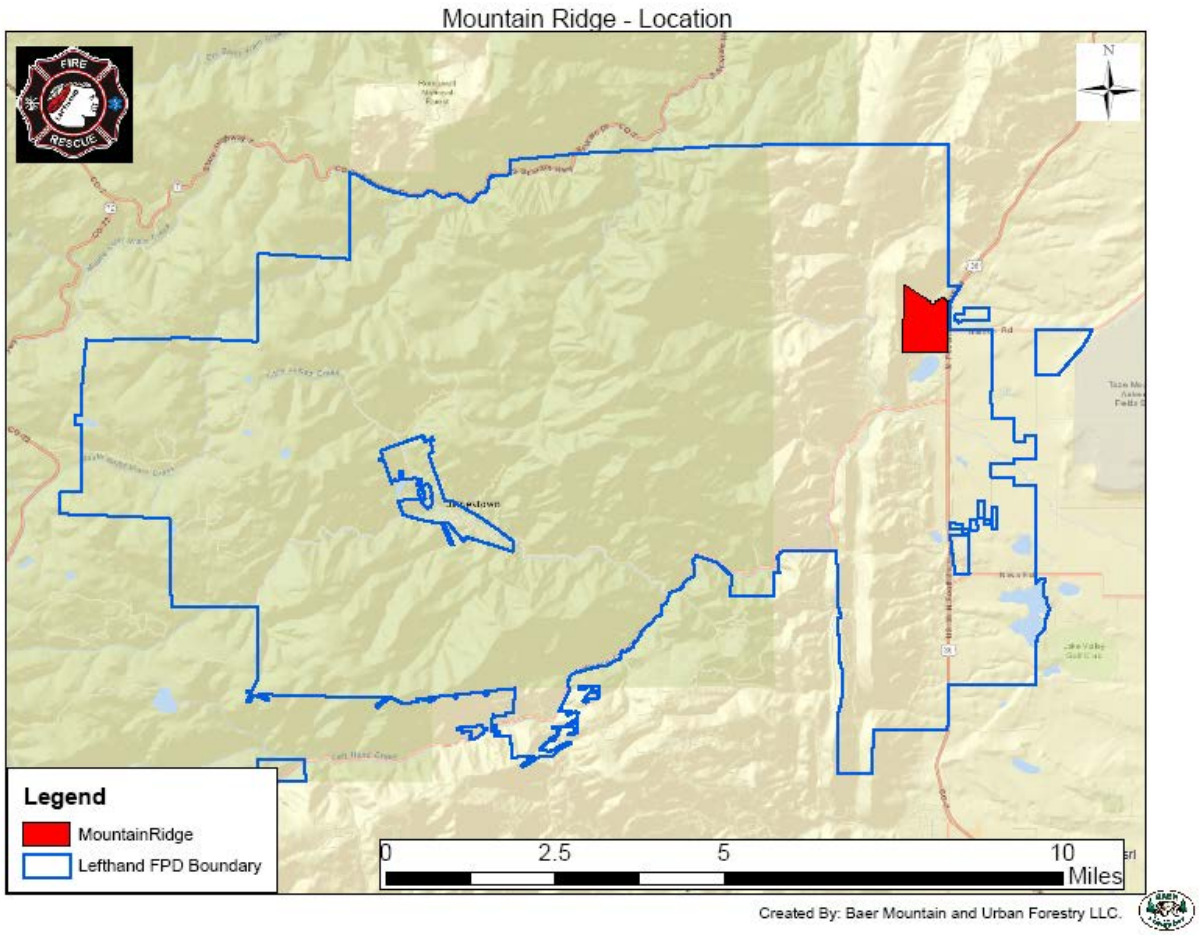
Mountain Ridge

Lower Lefthand Canyon Complex

Community Resource

Assessment · Mitigation Recommendations · Maps

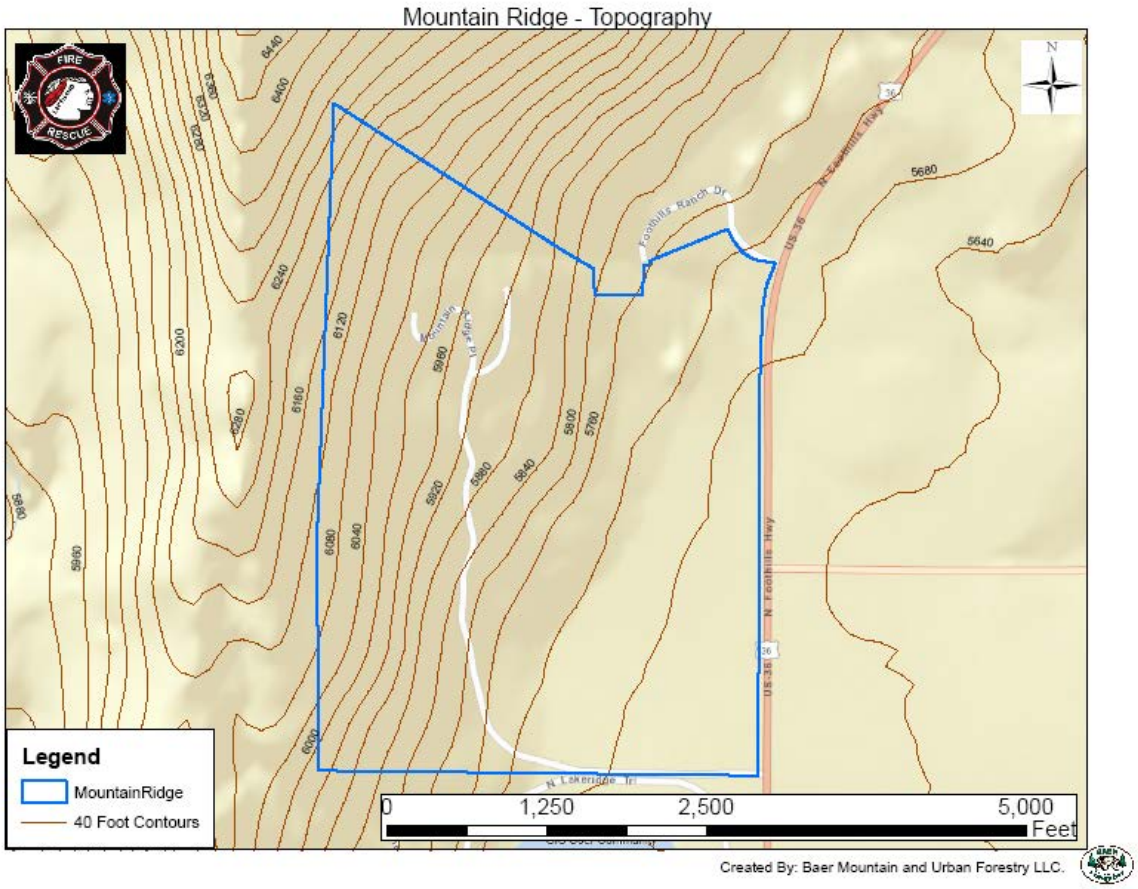
Wildfire Hazard and Risk Rating **MODERATE**



Community Size-Up

The Mountain Ridge is one of several adjacent subdivisions situated at the mouth of Lefthand Canyon that that comprise the lower Lefthand Canyon assessment area. Subdivisions in this area are individually assessed but are also grouped into the Lower Lefthand Canyon Complex for landscape-scale strategic mitigation planning. Individual community assessments are utilized to generate a suite of recommendations that address the unique wildfire hazards that affect each subdivision. 17 residences are located on Mountain Ridge Road, a narrow single ingress/egress road on the east slope of the

Dakota Hogback. This is a gated community with an active HOA and an active mitigation program that includes defensible space and strategic landscape treatments. The community is situated on a steep forested slope in the ecological transition zone between high prairie to the east and lower elevation conifers to the west. Grass, grass understory, and ponderosa pine are the primary wildland fuels. Many pine stands adjacent to community to the north and northwest are dense and overgrown. Road dead ends are constructed with turnarounds. North Foothills Ranch subdivision is adjacent to Mountain Ridge, downslope and to the northeast. Approximately 70% of the 188 acres that comprise these two neighborhoods are undeveloped areas designated as common open space belonging to the residents. Boulder County manages adjacent land to the north and west and to the south of the subdivision and is collaborating with the fire department on mitigation planning and implementation to benefit the communities.



Wildfire Fire Risk and Hazard Severity Form NFPA 1144	
Mountain Ridge	
Hazard Rating 64	MODERATE
Means of Access	
Ingress and Egress	7
2 or more roads in & out	0
One road in & out	7
Road Width	4
> 24 ft	0
> 20 ft < 24 ft	2
< 20 ft	4
All-Season Road Condition	2
Surfaced Road, grade <5%	0
Surfaced Road, grade >5%	2
Non-surfaced Road, grade <5%	2
Non-surfaced Road, grade >5%	5
Other than all season	7
Fire Service Access	2
< 300 ft with turnaround	0
> 300 ft with turnaround	2
< 300 ft with no turnaround	4
> 300 ft with no turnaround	5
Street Signs (predominent)	0
Present - reflective	0
Not present	5
Vegetation (fire behavior fuel models)	
Characteristics of predominent veg w/in 300 ft	10
Light - 1, 2, 3	5
Medium - 5, 6, 7, 8, 9	10
Heavy - 4, 10	20
Slash - 11, 12, 13	25
Defensible Space - vegetation treatment around structure	12
> 100 ft around structure	1
> 70 ft < 100 ft around structure	3
> 30 ft < 70 ft around structure	10
< 30 ft around structure	25
Topography Within 300 ft of Structures	
Slope	4
< 9%	1
10% to 20%	4
21% to 30%	7
31% to 40%	8
> 41%	10
Additional Rating Factors (rate all that apply)	
Additional factors	13
Topographic feaures that adversely affect fire behavior (0 - 5)	3
Areas with a history of high fire occurance - ignition potential (0 - 5)	5
Severe fire weather potential (0 - 5)	3
Separation of adjacent structures contributing to fire spread (0 - 5)	2
Roofing Assembly	
Roofing	1
Class A	0
Class B	3
Class C	15
Unrated	25
Building construction	
Materials (predominent)	5
Non-combustible fire-resistive siding, eaves and deck	0
Non-combustible siding, eaves and combustible deck	5
Combustible siding and deck	15
Building set-back relative to slope of 30% or more	3
> 30 ft to slope	1
< 30 ft to slope	5
Available Fire Protection	
Water source availability	1
Hydrants 500 gpm < 1000 ft apart	0
Hydrants 250 gpm < 1000 ft apart	1
Non-pressurized water source > 250 gpm for 2 hours	3
Non-pressurized water source < 250 gpm for 2 hours	5
Water unavailable	10
Organized response resources	1
Station < 5 mi from structure	1
Station > 5 mi from structure	3
Fixed fire protection	0
NFPA 13, 13R, 13D sprinkler system	0
None	5
Placement of gas and Electric Utilities	
Utilities	0
Both underground	0
One above, one below	3
Both above ground	5
Totals for home or subdivision	**65**
Hazard Rating Scale	
< 40 LOW	
> 40 MODERATE	
> 70 HIGH	
> 112 EXTREME	

Topography

The area is characterized by a broad east facing slope that rises from the plains forming the Dakota Hogback. This is a prominent topographic feature that extends north/south through much of the state along the base of the Rocky Mountain foothills. The continuity of the hogback feature extends north and south out of the immediate assessment area. A prominent ridge and steep forested west facing slope borders the community to the west.

Vegetation/Fuels

Vegetation and fuels within the assessment are characteristic of the ecotone between mixed grass prairie and montane woodland. Vegetation communities include mixed grass prairie (FBFM 1), ponderosa pine savanna (FBFM 2), ponderosa pine forest (FBFM 8), and riparian shrubland (FBFM 6). Grass, grass understory and ponderosa pine overstory are the dominant fuel types found in the subdivision. Ponderosa pine stem count/acre is very high adjacent to the north end of the subdivision and in smaller stands to the west. Larger dense stands are located on the west side of the ridge on open space land. With the exception of the northern – most parcels, stem count is moderate to low around the residences and south and southwest of the subdivision. To the east lie the irrigated meadows of Autumn Hill Farm and surrounding plains. These vegetation and ecological conditions are characteristic of areas with frequent ignitions, high rates of spread, and low to moderate fire intensity in natural historic conditions. Conifer density in the area deviates from these historic conditions and would support intense, localized crown fire activity in extreme weather conditions.

Hazard and Risk Factors

Primary hazard and risk factors affecting Mountain Ridge are the condition of the surrounding forest,

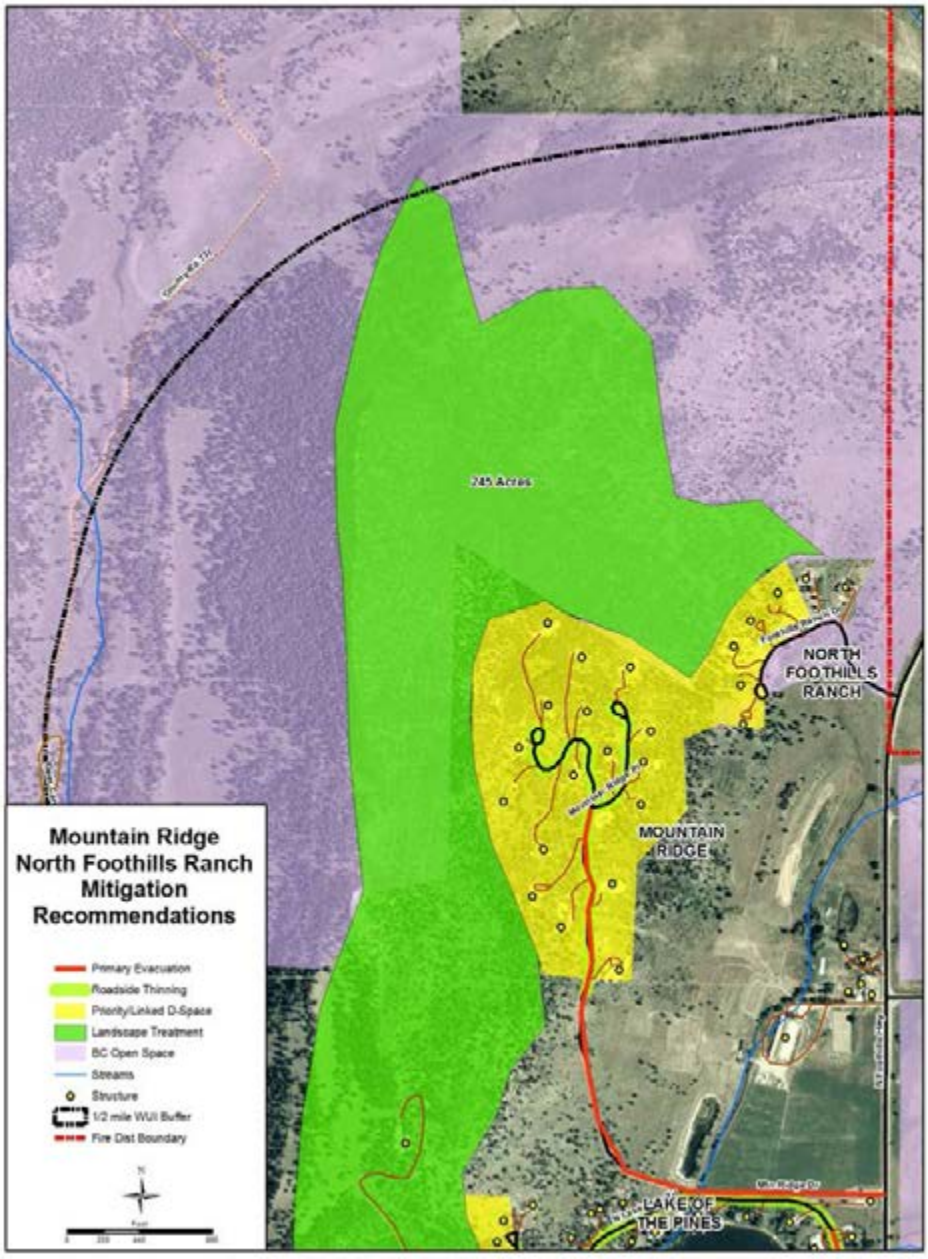
homes that have not implemented defensible space, restricted 2-way traffic flow on a single ingress/egress evacuation route, and wildfire frequency. The hydrant grid is a valuable community emergency resource. However as a closed system gravity-supplied by a single 40,000 gallon cistern, water flow rates and available supply are dependent upon cistern fill level, limiting system effectiveness for extended use. Current mitigation activities west of the homes on community land has greatly improved forest conditions and significant hazardous fuel loads in the area of the fuel break. Despite extensive landscaping, many residents within the subdivision have not created effective fuel free zones or broken canopy conditions around homes to affect structure ignition potential. Ignition risk is also high in the off-road recreational complex on national forest lands to the west. In high-wind fire weather conditions wind-blown embers from these public lands are likely to ignite spot fires to the east. Fire behavior is strongly affect by topography and exhibits higher intensity on slopes than flat ground. All of the homes in Mountain Ridge are situated on slopes of 10° to 20° which increases potential wildfire rates of spread. Predominance of grass and grass understory flanking high density timber supports a rapidly moving wildfire into zones prone to crown fire.

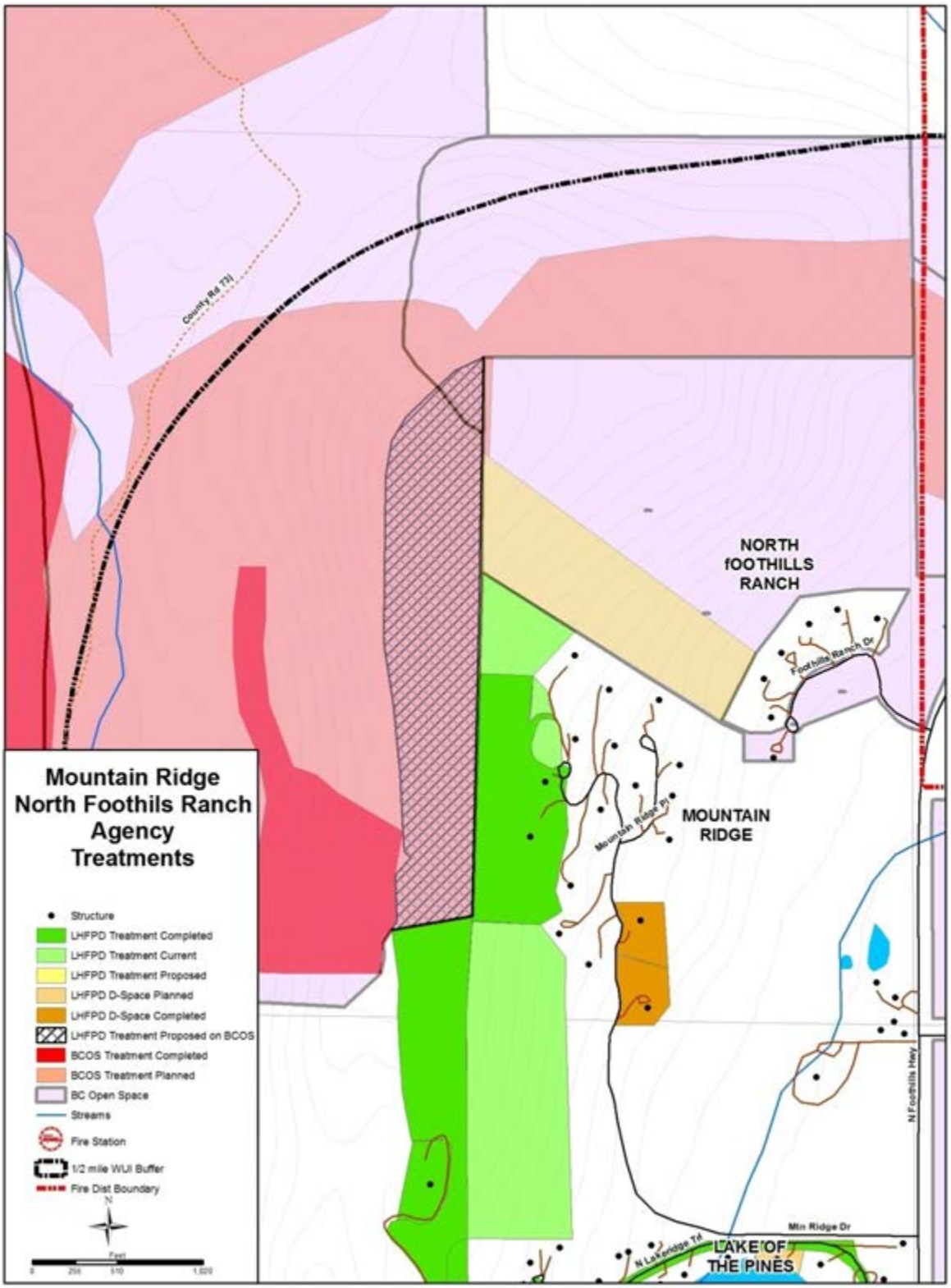
Mitigation Recommendations

- Engage residents through outreach and continuing education regarding wildfire hazards and risks, structure ignitability factors, defensible space improvements, landscape mitigation, pine beetle options, emergency planning, evacuation, and involvement with the fire department.
- Reduce structural ignitability through construction upgrades, site improvement, defensible space, and seasonal maintenance.
- Improve and maintain adequate and effective defensible space around all residences. Adequate treatment eliminates the possibility of all flames within 10 feet of the structure and large flames within 100 feet of the structure. Seasonal mowing is an effective mitigation treatment in areas where grass and grassy understory dominate the landscape. Coordinated mitigation between lots and landscape treatments to create an effective community-wide fuel break.
- Road side fall mowing/thinning is recommended along all roadside margins in the subdivision. Width of downhill treatment increases with slope. Minimum recommended fuelbreak width is 300 feet (150 feet on either side of the road) with a minimum of 10 feet crown separation on flat ground
- Additional treatment is recommended for timber stands west and northwest of the subdivision, expanding the scope of the existing fuel break, incorporating lands managed by Boulder County.
- Treatment is recommended for the dense ponderosa pine stands north of the residences in the unburned zone south of the North Foothills Ranch fire perimeter, west of North Foothills Ranch. Treatment should cover the full extent of the draw to the Dakota Hogback Ridge. Thinning should produce a minimum of 10 feet crown separation on flat ground, with greater separation on steeper slopes.
- A neighborhood task force should be created to facilitate discussion between projects stakeholders, including North Foothills Ranch, Boulder County Open Space, and the LHFPD.

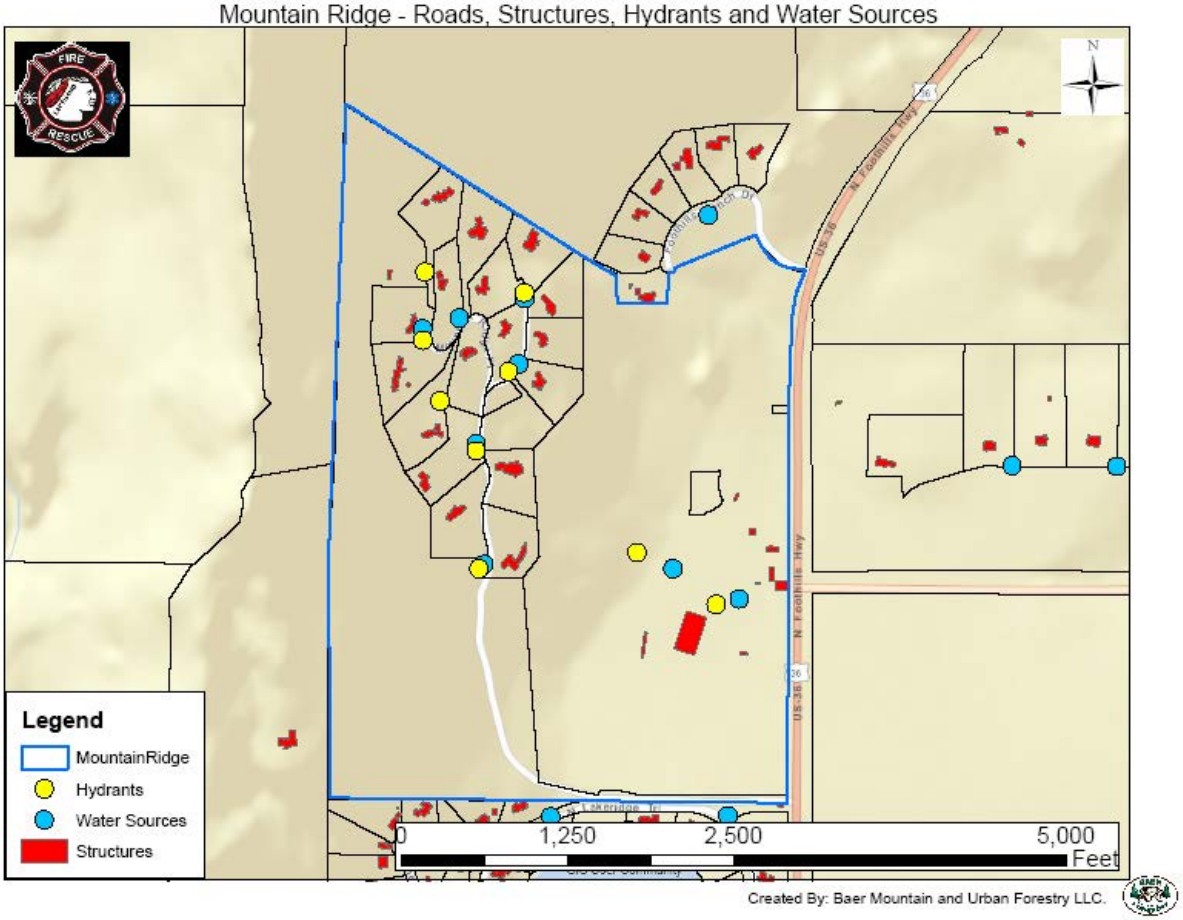
- Treatment is recommended on all adjacent lands managed Boulder County.
- Improve access to existing hydrant cistern and expand current capacity.
- Private gate should be upgraded with siren activation and clearly marked.

Current/Planned Projects: Extensive thinning treatment was conducted in the summer of ’09 on community owned open space west of the residences. Current treatment is extending a contiguous fuel break to the north and south along the slope. Collaborative mitigation is planned for adjacent lands managed by Boulder County. Two parcels have been improved to exceed minimum standards for defensible space.




Mountain Ridge
North Foothils Ranch
Agency
Treatments
Structure
LHFPD Treatment Completed
LHFPD Treatment Current
LHFPD Treatment Proposed
LHFPD D-Space Planned
LHFPD D-Space Completed
LHFPD Treatment Proposed on BCOS
BCOS Treatment Completed
BCOS Treatment Planned
BC Open Space
Streams
Fire Station
1/2 mile WUI Buffer
Fire Dist Boundary
N
Feet
0
255
510
1,020
County Rd 71i
NORTH
fOOTHILLS
RANCH
Foothills Ranch Dr
MOUNTAIN
RIDGE
Mountain Ridge Pl
N Foothills Hwy
Mtn Ridge Dr
N LaVeridge Trl
LAKE OF
THE PINES

Mountain Ridge - Roads, Structures, Hydrants and Water Sources



Lower Lefthand Canyon

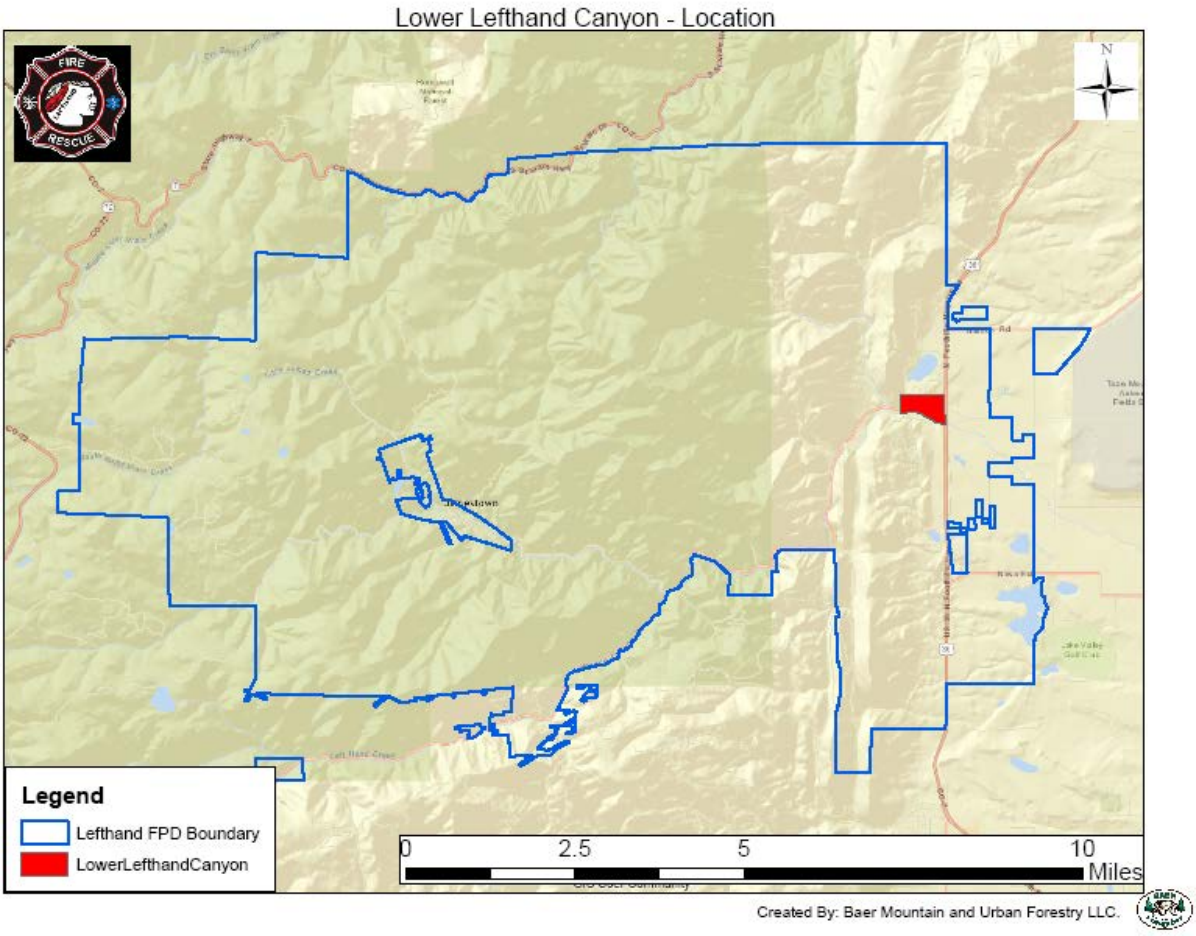
Lower Lefthand Canyon

Lower Lefthand Canyon Complex

Community Resource

Assessment · Mitigation Recommendations · Maps

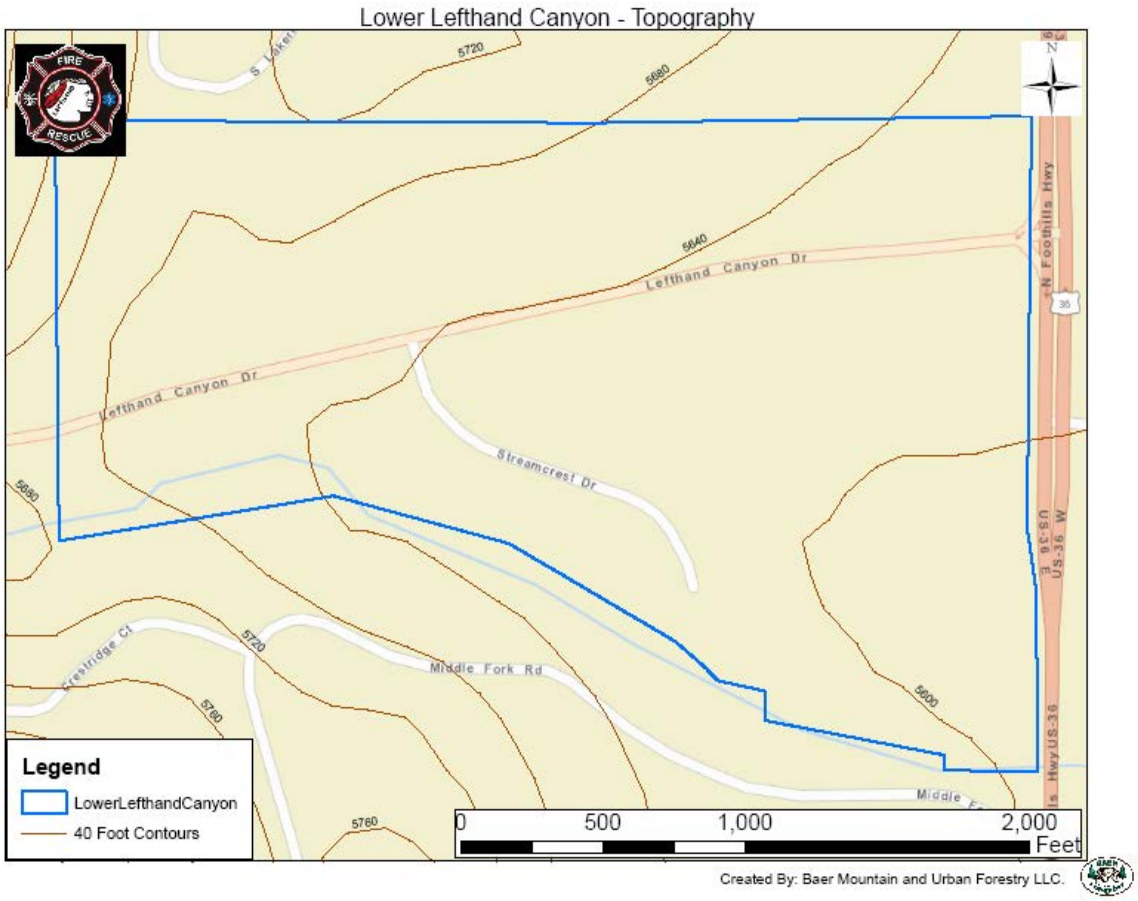
Wildfire Hazard and Risk Rating **MODERATE**



Community Size-Up

The lower Lefthand Canyon community is one of several adjacent subdivisions situated at the mouth of Lefthand Canyon that that comprise the lower Lefthand Canyon assessment area. Subdivisions in this area are individually assessed but are also grouped into the Lower Lefthand Canyon Complex for landscape-scale strategic mitigation planning. Individual community assessments are utilized to generate a suite of recommendations that address the unique wildfire hazards that affect each subdivision. The lower Lefthand Canyon community includes homes located on along Lefthand Canyon Drive, approaching the intersection of HWY 36, including the Greenbrier Restaurant, and residences

along Stream Crest Drive to the south. The area is located on flat flood plain just east of the mouth of Lefthand Canyon. Prairie grass, riparian timber and shrub, and grass understory are the primary wildland fuels. Lefthand Canyon Drive provides dual two-way access through the area. Streamcrest Drive is dead end, groomed with a wide turnaround. A pressurized hydrant is located near the intersection of Streamcrest Dr. and Lefthand Canyon Drive.



Wildfire Fire Risk and Hazard Severity Form NFPA 1144	
Lower Lefthand Canyon	
Hazard Rating 58	MODERATE
Means of Access	
Ingress and Egress	0
2 or more roads in & out	0
One road in & out	7
Road Width	1
> 24 ft	0
> 20 ft < 24 ft	2
< 20 ft	4
All-Season Road Condition	1
Surfaced Road, grade <5%	0
Surfaced Road, grade >5%	2
Non-surfaced Road, grade <5%	2
Non-surfaced Road, grade >5%	5
Other than all season	7
Fire Service Access	2
< 300 ft with turnaround	0
> 300 ft with turnaround	2
< 300 ft with no turnaround	4
> 300 ft with no turnaround	5
Street Signs (predominent)	0
Present - reflective	0
Not present	5
Vegetation (fire behavior fuel models)	
Characteristics of predominent veg w/in 300 ft	6
Light - 1, 2, 3	5
Medium - 5, 6, 7, 8, 9	10
Heavy - 4, 10	20
Slash - 11, 12, 13	25
Defensible Space - vegetation treatment around structure	8
> 100 ft around structure	1
> 70 ft < 100 ft around structure	3
> 30 ft < 70 ft around structure	10
< 30 ft around structure	25
Topography Within 300 ft of Structures	
Slope	1
< 9%	1
10% to 20%	4
21% to 30%	7
31% to 40%	8
> 41%	10
Additional Rating Factors (rate all that apply)	
Additional factors	11
Topographic feaures that adversely affect fire behavior (0 - 5)	1
Areas with a history of high fire occurance - ignition potential (0 - 5)	5
Severe fire weather potential (0 - 5)	3
Separation of adjacent structures contributing to fire spread (0 - 5)	2
Roofing Assembly	
Roofing	3
Class A	0
Class B	3
Class C	15
Unrated	25
Building construction	
Materials (predominent)	15
Non-combustible fire-resistive siding, eaves and deck	0
Non-combustible siding, eaves and combustible deck	5
Combustible siding and deck	15
Building set-back relative to slope of 30% or more	1
> 30 ft to slope	1
< 30 ft to slope	5
Available Fire Protection	
Water source availability	2
Hydrants 500 gpm < 1000 ft apart	0
Hydrants 250 gpm < 1000 ft apart	1
Non-pressurized water source > 250 gpm for 2 hours	3
Non-pressurized water source < 250 gpm for 2 hours	5
Water unavailable	10
Organized response resources	1
Station < 5 mi from structure	1
Station > 5 mi from structure	3
Fixed fire protection	3
NFPA 13, 13R, 13D sprinkler system	0
None	5
Placement of gas and Electric Utilities	
Utilities	3
Both underground	0
One above, one below	3
Both above ground	5
Totals for home or subdivision	**58**
Hazard Rating Scale	
< 40 LOW	
> 40 MODERATE	
> 70 HIGH	
> 112 EXTREME	

Topography

The area is situated on the broad flat flood plain of Lefthand Canyon Creek, just east of the mouth of the canyon. The creek provides a natural boundary with Crestview Estates to the south. The Dakota Hogback rises to the west. A low bluff separates the area from Lake of the Pines to the north.

Vegetation/Fuels

Vegetation and fuels within the assessment are characteristic of the ecotone between mixed grass prairie and riparian floodplain. Vegetation communities include mixed grass prairie (FBFM 1), grass understory (FBFM 2), and riparian forest and riparian shrubland (FBFM 6). Wetland communities are located along the creek. Grass and grass understory is the dominant fuel type in the subdivision. These conditions support low fire intensity but are characteristic of areas with frequent ignitions and high rates of spread.

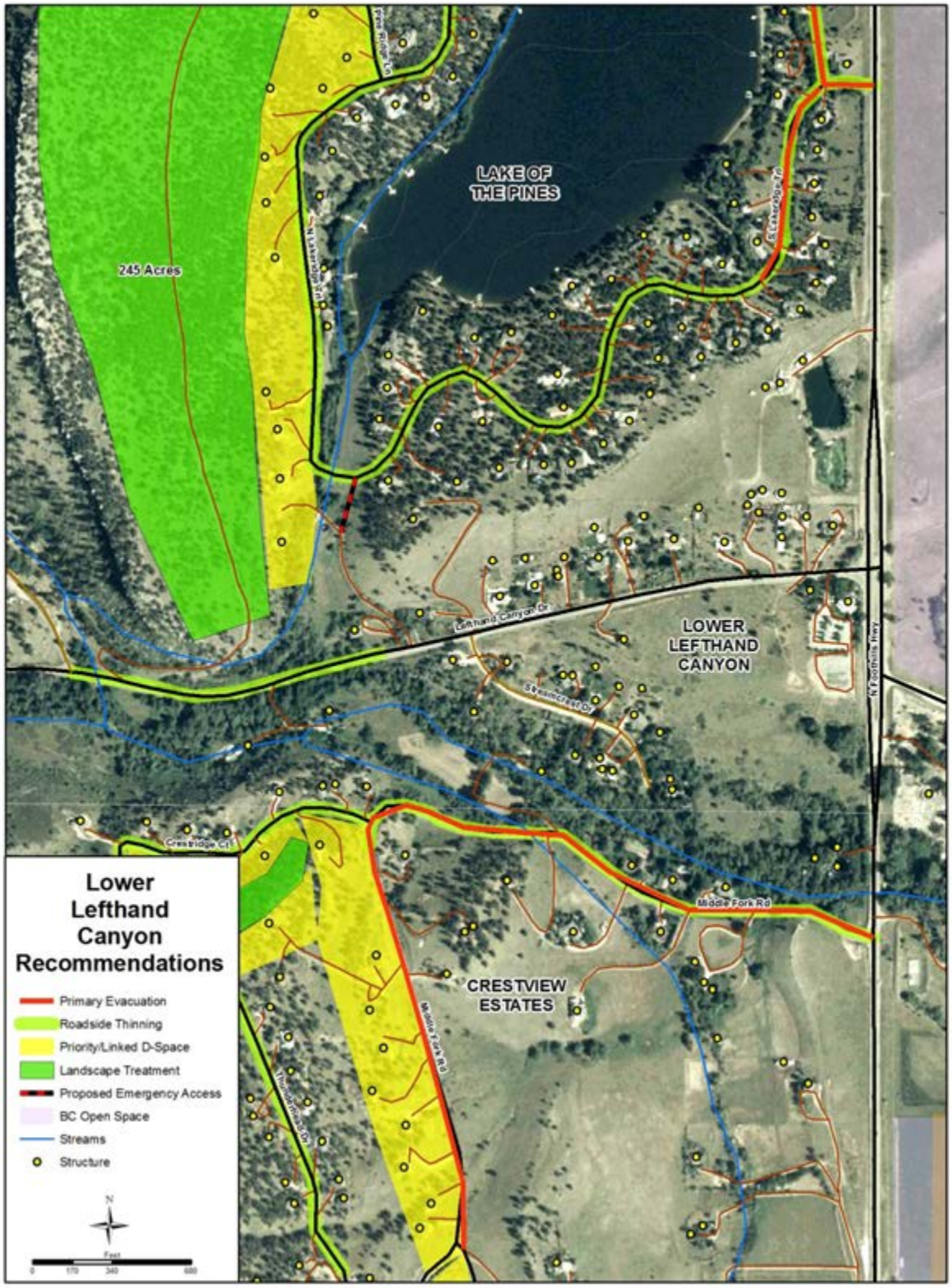
Hazard and Risk Factors

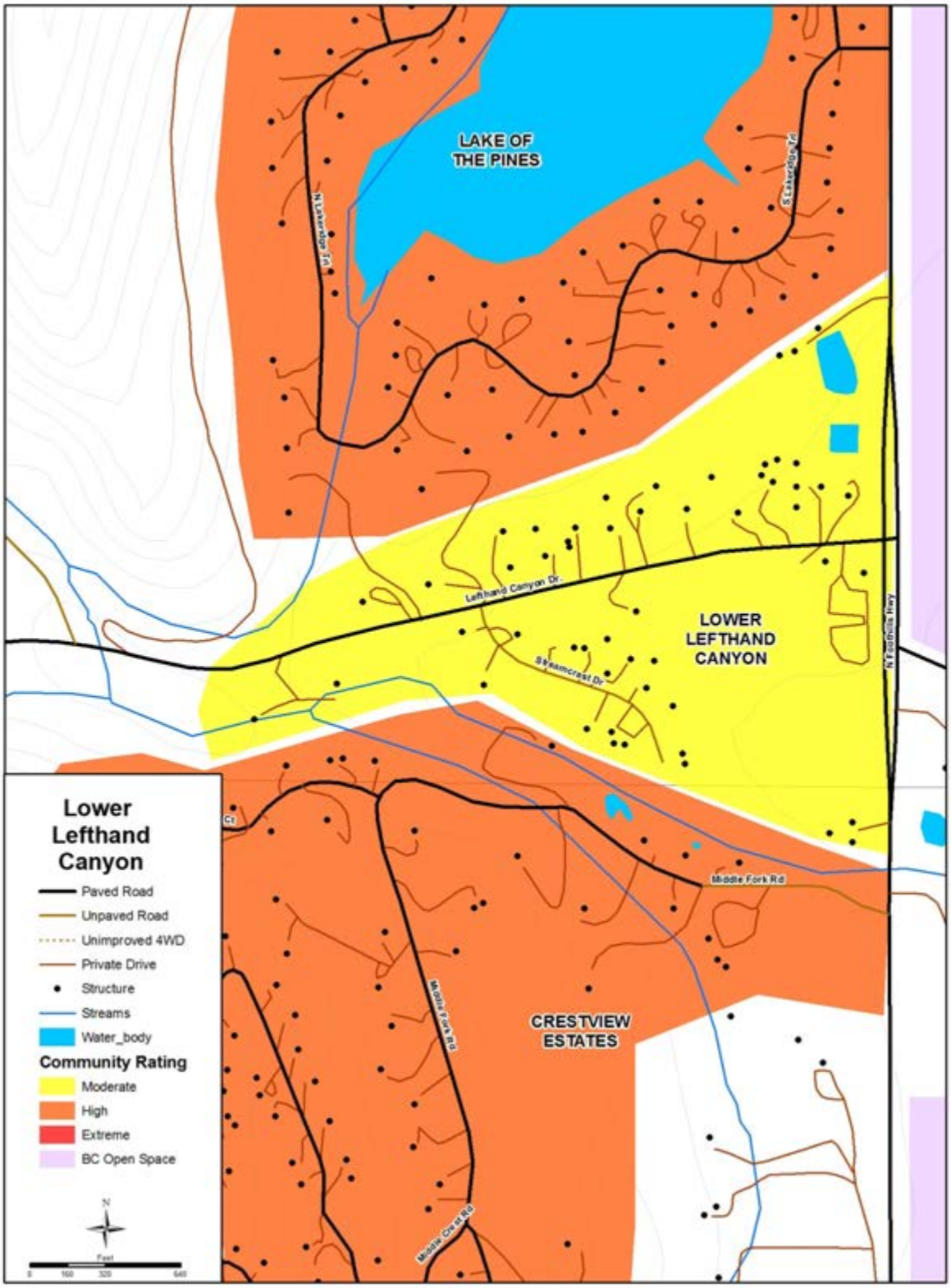
Primary hazard and risk factors for Lower Lefthand Canyon are combustible residential construction materials and unmanaged grass fuel adjacent to homes. Several homes were observed with flammable roofing construction. Above ground utilities represent a significant ignition risk in areas prone to high winds. This scenario supports a rapidly moving wildfire and a high probability of structural ignition. One pressurized hydrant is located on Streamcrest Drive. Lefthand Creek is generally not accessible as a draft resource.

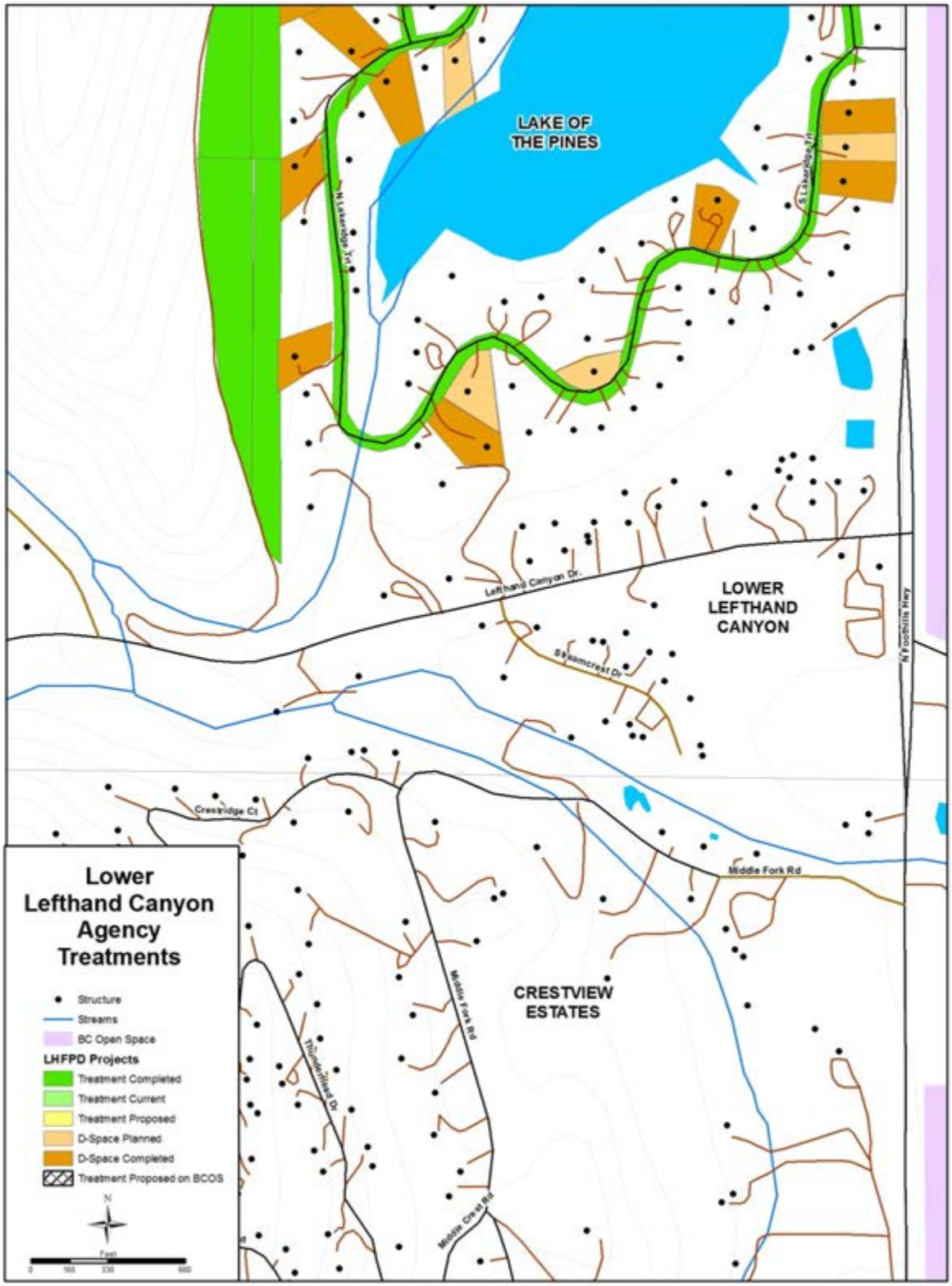
Mitigation Recommendations

- Engage residents through outreach and continuing education regarding wildfire hazards and risks, structure ignitability factors, defensible space, landscape mitigation, pine beetle options, emergency planning, evacuation, and involvement with the fire department.
- Reduce structural ignitability through construction upgrades, site improvement, defensible space, and seasonal maintenance.
- Improve and maintain adequate and effective defensible space around all residences. Adequate treatment eliminates the possibility of all flames within 10 feet of the structure and large flames within 100 feet of the structure. Seasonal mowing is an effective mitigation treatment in areas where grass and grassy understory dominate the landscape.
- Road side fall mowing is recommended along roadside margins.
- Roadside thinning is recommended for Lefthand Canyon Drive in the area of the canyon mouth. Minimum recommended fuelbreak width is 300 feet (150 feet on either side of the road) with a minimum of 10 feet crown separation on flat ground

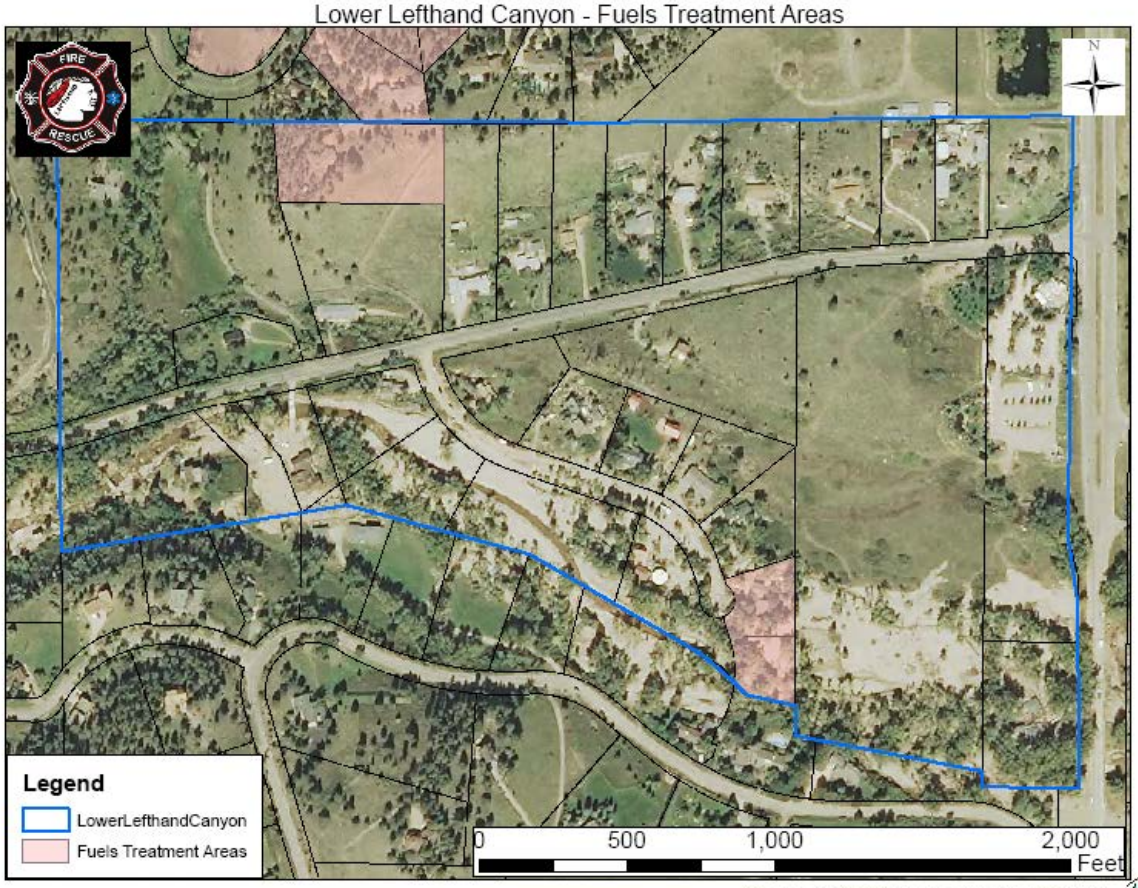
Current/Planned Projects: There are currently no active or planned projects in the assessment area.




LAKE OF THE PINES
N Lakeridge Trl
S Lakeridge Trl
Lefthand Canyon Dr
Streamcrest Dr
LOWER LEFTHAND CANYON
N Foothills Hwy
Middle Fork Rd
Middle Fork Rd
Middle Creek Rd
CRESTVIEW ESTATES
Lower Lefthand Canyon
Paved Road
Unpaved Road
Unimproved 4WD
Private Drive
Structure
Streams
Water_body
Community Rating
Moderate
High
Extreme
BC Open Space
N
East
0
160
320
640


LAKE OF THE PINES
N Lakeridge Trl
S Lakeridge Trl
Lefthand Canyon Dr
LOWER LEFTHAND CANYON
Steamcrest Dr
N Foothills Hwy
Crestridge Ct
Middle Fork Rd
CRESTVIEW ESTATES
Middle Fork Rd
Thunderhead Dr
Middle Crest Rd
Lower Lefthand Canyon Agency Treatments
Structure
Streams
BC Open Space
LHFPD Projects
Treatment Completed
Treatment Current
Treatment Proposed
D-Space Planned
D-Space Completed
Treatment Proposed on BCOS
N
Feet
0
165
330
660

Lower Lefthand Canyon - Fuels Treatment Areas



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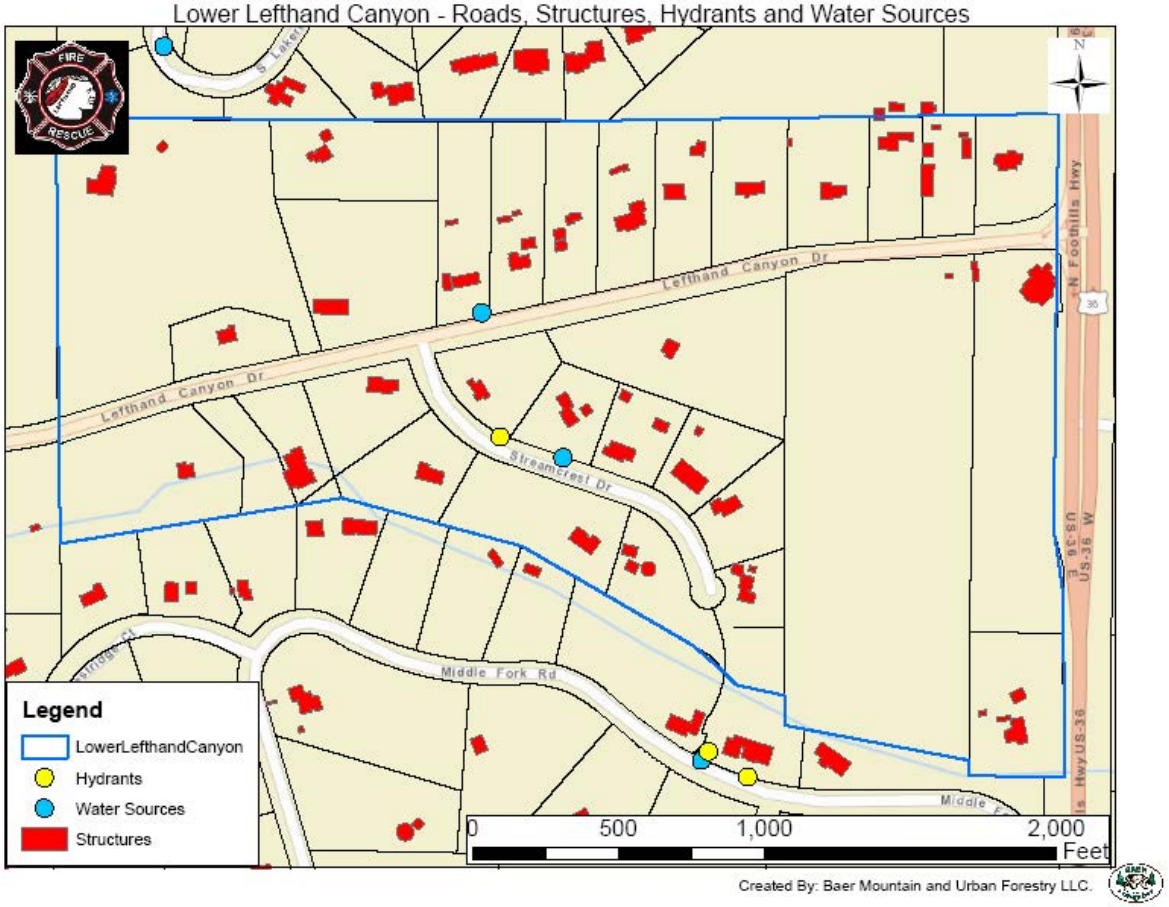
Lower Lefthand Canyon - Roads, Structures, Hydrants and Water Sources



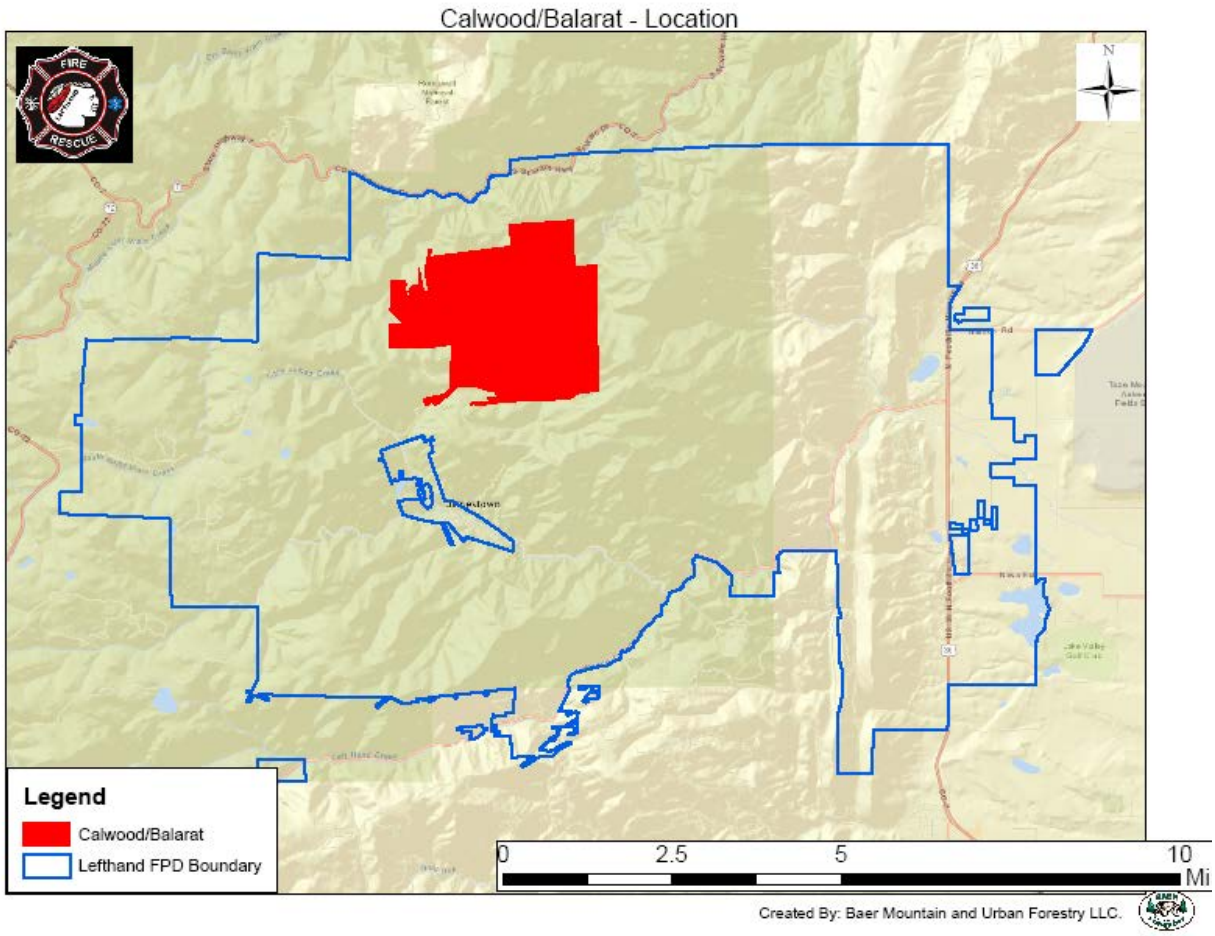
Cal-Wood/Balarat (ASI)

Cal-Wood/Balarat

Area of Special Interest

Assessment · Mitigation Recommendations · Maps

Wildfire Hazard and Risk Rating **ASI – Not Rated**



Cal-Wood

The Calvert's bequeathed their Boulder County foothills ranch in the late 1970's, along with an endowment, to the Pilot Trust with a vision that their land be used as a place for people to learn about the environment. Shortly thereafter, their special 1,000-acre mountain property was established as a private, non-profit education center called Cal-Wood. The name Cal-Wood honors and combines the names of Calvert and Larry Wood, a close friend who was instrumental in the establishment of the organization. Cal-Wood Education Center has now conducted programs for over twenty-five years that

honor the Calvert's love for sharing nature with others, particularly children. Cal-Wood remains owned and operated by the Pilot Trust.

Cal-Wood's mission provides a unique outdoor educational experience to youth and adults in a manner that will carry on the vision of Roger and Oral Calvert. To this end Cal-Wood's goals are: 1) to help all who come to Cal-Wood develop a greater appreciation or the natural world; 2) to offer environmental education to those who would not otherwise experience it; and 3) to provide unique outdoor education opportunities in a special mountain setting. To that end, school programs, specifically outreaching to low-income, multi-cultural groups, is the primary focus of the organization. The mission statement is also supported through collaborative efforts with a variety of organizations on trainings, retreats, and camps.

Our target educational audience is wide ranging as displayed below in the table below. This table shows the students Cal-Wood currently serves, this curriculum will be in addition to our already world class, on-site, scientific education program. Current trends show our student population growing every year.

Cal-Wood Programs	
Participant Groups	**Participants per Year**
General students K-12	3,800
Teachers accompanying students	300
Youths from several organizations	500
Adults from retreats	1,000
Total	**5,600**

In October of 2003 Cal-Wood made a significant and permanent commitment as stewards of this valuable foothills ecosystem. In cooperation with Boulder County Parks and Open Space a conservation easement was placed on the Cal-Wood property. This easement ensures that Cal-Wood will never be significantly developed and will always be a pristine environmental and educational resource. Likewise, it will empower Cal-Wood to practice the best possible conservation approach that honors the integrity and future history of this magnificent land.

Cal-Wood has focused considerable attention toward forest stewardship in the last three years. Approximately 900 of Cal-Wood's 1,200 acres are forested and they present a diversity of dynamic conditions, some in urgent need of attention.

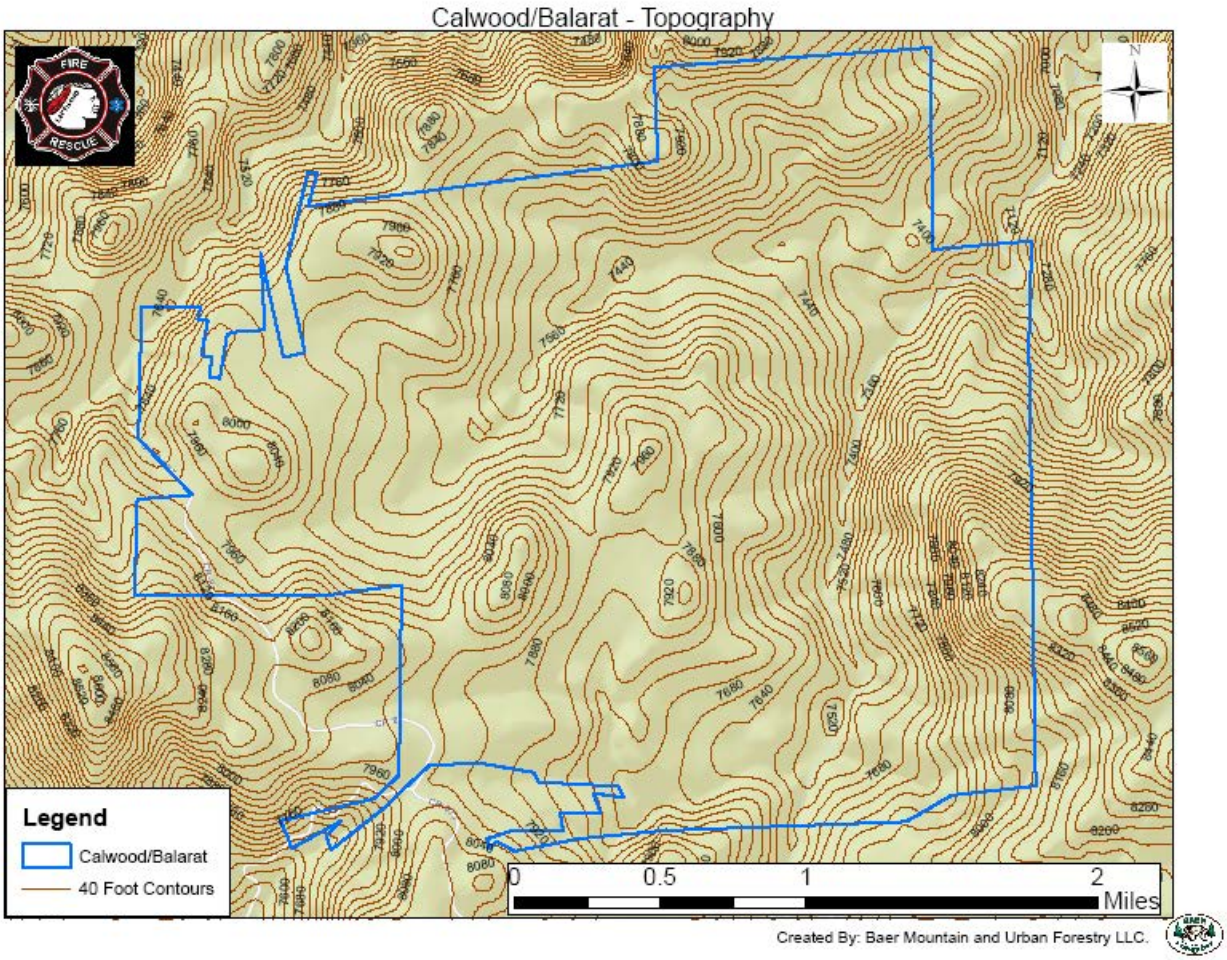
A century or so of fire suppression as well as recent severe drought has taken a toll on the forests of the Colorado Front Range. Many forested areas are extremely dense with young trees as well as dead/dying trees that would have normally been cleared with a low-intensity natural fire. Additionally, parasites such as beetles and especially dwarf mistletoe are spreading and killing trees at an alarming rate.

Cal-Wood has developed a comprehensive strategic plan, in collaboration with public land management agencies, to address fuels reduction, forest health, biomass utilization, and the development of a sustainable source of alternative energy. Plan objectives include:

- Forest fire mitigation, creating an environmentally responsible, fiscally advantageous, and fire conscious way to dispose of forest resides and wood.
- Reduce small diameter dense forest fuel.
- Control insect and disease populations within the forest.
- Install wood biomass heating system
- "Hands On" outreach education focused on, renewable biomass energy and fire mitigation.

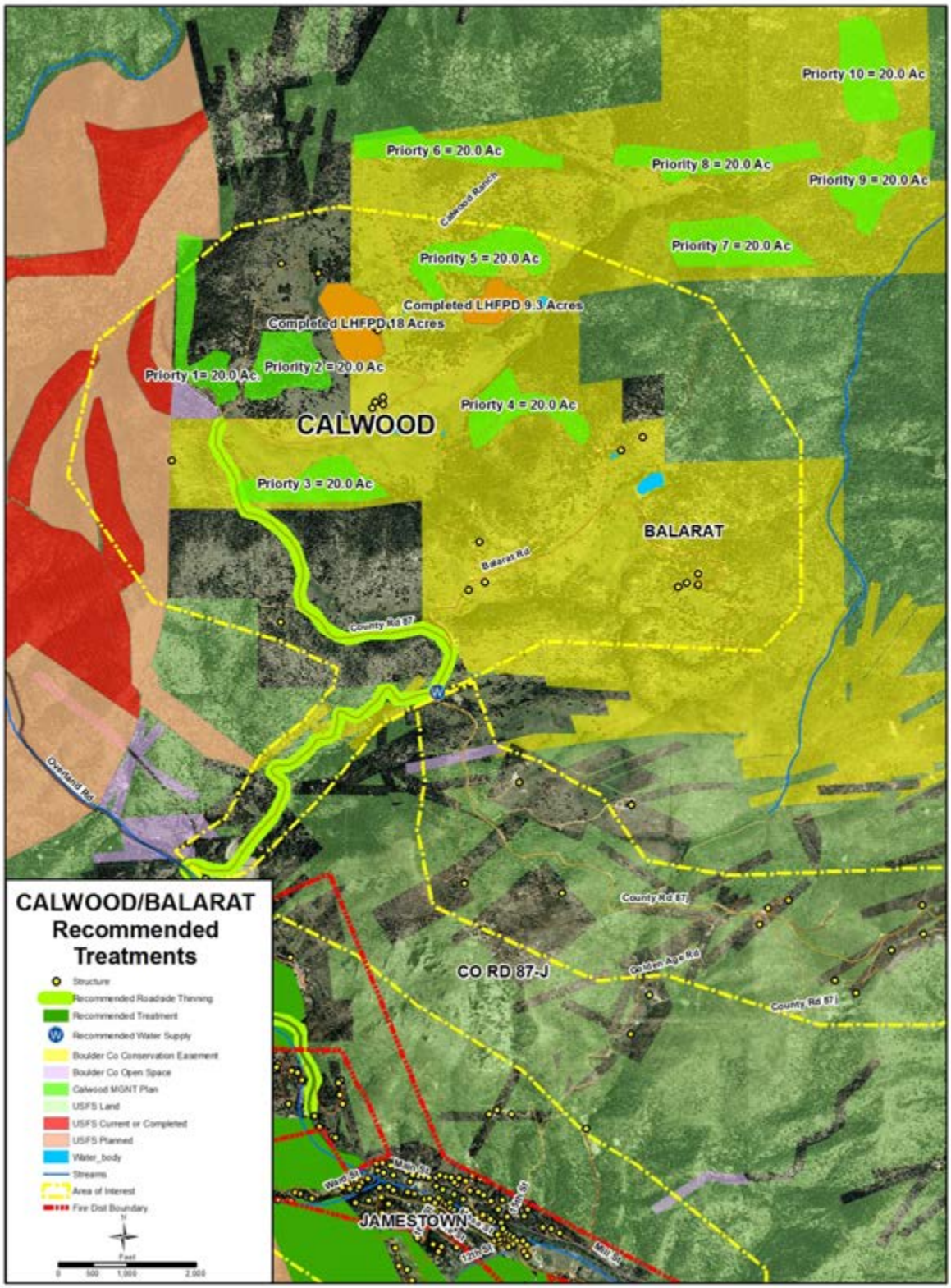
Balarat

The Balarat Outdoor Educational Center has been a part of the Denver Public Schools since the late 1960's. In 1975, Balarat launched the fifth grade residential program. Since then, Balarat has continued to offer residential programs to fifth graders, and has expanded to offer outdoor educational experiences to third graders, middle school students, and high school students. Currently Balarat Outdoor Educational Center serves over 10,000 students each year.

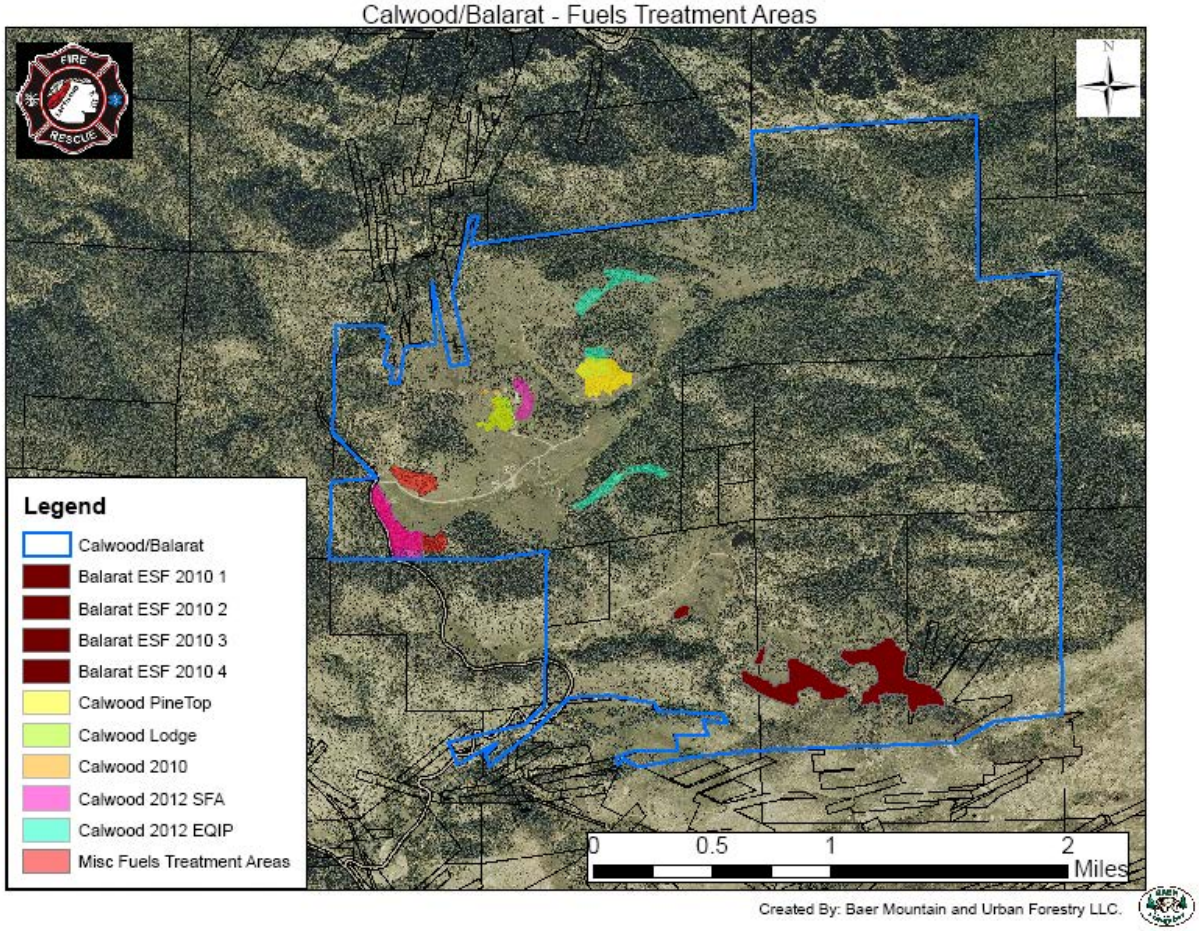


Mitigation Recommendations

- Engage residents through outreach and continuing education regarding wildfire hazards and risks, structure ignitability factors, defensible space, landscape mitigation, pine beetle options, emergency planning, evacuation, and involvement with the fire department.
- Reduce structural ignitability through construction upgrades, site improvement, defensible space, and seasonal maintenance.
- Improve and maintain adequate and effective defensible space around all residences. Adequate treatment eliminates the possibility of all flames within 10 feet of the structure and large flames within 100 feet of the structure. Seasonal mowing is an effective mitigation treatment in areas where grass and grassy understory dominate the landscape.
- Road side fall mowing is recommended along grassy roadside margins.
- Roadside thinning is recommended for County Road 87 from Overland Rd to the Cal-Wood gate. Minimum recommended fuelbreak width is 300 feet (150 feet on either side of the road) with a minimum of 10 feet crown separation on flat ground.
- Develop a formal evacuation plan for potentially +300 individuals. Coordinate with LHFPD and Boulder County Sheriff's Department.
- Engage LHFPD to coordinate collaborative mitigation and forest treatment discussions between private landowners, Cal-wood, Balarat, and the USFS for strategic planning purposes.

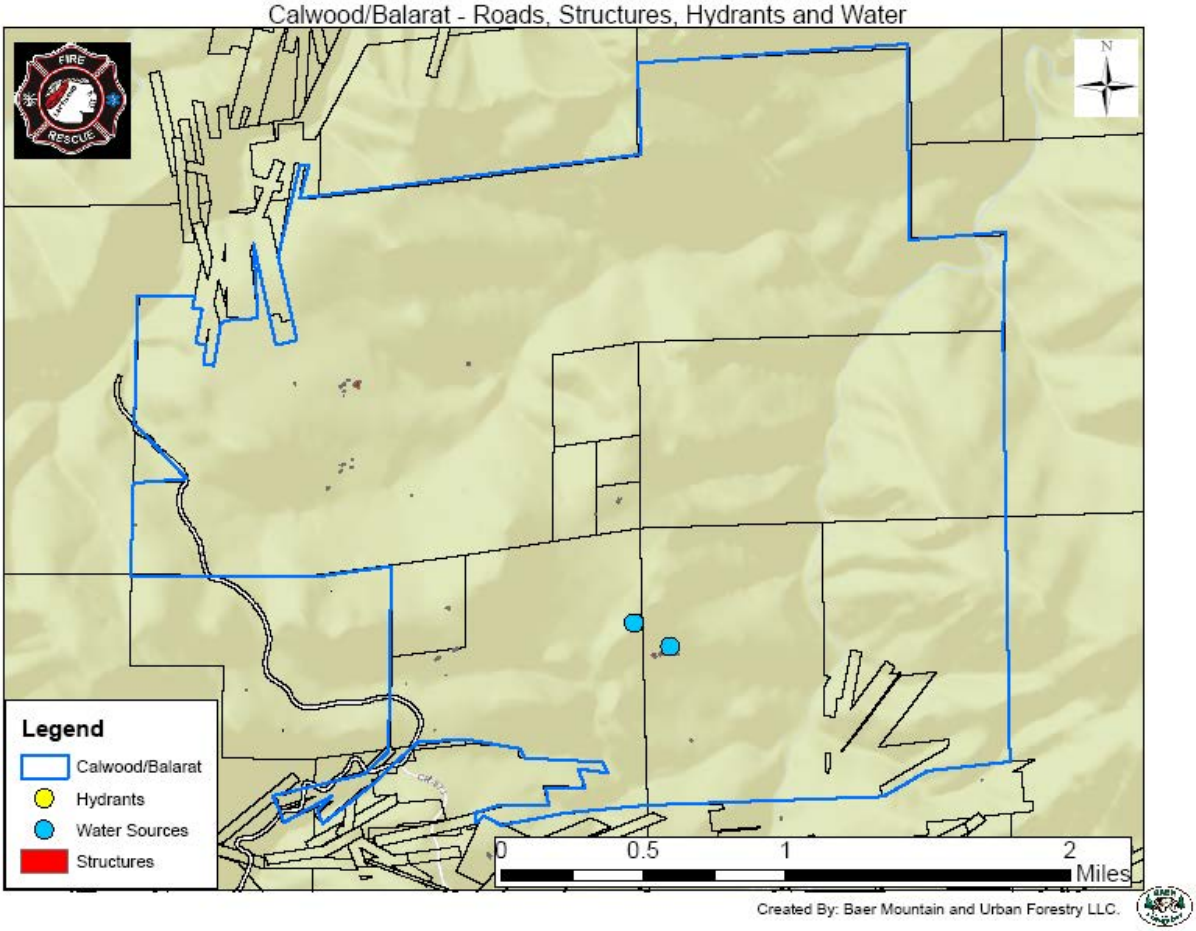

Priorty 10 = 20.0 Ac
Priorty 6 = 20.0 Ac
Priority 8 = 20.0 Ac
Priority 9 = 20.0 Ac
Calwood Ranch
Priority 7 = 20.0 Ac
Priority 5 = 20.0 Ac
Completed LHFPD 9.3 Acres
Completed LHFPD 18 Acres
Priorty 1= 20.0 Ac.
Priority 2 = 20.0 Ac
Priority 4 = 20.0 Ac
CALWOOD
Priorty 3 = 20.0 Ac
BALARAT
Balarat Rd
County Rd 87
Overland Rd
CO RD 87-J
Golden Age Rd
JAMESTOWN
Main St
Ward St
12th St
Mill St
CALWOOD/BALARAT
Recommended
Treatments
Structure
Recommended Roadside Thinning
Recommended Treatment
Recommended Water Supply
Boulder Co Conservation Easement
Boulder Co Open Space
Calwood MGNT Plan
USFS Land
USFS Current or Completed
USFS Planned
Water_body
Streams
Area of Interest
Fire Dist Boundary
N
Feet
0
500
1,000
2,000

Calwood/Balarat - Fuels Treatment Areas



Created By: Baer Mountain and Urban Forestry LLC.

Calwood/Balarat - Roads, Structures, Hydrants and Water



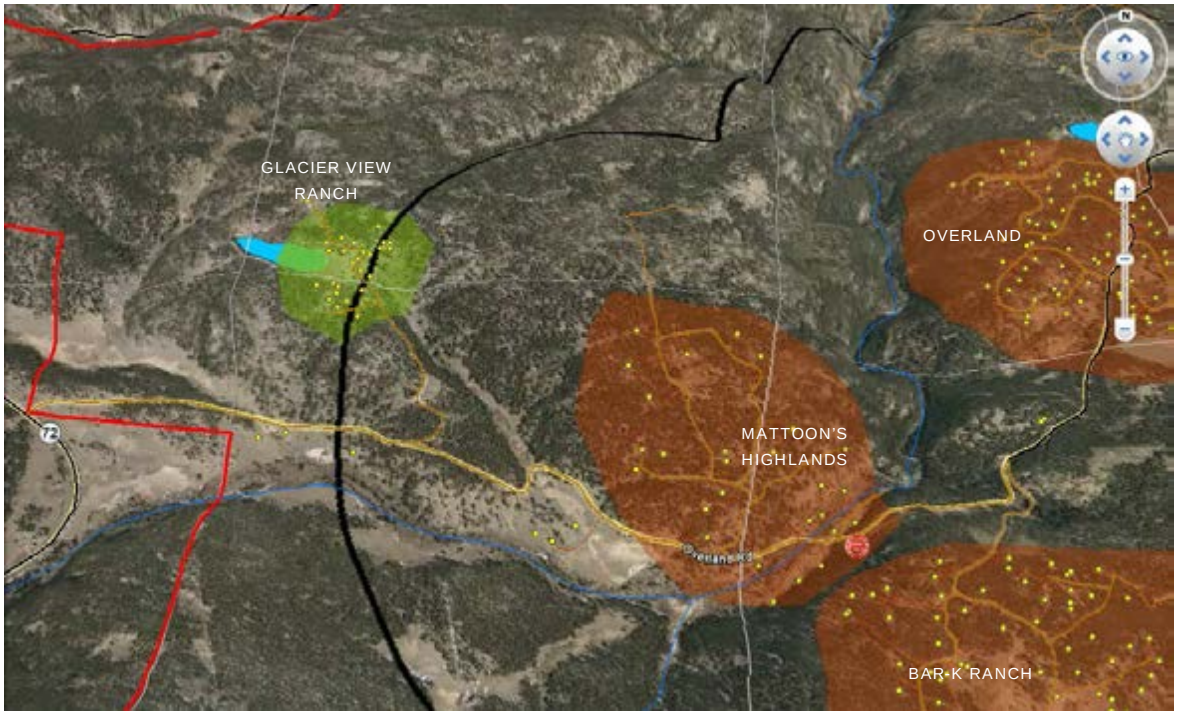
Glacier View Ranch (ASI)

Glacier View Ranch

Area of Special Interest

Assessment · Mitigation Recommendations · Maps

Wildfire Hazard and Risk Rating **ASI – Not Rated**

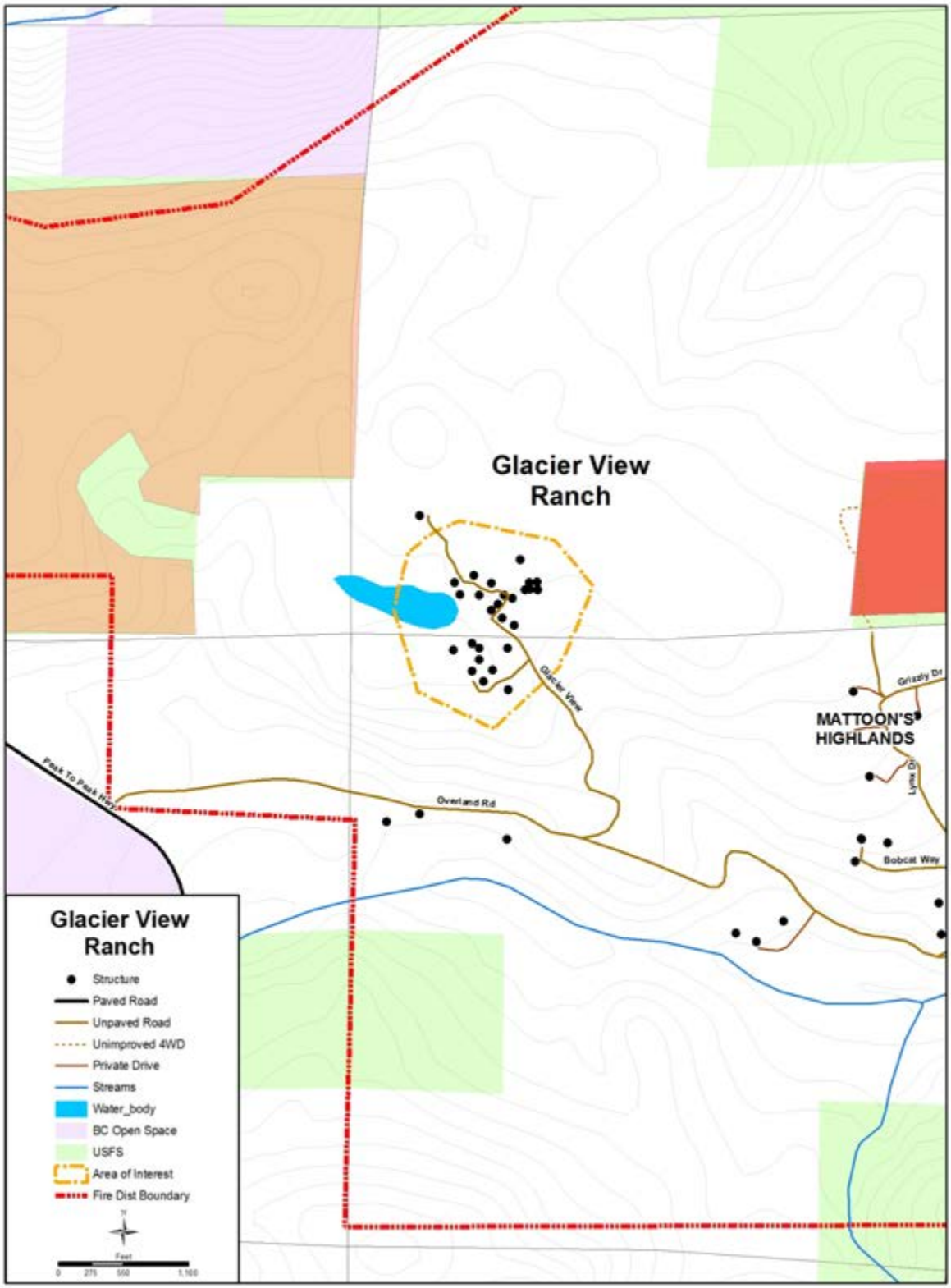


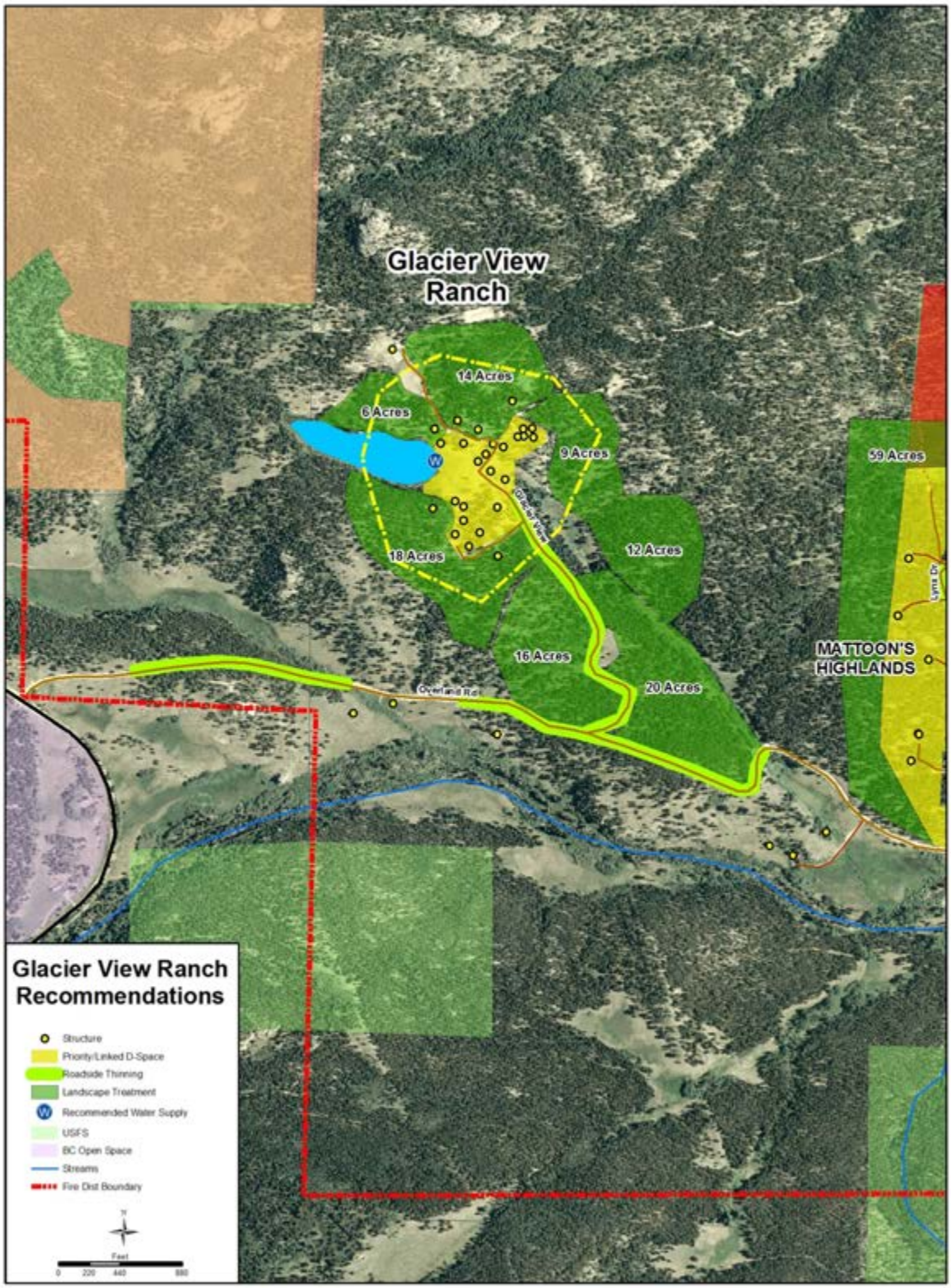
Glacier View Ranch

Glacier View Ranch is year round conference and retreat center with an interior combined lodging and conference capacity of nearly 900 people. The ranch also supports an outdoor summer camp program for teens and campsites for all visitors. The facility is located at the western margin of the fire district, north of Overland Road, northeast of the intersection of Overland Road and HWY 72. Water resources include a 100,000 gallon indoor pool, two 600 gallon spas, and a 5 acre pond. The area is surrounded by continuous forest dominated by ponderosa pine and stands of lodgepole pine on moister protected slopes. A large meadow dominates the Ceran Saint Vrain drainage to the south.

Recommendations

- Securing a safe evacuation route to Overland Rd with roadside thinning along primary access
- Ensure emergency access to existing water supplies
- Create defensible space around lodge facilities
- Thinning treatments for adjacent timber stands


Glacier View Ranch
MATTOON'S HIGHLANDS
Glacier View
Grizzly Dr
Lynx Dr
Bobcat Way
Overland Rd
Peak To Peak Hwy
Glacier View Ranch
Structure
Paved Road
Unpaved Road
Unimproved 4WD
Private Drive
Streams
Water_body
BC Open Space
USFS
Area of Interest
Fire Dist Boundary
N
Feet
0 275 550 1,100


Glacier View Ranch
14 Acres
6 Acres
9 Acres
59 Acres
18 Acres
12 Acres
16 Acres
20 Acres
MATTOON'S HIGHLANDS
Overland Rd
Glacier View Ranch Recommendations
Structure
Priority/Linked O-Space
Roadside Thinning
Landscape Treatment
Recommended Water Supply
USFS
BC Open Space
Streams
Fire Dist Boundary
N
Feet
0 220 440 880

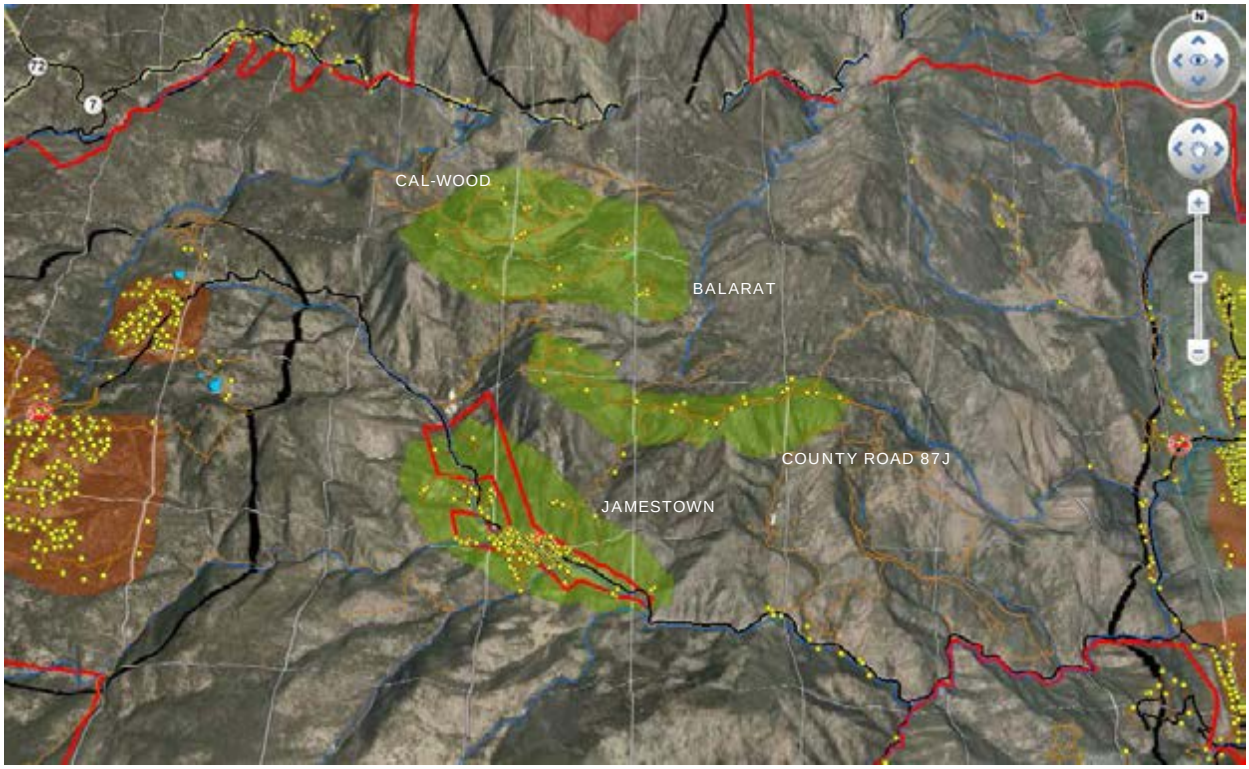
Jamestown (ASI)

Jamestown

Area of Special Interest

Assessment · Mitigation Recommendations · Maps

Wildfire Hazard and Risk Rating **ASI – Not Rated**



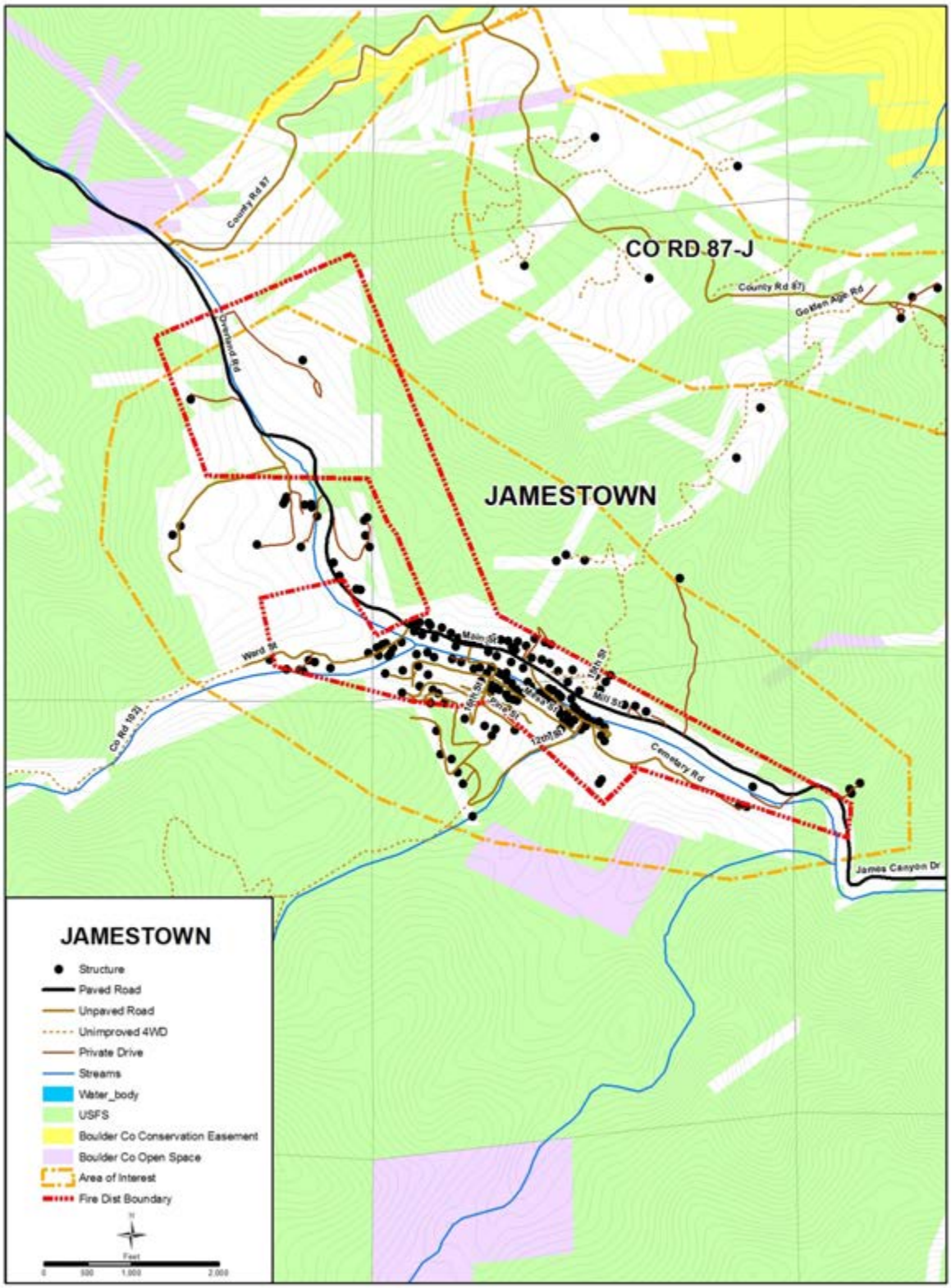
Jamestown

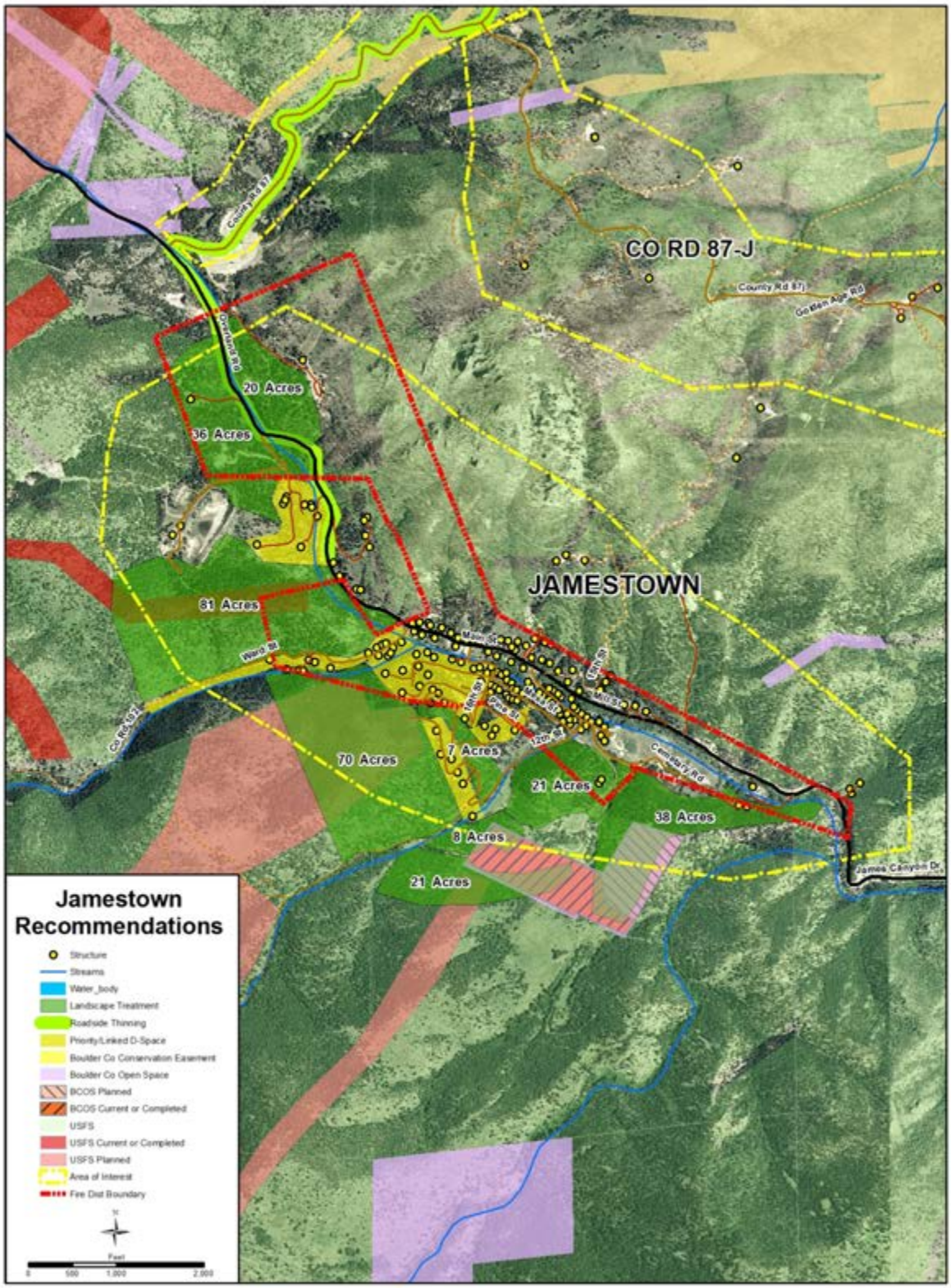
As of the 2000 census there were 205 people, 96 households, and 52 families living in Jamestown. The town is surrounded by USFS land and the LHFPD. Jamestown maintains an all-volunteer fire department but with a very limited service area lacks a call count that provides adequate practical experience. Department response to wildfire incidents is largely limited to mutual aid requests from surrounding agencies. The northern margin of the town was grazed by the Overland Fire, 2003. Although the fire was a devastating event, it drastically modified and reduced hazardous fuel loads to the north. There are several pressurize hydrants and draft sites located within the town limits.

Recommendations

- Coordinate creating a linked defensible space environment for properties on the south side of town adjacent to USFS lands and within the subdivision at the town's west margin
- Conduct roadside thinning along Overland Rd, west of town to the Balarat Rd turnoff

- Conduct landscape-scale thinning treatments in identified timber stands west and south of town to augment linked defensible space improvements and roadside thinning efforts
- Collaborate with the USFS to prioritize and enhance planned treatments to augment linked defensible space and landscape treatments on private land.
- Investigate a formal merger with LHFPD.


CO RD 87-J
JAMESTOWN
County Rd 87
Overland Rd
County Rd 87J
Golden Age Rd
Ward St
Co Rd 87J
Main St
Mill St
Cemetery Rd
James Canyon Dr
JAMESTOWN
Structure
Paved Road
Unpaved Road
Unimproved 4WD
Private Drive
Streams
Water_body
USFS
Boulder Co Conservation Easement
Boulder Co Open Space
Area of Interest
Fire Dist Boundary
Feet
0
500
1,000
2,000


CO RD 87-J
JAMESTOWN
20 Acres
36 Acres
81 Acres
70 Acres
7 Acres
21 Acres
38 Acres
8 Acres
21 Acres
Jamestown Recommendations
Structure
Streams
Water_body
Landscape Treatment
Roadside Thinning
Priority/Linked O-Space
Boulder Co Conservation Easement
Boulder Co Open Space
BCOS Planned
BCOS Current or Completed
USFS
USFS Current or Completed
USFS Planned
Area of Interest
Fire Dist Boundary

County Road 87J (ASI)

County Road 87J

Area of Special Interest

Mitigation Recommendations · Maps

Wildfire Hazard and Risk Rating **ASI – Not Rated**

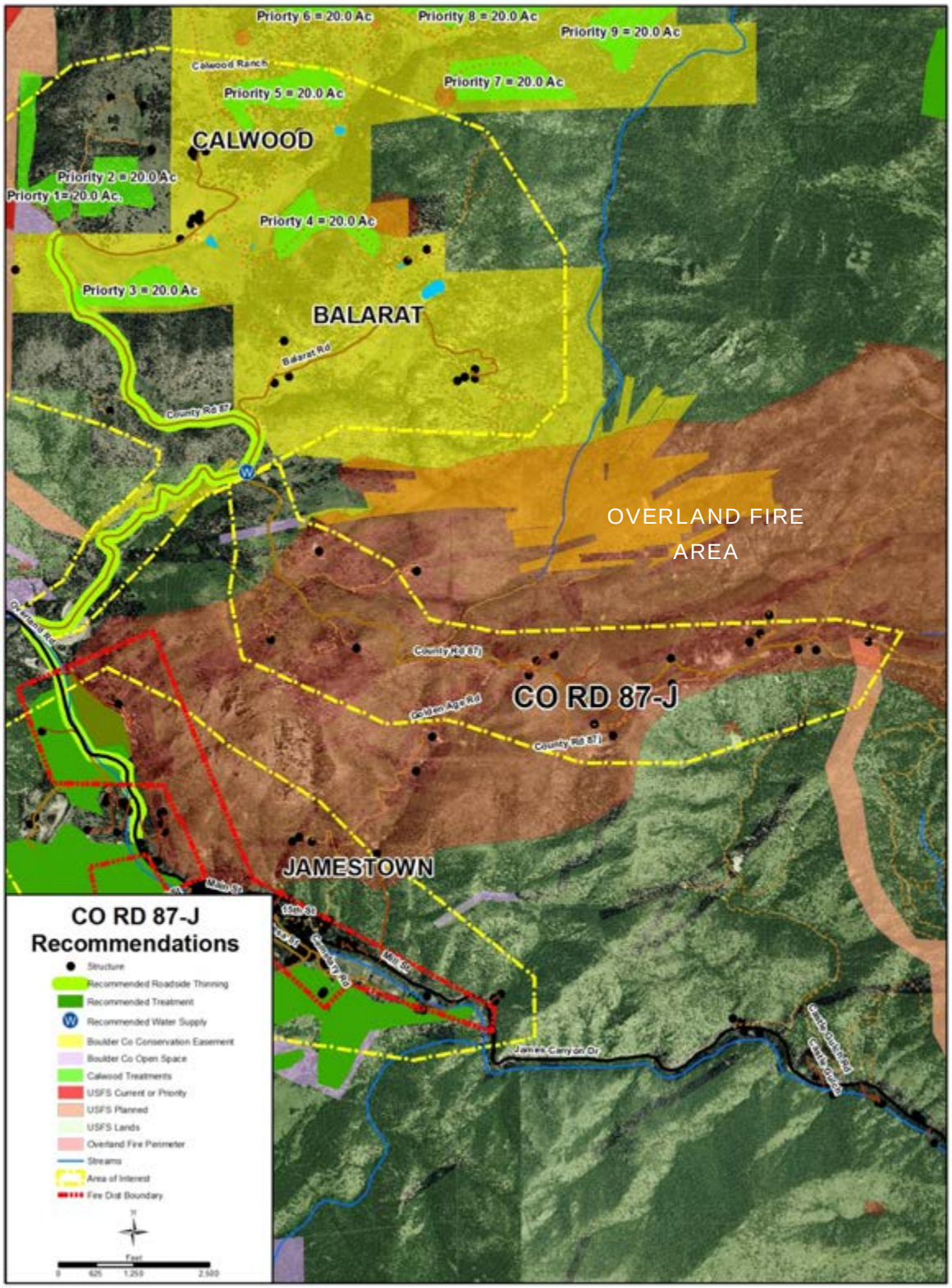
MAP

County Road 87J

County Road 87J is accessed from the Balarat access road and runs along the ridge just north of Jamestown. This is essentially a 3 mile long dead end road that serves over a dozen residences. The only ingress/egress is a steep, sometimes single lane dirt road that climbs steep ravine from Overland Road. Due to the areas limited access, lack of resources, road length, and precarious geographic location above Jamestown, Co Road 87J is an extreme hazard and risk scenario for both residents and emergency responders. The area was devastated during the Overland Fire, 2003 with the loss of 10 residences and near entrapment of several holdout residents. The fire also greatly modified and reduced hazardous fuel loads in the area.

Recommendations

- Install a static emergency water source at the intersection of 87J and Balarat road.
- Construct turnarounds midway and at the terminus of the road.
- Include residents in LHFPD community outreach program.
- Coordinate and collaborate with USFS planned mitigation projects in the area.


Priority 6 = 20.0 Ac
Priority 8 = 20.0 Ac
Priority 9 = 20.0 Ac
Calwood Ranch
Priority 5 = 20.0 Ac
Priority 7 = 20.0 Ac
CALWOOD
Priority 2 = 20.0 Ac
Priority 1 = 20.0 Ac
Priority 4 = 20.0 Ac
Priority 3 = 20.0 Ac
BALARAT
Balarat Rd
County Rd 87
OVERLAND FIRE AREA
County Rd 87J
CO RD 87-J
Golden Age Rd
County Rd 87J
JAMESTOWN
Main St
James Canyon Dr
CO RD 87-J Recommendations
Structure
Recommended Roadside Thinning
Recommended Treatment
Recommended Water Supply
Boulder Co Conservation Easement
Boulder Co Open Space
Calwood Treatments
USFS Current or Priority
USFS Planned
USFS Lands
Overland Fire Perimeter
Streams
Area of Interest
Fire Dist Boundary
Feet
0
625
1,250
2,500

11 APPENDIX B

LHFPD District Maps

Managed Lands

Vegetation

Topography

Fire Behavior Fuel Models

Burned Area Fire History

LHFPD Station Locations

12 APPENDIX C

FIREWISE & Defensible Space Documents

13 APPENDIX D

Grant and Tax Information