



# Evergreen Fire Protection District Community Wildfire Protection Plan



September 28, 2007  
Walsh Project Number: 7404-040





Environmental Scientists and Engineers, LLC

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# EVERGREEN FIRE PROTECTION DISTRICT COMMUNITY WILDFIRE PROTECTION PLAN

September 28, 2007

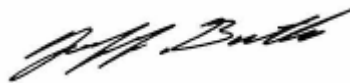
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Environmental Scientists and Engineers, LLC

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# Community Wildfire Protection Plan

Evergreen Fire Protection District  
Jefferson County, Clear Creek County, Colorado

October, 2007

## Introduction

This Community Wildfire Protection Plan (CWPP) was developed for the Evergreen Fire Protection District with guidance and support from the Jefferson County Division of Emergency Management, Colorado State Forest Service, and U.S. Forest Service. The CWPP was developed according to 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). This CWPP supplements the Jefferson County and Clear Creek County Annual Operating Plans and the Jefferson County Fire Plan.

## Wildfire Prevention and Fire Loss Mitigation

The Jefferson County Division of Emergency Management, the Jefferson County Fire Council, and the Evergreen Fire Protection District support and promote Firewise activities as outlined in the Jefferson County Fire Plan.

## Protection Capability

Initial response to all fire, medical, and associated emergencies within the Evergreen Fire Protection District is the responsibility of Evergreen Fire Rescue. Wildland fire responsibilities of local fire departments, Jefferson and Clear Creek Counties, the Colorado State Forest Service, U.S. Forest Service, Bureau of Land Management, and the U.S. Fish and Wildlife Service are described in the current Jefferson and Clear Creek Counties Annual Operating Plans. All mutual aid agreements, training, equipment, and response are the responsibility of the local fire department and the agencies listed above.

The following agencies have reviewed and agree to this Community Wildfire Protection Plan.

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USDA Forest Service, Arapaho/Roosevelt National Forest

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Golden District, Colorado State Forest Service

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Jefferson County Division of Emergency Management

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Evergreen Fire Protection District



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## List of Acronyms and Abbreviations

AOP	Annual Operating Plan
BTU	British thermal unit
CAPCD	Colorado Air Pollution Control Division
CDPHE	Colorado Department of Public Health and Environment
CRWB	Crew Bosses
CSFS	Colorado State Forest Service
CWPP	Community Wildfire Protection Plan
EFPD	Evergreen Fire Protection District
EFR	Evergreen Fire/Rescue
ENGB	Engine Bosses
ERC	Energy Release Component
F	Fahrenheit
FBFM	Fire Behavior Fuel Model
FEMA	Federal Emergency Management Agency
FPD	Fire Protection District
GIS	Geographic Information System
HFRA	Healthy Forests Restoration Act
HOA	Homeowners Association
ICT	Incident Command Team
ICT3	Incident Commander Type 3
IMT	Incident Management Team
JFDRS	Jefferson County Fire Danger Rating System
mph	miles per hour
NEPA	National Environmental Policy Act
NFDRS	National Fire Danger Rating System
NFPA	National Fire Protection Association
NWCG	National Wildfire Coordinating Group
PPE	Personal Protective Equipment
PTB	Position Task Books
RAWS	Remote Automated Weather Stations
TFLD	Taskforce Leaders
USFS	U.S. Forest Service
WALSH	Walsh Environmental Scientists and Engineers, LLC
WFU	Wildland Fire Use
WUI	Wildland-Urban Interface



## List of Fire Behavior Terms

<b>Aerial Fuels</b>	All live and dead vegetation in the forest canopy or above surface fuels, including tree branches, twigs and cones, snags, moss, and high brush.
<b>Aspect</b>	Direction a slope faces.
<b>Chain</b>	A unit of linear measurement equal to 66 feet.
<b>Chimney</b>	A steep gully or canyon conducive to channeling strong convective currents, potentially resulting in dangerous increases in rates of fire spread and fireline intensity.
<b>Crown Fire</b>	The movement of fire through the crowns of trees or shrubs more or less independently of the surface fire.
<b>Dead Fuels</b>	Fuels with no living tissue in which moisture content is governed almost entirely by atmospheric moisture (relative humidity and precipitation), dry-bulb temperature, and solar radiation.
<b>Defensible Space</b>	An area either natural or manmade where material capable of causing a fire to spread has been treated, cleared, reduced, or changed to act as a barrier between an advancing wildland fire and the loss to life, property, or resources. In practice, “defensible space” is defined as an area a minimum of 30 feet around a structure that is cleared of flammable brush or vegetation.
<b>Direct Attack</b>	A method of fire suppression where actions are taken directly along the fire’s edge. In a direct attack, burning fuel is treated directly, by wetting, smothering, or chemically quenching the fire or by physically separating burning from unburned fuel.
<b>Fire Behavior</b>	The manner in which a fire reacts to the influences of fuel, weather, and topography.
<b>Fire Danger</b>	The broad-scale condition of fuels as influenced by environmental factors.
<b>Fire Front</b>	The part of a fire within which continuous flaming combustion is taking place. Unless otherwise specified the fire front is assumed to be the leading edge of the fire perimeter. In ground fires, the fire front may be mainly smoldering combustion.
<b>Fire Hazard</b>	The presence of ignitable fuel coupled with the influences of terrain and weather.

<b>Fire Intensity</b>	A general term relating to the heat energy released by a fire.
<b>Fire Regime</b>	The characterization of fire's role in a particular ecosystem, usually characteristic of particular vegetation and climatic regime, and typically a combination of fire return interval and fire intensity (i.e., high frequency low intensity/low frequency high intensity).
<b>Fire Weather</b>	Weather conditions that influence fire ignition, behavior, and suppression.
<b>Flame Length</b>	The distance from the base to the tip of the flaming front. Flame length is directly correlated with fire intensity.
<b>Flaming Front</b>	The zone of a moving fire where combustion is primarily flaming. Behind this flaming zone combustion is primarily glowing. Light fuels typically have a shallow flaming front, whereas heavy fuels have a deeper front.
<b>Forest Improvement District</b>	A special district created pursuant to Article 18 of the Colorado State Revised Statutes that protects communities from wildfires and improves the condition of forests in the District.
<b>Fuel Loading</b>	The amount of fuel present expressed quantitatively in terms of weight of fuel per unit area.
<b>Fuel Model</b>	Simulated fuel complex (or combination of vegetation types) for which all fuel descriptors required for the solution of a mathematical rate of spread model have been specified.
<b>Fuel Type</b>	An identifiable association of fuel elements of a distinctive plant species, form, size, arrangement, or other characteristics that will cause a predictable rate of fire spread or difficulty of control under specified weather conditions.
<b>Fuel</b>	Combustible material that includes vegetation such as grass, leaves, ground litter, plants, shrubs, and trees that feed a fire. Not all vegetation is necessarily considered fuel. Deciduous vegetation such as aspen actually serve more as a barrier to fire spread and many shrubs are only available as fuels when they are drought-stressed.
<b>Ground Fire</b>	Fire that consumes the organic material beneath the surface litter ground, such as a peat fire.
<b>Ground Fuel</b>	All combustible materials below the surface litter, including duff, tree or shrub roots, punchy wood, peat, and sawdust that normally support a glowing combustion without flame.

<b>Indirect Attack</b>	A method of fire suppression where actions are taken some distance from the active edge of the fire due to intensity, terrain, or other factors that make direct attack difficult or undesirable.
<b>Intensity</b>	The level of heat radiated from the active flaming front of a fire, measured in British thermal units (BTUs) per foot.
<b>Ladder Fuels</b>	Fuels that provide vertical continuity between strata, thereby allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease. Ladder fuels help initiate and ensure the continuation of crowning.
<b>Live Fuels</b>	Living plants, such as trees, grasses, and shrubs, in which the seasonal moisture content cycle is controlled largely by internal physiological mechanisms, rather than by external weather influences.
<b>National Fire Danger Rating System (NFDRS)</b>	A uniform fire danger rating system that focuses on the environmental factors that control the moisture content of fuels.
<b>One-Hour Timelag Fuels</b>	(a.k.a. one-hour fuels) Fuels consisting of dead herbaceous plants and roundwood less than about ¼ inch (6.4 mm) in diameter. Also included is the uppermost layer of needles or leaves on the forest floor.
<b>One-Hundred-Hour Timelag Fuels</b>	(a.k.a. hundred-hour fuels) Dead fuels consisting of roundwood in the size range of 1 to 3 inches (2.5 to 7.6 cm) in diameter and very roughly the layer of litter extending from approximately ¾ of an inch (1.9 cm) to 4 inches (10 cm) below the surface.
<b>One-Thousand-Hour Timelag Fuels</b>	(a.k.a. thousand-hour fuels) Dead fuels consisting of roundwood 3 to 8 inches in diameter and the layer of the forest floor more than about 4 inches below the surface.
<b>Prescribed Fire</b>	Any fire ignited by management actions under certain predetermined conditions to meet specific objectives related to hazardous fuels or habitat improvement. A written, approved prescribed fire plan must exist, and National Environmental Policy Act (NEPA) requirements must be met prior to ignition.
<b>Rate of Spread</b>	The relative activity of a fire in extending its horizontal dimensions. It is expressed as a rate of increase of the total perimeter of the fire, rate of forward spread of the fire front, or rate of increase in area, depending on the intended use of the information. Usually it is expressed in chains or acres per hour for a specific period in the fire's history.

Sometimes it is expressed as feet per minute; one chain per hour is equal to 1.1 feet per minute.

<b>Risk</b>	The probability that a fire will start from natural- or human-caused ignition.
<b>Surface Fire</b>	Fire that burns loose debris on the surface, which includes dead branches, leaves, and low vegetation.
<b>Surface Fuels</b>	Loose surface litter on the soil surface, normally consisting of fallen leaves or needles, twigs, bark, cones, and small branches that have not yet decayed enough to lose their identity; also grasses, forbs, low and medium shrubs, tree seedlings, heavier branchwood, downed logs, and stumps interspersed with or partially replacing the litter.
<b>Ten-Hour Timelag Fuels</b>	(a.k.a. ten-hour fuels) Dead fuels consisting of roundwood $\frac{1}{4}$ to 1 inch (0.6 to 2.5 cm) in diameter and, very roughly, the layer of litter extending from immediately below the surface to $\frac{3}{4}$ inch (1.9 cm) below the surface.
<b>Topography</b>	Referred to as “terrain.” The term also refers to parameters of the “lay of the land” that influence fire behavior and spread. Key elements are slope (in percent), aspect (the direction a slope faces), elevation, and specific terrain features such as canyons, saddles, “chimneys,” and chutes.
<b>Torching</b>	(a.k.a. passive crown fire) The burning of the foliage of a single tree or a small group of trees, from the bottom up.
<b>Wildfire</b>	An unplanned and unwanted wildland fire that is not meeting management objectives and thus requires a suppression response.
<b>Wildland Fire</b>	Any fire burning in wildland fuels, including prescribed fire, fire use, and wildfire.
<b>Wildland Fire Use</b>	The management of naturally ignited wildland fires to accomplish specific pre-stated resource management objectives in pre-defined geographic areas outlined in fire management plans.

Source: NWCG 1996

## EXECUTIVE SUMMARY

The Community Wildfire Protection Plan (CWPP) is a strategic plan that identifies specific wildland fire hazard and risks facing communities and neighborhoods, and provides prioritized mitigation recommendations that are designed to reduce those hazards and risks. Once the CWPP is finalized and adopted, it is the responsibility of the community or neighborhood to move forward and implement the action items. This may require further planning at the project level, acquisition of funds, or simply motivating individual homeowners. It should be emphasized that the CWPP is a living document to be revisited on a regular basis and revised as needed.

This CWPP is not a legal document. There is no legal requirement to implement the recommendations herein. However, treatments on private land may require compliance with county land use codes, building codes, local covenants, and treatments on public lands will be carried out by appropriate agencies and may be subject to federal, state, and county policies and procedures such as adherence to the Healthy Forests Restoration Act (HFRA) and National Environmental Policy Act (NEPA).

The HFRA of 2003 provides the impetus for local communities to engage in comprehensive forest and wildfire management planning as well as incentive for public land management agencies to consider these recommendations as they develop their own strategic management plans. The HFRA provides communities with a flexible set of assessment procedures and guidelines that facilitate a collaborative standardized approach to identify wildfire risks and prioritize mitigation actions. The CWPP addresses such factors as:

- Stakeholder collaboration;
- Public agency and local interested party engagement;
- Mapping;
- Risk assessment – fuels, historical ignitions, infrastructure, structural ignitability, local resources, and firefighting capability;
- Hazard reduction recommendations; and
- Strategic action plans.

This CWPP provides wildfire hazard and risk assessments and mitigation recommendations for select neighborhoods and subdivisions within the Evergreen Fire Protection District (EFPD), situated approximately 30 miles west of Denver on the eastern slopes of Mount Evans. The elevation of Evergreen is approximately 7,500 feet and the elevation within the fire district ranges from 6,720 to 10,500 feet. As its name implies, Evergreen is a heavily forested region that is dissected by streams and expansive grassy meadows. Evergreen Fire/Rescue (EFR) serves nearly 40,000 residents across EFPD's more than 120 square miles. Subdivision characteristics range from rugged ridge top developments to luxury fairway homes. Commercial development is primarily service oriented and concentrated along primary roadways.

A wildland-urban interface (WUI) is defined as the area where development encroaches on undeveloped natural areas and represents the zone of greatest potential for loss resulting from wildfire. WUI delineations within the EFPD focus on development margins that are adjacent to open space or subdivisions that represent a common emergency response area with similar resources, risks, and hazards. Thirty such areas were identified within the District.

Natural resource management policies and changing ecological conditions have converged to create hazardous fuel situations throughout the assessment area. Decades of aggressive fire suppression practices have resulted in very dense and weakened timber stands. Years of drought have further stressed the forests, setting the stage for the devastating insect and disease infestations the area is experiencing today. Shrubs have expanded into traditional grasslands, resulting in accumulating hazardous amounts of woody ground fuel. The diversity of native grasses has succumbed to aggressive non-native species and noxious weeds. In many areas these fire-dependent ecosystems have grown unchecked by fire for more than a century. When combined with continued human development in the area, the net result is any wildfire has the capacity to become catastrophic.

Field surveys, interviews with public lands managers, and close collaboration with the EFPD and other stakeholders were utilized for data collection, hazard assessments, and treatment recommendations. All information was gathered, analyzed, and prepared in the CWPP format by Walsh Environmental Scientists and Engineers, LLC (WALSH). A project website ([http://jeffco.us/sheriff/sheriff\\_T62\\_R191.htm](http://jeffco.us/sheriff/sheriff_T62_R191.htm)) is maintained by Jefferson County Division of Emergency Management and provides access to the CWPP report for public review, project updates, meeting notices, and related project information. Wildland fire information and a downloadable version of the CWPP is also available from EFR at <http://www.evergreenfirerescue.com>.

The success of any CWPP hinges on community involvement, and input from local stakeholders is a required component of a certified CWPP. Although important during the writing of the plan, this type of involvement is critical when it comes to implementing recommended actions. The EFPD CWPP process included community meetings with objectives including sharing information about the CWPP process, project goals and objectives, assessment methodology, as well as facilitating communication between the Core Team, stakeholders, and District residents. Input from these meetings has been incorporated into the final CWPP plan.

Questionnaires were distributed to District residents in order to ascertain public opinion concerning the level of wildfire risk in the EFPD, evaluate values at risk, and assess mitigation practices needed to reduce risk. Safety pamphlets and brochures explaining proper home construction and landscaping practices designed to reduce the risk of wildfire were also made available. CWPP documentation is posted on Jefferson County's Emergency Management website to encourage public review and comment.

The National Fire Protection Association (NFPA) Form 1144, Standards for Protection of Life and Property from Wildfire, 2002 Edition, was utilized to assess the level of risk and hazard to individual neighborhoods. Form 1144 provides a means to assess predominant

characteristics within individual neighborhood communities 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 totaled to determine the overall level of risk. Low, moderate, high, and extreme hazard categories are determined based on the total score. This methodology provides a standardized basis for wildfire hazard assessment and a baseline for future comparative surveys. Thirty subdivisions and neighborhoods were identified by the EFPD as areas of concern and were surveyed according to NFPA Form 1144 protocols during February and March 2007. A summary of the community hazard ratings is provided in Table ES-1.

**Table ES-1. Community Hazard Rating Summary**

Wildland Urban Interface ID	Subdivision(s)	Hazard Rating
5	Echo Hills	<b>EXTREME</b>
20	Brook Forest Estates, Upper Cub Creek	<b>EXTREME</b>
12	Rosedale Acres, Segar Acres	<b>EXTREME</b>
1	Beaver Brook Canyon, Highland Hills, Chase Subdivision, Elmgreen Acres, Pleasant Lane, Homestead Hideaway	<b>EXTREME</b>
21	Buffalo Park Estates, Evergreen Hills	<b>EXTREME</b>
7	Evergreen West	<b>HIGH</b>
30	Greystone Estates	<b>HIGH</b>
13	Independent Heights, Forest Hill, Mountain Park Homes	<b>HIGH</b>
18	Bear Mountain Vista, Stanley Park	<b>HIGH</b>
29	French Springs	<b>HIGH</b>
23	Cub Creek Ranch, Evergreen Highlands, North Marshner, South Marshner	<b>HIGH</b>
2	Soda Creek, Fox Ridge	<b>HIGH</b>
11	Circle K, Bendemeer Valley, Golden Willow, Greystone Lazy Acres, Bear Creek Estates, Diamond Park, Wilderness Point	<b>HIGH</b>
3	Beaver Brook, Beaver Brook Lodge Estates Hoffer Heights, Pine Valley Estates	<b>HIGH</b>
25	Evergreen Meadows East	<b>HIGH</b>
22	Estates of Blue Creek, Blue Creek Road	<b>HIGH</b>
9	Hiwan Hills, Hidden Village at Hiwan, Douglas Park, Hiwan Homestead Museum	<b>HIGH</b>
19	Pine Valley Estates, Hillcrest Village, Peaceful Hills	<b>HIGH</b>
17	Herzman Mesa, Wonderview, Pine Crest Park, Sunset Heights, High Prairie, Far View Acres, Craigmont Estates, Marshdale Park, Marshdale	<b>HIGH</b>
8	Tanoa, Overlook, Palo Verde, Troutdale Estates, Glen Eyrie, Bear Creek	<b>HIGH</b>
26	The Ridge at Hiwan	<b>HIGH</b>
16	Evergreen Park Estates, Evergreen Heights, Evergreen Golf Course, Evergreen Valley Estates, Columbine Road	<b>HIGH</b>

Wildland Urban Interface ID	Subdivision(s)	Hazard Rating
27	El Pinal, El Pinal Acres	HIGH
10	Kittredge, Quartz Mountain, Pine Valley Acres, Mountain Meadow Heights	HIGH
24	Evergreen Meadows West, Timbers Estates	HIGH
4	Hidden Valley, Ruby Ranch, Nob Hill, Avery Acres, El Rancho	HIGH
28	Wah Keeney Park	MODERATE
14	Hagan Ranch, Elk Ridge, Elephant Park, Our-Lady-of-the-Rockies, Westhaven Heights	MODERATE
15	Greenwood, Wilmot Woods, Evergreen Hill	MODERATE
6	Hiwan Country Club	MODERATE

There are many rural areas within the District that are not identified as a designated WUI. The CWPP recognizes that there are individual residences and commercial occupancies within those areas that would benefit from individualized hazard and risk assessment and targeted mitigation. While it is beyond the scope of a CWPP to develop mitigation recommendations for outlying residents, the planning process should facilitate interaction between all concerned residents with available resources that can aid with individual home and property assessments.

In addition to the larger-scale treatments recommended in this plan, the most effective wildfire hazard reduction depends largely on the efforts of individual landowners making common sense modifications to their own homes and property. In to assessment services provided by the CSFS, EFR provides hazard mitigation assessments through the Fire Prevention Division. The creation of effective defensible space and the utilization of fire-resistant construction materials will significantly reduce the risk of life and property loss in the event of a wildfire. When these common sense practices become the predominant model in a neighborhood the entire community benefits.

Familiarization and coordination with the Jefferson County and Clear Creek County Annual Operating Plans (AOPs) are also recommended. This provides important information concerning county and regional fire operations, policies, and procedure definitions. Information is available through the Clear Creek County and Jefferson County Division of Emergency Management websites.

The EFPD CWPP is a strategic planning document that is developed and approved by the Core Team. An important component of the development process includes building a stakeholder group that will move the plan forward, implement prioritized recommendations, and maintain the CWPP as the characteristics of the WUI change over time. Organizing and maintaining this team is often the most challenging component of the CWPP process. It is, however, essential in the process of converting the CWPP from a strategic plan into action. This team will oversee the implementation and maintenance of the CWPP by working with fire authorities, community organizations, private landowners, and public agencies to coordinate and implement hazardous fuels treatment

projects management and other mitigation projects. Building partnerships among neighborhood-based organizations, fire protection authorities, local governments, public land management agencies, and private landowners is necessary in identifying and prioritizing measures to reduce wildfire risk. Maintaining this cooperation is a long-term effort that requires the commitment of all partners involved. The CWPP encourages citizens to take an active role in identifying needs, developing strategies, and implementing solutions to address wildfire risk by assisting with the development of local community wildfire plans and participating in countywide fire prevention activities.



Environmental Scientists and Engineers, LLC

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# EVERGREEN FIRE PROTECTION DISTRICT COMMUNITY WILDFIRE PROTECTION PLAN

## 1 INTRODUCTION

### 1.1 Community Wildfire Protection Plan Purpose

The Community Wildfire Protection Plan (CWPP) is a strategic plan that identifies specific wildland fire risks facing communities and neighborhoods and provides prioritized mitigation recommendations that are designed to reduce those risks. Once the CWPP is adopted, it is the community's responsibility to move forward and implement the action items. This may require further planning at the project level, acquisition of funds, or simply motivating individual homeowners.

Decades of aggressive fire suppression practices in fire-adapted ecosystems have removed a critical natural cleansing mechanism from the vegetation regeneration cycle. Fire exclusion has altered historic forest and scrubland conditions and contributed to an unprecedented buildup of naturally occurring flammable fuels. Such management tactics have also led to an alteration of prairie habitats, supporting the invasion of aggressive and highly flammable noxious weeds and grasses that, in many areas, have entirely replaced naturally occurring species. In addition, years of persistent drought have resulted in a weakened forest infrastructure and regional epidemics of disease and insect infestation. At the same time, demographic trends have shifted the nation's population growth centers to western and southwestern states where these ecosystems are predominant. The region where human development is pushing into these stressed ecosystems is known as the wildland-urban interface (WUI). This is the area where risk of loss resulting from wildfire is the greatest. The potential consequences are devastating and costly, and in recent years have drawn the attention of the U.S. Congress in the pursuit of an effective solution.

Precipitated by over a decade of increasing wildfire activity, related losses, and spiraling suppression costs, the National Fire Plan was developed by the federal government in 2000. The Healthy Forests Restoration Act (HFRA) of 2003 helps implement the core components of the plan and provides the impetus for wildfire risk assessment and planning at the county and community level. The HFRA refers to this level of planning as the CWPP process. This empowers the participating community to take advantage of wildland fire and hazardous fuel management opportunities offered under HFRA legislation. This includes a framework for hazard evaluation and strategic planning, prioritized access to federal grants supporting hazard reduction projects, and a basis for collaboration with local, state, and federal land management agencies.

## 1.2 Need for a Community Wildfire Protection Plan

The Evergreen Fire Protection District (EFPD) lies between 6,720 and 10,500 feet elevation in the foothills to the west of the greater Denver, Colorado, metropolitan area, straddling the Clear Creek County/Jefferson County boundary (Map 1, Appendix A). A population of approximately 40,000 resides in the numerous subdivisions and several named communities within the fire District's 120 square miles. The District is characterized by a lattice work of roads and neighborhoods in this mountainous and forested terrain. The eastern half of the District is more heavily populated, while the western portion of the District has a higher percentage of public lands. Commercial areas are concentrated along the main travel routes of I-70, CH 73, SH 74 also known as the Evergreen Parkway.

The forest, shrublands, and grasslands in EFPD have adapted to a mixture of low- and high-severity fires along a broad range of historic frequencies. It is generally acknowledged that a policy of fire suppression along the Front Range has exacerbated the potential for high-intensity wildfire.

Weather plays a critical role in determining fire frequency and behavior. A dry climate and available fuels in an area prone to strong gusty winds can turn an ignition from a discarded cigarette, vehicle parked over dry grass, or lightning into a major wildfire event in a matter of several minutes.

The EFPD is characterized by a combination of a relatively dense population, heavily utilized recreational lands and travel routes, fire adapted vegetation, and the potential for natural and human ignitions. These factors combine a degree of hazard, ignition risk, and values at risk that require serious evaluation.

The EFPD is a desirable place to live because of diverse forests, recreation, and aesthetics. However, the District is characterized by several factors that typify a hazardous WUI: aggressive development into fire-adapted ecosystems, steep topography, frequency of natural and human-caused ignitions, hazardous fuels, prolonged drought, and dry, windy weather conditions. Each identified WUI neighborhood or subdivision represents a distinct area with a unique combination of wildfire fuels, building construction, topography, access, available resources, and opportunities for fuels mitigation (Map 2, Appendix A).

The CWPP provides a coordinated assessment of neighborhood wildfire risks and hazards and outlines specific mitigation treatment recommendations designed to make the EFPD a safer place to live, work, and play. The CWPP development process can be a significant educational tool for people who are interested in improving the environment in and around their homes. It provides ideas, recommendations, and guidelines for creating a defensible space around the house and ways to reduce structural ignitability through home improvement and maintenance.

### 1.3 Community Wildfire Protection Plan Process

The HFRA designed the CWPP to incorporate a flexible process that can accommodate a wide variety of community needs. This CWPP is tailored to meet specific goals as identified by the Core Team, following the standardized steps for developing a CWPP as outlined in “Preparing a Community Wildfire Protection Plan: A Handbook for Wildland-Urban Interface Communities” (Society of American Foresters 2004) and the Colorado State Forest Service Minimum Standards for Community Wildfire Protection Plans (CSFS 2004). Table 1 presents the CWPP development process.

**Table 1. CWPP Development Process**

Step	Task	Explanation
One	Convene Decision Makers	Form a Core Team made up of representatives from local governments, fire authorities, and the Colorado State Forest Service (CSFS).
Two	Involve Federal Agencies	Engage local representatives of the U.S. Forest Service (USFS) and other land management agencies as appropriate.
Three	Engage Interested Parties	Contact and encourage participation from a broad range of interested organizations and stakeholders.
Four	Establish a Community Base Map	Develop a base map of the District that provides a better understanding of communities, critical infrastructure, and forest/open space at risk.
Five	Develop a Community Risk Assessment	Develop a risk assessment that considers fuel hazards, community and commercial infrastructure, resources, and preparedness capability. Rate the level of risk and incorporate into the base map as appropriate.
Six	Establish Community Priorities and Recommendations	Use the risk assessment and base map to facilitate a collaborative public discussion that prioritizes fuel treatments and non-fuel mitigation practices to reduce fire risk and structural ignitability.
Seven	Develop an Action Plan and Assessment Strategy	Develop a detailed implementation strategy and a monitoring plan that will ensure long-term success.
Eight	Finalize the CWPP	Finalize the District CWPP and communicate the results to interested parties and stakeholders.

The initial step in developing the EFPD CWPP is to organize an operating group that serves as the core decision-making team (Table 2). At a minimum, the Core Team consists of representatives from local government, local fire authorities, and the CSFS. In addition, the Core Team should include relevant affected land management agencies (Map 3, Appendix A) and active community and homeowners association (HOA) stakeholders. Collaboration between agencies and with communities is an important CWPP component because it promotes sharing of perspectives, plans, priorities, and

other information that are useful to the planning process. Together these entities guide the development of the CWPP as described in the HFRA and must mutually agree on the plan's final contents.

**Table 2. EFPD CWPP Core Team Members**

Team Member	Organization	Phone Number
Rocco Snart	Jefferson County Division of Emergency Management	303-271-4900
Allen Gallamore	CSFS	303-279-9757 x 302
Randy Frank	Jefferson County Open Space	303-271-5925
Kathleen Gaubatz	Director, Clear Creek County Office of Emergency Management	303-679-2320
Frank Dearborn	EFR	303-674-3145
Einar Jensen	EFR	303-674-3145
Peter Anderson	EFR	303-674-3145

As a strategic plan, the real success of any CWPP hinges on effective and long-term implementation of the identified objectives. The CWPP planning and development process must include efforts to build a stakeholder group that serves as an implementation team and will oversee the execution of prioritized recommendations and maintain the plan as the characteristics of the WUI change over time. Specific projects may be undertaken by individual HOAs, while larger-scale treatments may require collaboration between multiple HOAs, local government, and public land management agencies. Original CWPP Core Team representatives may, but are not required to, assist in the implementation of the CWPP action plan. Continued public meetings are recommended as a means to generate additional support and maintain momentum.

A successful CWPP utilizes relevant geographic information (e.g., Geographic Information System [GIS] data) to develop a community base map. Comprehensive risk assessment is conducted at the neighborhood or community level to determine relative levels of wildfire risk to better address hazard treatment prioritization. A standardized survey methodology is utilized to create an address-based rating benchmark for comparative future assessments and project evaluations.

CWPP fuel treatment recommendations derived from this analysis are prioritized through an open and collaborative effort with the Core Team and stakeholders. Prioritized treatments target wildfire hazard reduction in the WUI communities and neighborhoods, including structural ignitability and critical supporting infrastructure. An action plan guides treatment implementation for high-priority projects over the span of several years.

The finalized CWPP represents a strategic plan with Core Team consensus that provides prioritized wildfire hazard reduction treatment projects, preferred treatment methods, a base map of the WUI, defensible space recommendations, and other information relevant to the scope of the project.

## 1.4 Policy Framework

This CWPP is not a legal document. There is no legal requirement to implement the recommendations herein. Actions on public lands will be subject to federal, state, and county policies and procedures such as adherence to the HFRA and National Environmental Policy Act (NEPA). Action on private land may require compliance with county land use codes, building codes, and local covenants.

There are several federal legislative acts that set policy and provide guidance to the development of the CWPP for the EFPD:

- HFRA (2003) – Federal legislation that promotes healthy forest and open space management, hazardous fuels reduction on federal land, community wildfire protection planning, and biomass energy production;
- National Fire Plan and 10-Year Comprehensive Strategy (2001) – Interagency plan that focuses on firefighting coordination, firefighter safety, post-fire rehabilitation, hazardous fuels reduction, community assistance, and accountability; and
- Federal Emergency Management Agency (FEMA) Disaster Mitigation Act (2000) – Provides criteria for state and local multiple-hazard and mitigation planning.

The CSFS is a valuable resource that provides education and guidance to communities and individual landowners concerned with the threat of wildfire, as well as forest resource management in the WUI. EFR is another excellent resource for wildfire mitigation guidance within EFPD.

The Jefferson County and Clear Creek County Annual Operating Plans (AOPs) provide intergovernmental mutual aid agreements between local fire districts within each county and include the CSFS and USFS. These plans provide emergency response infrastructure for any large incident support.

## 1.5 Evergreen Fire Protection District, Community Wildfire Protection Plan Goals and Objectives

Table 3 provides a brief summary of the primary goals and objectives for the EFPD CWPP process.

**Table 3. EFPD CWPP Goals and Objectives**

Goal	Objective
Facilitate and develop a CWPP for the EFPD	<ul style="list-style-type: none"> <li>▪ Provide oversight for all activities related to the CWPP.</li> <li>▪ Ensure representation and coordination among agencies and interest groups.</li> <li>▪ Develop a long-term framework for sustaining CWPP efforts.</li> </ul>
Conduct a wildfire risk assessment	<ul style="list-style-type: none"> <li>▪ Conduct a district-wide wildfire risk assessment.</li> <li>▪ Identify areas at risk and contributing factors.</li> <li>▪ Determine the level of risk to structures that wildfires and contributing factors pose.</li> </ul>
Develop a mitigation plan	<ul style="list-style-type: none"> <li>▪ Identify and prioritize hazardous fuel treatment projects.</li> <li>▪ Identify and prioritize non-fuel mitigation needs.</li> <li>▪ Identify communities at highest risk and prioritize hazard reduction treatments.</li> <li>▪ Recommend sustainable initiatives at the HOA level.</li> </ul>

Goal	Objective
Facilitate emergency planning	<ul style="list-style-type: none"><li>▪ Develop strategies to strengthen emergency management, response, and evacuation capabilities for wildfire.</li><li>▪ Build relationships among county government, fire authorities, and communities.</li></ul>
Facilitate public outreach	<ul style="list-style-type: none"><li>▪ Develop strategies to increase citizen awareness and action for firewise practices.</li><li>▪ Promote public outreach and cooperation for all fuel reduction projects to solicit community involvement and private landowner cooperation.</li></ul>

## 1.6 Forest Improvement District

The Colorado State legislated the Forest Improvement District (House Bill 07-11680) during the 2007 legislative session that allows for a special overlay district to be created for wildland fire mitigation. The counties of Jefferson, Clear Creek, Gilpin, and northeast Park should develop a special district to assist the counties and fire districts to meet the goals outlined within these and other CWPPs. The District's objectives will be to provide a funding base for managing mitigation projects, developing grant applications for the individual communities, developing specific mitigation plans not outlined within this document, providing a contracting process for mitigation work and providing staffing/equipment for mitigation projects.

## 2 WILDLAND FIRE MANAGEMENT PRIMER

Wildland fire is defined as any fire burning in wildland fuels and includes prescribed fire, wildland fire use (WFU), and wildfire. Prescribed fires are planned fires ignited by land managers to accomplish specific natural resource improvement objectives. Fires that occur from natural causes, such as lightning, that are then used to achieve management purposes under carefully controlled conditions with minimal suppression costs are known as WFU. Wildfires are unwanted and unplanned fires that result from natural ignition, unauthorized human-caused fire, escaped WFU, or escaped prescribed fire. EFR actively suppresses all wildfires, and WFU is not authorized in the District.

Wildland fires may be further classified as ground, surface, or crown fires. Ground fire refers to burning/smoldering materials beneath the surface including duff, tree or shrub roots, punchy wood, peat, and sawdust that normally support a glowing combustion without flame. Surface fire refers to loose fuels burning on the surface of the ground such as leaves, needles, and small branches, as well as grasses, forbs, low and medium shrubs, tree seedlings, fallen branches, downed timber, and slash. Crown fire is a wildland fire that moves rapidly through the crowns of trees or shrubs.

### 2.1 Wildland Fire Behavior

Fire behavior is the manner in which a fire reacts to the influences of fuel, weather, and topography. Fire behavior is typically modeled at the flaming front of the fire and described most simply in terms of fireline intensity (flame length) and in rate of forward spread. The implications of observed or expected fire behavior are important components of suppression strategies and tactics, particularly in terms of the difficulty of control and effectiveness of various suppression resources. The Hauling Chart (Table 4) is an excellent tool for measuring the safety and potential effectiveness of various fireline resources given a visual assessment of active flame length. . It was so named because it infers the relative intensity of the fire behavior to trigger points where hauling various resources to or away from an incident should be considered.

**Table 4. Hauling Chart Interpretations**

Flame Length (Feet)	Fireline Intensity (BTU/Ft/Sec)	Interpretation
0-4	0-100	Persons using handtools can generally attack fires at the head or flanks. Handline should hold the fire.
4-8	100-500	Fires are too intense for direct attack on the head by persons using handtools. Handline can not be relied on to hold fire. Equipment such as dozers, engines, and retardant aircraft can be effective.
8-11	500-1,000	Fires may present serious control problems such as torching, crowning, and spotting. Control efforts at the head of the fire will probably be ineffective.
11+	1,000+	Crowning, spotting, and major runs are common, control efforts at the head of the fire are ineffective.

Source: Fireline Handbook Appendix B

Fire risk is the probability that wildfire will start from natural or human-caused ignitions. Fire hazard is the presence of ignitable fuel coupled with the influences of topography and weather, and is directly related to fire behavior. Fire severity, on the other hand, refers to the immediate effect a fire has on vegetation and soils.

The characteristics of fuels, topography, and weather conditions combine to dictate fire behavior, rate of spread, and intensity. Wildland fuel attributes refer to both dead and live vegetation and include such factors as density, bed depth, continuity, density, vertical arrangement, and moisture content. Structures with flammable materials are also considered a fuel source.

Fuels are often characterized in terms of fire behavior fuel models, which are discussed in sections 3.4 and 3.5. Fuels may also be described in terms of size. The terms one-hour, ten-hour, one-hundred-hour, and one-thousand-hour timelag fuels refer to the amount of time required for the water content of the fuel particle to reach equilibrium with the ambient environment. This timelag corresponds to the diameter of the fuel particle. Each size class is individually described in the List of Fire Behavior Terms at the beginning of this document.

When fire burns in the forest understory or through grass, it is generally a surface fire. When fire burns through the canopy of vegetation, or overstory, it is considered a crown fire. The vegetation that spans the gap between the forest floor and tree crowns can allow a surface fire to become a crown fire and is referred to as ladder fuel.

For fire to spread, materials such as trees, shrubs, or structures in the flame front must meet the conditions of ignitability. The conditions needed are the presence of oxygen, flammable fuel, and heat. Oxygen and heat are implicitly available in a wildland fire. However, if the potential fuel does not meet the conditions of combustion, it will not ignite. This explains why some trees, vegetation patches, or structures may survive a wildland fire and others in the near vicinity are completely burned.

Potential surface fire behavior may be estimated by classifying vegetation in terms of fire behavior fuel models (FBFMs) and using established mathematical models to predict potential fire behavior under specific climatic conditions. In this analysis, FBFMs were determined through a combination of field evaluations and interpret satellite image. Climatic conditions were derived from local weather station records.

Weather conditions such as high ambient temperatures, low relative humidity, and windy conditions favor fire ignition and high-intensity fire behavior. Under no-wind conditions fire burns more rapidly and intensely upslope than on level terrain. The affects of terrain can be particularly pronounced in steep narrow canyons often referred to as “chimneys” due to their convective characteristics. Wind tends to be the driving force in fire behavior in the most destructive WUI fires. The “chinook” winds common along the Front Range can rapidly drive wildfire downslope.

## 2.2 History of Wildfire

Lightning-induced fire is a historic component of Jefferson County ecosystems, and its occurrence is important to maintaining the health of forest and open space ecosystems. Native Americans used fire as a tool for hunting, improving wildlife habitat, and land clearing. As such, many of the plant species and communities have adapted to recurring fire through phenological, physiological, or anatomical attributes. Some plants, such as Lodgepole pine and western wheatgrass, require reoccurring fire to exist.

European settlers, land use policy, and changing ecosystems have altered fire behavior and fuels accumulation from their historic setting. Euro-American settlers in Jefferson County changed the historic fire regime in several interrelated ways. The nature of vegetation (fuel) changed because of land use practices such as homesteading, livestock grazing, agriculture, water development, and road construction. Livestock grazing reduced the amount of fine fuels such as grasses and forbs, which carried low-intensity fire across the landscape. Continuous stretches of forest and open space fuels were broken up by land-clearing activities. The removal of the natural vegetation facilitated the invasion of nonindigenous grasses and forbs, some of which create more flammable fuel beds than their native predecessors.

In addition, more than a century of fire-suppression policy has resulted in large accumulations of surface and canopy fuels in western forests and brushlands. Fuel loads also increased as forests and brushlands encroached into grasslands as a result of fire exclusion. This increase in fuel loading and continuity has created hazardous situations for public safety and fire management, especially when found in proximity to communities. These hazardous conditions will require an array of mitigative tools, including prescribed fire and thinning treatments.

## 2.3 Prescribed Fire

Prescribed fire may be used as a resource management tool under carefully controlled conditions. This includes pre-treatment of the fuel load and close monitoring of weather and other factors. Prescribed fire ultimately improves wildlife habitat, helps abate invasive vegetation, reduces excess fuel loads, and lowers the risk of future wildfires in the treatment area. These and other fuel management techniques are employed to protect human life, economic values, and ecological values. The use of prescribed fire in the WUI is carefully planned and enacted only under favorable weather conditions, and must meet air quality requirements of the Colorado Department of Public Health and Environment (CDPHE) Air Pollution Control Division (CAPCD). Open burning permits are obtained from Jefferson County Environmental Health Services ([www.co.jefferson.co.us/health/health\\_T111\\_R38.htm](http://www.co.jefferson.co.us/health/health_T111_R38.htm)).

Prescribed fire may be conducted either in a defined area, as a broadcast burn, or in localized burn piles. Broadcast burns are used to mimic naturally occurring wildfire but only under specific weather conditions, fuel loads, and expert supervision. Burn piles are utilized to dispose of excess woody material after thinning if other means of disposal are not available or cost-prohibitive.

## 2.4 Hazardous Fuels Mitigation

Wildfire behavior and severity are dictated by fuel type, weather conditions, and topography. Because fuel is the only variable of these three that can be practically managed, it is the focus of many mitigation efforts. The objectives of fuels management may include reducing surface fire intensity, reducing the likelihood of crown fire initiation, reducing the likelihood of crown fire propagation, and improving forest health. These objectives may be accomplished by reducing surface fuels, limbing branches to raise canopy base height, thinning trees to decrease crown density, and/or retaining larger fire-resistant trees.

By breaking up vertical and horizontal fuel continuity in a strategic manner, fire suppression resources are afforded better opportunities to control fire rate of spread and contain wildfires before they become catastrophic. In addition to the creation of defensible space, fuelbreaks may be utilized to this end. These are strategically located areas where fuels have been reduced in a prescribed manner, often along roads. Fuelbreaks may be strategically placed with other fuelbreaks or with larger-area treatments. When defensible space, fuelbreaks, and area treatments are coordinated, a community and the adjacent natural resources are afforded an enhanced level of protection from wildfire.

Improperly implemented fuel treatments can have negative impacts in terms of forest health and fire behavior. Aggressively thinning forest stands in wind-prone areas may result in subsequent wind damage to the remaining trees. Thinning can also increase the amount of surface fuels and sun and wind exposure on the forest floor. This may increase surface fire intensity if post-treatment debris disposal and monitoring are not properly conducted. The overall benefits of properly constructed fuelbreaks are, however, well documented.

The WUI is the zone where communities and wildland fuel interface and is the central focus of this CWPP. Every fire season catastrophic losses from wildfire plague the WUI. Homes are lost, businesses are destroyed, community infrastructure is damaged, and, most tragically, lives are lost. Precautionary action taken before a wildfire strikes often makes the difference between saving and losing a home. Creating a defensible space around a home is an important component in wildfire hazard reduction. Providing an effective defensible space can be as basic as pruning trees, applying low-flammability landscaping, and cleaning up surface fuels and other fire hazards near a home. These efforts are typically concentrated within 75 feet of a home but may significantly vary based on percent of slope adjacent to the structure. Recommended guidelines for creating effective defensible space are outlined in CSFS bulletin 6.302 and included as Appendix G. Defensible space is defined as an area around a structure where fuels have been treated, thinned, or removed in order to reduce wildfire intensity as it moves towards a structure, reduce the chances of a structure fire moving to the surrounding wildlands, and to provide room for firefighters to do their jobs (see Section 5.2).

While reducing hazardous fuels around a structure is very important to prevent fire loss, recent studies indicate that, to a great extent, the attributes of the structure itself determine ignitability. Experiments suggest that even the intense radiant heat of a crown

fire is unlikely to ignite a structure that is more than 30 feet away as long as there is no direct flame impingement (Cohen and Saveland 1997). Studies of home survivability indicate that homes with noncombustible roofs and a minimum of 30 feet of defensible space had an 85-percent survival rate. Conversely, homes with wood shake roofs and less than 30 feet of defensible space had a 15-percent survival rate (Foote 1996).



### **3 EVERGREEN FIRE PROTECTION DISTRICT PROFILE**

#### **3.1 County and District Setting**

Jefferson County was established in 1861 as one of the original 17 counties created by the Colorado Territorial Legislature with a land base of 774 square miles. The county population is currently estimated at 529,401 people with approximately 184,640 people living in the incorporated areas.

Evergreen is an unincorporated community of approximately 40,000 people, and is located in the Front Range of west-central Jefferson County, west of Denver, Colorado. The EFPD is mountainous and heavily forested with a mix of conifer and deciduous trees. The elevation is approximately 6,720 to 10,500 feet. The three major highways in and around Evergreen are I-70, CH 73, and CH 74 (Evergreen Parkway). Evergreen attractions include Evergreen Lake, downtown Evergreen with its historic buildings, miles of hiking trails, the Evergreen and Hiwan Golf courses, and the close proximity to summer and winter playgrounds including Mount Evans. Winter sport activities can also be found at nearby Echo Mountain Park.

Evergreen is surrounded by thousands of acres of forested land in the Denver Mountain Parks and Jefferson County Open Space park systems. The Denver Mountain Parks located within the EFPD are Bergen Park, Corwina Park, Dedisse Park, Dillon Park, Fillius Park, O'Fallon Park, and multiple holdings scattered throughout the District. The Jefferson County Open Space parks include Alderfer/Three Sisters and Elk Meadow.

The EFPD serves 126 square miles of suburban and rural WUI. The majority of the WUI is within the Jefferson County portion of EFPD. Fifty-two square miles of the EFPD lie within east Clear Creek County.

WUI delineations focus on neighborhoods and neighborhood margins adjacent to open space or rural developments that represent a common emergency response zone with similar assets, risks, and hazards. Of the 30 identified WUI response areas within the District, many are situated in close proximity to hazardous fuels, with the primary access limited to single ingress/egress roads with steep mountainous grades.

#### **3.2 Climate**

The EFPD climate is relatively dry with the majority of precipitation occurring with spring rains and summer monsoons (Table 5). The area receives more than 220 days of sunshine per year and an average of 18.75 inches of annual precipitation. Winter high temperatures are typically in the mid 40s (degree Fahrenheit [F]) and summer highs are in the 70s and low 80s. The low precipitation months are typically December, January, and February. Fire weather conditions are discussed in Section 4.2.

**Table 5. Average Monthly Climate Summary for the EFPD  
(1961-2005, Evergreen, Colorado)**

Climate Attribute	Month												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average maximum temperature (° F)	45	46	50	57	65	75	82	80	72	63	51	45	61
Average total precipitation (inches)	0.54	0.68	1.66	2.2	2.56	2.19	2.24	2.35	1.49	1.22	0.97	0.66	18.75
Average snowfall (inches)	8.3	9.6	18.5	14.1	3.5	0.1	0.0	0.0	1.6	6.7	12.6	8.5	83.6

Source: High Plains Regional Climate Center (<http://hprcc.unl.edu>)

### 3.3 Topography

Topography and elevation play an important role in dictating existing vegetation, fuels, and wildland fire behavior. Topography also dictates community infrastructure design, further influencing overall hazard and risk factors. The terrain of the EFPD is mountainous with steep slopes and open valleys. The elevation of the EFPD ranges from 6,720 to 10,500 feet. The majority of communities within the EFPD are situated on steep mountainous terrain and ridge tops, though most of the commercial development is located along valley floors and is less susceptible to problematic fire behavior. Mountainous topography limits the availability of alternative evacuation routes, significantly increasing the risk of entrapment. Although ideal slopes for home sites are generally less than 10 percent, many homes in the District are perched on steeper slopes, restricting access and exposing the structures to higher intensities of fire behavior. Defensible space zones need to be expanded to accommodate steep slopes.

### 3.4 Wildland Vegetation and Fuels

The vegetation found in the District is typical of the Rocky Mountain montane ecosystem. Vegetation type and distribution is controlled primarily by available soil moisture, which is closely related to slope aspect. Drier south-facing slopes support open stands of ponderosa pine, shrub, and grass. The spacing of individual ponderosa trees is related to available soil moisture and may become dense in protected drainages or more shaded slope aspects.

North aspects of the montane ecosystem retain more soil moisture and support denser stands of conifer that are less drought resistant. These species include Douglas-fir, Englemann spruce, and, at higher elevations, Lodgepole pine. Depending on the elevation and localized aspect, these stands may be mixed with ponderosa pine. Montane zones with high soil moisture content may support deciduous groves of quaking aspen. Willows, blue spruce, Engleman spruce, mountain alder, water birch, and other water-loving trees may be found in riparian zones along creeks and streams. The District is also characterized by valley meadows that support a variety of high altitude grasses.

Existing vegetation is the fuel source for wildland fire and has a direct effect on fire behavior. Accurately mapping vegetative ground cover is a critical component of fuel modeling and fire behavior modeling. Understanding the fire behavior characteristics of particular fuel types facilitates effective fuels treatment strategies on a local, as well as landscape, level. Maps 4a and 4b (Appendix A) illustrate FBFMs that are derived from spectral analysis of vegetation from satellite imagery and ground truthed through field surveys. Map 4b is derived from the assessment of SPOT multispectral satellite imagery (19-meter resolution) and classified using remote sensing techniques that recognize specific reflected spectral signatures of vegetation and other ground cover types. FBFM data from the LandFire project is included as Map 4a due to cloud and cloud shadow cover in the available SPOT image. LandFire is a shared project between the wildland fire management programs of the U.S. Department of Agriculture Forest Service and U.S. Department of the Interior. LANDFIRE data products are designed to facilitate national- and regional-level strategic planning and reporting of wildland fire management activities. LandFire FBFMs are classified utilizing Landsat multispectral satellite imagery (30-meter resolution).

FBFMs are utilized in predictive fire modeling which is an important component in a variety of strategic and tactical applications including risk and hazard assessments, pre-attack planning, initial attack, extended suppression, prescribed fire planning, and predictive modeling of active wildfires.

BehavePlus fire behavior modeling software was utilized for this assessment. By inputting several user-defined parameters including FBFM, fuel moisture, weather, and slope, expected rates of spread, associated flame lengths, and fire intensity can be determined. These are important factors in any tactical or strategic fire management decision. Fire behavior analysis is detailed in Section 4.2.

There are several systems for classifying fuel models. This CWPP utilizes the most commonly used fuel modeling methodology as developed by Hal E. Anderson (1982). Thirteen FBFMs are presented in four fuel groups: grasslands, shrublands, timber litter and understory, and logging slash. Each group comprises three or more fuel models. Of these 13 fuel models, FBFMs 1, 2, 4, 5, 6, 8, 9, and 10 are the most prevalent in the EFPD assessment area (Table 6).

**Table 6. Fuel Models Common to the EFPD  
(Fuel models most prevalent in EFPD are shaded)**

Group	FBFM Number	Description
Grasslands	1	Short grass (1 foot)
	2	Grass with timber/brush overstory
	3	Tall grass (2.5 feet)
Shrublands	4	Mature brush 6 feet)
	5	Young brush
	6	Intermediate or dormant brush

Group	FBFM Number	Description
	7	Southern rough
Timber Litter and Understory	8	Closed or short-needle timber litter – light fuel load
	9	Hardwood or long-needle or timber litter
	10	Mature/overstory timber and understory
Logging Slash	11	Light slash; closed timber with down woody fuel
	12	Medium slash (35 tons/acre)
	13	Heavy slash (200 tons/acre)

Source: Anderson 1982

### Grasslands, FBFMs 1 and 2

Grass fuels are most common on south-facing slopes and valley meadows. On many forested slopes with a south-facing aspect, grasses may mix with open ponderosa pine and shrub to form a vegetative understory. The short- and mid-grass species common to this area include blue grama, western wheatgrass, needle-and-thread, and prairie Junegrass. These western annual grasses are adapted to the relatively frequent disturbance of fire and benefit from fast moving, “cool” fire because it removes excess dried biomass and adds nutrients to the soil. In the absence of these periodic fires, the accumulation of thatch and woody material and the encroachment of brush increases surface fuel loads, increasing the probability of high-intensity surface fires.

Historic fire return intervals for these grasslands range from approximately 10 to 35 years, allowing for a rapid departure from the historic fire regime conditions when fire is excluded. Fire exclusion also encourages shrub and noxious grass and weed encroachment. Cheatgrass, also known as downy brome, is an aggressive invasive grass species that is now common throughout the state and region. It exhibits higher fire intensity than other native grasses. Despite its early growth and rich color, cheatgrass provides poor nutrition for livestock, deer, and elk.

Although brush and timber fires are known for intense fire behavior, the potential impact of grass fires should not be underestimated. These light, flashy fuels can be resistant to suppression, producing incredibly rapid rates of spread, and flame lengths in excess of 10 feet. They can pose a very real risk to firefighter safety and a serious threat to untreated homes.

Open prairie, grassy slopes, and irrigated meadow and lawns are characterized as FBFM 1. Grassy understory of ponderosa pine mixed with other herbaceous fuels that would carry a surface fire is defined as FBFM 2.

### Shrublands, FBFMs 4, 5, and 6

Shrub stands are most common on south slope aspects and meadow margins throughout the District. Mountain mahogany is the dominant shrub species in the northern two-thirds and oakbrush is dominant in the southern one-third of the District. Areas where conifer is aggressively regenerating are also classified as shrublands based primarily on density and height of the growth. Deciduous riparian zones along creek beds and slope

drainages are common throughout the area and also support shrub growth. Cottonwood, scrub willow, chokecherry, and alder are common in these zones.

Shrub stands in the EFPD are classified as FBFM 4 (mature brush, greater than 6 feet tall, dense woody surface fuel), FBFM 5 (young brush, less than 6 feet tall, clean litter), and FBFM 6 (intermediate brush, older than FBFM 5, less dense than FBFM 4).

It should be noted that shrub vegetation typically constitutes higher-moisture woody plants associated with low to moderate fire behavior. However, prolonged drought, experienced in recent years, lowers the live fuel moisture content in plant stems, producing extreme fire behavior under favorable weather conditions.

### **Timber Litter and Understory, FBFMs 8, 9, and 10**

Forest composition in the District is strongly influenced by elevation and slope aspect, which are directly related to the available soil moisture. Ponderosa pine favor drier south-facing aspects while Douglas-fir, lodgepole pine, and spruce favor moister and cooler north-facing aspects. Lodgepole pine is more common in higher elevations above 8,000 feet but species will commonly mix on transitional slope aspects. In some areas, fire exclusion has allowed Douglas fir to become disproportionately dominant. Continuous forest canopy, most common at higher elevations and north-facing aspects, often prohibits live surface fuels from taking hold. In some mature and over mature closed canopy conifer stands, the understory is devoid of live surface fuel but thick with woody timber litter from downed trees and ladder fuels.

FBFMs in timber are classified according to the surface fuels that accumulate in the absence of a dominant live understory. FBFM 8 is associated with all short-needle conifer species including Douglas fir, lodgepole pine, and a variety of spruce; FBFM 9 is characterized by the long needles of ponderosa pine; and FBFM 10 is associated with forest floors that are thick with naturally occurring downed timber in a mature or overmature stand.

### **3.5 Fire Behavior Fuel Model Classifications of the Evergreen Fire Protection District**

This section details the predominant FBFMs observed in the EFPD, including their unique characteristics and expected fire behavior. Local photos of fuels are displayed with a narrative for each fuel model as described by Anderson (1982). This section can be used independently as a field reference.

**FBFM 1 – Short Grass****Figure 1. FBFM 1**

**Characteristics:** Grassland and savanna vegetation are dominant (Figure 1). Very little shrub or timber overstory is present, generally less than 30 percent of the area. Western perennial and annual grasses such as western wheatgrass, buffalograss, blue grama, and little bluestem that characterize short- to mid-grass prairie are common. Cheatgrass, medusahead, ryegrasses, and fescues occur at slightly higher elevations. Grass shrub combinations that meet the above criteria are also represented.

**Fire Behavior:** Fire spread is governed by the fine, very porous, and continuous herbaceous fuels that have cured or are nearly cured. Fires burn as surface fires that move rapidly through the cured grass and associated material.

**Fuel Model Values for Estimating Fire Behavior**

Total Fuel Load, less than 3-inch dead and live	0.74 ton/acre
Dead Fuel Load, 0 to ¼ inch	0.74 ton/acre
Live Fuel Load, foliage	0.0 ton/acre
Fuel Bed Depth	1.0 foot

Source: Anderson 1982

**FBFM 2 – Grass with Timber/Shrub Overstory****Figure 2. FBFM 2**

**Characteristics:** FBFM 2 defines surface fuels found in open conifer, shrub, or riparian stands (Figure 2). Ground cover generally consists of grasses, needles, and small woody litter. Conifers are typically mature and widely spaced. Limited shrub or regeneration may be present. This model favors mature conifer in the foothill to montane zones. Open shrubland, pine stands, or Rocky Mountain juniper that cover one-third to two-thirds of the area may generally fit this model. Such stands may include clumps of fuels that generate higher fire intensities that may produce firebrands (embers that stay ignited and aloft for great distances).

**Fire Behavior:** Fire is spread primarily through the fine herbaceous fuels, either curing or dead. These are surface fires where the herbaceous material, in addition to litter and dead-down stem wood from the open shrub or timber overstory, contribute to the fire intensity.

**Fuel Model Values for Estimating Fire Behavior**

Total Fuel Load, less than 3-inch dead and live	4.0 tons/acre
Dead Fuel Load, 0 to ¼ inch	2.0 tons/acre
Live Fuel Load, foliage	0.5 ton/acre
Fuel Bed Depth	1.0 foot

Source: Anderson 1982

**FBFM 4 – Mature Brush****Figure 3. FBFM 4**

**Characteristics:** Stands of mature shrubs 6 or more feet in height, local oakbrush, and tall western sage with flammable foliage and a significant dead component fit this model (Figure 3). A deep litter layer may also be present. Actual brush height qualifying for this model varies and depends on local conditions.

**Fire Behavior:** High fire intensity and fast-spreading fires involve the foliage and live and dead fine woody material in the crowns of a nearly continuous secondary overstory.

**Fuel Model Values for Estimating Fire Behavior**

Total Fuel Load, less than 3-inch dead and live	13.0 tons/acre
Dead Fuel Load, 0 to ¼ inch	5.0 tons/acre
Live Fuel Load, foliage	5.0 tons/acre
Fuel Bed Depth	6.0+ feet

Source: Anderson 1982

## FBFM 5 – Young Brush



Figure 4. FBFM 5

**Characteristics:** Shrubs in FBFM 5 are younger than in FBFM 6, not as tall as in FBFM 4, and do not contain as much fuel as in FBFMs 4 and 6. Shrub height is less than 6 feet tall and shrub cover most of area. Young green stands with no dead wood qualify for this FBFM. Fuel situations would include young stands of oak and mountain mahogany (Figure 4).

**Fire Behavior:** Fire is generally carried on the surface fuels that are made up of litter cast by the shrubs and the grasses and forbs in the understory. The live vegetation produces poor burning qualities.

### Fuel Model Values for Estimating Fire Behavior

Total Fuel Load, less than 3-inch dead and live	3.5 tons/acre
Dead Fuel Load, 0 to ¼ inch	1.0 tons/acre
Live Fuel Load, foliage	2.0 tons/acre
Fuel Bed Depth	2.0 feet

Source: Anderson 1982

## FBFM 6 – Intermediate or Dormant Brush



Figure 5. FBFM 6

**Characteristics:** Shrubs in FBFM 6 are older than in FBFM 5, not as tall as in FBFM 4, and do not contain as much fuel as in FBFM 4. Fuel situations to be considered include intermediate stands of chamise, chaparral, oakbrush, mountain mahogany, and juniper shrublands (Figure 5).

**Fire Behavior:** Fires carry through the shrub layer where the foliage is more flammable than in FBFM 5; however, this requires moderate winds (greater than 8 miles per hour [mph] at midflame height). Fire will drop to the ground at low wind speeds or break in continuous stands.

### Fuel Model Values for Estimating Fire Behavior

Total Fuel Load, less than 3-inch dead and live	6.0 tons/acre
Dead Fuel Load, 0 to ¼ inch	1.5 tons/acre
Live Fuel Load, foliage	0.0 ton/acre
Fuel Bed Depth	2.5 feet

Source: Anderson 1982

## FBFM 8 – Closed or Short-Needle Timber Litter – Light Fuel Load



Figure 6. FBFM 8

**Characteristics:** Closed canopy stands of short-needle conifers or hardwoods that have leafed out support fire in the compact litter layer (Figure 6). This layer is mainly needles, leaves, and twigs because little undergrowth is present in the stand. Representative conifer types are white pine, lodgepole pine, spruce, and fir. Ponderosa pine can also be included if the understory reflects these characteristics.

**Fire Behavior:** Fires associated with this model are generally slow-burning, low-intensity ground fires, although a fire may encounter an occasional area of heavy fuels concentration that can flare up (jackpot). Only under severe fire weather conditions does this fuel model pose a significant fire hazard, and this is typically due to fire becoming active in the crowns of trees.

### Fuel Model Values for Estimating Fire Behavior

Total Fuel Load, less than 3-inch dead and live	5.0 tons/acre
Dead Fuel Load, 0 to ¼ inch	1.5 tons/acre
Live Fuel Load, foliage	0.0 ton/acre
Fuel Bed Depth	0.2 foot

Source: Anderson 1982

## FBFM 9 – Hardwood or Long-Needle or Timber Litter – Moderate Ground Fuel Load



Figure 7. FBFM 9

**Characteristics:** Both long-needle conifer and hardwood stands, especially the oak-hickory types, are characterized by FBFM 9 (Figure 7). Closed stands of long-needle pine such as ponderosa pine are grouped in this model.

**Fire Behavior:** Fires run through the surface litter faster than in FBFM 8 and have longer flame lengths. Fall fires in hardwoods are predictable; however, high winds will actually cause higher rates of spread than predicted because of spotting caused by rolling or blowing embers and fire brands. Concentrations of dead-down woody material will contribute to possible torching, crowning, and spotting.

### Fuel Model Values for Estimating Fire Behavior

Total Fuel Load, less than 3-inch dead and live	3.5 tons/acre
Dead Fuel Load, 0 to ¼ inch	2.9 tons/acre
Live Fuel Load, foliage	0.0 ton/acre
Fuel Bed Depth	0.2 foot

Source: Anderson 1982

**FBFM 10 – Mature/Over Mature Timber and Understory****Figure 8. FBFM 10**

**Characteristics:** Any forest type may be considered FBFM 10 if heavy downed woody material is present. Locally this model is represented by dense stands of over mature ponderosa pine, lodgepole pine, mixed conifer, and continuous stands of Douglas fir (Figure 8). Examples include insect or disease-ridden stands, wind-thrown stands, over mature situations with deadfall, and aged light thinning or partial-cut slash. Dead-down fuels include large quantities of 3-inch or larger limbwood resulting from over maturity or natural events that create a large load of dead material on the forest floor.

**Fire Behavior:** Fire will burn in the surface and ground fuels with greater intensity than the other timber litter models. Crowning out, spotting, and torching of individual trees is more frequent in this fuel situation, leading to potential fire control difficulties.

**Fuel Model Values for Estimating Fire Behavior**

Total Fuel Load, less than 3-inch dead and live	12.0 tons/acre
Dead Fuel Load, 0 to ¼ inch	3.0 tons/acre
Live Fuel Load, foliage	2.0 tons/acre
Fuel Bed Depth	1.0 foot

FBFMs present in the District are summarized in Table 7.

Source: Anderson 1982

**Table 7. Fire Behavior Fuel Models of EFPD**

FBFM	Description
<p style="text-align: center;"><b>1</b> <b>Short Grass</b></p>	<p><b>Grass Group</b> – Fire spread is determined by the fine, very porous, and continuous herbaceous fuels that have cured or are nearly cured. These are surface fires that 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.</p>
<p style="text-align: center;"><b>2</b> <b>Grass with Timber/Shrub Overstory</b></p>	<p><b>Grass Group</b> – 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.</p>
<p style="text-align: center;"><b>4</b> <b>Mature Brush</b></p>	<p><b>Shrub Group</b> – 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.</p>
<p style="text-align: center;"><b>5</b> <b>Young Brush</b></p>	<p><b>Shrub Group</b> – 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.</p>
<p style="text-align: center;"><b>6</b> <b>Intermediate or Dormant Brush</b></p>	<p><b>Shrub Group</b> – 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.</p>
<p style="text-align: center;"><b>8</b> <b>Closed or Short-Needle Timber Litter–Light Fuel Load</b></p>	<p><b>Timber Group</b> – 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.</p>
<p style="text-align: center;"><b>9</b> <b>Hardwood or Long-Needle or Timber Litter–Moderate Ground Fuel</b></p>	<p><b>Timber Group</b> – 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.</p>
<p style="text-align: center;"><b>10</b> <b>Mature/Overmature Timber and Understory</b></p>	<p><b>Timber Group</b> – 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.</p>

Source: Anderson (1982)

### 3.6 Water Resources

Nine assessed WUI areas and a portion of a tenth are serviced with pressurized hydrant grids. This emergency water infrastructure serves most of the newer, higher-density subdivisions along the Evergreen Parkway, totaling more than 3,500 homes and the adjacent commercial areas. Grid spacing is based on local building codes and generally requires a 1,000-foot minimum spacing for residential areas and a 300-foot minimum spacing for commercial areas.

Cisterns and a few single gravity-fed hydrants are distributed throughout most of the other interface regions. Many cisterns are privately owned and serve a specific residence. Several EFPD-maintained cistern installations were observed as part of the community surveys. These installations are accessible with standard-diameter fire apparatus fittings and most appear to be gravity feeds.

Reservoirs are located on Beaver Brook Creek and Bear Creek, where the Evergreen Lake Dam creates the historic Evergreen Lake. Numerous stock ponds are identified as potential helicopter dip sits pending field survey and acquisition of emergency access agreements. Stream drainages include Cub, North Turkey, Witter Gulch, Yankee, Corral, and Soda Creeks. Most observed streams had adjacent roads providing many access points for drafting.

Coordinates and descriptions of hydrants and cisterns within the EFPD are available from EFPD and have been utilized in this plan. Some discrepancies were noted during field surveys and associated attributes of plotted cistern resources were sometimes insufficient for assessment purposes. A water resource records update through field survey and attribute enhancements is recommended.

### **3.7 Fire Protection District**

Emergency fire, medical, and rescue services for the District are provided by EFR, which is comprised of 85 volunteer firefighters, 33 full-time paid staff, and 12 part-time paid staff. There are currently eight lieutenants, six captains, two assistant chiefs, and one operations chief under the command of the Chief of EFR. EFR maintains eight fully equipped stations and 29 pieces of apparatus.

- Station 1
  - 1 Type 6 Engine
  - 1 Type 1 Engine
  - 1 Water Tender
  - 1 Command Vehicle
  - 1 Rescue
  - 1 Mobile Pumping Platform
  
- Station 2
  - 1 Type 6 Engine (SCAT)
  - 1 Type 1 Engine
  - 2 Water Tenders
  - 1 Rescue
  - 1 Ladder Tower
  - 2 ALS Ambulances
  
- Station 3
  - 1 Type 6 Engine
  - 1 Type 1 Engine

- 1 Water Tender
- Station 4
  - 1 Investigation Truck
  - 2 ALS Ambulances
- Station 5
  - 1 Type 6 Engine
  - 1 Type 7 Engine
  - 1 Water Tender
- Station 6
  - 1 Type 1 Engine
  - 1 Type 1 Reserve Engine
- Station 7
  - 1 Type 1 Engine
  - 1 Type 6 Engine
  - 1 Mass Casualty Incident Trailer
- Station 8
  - 1 Type 1 Engine
  - 1 Water Tender

Mutual aid agreements for the EFPD are governed by the Denver-wide mutual aid agreement as well as the Jefferson County AOP, which provides an intergovernmental mutual aid agreement between all fire districts in the county, and include the CSFS and USFS. Jefferson County maintains a certified Type 3 Incident Management Team (IMT) for additional overhead support in the event of a large-scale incident. EFR also has specific mutual aid agreements with the Clear Creek Fire Authority and the Clear Creek Sheriff's Office.

EFR has developed a draft Wildland Fire Plan (Appendix M) that addresses operational goals and objectives, including training and response targets. The plan's goals are reflected in this CWPP:

- Facilitate a CWPP;
- Conduct a wildfire risk assessment;
- Develop a mitigation plan;
- Manage hazardous fuels;
- Facilitate emergency planning and operations; and
- Facilitate public outreach.

### 3.8 Values at Risk

In any hazard and risk assessment, human life and welfare are the most important resources to protect. Homes, businesses, aesthetics, and cultural and ecological resources are all important factors and certainly influence any recommendation; however, the safety and welfare of residents and emergency responders remains the top priority. The WUI has inherent risks including residential and commercial development in areas historically prone to fire, hazardous fuels, and limited access. The EFPD is characterized by dense suburban development within a forested setting.

Resources at risk include the following:

- Homes
- Businesses
- Local economy
- Municipal water supply
- Community infrastructure
- Wildlife and aquatic habitat
- Watersheds
- Water quality
- Air quality
- Natural vegetation communities
- Viewshed
- Historic structures

Catastrophic wildfire can have a severe and long-term impact on all natural resource and ecological values that people take for granted. The actions recommended in this CWPP are geared toward lowering the wildfire risk to neighborhoods, as well as economic and ecological resources.

## **4 WILDFIRE RISK ASSESSMENT**

### **4.1 Approach to the Wildfire Risk Assessment**

A comprehensive wildfire risk assessment takes into account a variety of factors that ultimately result in an accurate hazard ranking of the neighborhoods and subdivisions that have been collaboratively identified and determined to be the primary areas of concern within the assessment area. Hazard rankings provide quantifiable guidance in the determination of mitigation treatment project prioritization.

To better understand the nature and scope of the wildfire threat that faces the EFPD, a full spectrum of factors that influence fire behavior are evaluated including vegetation and fuels, topography, weather, potential fire behavior, and historical fire frequency. Community infrastructure is evaluated in terms of emergency response, defensibility, and structural flammability. Analyzing the relationship between expected fire behavior in the wildlands and the placement and design of neighborhoods and subdivisions proximate to those areas is at the core of an effective community wildfire risk assessment. From this process targeted mitigation recommendations are developed that directly address the identified hazards and, if implemented, will greatly reduce the risk of loss from a wildfire for each homeowner as well as the community as a whole.

The primary assessment area for this CWPP is defined by the boundaries of the EFPD. Thirty neighborhoods within the District were identified as areas of critical concern and surveyed in detail using a standardized methodology. Vegetation was mapped 1 mile into surrounding regions utilizing overhead imagery which was ground verified (photo survey points) and converted to FBFMs (Map 4a, Map 4b, Appendix A).

In the wildland fire vernacular, fire hazard refers to vegetation or wildland fuel in terms of its contribution to problem fire behavior and its resistance to control. Risk is the probability of ignition of wildland fuels. Values-at-risk include infrastructure, structures, improvements, and natural resources that are likely to suffer long-term damage from the direct impacts of a wildfire.

As part of the assessment, a concerted effort was made to solicit and include input from the public and local experts in fire and natural resource issues. This was achieved through direct outreach, meetings, and the distribution of questionnaires (Appendices D and E). A draft report of the CWPP was posted on the Jefferson County Emergency Services and EFR websites to encourage public participation and input.

### **4.2 Fire Behavior Analysis**

Fire behavior is defined as the manner in which a fire reacts to the influences of fuel, weather, and topography. Two key measures of this behavior are the rate of spread and the intensity. Rate of spread is often expressed in chains per hour. A chain is 66 feet, and one chain per hour closely approximates a spread rate of 1.1 feet per minute. Fire line intensity is reflected by flame length at the flaming front; it does not account for continued burning of fuels once the main fire front has passed.

BehavePlus version 3.0.1 is software that was used to assess potential fire behavior given the identified FBFMs, local topography, and local weather conditions. The predicted fire behavior represents surface fire behavior only. Fire moving through the forest canopy (crowning) and other types of extreme fire behavior are not represented in this analysis.

## Topography

Topography plays an import role in wildland fire behavior and may also dictate infrastructure design, influencing overall hazard and risk factors. Elevation in the EFPD ranges from 6,720 to 10,500 feet. Slope steepness of developed areas generally ranges from 10 to 20 percent but may exceed 30 percent in some cases. In the less populated western portion of the District slopes up to 70 percent are present. Many homes and roads within the District are exposed to hazardous terrain features such as steep slopes, narrow gullies, and saddles along ridges.

## Fire Weather

Average and severe case weather and fuel moisture conditions were determined using records from local remote access weather stations (RAWS) during the summer wildfire season of June through August. Data sets from four RAWS stations within 30 miles of Evergreen (Table 8) were processed using FireFamily Plus. Average and severe fire climate conditions were identified for each station using 50<sup>th</sup> and 90<sup>th</sup> percentile conditions. There are other weather stations in close proximity to Evergreen that were not used because of their lack of appropriate data including Bailey 7,982 ft. 15 miles wnw, South Platte 7,550 ft. 21 miles sse, and Polhemus 8,683 ft. 27 miles sse.

**Table 8. Remote Access Weather Stations near Evergreen, Colorado**

Station	Elevation (feet)	Location Relative to Evergreen	Years of Data
Corral Creek	7,844	7 miles west	2001-2006
Pickle Gulch	9,380	18 miles northwest	1995-2006
Sugarloaf	6,758	26 miles north-northwest	1977-2006
Cheesman	7,546	30 miles south	1987-2006

Percentile refers to historic occurrences of specified conditions. For example, 90<sup>th</sup> percentile conditions means that within the weather data examined from the RAWS stations, only 10 percent of the days had more extreme conditions. Fiftieth percentile is approximately average with half the records exceeding recorded conditions and half the records below recorded conditions. Fire climate and fuel moisture conditions were defined for the typical summer fire season of June through August for each of the RAWS stations (Table 9). Mid-flame wind speeds of 8 and 4 mph were used for the modeling of 90<sup>th</sup> and 50<sup>th</sup> percentile conditions respectively.

**Table 9. Average and Severe Case Fire Weather and Fuel Moisture Conditions for June - August near Evergreen, Colorado**

Raws Station	Percentile	Max Temp	Relative Humidity	1-Hour Fuel Moisture	10-Hour Fuel Moisture	100-Hour Fuel Moisture	Herbaceous Fuel Moisture	Woody Fuel Moisture
Corral Creek 2001-2006	50th	77°F	34%	5%	6%	10%	55%	105%
	90th	85°F	15%	3%	3%	6%	30%	75%
Pickle Gulch 1995-2006	50th	80°F	33%	6%	7%	11%	51%	98%
	90th	73°F	15%	3%	4%	7%	30%	72%
Sugarloaf 1977-2006	50th	84°F	35%	6%	8%	10%	64%	110%
	90th	91°F	16%	3%	4%	6%	29%	71%
Cheesman 1987-2006	50th	81°F	25%	5%	7%	10%	52%	100%
	90th	89°F	11%	2%	3%	6%	29%	67%

Additional important fire- and weather-related resources include:

- Fort Collins Interagency Wildfire Dispatch Center Web index for Fire Intelligence, Fire Weather, Fire Danger/Severity, RAWS – <http://www.fs.fed.us/r2/arnf/fire/fire.html>
- RAWS index for the Rocky Mountain Geographic Coordinating Area – [http://raws.wrh.noaa.gov/cgi-bin/roman/raws\\_ca\\_monitor.cgi?state=RMCC&rawsflag=2](http://raws.wrh.noaa.gov/cgi-bin/roman/raws_ca_monitor.cgi?state=RMCC&rawsflag=2)
- National Fire Weather Page – <http://fire.boi.noaa.gov/>

### Potential Fire Behavior

Fire behavior is defined as the manner in which a fire reacts to the influences of fuel, weather, and topography. Two key measures of this behavior are the rate of spread and the intensity. Rate of spread is expressed here in feet per minute, rather than chains per hour as commonly used in the wildland fire profession. Fireline intensity is reflected by flame length at the flaming front.

Fire behavior simulations were conducted for average (50<sup>th</sup> percentile) and severe (90<sup>th</sup> percentile) conditions for the critical months of the fire season, June through August (Table 10). The high and low fuel moistures from the four RAWS stations were used as inputs to the BehavePlus model to represent a range of potential conditions. Slope steepness was set to 20 percent.

BehavePlus software was used to generally illustrate the potential surface fire behavior given the prevailing fuel types, local topography, and local weather conditions. While any number of variables and assumptions will affect the modeled outputs, there are several significant general principles to focus on:

- The differences in surface fire behavior under 50<sup>th</sup> and 90<sup>th</sup> percentile conditions (drier fuels, windier conditions) are most pronounced in brush and grass fuels.

- This increase in fire activity is approximately two times for flame length and three to four times for rate of spread.
- Fire behavior for most fuel types under 90<sup>th</sup> percentile conditions exceeds the 4-foot flame lengths generally considered appropriate for direct line construction with handcrews.
- If FBFM 9 converts into the denser FBFM 10, the increases in fireline intensity and flame length are pronounced and conducive to the initiation of crown fire.

**Table 10. BehavePlus Predictions of Fire Behavior on 20 Percent Slope  
for Average and Severe Climatic Conditions**

FBFM	Flame Length (feet) Average Conditions <sup>a</sup>	Rate of Spread (chains/hr) <sup>b</sup> Average Conditions	Flame Length, (feet) Severe Conditions <sup>c</sup>	Rate of Spread (chains/hr) <sup>b</sup> Severe Conditions
1 Short Grass	4	68-72	9-10	316-370
2 Grass with Timber/Shrub Overstory	6	33	13-14	133-150
4 Mature Brush	17-18	61	34-38	213-247
5 Young Brush	4-6	14-20	11-12	67-78
6 Intermediate or Dormant Brush	6	27-30	10-11	86-98
8 Closed or Short-needle Timber Litter – Light Fuel Load	1	2	2	5-6
9 Hardwood or Long-Needle or Timber Litter – Moderate Ground Fuel	3	7	5-6	26-30
10 Mature/Overstory Timber and Understory	5	7	9-10	23-27

a. Average conditions based on 50th percentile weather and 4 mph midflame windspeed

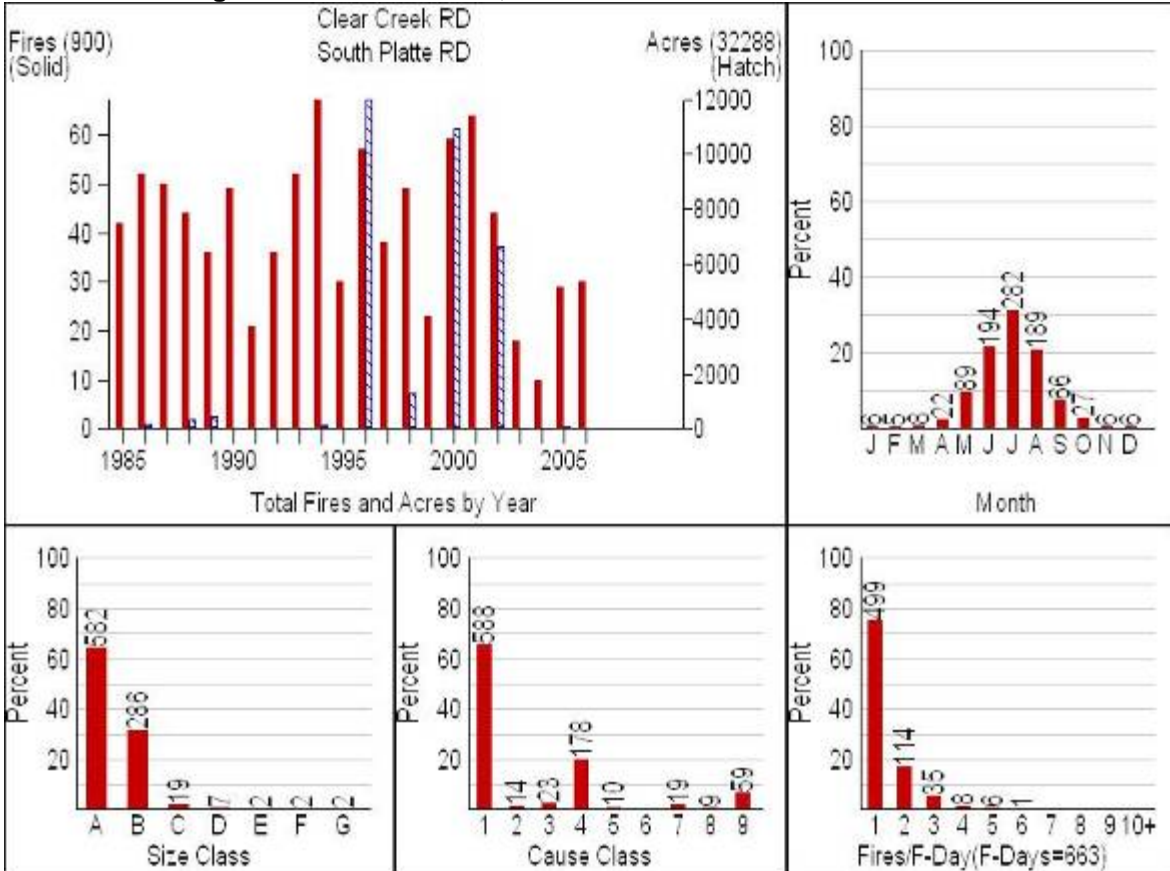
b. Severe conditions based on 90th percentile weather and 8 mph midflame windspeed

### 4.3 Wildfire Occurrence

The vegetation in the assessment area is diverse and typical for the Colorado Front Range. A mix of grass, brush, and a variety of forest types are found throughout the EFPD. All of these vegetation types represent ecosystems that are fire-adapted to some degree. Fire regimes in the area include low, mixed, and high severity with fire return intervals ranging from less than 30 years to over 200 years.

While the majority of fires on the surrounding USFS districts are caused by lightning, humans have started the majority of community-threatening fires in the EFPD, and it is widely acknowledged that fire suppression policies have exacerbated fire intensity along the Colorado Front Range (Figure 9).

**Figure 9. USFS Fire Data, South Platte and Clear Creek Districts**



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

EFPD call records show that approximately 70 percent of incidents responded to are medical. Approximately 15 percent of responses are fire incidents. The average of five wildfires per year constitutes approximately 17 percent of fire calls and less than 1 percent of total incidents. Most wildfires in the District are contained and suppressed during the initial attack phase. Though these statistics may seem to portray wildfires as a limited hazard within the District, a study of past wildfires in the area illustrates the potential for large fires and the threat to communities (Table 11). See Appendix L for a comprehensive wildfire history of the CSFS, Golden District, which includes the EFPD.

**Table 11. Significant Wildfires in the Local WUI**

Fire	Month/Year	Acres Burned	Fire Protection District
Murphy Gulch	Sep 1978	3,300	Inter-Canyon/Bancroft
Mount Falcon	Apr 1989	125	Indian Hills
O'Fallon	Mar 1991	52	Evergreen
Elk Creek	May 1991	102	Golden Gate
Buffalo Creek	May 1996	10,400	USFS/North Fork
Bear Tracks	Jun 1998	500	USFS/Evergreen
Lininger Mountain	Feb 1999	35	Genesee/Foothills
Hi Meadow	Jun 2000	10,800	Platte Cyn/Elk Cr/North Fork
Black Mountain	May 2002	300	USFS/Elk Cr/Evergreen
Fountain Gulch	Jun 2002	200	Clear Creek
Centennial Cone	Jul 2006	22	Jefferson County Open Space
Upper Bear Creek	Jan 2006	35	Evergreen

Source: Gallamore 2007 (See Appendix L for a comprehensive wildfire history of the CSFS, Golden District)

#### 4.4 Jefferson County Fire Danger Rating System and Local Weather Information

The Jefferson County Fire Danger Rating System (JFDRS) is based on the National Fire Danger Rating System (NFDRS) implemented in 1978. The JFDRS uses both RAWS and independent weather stations that are monitored with the data available from the Internet. Jefferson County limits the fire danger rating to NFDRS fuel models C (Pine-Grass Savanna) and G (Short-Needle [Heavy Dead]). The RAWS supply all necessary data used for fire danger rating; however, the independent stations require manual inputs to calculate fire danger such as state of the weather and calculation of 1-hour fuel moisture. After the weather data are collected the fire danger is calculated with an NFDRS calculator provided in the Fire Family Plus software. The energy release component (ERC) is then compared to the rating chart developed for Jefferson County, and an adjective fire danger value (extreme, very high, high, moderate, or low) is assigned. The Evergreen Communications Center emails completed forms for the RAWS and independent weather stations to the Jefferson County Sheriff, CSFS, and local fire agencies for distribution. The completed form with various components of the NFDRS is used for responders and an adjective fire danger for the public.

#### 4.5 Wildfire Risk to Communities

EFPD assessment and neighborhood hazard and risk surveys were conducted during May, June, and July 2007. Detailed analysis of the assessment area, conducted with the EFPD, resulted in the identification of thirty individual WUI zones. Each identified WUI represents a unique response area with specific characteristics, resources, and identifiable hazards and risks. A single WUI may span multiple subdivisions or HOAs, or a single subdivision or HOA may be subdivided in multiple WUIs. The remainder of the District

may be characterized as either urban/commercial with no direct wildland interface, or rural, that is best served through individual home and property hazard and risk assessments

A standardized survey process defined by the NFPA was utilized to assess the relative level of wildfire risk and hazard for each neighborhood. Appendix B contains an example of the NFPA Form 1144, *Standard for Protection of Life and Property from Wildfire*. 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 (Table 12). Detailed observations and survey results are provided in Appendix C.

**Table 12. Community Hazard Rating and Contributing Factors**

HAZARD RATING	WUI ID - SUBDIVISIONS	1144 SURVEY SCORE	CONTRIBUTING FACTORS
<b>EXTREME</b>	5 - Echo Hills	123	<ul style="list-style-type: none"> <li>▪ Single ingress/egress.</li> <li>▪ Topographic locale on ridgeline with long chimneys.</li> <li>▪ Predominant north aspect and dense over-mature lodgepole pine and Douglas-fir stands.</li> <li>▪ Limited emergency water access.</li> <li>▪ Majority of homes lack adequate defensible space, are constructed with combustible building material, and are in close proximity to steep heavily forested slopes.</li> </ul>
	20 - Brook Forest Estates, Upper Cub Creek	118	<ul style="list-style-type: none"> <li>▪ Single access with poor secondary access through a forest service access road.</li> <li>▪ Dense forest encroachment on main access routes.</li> <li>▪ Defensible space efforts complicated by dense continuous lodgepole pine &gt; 50% &lt;30'.</li> <li>▪ Dead ends on most secondary roads.</li> <li>▪ Topography, steep slopes, chimney access.</li> <li>▪ Grade and condition of secondary roads.</li> </ul>
	12 - Rosedale Acres, Segar Acres	115	<ul style="list-style-type: none"> <li>▪ Single ingress/egress.</li> <li>▪ Steep valley slopes.</li> <li>▪ Heavy forest fuels on both north and south aspects.</li> <li>▪ Limited emergency access/no turnarounds.</li> <li>▪ Combustible building materials and restricted defensible space.</li> </ul>
	1 - Beaver Brook Canyon, Highland Hills, Chase Subdivision, Elmgreen Acres, Pleasant Lane, Homestead Hideaway	115	<ul style="list-style-type: none"> <li>▪ Single ingress/egress.</li> <li>▪ Dead ends.</li> <li>▪ Majority of homes lack adequate defensible space, are constructed with combustible building material, and are in close proximity to steep heavily forested slopes.</li> <li>▪ Steep topography with chimney.</li> <li>▪ Limited emergency water access.</li> </ul>
	21 - Buffalo Park Estates, Evergreen Hills	112	<ul style="list-style-type: none"> <li>▪ Areas of high timber density.</li> <li>▪ Topography; significant relief, steep chimneys.</li> <li>▪ Upper half of subdivision single ingress/egress.</li> <li>▪ Structural ignitability.</li> <li>▪ Structure proximity to steep slopes.</li> <li>▪ Defensible space &gt; 40% &lt; 30'; efforts complicated by lodgepole stands.</li> <li>▪ Forest encroachment on main access routes.</li> <li>▪ Dead ends on many secondary roads.</li> <li>▪ Steep grade and washed out condition of some secondary roads.</li> <li>▪ Absence of emergency water supply.</li> </ul>

HAZARD RATING	WUI ID - SUBDIVISIONS	1144 SURVEY SCORE	CONTRIBUTING FACTORS
<b>HIGH</b>	7 - Evergreen West	105	<ul style="list-style-type: none"> <li>▪ Topography, box canyon, chimney.</li> <li>▪ Forest composition, high density.</li> <li>▪ Dense forest along primary access road margins.</li> <li>▪ Wood shingle roofing.</li> <li>▪ Structure proximity to steep slopes.</li> <li>▪ Hazardous dead ends and restricted turnarounds.</li> </ul>
	30 - Greystone Estates	105	<ul style="list-style-type: none"> <li>▪ Topography, steep south aspect.</li> <li>▪ Restricted ingress/egress to homes.</li> <li>▪ Predominance of flashy fuels.</li> <li>▪ Structural ignitability.</li> <li>▪ Wood shingle roofing.</li> <li>▪ Structure proximity to steep slopes.</li> <li>▪ Absence of emergency water supply or drafting source.</li> </ul>
	13 - Independent Heights, Forest Hill, Mountain Park Homes	101	<ul style="list-style-type: none"> <li>▪ Housing density.</li> <li>▪ Timber composition and density.</li> <li>▪ Topography; steep slopes cut by chimneys.</li> <li>▪ Structural ignitability.</li> <li>▪ Structure proximity to steep slopes.</li> <li>▪ Defensible space &gt; 70% &lt; 30'.</li> <li>▪ Secondary roads dead end and steep switchbacks.</li> </ul>
	18 - Bear Mountain Vista, Stanley Park	98	<ul style="list-style-type: none"> <li>▪ Upper half of subdivision single ingress/egress.</li> <li>▪ Density and composition of timber stands.</li> <li>▪ Topography; areas of significant relief, steep slopes, chimneys.</li> <li>▪ Proximity of homes to slopes &lt;10%.</li> <li>▪ Limited emergency water supply.</li> <li>▪ Forest encroachment on some secondary roads.</li> <li>▪ Structural ignitability.</li> </ul>
	29 - French Springs	96	<ul style="list-style-type: none"> <li>▪ Single ingress/egress.</li> <li>▪ Dead-ends with no turnarounds.</li> <li>▪ Defensible space &gt; 50% &lt; 30'.</li> <li>▪ Structural flammability.</li> <li>▪ Absence of established emergency water source.</li> </ul>
	23 - Cub Creek Ranch, Evergreen Highlands, Timbers Estates, North Marshner, South Marshner	96	<ul style="list-style-type: none"> <li>▪ Limited dual access.</li> <li>▪ Density and composition of timber stands.</li> <li>▪ Limited emergency water supply.</li> <li>▪ Structural flammability.</li> <li>▪ Roofing flammability.</li> <li>▪ Above-ground utilities.</li> <li>▪ Topography; steep slopes, chimneys, and saddles.</li> </ul>
	2 - Soda Creek, Fox Ridge	94	<ul style="list-style-type: none"> <li>▪ Topography, significant relief, steep slopes.</li> <li>▪ Limited emergency water supply.</li> <li>▪ Secondary road accessibility and restricted turnarounds.</li> <li>▪ Timber stand density and composition.</li> <li>▪ Forest encroachment along primary access routes.</li> <li>▪ Roofing flammability ~ 25% wood shake shingle.</li> </ul>
11 - Circle K, Bendemeer Valley, Golden Willow, Greystone Lazy Acres, Bear Creek Estates, Diamond Park, Wilderness Point	92	<ul style="list-style-type: none"> <li>▪ Lower tier secondary roads not maintained and dead end with no turnarounds.</li> <li>▪ Topography; significant relief, chimney access, steep slopes in some areas.</li> <li>▪ Limited emergency water supply.</li> <li>▪ Structural flammability.</li> <li>▪ Above-ground utilities.</li> </ul>	
3 - Beaver Brook, Hoffer Heights, Pine Valley Estates	91	<ul style="list-style-type: none"> <li>▪ Limited emergency water supply.</li> <li>▪ Street signage.</li> <li>▪ Structural flammability.</li> <li>▪ Above-ground utilities.</li> <li>▪ Heavy timber at east access.</li> <li>▪ Restricted access and dead ends in north end of area, Bluebell, Beaver Roads.</li> <li>▪ Defensible space ~ 35% &lt;30'.</li> </ul>	

HAZARD RATING	WUI ID - SUBDIVISIONS	1144 SURVEY SCORE	CONTRIBUTING FACTORS
	25 - Evergreen Meadows East	89	<ul style="list-style-type: none"> <li>▪ Timber density and composition.</li> <li>▪ Limited emergency water availability.</li> <li>▪ Topography; significant west aspect slope.</li> <li>▪ Proximity of homes to steep slope.</li> <li>▪ Structural flammability.</li> <li>▪ Above-ground utilities.</li> </ul>
	22 - Estates of Blue Creek, Blue Creek Rd	82	<ul style="list-style-type: none"> <li>▪ Timber density and composition.</li> <li>▪ Limited emergency water availability.</li> <li>▪ Topography; significant west aspect slope.</li> <li>▪ Proximity of homes to steep slope.</li> <li>▪ Structural flammability.</li> <li>▪ Secondary roads steep switchbacks and dead ends.</li> <li>▪ Above-ground utilities.</li> </ul>
	9 - Hiwan Hills, Hidden Village at Hiwan, Douglas Park, Hiwan Homestead Museum	81	<ul style="list-style-type: none"> <li>▪ Defensible space ~ 45% &lt;30'.</li> <li>▪ Structural flammability.</li> <li>▪ Structural density.</li> <li>▪ Topography; steep slope in central area.</li> <li>▪ Medium timber predominant.</li> </ul>
	19 - Pine Valley Estates, Hillcrest Village, Peaceful Hills	81	<ul style="list-style-type: none"> <li>▪ Structural flammability.</li> <li>▪ Limited emergency water availability.</li> <li>▪ Topography; significant relief central.</li> <li>▪ Defensible space ~ 30% &lt;30'.</li> <li>▪ Timber stands dense in some areas.</li> </ul>
	17 - Herzman Mesa, Wonderview, Pine Crest Park, Sunset Heights, High Prairie, Far View Acres, Craigmont Estates, Marshdale Park, Marshdale	80	<ul style="list-style-type: none"> <li>▪ Structural flammability.</li> <li>▪ Limited emergency water availability.</li> <li>▪ Topography; significant relief central.</li> <li>▪ Defensible space ~ 30% &lt;30'.</li> <li>▪ Timber stands dense in some areas.</li> </ul>
	8 - Tanoa, Overlook, Palo Verde, Troutdale Estates, Glen Erie, Bear Creek	77	<ul style="list-style-type: none"> <li>▪ Timber density along some primary and secondary roads.</li> <li>▪ Structural flammability.</li> <li>▪ Topography; significant relief central.</li> <li>▪ Proximity of structures to steep slopes.</li> <li>▪ Access to some areas is limited to single ingress/egress.</li> <li>▪ Some secondary roads dead ends with no turnarounds.</li> <li>▪ Signage; some intersections missing.</li> </ul>
	26 - The Ridge at Hiwan	76	<ul style="list-style-type: none"> <li>▪ Wood shingle roofing.</li> <li>▪ Secondary road dead ends.</li> <li>▪ Conifer regeneration.</li> <li>▪ Restricted dual access south Keystone.</li> <li>▪ Housing density.</li> <li>▪ Defensible space maintenance.</li> </ul>
	16 - Evergreen Park Estates, Evergreen Heights, Evergreen Golf Course, Evergreen Valley Estates, Columbine Road	76	<ul style="list-style-type: none"> <li>▪ Defensible space ~ 46% &lt;30'.</li> <li>▪ Topography; significant relief, Evergreen Mountain central to the area; chimneys on lower slopes bisect housing.</li> <li>▪ Restricted turnarounds on the majority of dead ends.</li> <li>▪ Structural flammability.</li> <li>▪ Proximity of structures to steep slope.</li> <li>▪ Timber density and forest composition high on north aspects.</li> <li>▪ Absence of emergency water supply.</li> <li>▪ Above-ground utilities.</li> </ul>
	27- EL Pinal, El Pinal Acres	75	<ul style="list-style-type: none"> <li>▪ Housing density.</li> <li>▪ Topography; steep slope.</li> <li>▪ Narrow and steep roads, intersections.</li> <li>▪ Restricted ingress/egress east end.</li> <li>▪ Dead-ends with no turnarounds.</li> <li>▪ Proximity of structures to steep slope.</li> <li>▪ Structural flammability.</li> <li>▪ Wood shingle roofing ~ 12%.</li> </ul>
	10 - Kittredge, Quartz Mountain, Pine Valley Acres, Meadow Mountain Heights	75	<ul style="list-style-type: none"> <li>▪ Structural flammability.</li> <li>▪ Topography; steep valley slopes.</li> <li>▪ Single ingress/egress along Kittredge Park.</li> <li>▪ Predominant road grade.</li> </ul>

HAZARD RATING	WUI ID - SUBDIVISIONS	1144 SURVEY SCORE	CONTRIBUTING FACTORS
			<ul style="list-style-type: none"> <li>▪ Housing density.</li> <li>▪ Proximity of structures to steep slopes.</li> <li>▪ Secondary roads with restricted turnarounds or dead ends.</li> <li>▪ Timber encroachment on secondary roads.</li> <li>▪ Signage missing at some intersection.</li> </ul>
	24 - Evergreen Meadows West	74	<ul style="list-style-type: none"> <li>▪ Timber density and forest composition throughout area.</li> <li>▪ Housing density.</li> <li>▪ Structural flammability.</li> <li>▪ Limited emergency water availability.</li> <li>▪ Above-ground utilities.</li> <li>▪ Topography; significant relief to ridge on west side.</li> <li>▪ Proximity of homes to slope.</li> </ul>
	4 - Hidden Valley, Ruby Ranch, Nob Hill, Avery Acres, El Rancho	73	<ul style="list-style-type: none"> <li>▪ Topography; prominent ridge/valley.</li> <li>▪ Structures in proximity to slope.</li> <li>▪ Timber encroachment on primary and secondary access routes.</li> <li>▪ Timber density in proximity to subdivision.</li> <li>▪ Defensible space ~ 31% &lt;30'.</li> <li>▪ Major secondary road with single ingress/egress.</li> <li>▪ Above-ground utilities.</li> </ul>
<b>MODERATE</b>	14 - Hagan Ranch, Elk Ridge, Elephant Park, Westhaven Heights, Our-Lady-of-the-Rockies	67	<ul style="list-style-type: none"> <li>▪ Structural flammability.</li> <li>▪ Defensible space ~ 31% &lt;30'.</li> <li>▪ Above-ground utilities.</li> <li>▪ Limited emergency water supply.</li> </ul>
	28 - Wah Keeney Park	59	<ul style="list-style-type: none"> <li>▪ Structural flammability.</li> <li>▪ Restricted access at east end.</li> <li>▪ Predominance of flashy fuels.</li> <li>▪ Topography; steep slope.</li> </ul>
	15 - Greenwood, Wilmont Woods, Evergreen Hill	58	<ul style="list-style-type: none"> <li>▪ Structural flammability.</li> <li>▪ Some dead-end secondary roads.</li> <li>▪ One zone without hydrants.</li> </ul>
	6 - Hiwan Country Club	57	<ul style="list-style-type: none"> <li>▪ Roofing flammability.</li> <li>▪ Structural flammability.</li> <li>▪ Restricted access south end.</li> </ul>

*Note: In addition to the listed factors, rating scores are also influenced by the region's high fire occurrence and potential for severe fire weather.*

These comprehensive community assessments provide the basis for effective identification, prioritization, and implementation of specific mitigation and hazard reduction recommendations.

## 5 WILDFIRE MITIGATION PLAN

### 5.1 Approach to Mitigation Planning

Wildfire mitigation can be defined as those actions taken to reduce the likelihood of loss due to wildfire. Effective wildfire mitigation can be accomplished through a variety of methods including reducing hazardous fuels, managing vegetation, creating defensible space around individual homes and subdivisions, utilizing fire-resistant building materials, enhancing emergency preparedness and response capabilities, upgrading current infrastructure, and developing programs that foster community awareness and neighborhood activism. Once implemented, these actions will significantly reduce the risk of loss due to wildfire to an individual home, and on a larger implementation scale, to an entire community

Specific mitigation treatment recommendations for the EFPD were identified through detailed community wildfire hazard assessment surveys that evaluated parameters such as vegetation and hazardous fuels, predicted fire behavior, physical infrastructure, emergency response resources, home construction flammability, and defensible space characteristics around structures. All recommendations were reviewed by and collaboratively developed with the fire district, stakeholders, and relevant public agencies with detailed assessment of individual community surveys, stakeholder recommendations, public feedback, and the integration of existing fuels and forest management plans for affected public lands (Map 5). During the assessment process individual WUIs receive a hazard ranking that is relative to other WUIs within the assessment area as well as adjacent districts. Recommended project prioritization is based on individual WUIs, regardless of hazard and risk score.

### 5.2 Recommended Actions

Recommended action item categories are summarized in Table 13 and detailed in Table 15. Recommendation priorities are based on effective impact to overall community wildfire hazard and risk reduction. The most effective action begins with the individual homeowner taking responsibility to create defensible space and reduce structural ignitability. Community outreach and individual home owner mitigation actions are prioritized. Other recommendations such as strategic shaded fuel breaks, thinning in identified treatment zones, emergency access improvements, and water resource improvements follow.

**Table 13. Recommended Actions by Category**

Project	Actions
Outreach/Public Education	<ul style="list-style-type: none"> <li>▪ Encourage stakeholder participation in community meetings.</li> <li>▪ Distribute Firewise materials.</li> <li>▪ Assess individual homes.</li> </ul>
Defensible Space	<ul style="list-style-type: none"> <li>▪ Establish a fuel-free zone around homes.</li> <li>▪ Establish a treated second zone that is thinned, pruned, and cleared of excess surface fuels.</li> <li>▪ Extend treatment to property boundary to improve natural forest conditions and reduce excess hazardous</li> </ul>

Project	Actions
	vegetation. <ul style="list-style-type: none"> <li>▪ Employ defensible space practices around identified resources such as cisterns, dip and draft sites, potential safety zones, or observation areas.</li> </ul>
Firewise Building Improvements	<ul style="list-style-type: none"> <li>▪ Replace shake roofs with fire-resistive roofing.</li> <li>▪ Implement Firewise construction principals for all remodels.</li> <li>▪ Enclose exposed decks and gables.</li> <li>▪ Screen vents and chimneys.</li> </ul>
Shaded Fuelbreaks	<ul style="list-style-type: none"> <li>▪ Treat along primary and secondary evacuation routes.</li> <li>▪ Improve/expand utility right-of-ways.</li> </ul>
Access/Egress Improvements	<ul style="list-style-type: none"> <li>▪ Improve hazardous primary access routes.</li> <li>▪ Create/improve dead end turnarounds.</li> <li>▪ Create/improve secondary evacuation routes where needed.</li> <li>▪ Improve restricted switchbacks.</li> </ul>
Strategic Fuelbreaks	<ul style="list-style-type: none"> <li>▪ Provide for fuelbreaks in identified treatment zones.</li> <li>▪ Conduct removal where possible.</li> <li>▪ Burn piles where needed.</li> <li>▪ Coordinate with adjacent public land management agencies.</li> <li>▪ Expand to address infestation where needed.</li> </ul>
Supporting Actions	<ul style="list-style-type: none"> <li>▪ Support grant funding acquisition actions.</li> <li>▪ Involve Jefferson County in evacuation improvements.</li> <li>▪ Revise county statutes addressing defensible space requirements for home sales.</li> <li>▪ Coordinate with agency forest management plans.</li> </ul>
Fire Department Preparedness	<ul style="list-style-type: none"> <li>▪ Integrate project GIS</li> <li>▪ Update and distribute run books.</li> <li>▪ GIS and update all water resources.</li> <li>▪ Survey potential dip sites and safety zones</li> <li>▪ Develop community pre-plans based on surveys</li> <li>▪ On-going community education</li> <li>▪ Conduct ongoing recruitment, training, and certification</li> <li>▪ Coordinate mutual aid strategic planning.</li> <li>▪ Upgrade apparatus, facility, and personal protective equipment (PPE).</li> </ul>

**Outreach and Public Education:** The most effective means to initiate local action is through community education and public outreach. The purpose of a district-wide education program is as follows:

- Identify wildfire hazards and risks;
- Introduce the benefits of defensible space and Firewise construction principals;
- Urge homeowners to take action on their own property and influence neighbors, friends, and HOAs;
- Initiate creation of an oversight group to drive CWPP implementation and grant application;
- Increase awareness of current forest conditions and how hands-on management practices can help restore forest health and reduce wildfire risk; and

- Create awareness of the historical role fire has played in the regional ecosystem and forest and rangeland health.

Some parcels within subdivisions may be undeveloped and/or owned by absentee owners. A lack of fuels management on these lots can impact the entire community. An effort should be made to contact these landowners and determine how to address their concerns and overcome potential obstacles to conducting hazard fuel mitigation on their land.

**Action Item:** An annual community meeting in the spring can spur action on the part of neighborhoods and individuals. This can be a forum for presentations by experts in the field and allow for coordination of “cleanup” efforts within the community. Firewise materials and postings should be made available to the public at each fire station, post office, HOA, and elementary school on a regular basis. A disposal method for yard waste should be coordinated every spring. This may be coordinated with HOA spring cleanup activities and may include the coordination of a central disposal site, mobile chipping services, or a hauling service. See Section 5.4 for potential funding opportunities.

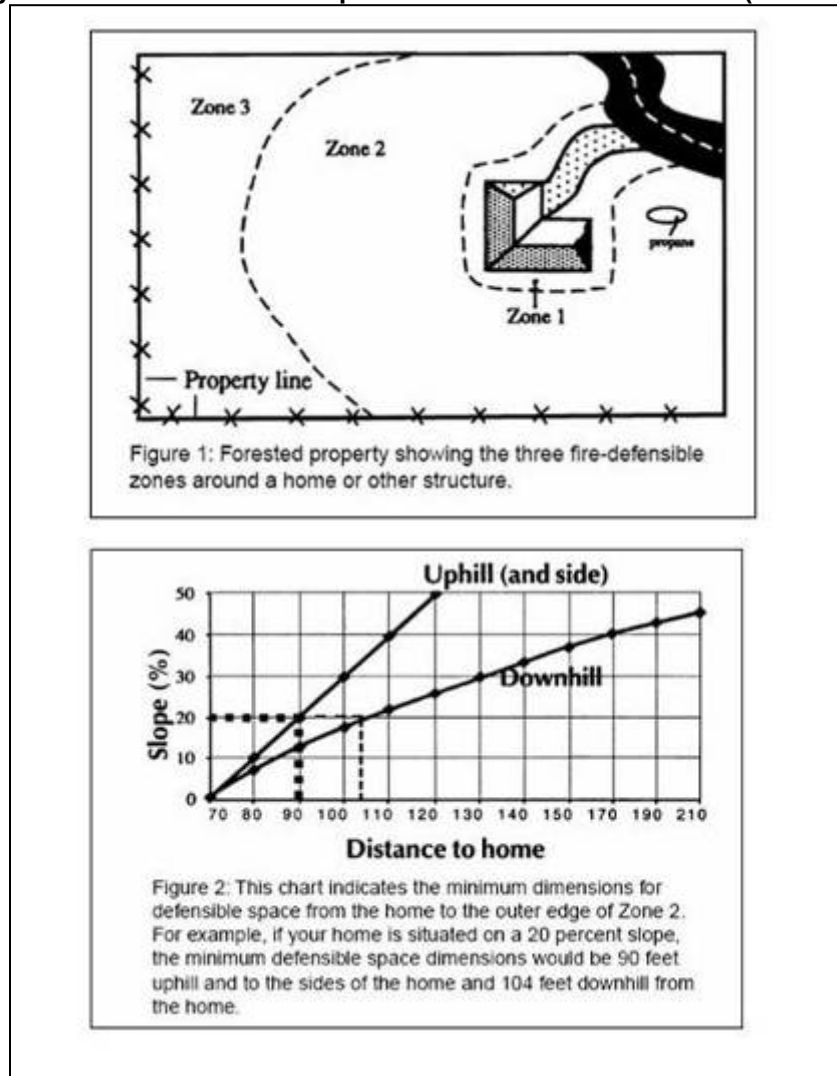
An example would be the continuance of the annual “Slash Day,” which took place this year on June 23 and 24 at the Evergreen High School. Perhaps slash collection days could occur in the fall or at other locations to make it easy for all residents to participate. A community, HOA, or neighborhood would hire a contractor by the hour to chip the slash stacked along the main road by homeowners in front of each residence. Each landowner would pay for the time it took to chip his/her slash, but the equipment and scheduling costs would be carried/distributed among all participating landowners.

**Defensible Space:** An action that can be taken immediately to improve community hazard ratings is the implementation of defensible space around individual homes. It is recommended that defensible space be created following the CSFS guidelines as set forth in *Creating Wildfire Defensible Zones*, Bulletin No. 6.302 (Dennis 2003) (Appendix G), which is consistent with Jefferson County regulations. A majority of the public questionnaires, that were filled out and returned, stated that defensible space was key to wildfire risk reduction (Appendix E).

**Action Item:** This is the primary recommendation for hazard fuels mitigation within the EFPD. It is suggested that the above outreach efforts be used to coordinate and spur implementation and slash disposal at the individual homeowner level. Active participation ultimately leads to effective hazard reduction at the community level. Many homeowners with the highest need for defensible space are directly adjacent to public lands. Coordinating fuel reduction activities between public and private lands creates a mutually beneficial environment. Establishing a procedure whereby homeowners who have established defensible space on their property may petition for fuels management on adjacent public lands would facilitate communication and coordination.



**Figure 11. CSFS Defensible Space Guidelines and Standards (Dennis 2006)**



**Zone 2 (typically from 15 feet out to 60-210 feet from Zone 1):** The size of this zone is dependent upon slope. Treatment of ground fuels and ladder fuels is generally the same as for Zone 1. Trees (or small groups of trees) and shrubs should be thinned to provide 10 feet of clearance among crowns. Grasses should be mowed because they dry in late summer.

**Zone 3 (beyond Zone 2 to property line):** This area outside of Zone 2 should be managed for the appropriate land use objectives, such as forest health, aesthetics, recreation, and wildlife habitat (Figure 12).

See Appendix K, or visit [www.csfs.colostate.edu/library.htm](http://www.csfs.colostate.edu/library.htm) for information on fire-resistant plants and grasses that can augment defensible space efforts.

Efforts can be encouraged and coordinated annually through community meetings, planned spring cleanups, and organized disposal efforts. Although most of the work can be accomplished by individual homeowners in a phased approach over time, neighborhood cooperation and support is essential to help those who are unable, or to provide access to critical hazardous areas. Table 14 outlines a manageable phased implementation schedule.

**Table 14. Community-Based Defensible Space Project Schedule**

Year	Project	Actions
1	Annual spring outreach	<ul style="list-style-type: none"> <li>▪ Contact and/or organize homeowners.</li> </ul>
	Annual spring mitigation (defensible space)	<ul style="list-style-type: none"> <li>▪ Clean roofs and gutters.</li> <li>▪ Trim limbs/bushes within 3 to 5 feet of home.</li> <li>▪ Rake yard.</li> <li>▪ Help a neighbor.</li> <li>▪ Organize debris disposal.</li> </ul>
2	Annual spring outreach	<ul style="list-style-type: none"> <li>▪ Contact and/or organize homeowners.</li> </ul>
	Annual spring mitigation (defensible space)	<ul style="list-style-type: none"> <li>▪ Clean up brush along property lines.</li> <li>▪ Repeat basic yard cleanup.</li> <li>▪ Organize debris disposal.</li> </ul>
3	Annual spring outreach	<ul style="list-style-type: none"> <li>▪ Contact and/or organize homeowners.</li> <li>▪ Advise individual homeowners on needed improvements to construction features.</li> </ul>
	Annual spring mitigation (defensible space)	<ul style="list-style-type: none"> <li>▪ If necessary, coordinate defensible space efforts between homeowner groups who have created defensible space and adjacent open space land managers.</li> </ul>
4	Annual spring outreach	<ul style="list-style-type: none"> <li>▪ Contact and/or organize homeowners.</li> <li>▪ Follow-up on construction feature recommendations.</li> </ul>
	Annual spring mitigation (defensible space)	<ul style="list-style-type: none"> <li>▪ Complete any outstanding projects from previous years.</li> <li>▪ Begin maintenance phase.</li> <li>▪ Initiate construction feature improvements.</li> </ul>

**Building Improvements:** Improving the fire-resistant characteristics of a structure goes hand-in-hand with the development of defensible space. Extensive recommendations can be found in CSFS publications available at <http://csfs.colostate.edu/library.htm>. The most significant improvement that can be made to many of the homes in the assessment areas is the replacement of wood shake roofing with noncombustible roofing material, as is required for all new and replaced roofs in Jefferson County’s WUI. All homeowners should keep roofs and gutters clear of leaves and pine needles. Screening of gutters and roof vents is recommended. Embers from a wildfire can become windborne and travel long distances before settling.

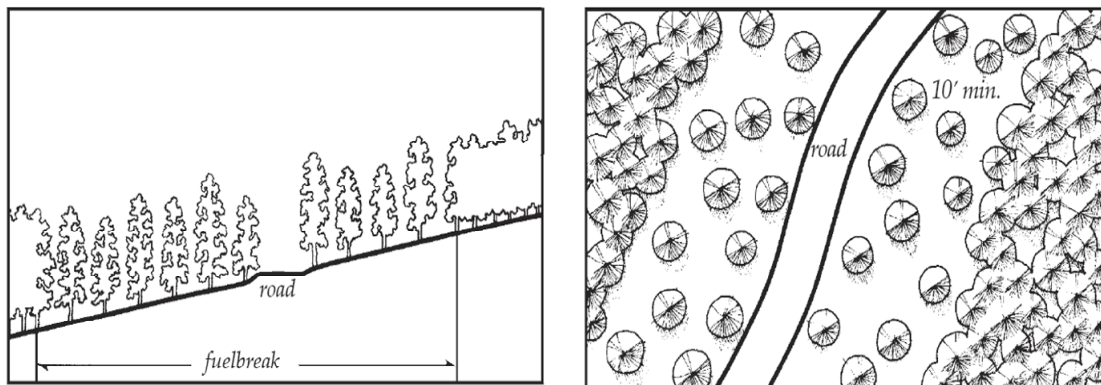
Common structural fuel hazards associated with homes in the WUI include:

- Combustible decks with exposed undersides;
- Combustible material under decks;
- Open attic vents;
- Propane tanks adjacent or downhill from home;
- Combustible fencing; and

- Woody debris in gutters.

**Action Item:** Provide for community education, outreach, and information distribution through HOAs and other neighborhood associations. Coordinate public education through existing spring cleanup programs. Grass-roots public awareness can be as simple and straightforward as coordinating with a local scout troop to distribute applicable CSFS flyers door-to-door.

**Shaded Fuelbreaks:** All forested access roads should be maintained as shaded fuelbreak zones where possible. Reducing the forest canopy along access roads enhances the effectiveness of the physical canopy break the road provides, as well as critical safety factors along likely evacuation and incident access routes. This creates a safer emergency ingress/egress scenario while greatly aiding potential tactical suppression efforts. Fuels treatment along roadways reduces removal costs as well as project complexity (Figure 12). Visit <http://csfs.colostate.edu/library> for fuelbreak guidelines (Appendix F).



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

Plan view of fuelbreak showing minimum distance between tree crowns.

Source: Dennis, undated

**Figure 12. Shaded Fuelbreak**

**Action Item:** All access roads within the EFPD with vegetation or timber encroachment should be targeted for mitigation or seasonal mowing. Treatments may be coordinated with property owners along private roads and coordinated with county and state transportation departments for any public roads. Conifer regeneration along road margins should be addressed. Due to emergency response concerns, monitoring the progress and evaluation of effectiveness by a certified forester is recommended.

**Treatment Zones:** Treatment recommendations may target areas that are not directly adjacent to a neighborhood or roads, but provide a critical wildfire buffer in areas where ignitions are likely and topography and fuel loads combine to create a hazardous situation for a subdivision at a higher elevation or downwind prevailing fire weather situations. Zone locations are influenced by topography, forest composition, access, and expected fire behavior in spatial relation to subdivisions at-risk. Any alternative treatment zones should be considered and prioritized should variables change such as access, ownership, cooperation, as well as forest characteristics through fire or infestation. Such treatments

also benefit the diversity of wildlife and vegetation. Specific treatments should be identified only with the assistance of a certified forester and take into consideration other fuels and forest management plans within the area. Fuel treatments of this scale are often subject to a number of hurdles that may include presiding agency staffing levels, current available funding levels, environmental impact concerns, public support, and private ownership.

**Action Item:** Forest management plans for public lands often focus on fuel reduction activities that address forest health and wildfire risk reduction concerns. Strategic development for these plans should take into account wildfire hazard factors that exist for adjacent WUIs and target forest management activities that are beneficial to both public and private lands.

**Weeds:** Weed abatement programs will reduce fuel hazards around and within communities and improve the health of grasslands. Post-fire treatment management such as the seeding of native grasses and spreading mulch is beneficial and may be necessary to establish a productive plant community.

**Action Item:** An ecological evaluation of the status of prairie and shrub rehabilitation is recommended for local areas affected by fires within the last few years. Analysis should focus on the presence of noxious weeds and aggressive non-native species as well as mortality rates in shrubs. Studies may foster modifications to county burned area rehabilitation seeding practices for future wildfire incidents.

**Access:** Access is an important component of any community's wildfire hazard and risk profile. Availability of ingress/egress, characteristics of road surface, road layout and design, treatment of dead ends, grade, characteristics of switchbacks, and width all factor into access assessment. In areas of limited access, secondary emergency access route development may be recommended. Typically this involves improvement of existing roads or trails from a WUI to a main road. Improvement is not intended to increase recreational use and emergency access only gating is recommended.

**Action Item:** The EFPD is large and diverse with access characteristics unique to each assessed WUI. Specific access characteristics and recommendations assessed are defined for each WUI in the survey summaries located in Appendix C.

**Emergency Preparedness:** Community assessments surveyed several resources directly related to safety and emergency response including emergency water supply, potential safety zones and potential dip sites for helicopter operations.

**Action Item:** Identified sites for potential water supplies should be further surveyed. Sites are generally located at subdivision entrances and favor gravity feed if possible. Available draft sources for dry hydrant installations are also identified. Access usually involves negotiations with landowners or holders of right-of-way road easements. Potential dip sites involve access negotiations for water rights holders and a careful survey of overhead obstructions. Potential safety zones require ground survey, landowner negotiations, and improvements. All resource locations require annual maintenance. Locations should be GPS'd and included in any operational pre-plan developed for the community.

Table 15 provides a summary of the community surveys and outlines a prioritized approach to specific mitigation and related hazard reduction recommendations.

**Table 15. Community Mitigation Recommendation Summary**

HAZARD RATING	WUI ID - SUBDIVISIONS	HAZARD REDUCTION RECOMMENDATIONS					
		HIGHER		PRIORITY		LOWER	
<b>EXTREME</b>	5 - Echo Hills, Castlewood Acres	Shaded fuel breaks along forested primary and secondary access roads including designated emergency access routes	Fuel reduction in identified treatment zones	Develop and maintain emergency access to Old Squaw Pass Road through Castlewood Gulch	Emergency water source development at subdivision entrance	Safety zone development and access improvement in meadow south of Sinton Road. Shelter in place training	Street signage, home addressing, and turnaround improvement
	20 - Brook Forest Estates, Upper Cub Creek	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary, secondary, and designated emergency access routes including Forest Estates, Crowfoot, and Black Mountain Roads and utility right of ways	Improve or construct secondary road turnarounds at dead ends	Develop emergency water availability on Brook forest Road at entrance	Develop and maintain emergency access options; Ski Rd to Strandsky, crowfoot to Brook Forest	Shelter in place training
	12- Rosedale Acres, Segar Acres	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary and secondary access roads including Skyline Dr, Valley View Dr, Meadow Brook Ln,	Turnaround improvement and construction and at critical dead ends	Develop emergency water availability at pond near meadow near Meadow Brook and Upper Bear Creek	Potential safety zone in meadow near Meadow Brook and Upper Bear Creek. Shelter in place training	Street signage, home addressing, improvement
	1 - Beaver Brook Canyon, Highland Hills, Chase Subdivision, Elmgreen Acres, Pleasant Lane, Homestead Hideaway	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary and secondary access roads including designated emergency access routes	Street signage, home addressing, improvement and turnaround improvements on Ponderosa and Hyland	Develop and maintain emergency access options; W. Beaver Brook Rd. to Sante Fe Mt. Rd.; E. Beaver Brook Rd to Elm Green Rd.; High School To Elm Green Rd.	Fuel reduction in identified treatment zones	ICP development in school compound. Shelter in place training

HAZARD RATING	WUI ID - SUBDIVISIONS	HAZARD REDUCTION RECOMMENDATIONS					
		HIGHER		PRIORITY		LOWER	
HIGH	21 - Buffalo Park Estates, Evergreen Hills	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary and secondary access roads including designated emergency access routes	Develop and maintain emergency access options Brook Forest to Bluebell (Buffalo Park); and/or Fawn Path/Weasel to Stransky	Fuel reduction in identified treatment zones	Develop emergency water availability along Cub Creek/Brook Forest Road	Improve or construct secondary road turnarounds at dead ends; visible and consistent home addressing Shelter in place training
	7 - Evergreen West	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary and secondary access roads including designated emergency access routes	Improve or construct secondary road turnarounds at dead ends	Develop emergency water availability at upper Witter Gulch Road and Hwy 103	Potential safety zone in meadow along Witter Gulch Road below Aspenwood. Shelter in place training	Visible and consistent home addressing
	30 - Greystone Estates	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Develop emergency water availability at Bergen Mountain and Stagecoach	Improve or construct secondary road turnarounds at dead ends	Visible and consistent home addressing	Potential safety zone in meadow near Alpine and Stagecoach	NA
	13 - Independence Heights, Forest Hill, Mountain Park Homes	Shaded fuel breaks along forested primary and secondary access roads including designated emergency access routes	Expand emergency water availability in the upper portions of Independence Heights, Forest Hill and Mountain Park Homes. Improve visibility of existing hydrants	Improve or construct secondary road turnarounds at dead ends	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking. Visible and consistent home addressing	Potential safety zone in meadow near Independence and Hilltop	Develop and maintain emergency access options; Fern Gulch to Independence and Hilltop to Independence
	18 - Bear Mountain Vista, Stanley Park	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary and secondary access roads including designated emergency access routes	Develop emergency water availability in the Bear Mountain, Giant Gulch area	Develop and maintain emergency access options along Fern Gulch and Independence	Fuel reduction in identified treatment zones	Potential safety zones in meadows near sunrise, Chris, Burro, North Mountain Park Area. Shelter in place training

HAZARD RATING	WUI ID - SUBDIVISIONS	HAZARD REDUCTION RECOMMENDATIONS					
		HIGHER		PRIORITY		LOWER	
	29 - French Springs	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary and secondary access roads including Yankee Creek, Normandy, and private drives	Fuel reduction in identified treatment zones	Develop emergency water availability in existing stock ponds along Yankee Creek Rd	Potential safety zone in meadow system along Yankee Creek	Visible and consistent home addressing
	23 - Cub Creek Ranch, Evergreen Highlands, Timbers Estates, North Marshner, South Marshner	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary, secondary, and designated emergency access roads	Develop and maintain an emergency access Timbers and Olympus, and along Little Cub Creek	Develop emergency water availability at pond located at Little Cub Creek Road and Annapurna	Potential safety zone in meadows near Little Cub Creek Road and Annapurna	Visible and consistent home addressing
	2 - Soda Creek, Fox Ridge	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary, secondary, and designated emergency access roads including Woodside, Soda Creek, Snyder Gulch, Woodland, and Deep Forest	Develop emergency water availability at Hwy 103 and Old Squaw Pass/Snyder Gulch Rd, at the ponds along Alta Vista Road and in the Fox Ridge area.	Develop and maintain an emergency access from Meadow to Old Squaw Pass	Improve or construct secondary road turnarounds at dead ends	Visible and consistent home addressing
	11 - Circle K, Bendemeer Valley, Golden Willow, Greystone Lazy Acres, Bear Creek Estates, Diamond Park, Wilderness Point	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary and secondary roads	Improve or construct secondary road turnarounds at dead ends	Develop emergency water availability at Witter Gulch and Upper Bear Creek	Visible and consistent home addressing	
	3 - Beaver Brook, Beaver Brook Lodge Estates, Hoffer Heights, Pine Valley Estates	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Develop and maintain an emergency access from Meadow to Old Squaw Pass	Shaded fuel breaks along forested primary, secondary, and designated emergency access roads	Fuel reduction in identified treatment zones	Develop emergency water supply at Hwy 103 and Old Squaw Pass/Snyder Gulch	Visible and consistent home addressing

HAZARD RATING	WUI ID - SUBDIVISIONS	HAZARD REDUCTION RECOMMENDATIONS					
		HIGHER	PRIORITY			LOWER	
	25 - Evergreen Meadows East	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary and secondary access roads including Armadillo and Grizzly	Improve emergency water availability at Gray Fox and County Highway 73 to support multiple tenders	Intersection signage improvements and visible and consistent home addressing		
	22 - Estates of Blue Creek, Blue Creek Rd	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary, secondary, and designated emergency access roads	Develop emergency water availability at Brook Forest and Blue Creek	Develop and maintain a emergency access between Gray Hawk, Lynx Lair and Frog Hollow	Fuel reduction in identified treatment zones. Potential safety zone development in Frog Hollow treatment area	Switchback improvements, Intersection signage improvements and visible and consistent home addressing
	9 - Hiwan Hills, Hidden Village at Hiwan, Douglas Park, Hiwan Homestead Museum	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary and secondary roads	Improve or construct secondary road turnarounds at dead ends	Visible and consistent home addressing		
	19 - Pine Valley Estates, Hillcrest Village, Peaceful Hills	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary and secondary roads including Peaceful Hills to North Turkey Creek Road, High to North Turkey Creek, High around Meadow and Caldwell	Develop emergency water availability at primary accesses along North Turkey Creek and South Mountain Park.	Fuel reduction in identified treatment zones	Potential safety zone in meadows in the southeast portion of the assessment area	Visible and consistent home addressing
	17 - Herzman Mesa, Wonderview, Pine Crest Park, Sunset Heights, High Prairie, Far View Acres, Craigmont Estates, Marshdale Park, Marshdale	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary and secondary roads	Develop emergency water access along Cub Creek, Skyline, Herzman, and Highway 73, Tresne area	Improve or construct secondary road turnarounds at dead ends	Visible and constant home addressing	

HAZARD RATING	WUI ID - SUBDIVISIONS	HAZARD REDUCTION RECOMMENDATIONS					
		HIGHER	PRIORITY			LOWER	
	8 - Tanoa, Overlook, Palo Verde, Troutdale Estates, Glen Erie, Bear Creek	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary, secondary, and designated emergency access roads	Develop and maintain a emergency access between Troutdale Scenic Drive and Wildflower and Upper Bear Creek; and between Upper Bear Creek and Stagecoach along Overlook	Fuel reduction in identified treatment zones	Improve or construct secondary road turnarounds at dead ends	Intersection signage improvements and visible and consistent home addressing
	26 - The Ridge at Hiwan	Reduce structural ignitability; reduce percentage of flammable roofs	Develop and maintain a emergency access between South keystone and Kittredge Park	Shaded fuel breaks along forested primary, secondary, and designated emergency access roads	Fuel reduction in identified treatment zones	Establish pre-plan for apparatus response to ~ 45 single lane dead end secondary roads	Visible and consistent home addressing
	16 - Evergreen Park Estates, Evergreen Heights, Evergreen Golf Course, Evergreen Valley Estates, Columbine Road	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary, secondary, and designated emergency access roads	Fuel reduction in identified treatment zones	Develop emergency water supply at Clearwater	Potential safety zone in meadow along Buffalo Park west of Evergreen Heights	Visible and consistent home addressing
	27 - El Pinal, El Pinal Acres	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Develop and maintain emergency access between Larkspur and Troublesome Gulch and between Yucca and Sulky	Improve turnarounds and intersections	Shaded fuel breaks along forested primary, secondary, and designated emergency access roads	Fuel reduction in identified treatment zones	Visible and consistent home addressing
	10 - Kittredge, Quartz Mountain, Pine Valley Acres, Meadow Mountain Heights	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary, secondary, and designated emergency access roads	Develop and maintain emergency access between Kittredge Park and Keystone and between Troublesome Gulch and Lewis Ridge	Visible and consistent home addressing		

HAZARD RATING	WUI ID - SUBDIVISIONS	HAZARD REDUCTION RECOMMENDATIONS					
		HIGHER		PRIORITY		LOWER	
	24 - Evergreen Meadows West	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary, secondary, and designated emergency access roads	Develop and maintain emergency access from Centaur along Frog Hollow	Develop emergency water supply in the central portion of the assessment area	Fuel reduction in identified treatment zones	Intersection signage improvements and visible and consistent home addressing
	4 - Hidden Valley, Ruby Ranch, Nob Hill, Avery Acres, El Rancho	Develop and maintain emergency access between Ruby Ranch and Humphrey	Shaded fuel breaks along forested primary, secondary, and designated emergency access roads	Fuel reduction in identified treatment zones	Develop emergency water supplies for Pine crest and Ruby Ranch areas	Improve or construct secondary road turnarounds at dead ends	Visible and consistent home addressing
MODERATE	14 - Hagan Ranch, Elk Ridge, Elephant Park, Westhaven Heights, Our-Lady-of-the-Rockies	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary and secondary roads	Develop emergency water supply in designated stock pond along Bluebell Rd	Potential safety zones in meadows along Buffalo Park Rd and Bluebell Rd	Visible and consistent home addressing	
	28 - Wah Keeney Park	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Develop and maintain emergency access between Yucca and Sulky and from Stagecoach to Troublesome Gulch	Visibly mark hydrants where obscured	Visible and consistent home addressing		
	15 - Greenwood, Wilmont Woods, Evergreen Hill	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Improve or construct secondary road turnarounds at dead ends	Possible hydrant line extension to Hazel and Gigi			

HAZARD RATING	WUI ID - SUBDIVISIONS	HAZARD REDUCTION RECOMMENDATIONS					
		HIGHER		PRIORITY		LOWER	
	6 - Hiwan Country Club	Reduce structural ignitability; reduce percentage of flammable roofs	Develop and maintain a emergency access between Pebble Beach and Lewis Ridge (water treatment plant)	Shaded fuel breaks along forested primary, secondary, and designated emergency access roads	Access and turnaround improvements on secondary roads	Visible and consistent home addressing	ICP development in school compounds or EFR Station 2 area

### 5.3 Treatment Options

Fuels treatment recommendations for the EFPD focus primarily on the creation of defensible space around structures and shaded fuel breaks along roads. Each of the recommended fuel mitigation projects can be achieved by a variety of methods (Table 16). Selecting the most appropriate, cost-effective option is an important planning step. This brief synopsis of treatment options and cost estimates is provided to assist in this process. Cost estimates for treatments should be considered as very general guidelines. Timber treatment costs can vary tremendously based on project complexity, but generally run \$300 to \$1,200 per acre depending upon:

- Type of fuel;
- Diameter of materials;
- Acreage of project;
- Steepness of slope;
- Density of fuels;
- Proximity to structures;
- Access; and
- Transportation costs.

It is imperative that implementers plan for the long-term monitoring and maintenance of all treatments. Post-treatment rehabilitation including seeding with native plants and erosion control may be necessary.

**Table 16. Treatment Methods**

Treatment	Estimated Cost	Comments
Machine Mowing	\$90 - \$200 per acre	<ul style="list-style-type: none"> <li>▪ Appropriate for large, flat grassy areas on relatively flat topography.</li> </ul>
Prescribed Fire	\$75 - \$300 per acre	<ul style="list-style-type: none"> <li>▪ Can be very cost effective.</li> <li>▪ Ecologically beneficial.</li> <li>▪ Can be used as training opportunities for firefighters.</li> <li>▪ Cost varies with complexity.</li> <li>▪ Carries risk of escape, which may be unacceptable in some WUI areas.</li> </ul>

Treatment	Estimated Cost	Comments
		<ul style="list-style-type: none"> <li>▪ Unreliable scheduling due to weather and smoke management constraints.</li> </ul>
Brush Mastication	\$300 - \$500 per acre	<ul style="list-style-type: none"> <li>▪ Brush species (Gamble oak in particular) tend to resprout vigorously after mechanical treatment.</li> <li>▪ Follow-up treatments with herbicides, fire, grazing, or further mechanical treatments are typically necessary.</li> <li>▪ Mastication tends to be less expensive than manual treatment and eliminates disposal issues.</li> </ul>
Timber Mastication	\$300 - \$1,200 per acre	<ul style="list-style-type: none"> <li>▪ Materials up to 10 inches in diameter and slopes up to 30 percent can be treated.</li> <li>▪ Eliminates disposal issues.</li> <li>▪ Environmental impacts of residue being left onsite are still under study.</li> </ul>
Manual Treatment with Chipping or Pile Burning	\$300 - \$1,200 per acre	<ul style="list-style-type: none"> <li>▪ Allows for removal of merchantable materials or firewood in timber.</li> <li>▪ Requires chipping, hauling, and pile burning of slash.</li> </ul>
Feller Buncher	\$750 and up per acre	<ul style="list-style-type: none"> <li>▪ Mechanical treatment on slopes over 30 percent of materials over 10 inches in diameter may require a feller buncher rather than a masticator.</li> <li>▪ Costs tend to be considerably higher than mastication.</li> <li>▪ May allow for removal of merchantable material.</li> </ul>

## 5.4 Project Support

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

**Funding and Grants:** Grant funding support is often a necessary component of a fuels treatment project and can facilitate recommended mitigation on both private and public lands. In addition to opportunities that may be available through Jefferson County Division of Emergency Management, an excellent resource for researching available public funding sources is the Rocky Mountain Wildland Fire website ([www.rockymountainwildlandfire.info](http://www.rockymountainwildlandfire.info)).

**Public Land Planning:** Public lands within the EFPD include those managed by the USFS, Jefferson County Open Space, Denver Mountain Parks, Colorado Division of Wildlife, Clear Creek County, and State Land Board. The CWPP development process is designed to facilitate dialog with these agencies and coordinate public and private wildfire and forest management strategies. As the CWPP strategic plan is implemented, dialogue and collaboration should be maintained with these agencies to coordinate strategies and treatments, and make adjustments if necessary.

**Regulatory Support:** One of the major issues confronting defensible space and hazardous fuels mitigation is the need for ongoing maintenance. Treatment projects in timber or brush fuels have an effective life span of approximately 10 to 15 years before regrowth fuel loads again become hazardous. On the other hand, defensible buffers and fuelbreaks mowed in grasslands are beneficial only through that growing season. For defensible space to be consistently successful some regulatory impetus is recommended. Jefferson County should examine the options for requiring the maintenance of defensible space. This could be associated with the sale of a home or based on time since initial

treatment. Those communities with local statutes or covenants should consider similar regulation as an interim step and to help drive the initiative from the bottom up. This is a public safety issue where failure to maintain one's property can create a hazard for firefighters, adjacent properties, and the community as a whole.



## **6 EMERGENCY OPERATIONS**

### **6.1 Wildfire Response Capability and Recommendations**

Emergency fire, medical, and rescue services within the EFPD are provided by EFR, which is comprised of 85 volunteer firefighters, 33 full-time paid staff, and 12 part-time paid staff. There are currently eight lieutenants, six captains, two assistant chiefs, and one operations chief under the command of the Chief of EFR. EFR maintains eight fully equipped stations and 29 pieces of apparatus.

The number and availability of firefighters within the District make EFR stand out among volunteer-dependent organizations. With a solid volunteer core available 24 hours a day and a sizeable paid staff, EFR has a comparably strong response capability. The vast majority of firefighters, over 90 percent, are red-carded as wildland firefighters. This response capability, combined with good quality equipment and apparatus, provides a strong foundation for building a wildland fire suppression organization. The District should increase the number of overhead positions to support advanced wildland fire operations, especially in the engine boss/crew boss/task force/strike team level of management. Participation in the Jefferson County IMT will strengthen the department capabilities and provide risk incident management experience.

#### **Mutual Aid**

EFPD is a participant in the Jefferson County and Clear Creek County AOPs, which provide intergovernmental wildland fire response memos of understanding between all fire districts in the counties, and includes Denver Mountain Parks, Jefferson County Open Space, CSFS, and USFS. The AOPs provide agreements that outline all management aspects of the wildland fire within both counties that includes: reimbursement, operational responsibilities, financial responsibilities, and other general areas of interface between the organizations and agencies responsible for wildland fire response. The Clear Creek AOP commits EFR to initial attack within the Arapaho National Forest, the Bear Creek Basin, and areas along Highway 103 (Squaw Pass Road) that are west of the District boundaries.

The department is also a member of the I-70 engine task force that includes the Genesee and Foothills fire protection districts (FPDs). Jefferson County maintains a qualified Type 3 IMT for additional overhead support in the event of a large-scale incident.

#### **Training and National Wildfire Coordinating Group Positions**

EFR has developed a draft Wildland Fire Plan that addresses operational goals and objectives. The plan's goals are reflected in this CWPP and include training targets and performance standards.

Currently EFR has one Incident Commander Type 3 (ICT3), two Crew Bosses (CRWB), two Engine Bosses (ENGB), and two Taskforce Leaders (TFLD). Target levels in the plan for NWCG positions are five TFLDs, 20 ENGBs, five CRWBs, five CRWB trainees, and all fire fighters trained to the advanced level of firefighter 1 (FFT1).

Training and maintaining this level of fireline leadership will require an ambitious commitment from the department and its firefighters. These standards can be met through a local certification program. There is latitude within the state and federal certification process for the department to set its own local certification program as long as the District personnel only deploy within the District and normal mutual aid. It is recommended the District develop standards that mirror the NWCG certification process by using NWCG courses and locally developed Position Task Books (PTB). PTBs should be developed for Squad Boss (FFT1), Crew Boss/Engine Boss (Single Resource), and Task Force/Strike Team Leader. ICT5 PTB should not be modified and officers should be able to complete without going on a wildland fire assignment.

EFR should provide a process for individuals who want to deploy on national incidents. This process could be developed similar to the program Fairmount Fire Department is using to provide AD positions at the national level. Completion of the required PTB for these positions can be facilitated by participation on prescribed fires but is still subject to the availability of wildfire assignments.

EFR should sponsor the required courses using its new training facilities and hiring the instructors. The costs of these courses can be born by the outside participants. This process will allow the department to set times and the location that is convenient to EFR personnel.

The District should develop the following interim position/training targets:

- Year 1: Officers/Officer Candidates/Interested Firefighters initiate FFT1/ICT5 EFR PTB, classes: S-131 Firefighter Type 1, S-133 Look Up, Look Down, Look Around; officers complete I-300 Intermediate ICS.
- Year 2: Officers/Officer Candidates/Interested Firefighters complete FFT1/ICT5 EFR PTB, classes: S-290 Intermediate Wildland Fire Behavior, S-230/231 Crew Boss/Engine Boss (Single Resource) (for ENGB); officers complete I-400 Advanced ICS.
- Year 3: Officers/Officer Candidates/Interested Firefighters initiate ENGB EFR PTB, classes: S-215 Fire Operations in the Wildland/Urban Interface.
- Year 4: Officers/Officer Candidates/Interested Firefighters complete ENGB EFR PTB and work towards Engine Strike Team Leader (STEN) and ICT4 as able, classes: S-330 Task Force/Strike Team Leader.

### **Performance Standards**

Target standards for wildland fire response as outlined in the existing draft of the Evergreen Fire Rescue Wildland Fire Plan are divided into two categories, wildland fire and WUI fires. These target performance standards are based on daytime turnout response and the threat to values at risk. These benchmarks should be monitored against actual response time over the next few years. It can then be determined if they require adjustment or if operational modifications are required in order to meet these objectives.

- Wildland Fire

- Size-up and scouting completed within 30 minutes of smoke report;
  - Hand crew stage within 30 minutes of smoke report;
  - Hand crew on the fire within 1 hour of smoke report;
  - Fire behavior forecast transmit within 30 minutes of smoke report;
  - Maintain type 4 incident management to termination or relief by a county type 3 incident management team;
  - Maintain a 20-person handcrew for the duration of an in-district incident; and
  - Activate air support within 30 minutes of smoke report.
- Wildland-Urban Interface Fire
    - Size-up and scouting completed within 10 minutes of smoke report;
    - Task force stage within 20 minutes of smoke report;
    - Fire behavior forecast transmit within 10 minutes of smoke report;
    - Maintain type 4 incident management to termination or relief by a county type 3 incident management team;
    - Maintain a 20-person task force for the duration of an in-district incident; and
    - Request air support within 10 minutes of smoke support.

### Suppression Requirements

For illustration purposes, Table 17 compares initial attack capabilities for an average engine crew as determined from the “Line Production Rates for Initial Action by Engine Crews” charts (NWCG 2004) with predicted fire spread under 50th percentile climatic conditions as determined from the Corral Creek RAWS data. These are generalized figures provided to illustrate the potential gap between potential fire behavior and available suppression resources and do not account for response time.

**Table 17. Wildland Fire Production Rates vs. Fire Growth**

Initial Attack Fire Line Production Rates Using 3-Person Engine Crew			
FBFM	Predicted Fireline Production Rates (chains/hr)	Fire Acreage and Perimeter (chains) After First Hour	Predicted Fire Spread (chains/hr) Under Average Conditions
1 – Short grass	24	222 acres/183 chains	72
2 – Grass with Timber/Shrub Overstory	15	47 acres/84 chains	33
4 – Mature Brush	8	16 acres/157 chains	61
5 – Young Brush	12	15 acres/47 chains	19
6 – Intermediate or Dormant Brush	12	39 acres/77 chains	30
8 – Closed or Short-Needle Timber Litter – Light Fuel Load	15	0.1 acres/5 chains	2
9 – Hardwood or Long-Needle or Timber Litter – Moderate Ground Fuel	12	2 acres/18 chains	7

Initial Attack Fire Line Production Rates Using 3-Person Engine Crew			
10 – Mature/Overstory Timber and Understory	12	2 acres/18 chains	7

1 chain = 66 feet

Source for production rates: NWCG 2004. *Fireline Handbook*

Source for fire size and rate of spread: BehavePlus Fire Behavior Modeling System

As indicated in Table 17, a single-engine company can make good process in containing a surface fire in timber fuels under average climatic conditions. Three or four engine companies should be able to catch a fire in light brush. Heavy brush, grass fuels that can't be quickly accessed by fire fighters during severe climatic conditions will pose a challenge to containment, highlighting the importance of mutual aid and aerial support.

Table 18 is based on the time a crew can prepare a structure for a wildland fire using a Type-1 engine. The accepted standard is 20 minutes for a four-firefighter crew and 30 minutes for a three-firefighter crew.

**Table 18. Structural Protection Rates**

Structural Protection Rates Per Hour Using Type-1 Engine		
Firefighters	Rates	Total Structures per Hour
3	30 minutes/structure	2
4	20 minutes/structure	3

A very similar discussion regarding production rates is included in the Evergreen Fire/Rescue Wildland Fire Plan. The aforementioned performance standards included in the plan are designed to address these suppression needs. As with the response targets, these production standards should be trained to and monitored for attainability.

## 6.2 Emergency Procedures and Evacuation Routes

In the event that the Jefferson County or Clear Creek Sheriff orders a community to evacuate because of threatening wildfire, residents should leave in an orderly manner. The Sheriff would proclaim the preferred evacuation routes and safe sites. However, the need for evacuation can occur without notice when conditions for wildfire are favorable. Homeowners should be prepared to evacuate without formal notice. Human safety is the number one concern in an evacuation.

Residents of the WUI should have a predetermined action plan for the eventuality of a wildfire. This should include closing windows and doors while leaving a door unlocked for firefighter access, placing a ladder to the roof for firefighter access, and leaving porch lights on so that the home can be seen at night. Families should have meeting locations in place and phone numbers to call in case family members are separated. A plan to quickly leave with essential items should be included. Some refer to these items as the “four P’s:” pets, papers, pills (medication), and photos.

Evacuation procedures vary according to subdivision. The EFPD should ensure that every resident has the opportunity to become familiar with these procedures. Evacuation plans should outline available evacuation centers and the procedures to activate them. Large-animal evacuation centers also need to be identified. These procedures should be addressed in public or HOA meetings with information eventually being distributed door-to-door.

Upon returning to a home after a fire, residents should be told to monitor the exterior of the house for smoke for several days. Embers may lodge in small cracks and crevices and smolder for several hours or days before flaming.

### **Shelter-In-Place Training**

Shelter-In-Place training should be considered for WUI areas that evacuation will be difficult or impossible. These areas are Brook Forest Estates, Upper Cub Creek, Beaver Brook Canyon, Highland Hills, and Saddleback Estates WUI areas. There may be a need to shelter-in-place in other areas depending on fire behavior, but the above areas pose a real egress problem and residents should be trained to remain at their structures until the fire moves through. There are some considerations that need to be included in the training: 1) residents need to be prepared; 2) residents need to have some basic firefighting hand tools available; 3) residents should not plan on having water; 4) residents should not, if water is available, waste it by presoaking; 5) residents should have some proper work clothing; 6) residents should identify their safety zone; and 7) residents should determine whether they are mentally and physically able to stay.



## **7 EVERGREEN FIRE PROTECTION DISTRICT, COMMUNITY WILDFIRE PROTECTION PLAN, MONITORING AND EVALUATION**

### **7.1 Community Wildfire Protection Plan Adoption**

The EFPD CWPP is a strategic planning document that is developed and approved by the Core Team. An important component of the development process includes building a stakeholder group that will move the plan forward, implement prioritized recommendations, and maintain the CWPP as the characteristics of the WUI change over time. Organizing and maintaining this team are often the most challenging components of the CWPP process. They are, however, essential in the process of converting the CWPP from a strategic plan into action.

This team will oversee the implementation and maintenance of the CWPP by working with fire authorities, community organizations, private landowners, and public agencies to coordinate and implement hazardous fuels treatment projects management and other mitigation projects. Building partnerships among neighborhood-based organizations, fire protection authorities, local governments, public land management agencies, and private landowners is necessary in identifying and prioritizing measures to reduce wildfire risk. Maintaining this cooperation is a long-term effort that requires the commitment of all partners involved. The CWPP encourages citizens to take an active role in identifying needs, developing strategies, and implementing solutions to address wildfire risk by assisting with the development of local community wildfire plans and participating in countywide fire prevention activities.

Public meetings were convened in September of 2007 to present the EFPD CWPP to the Core Team, fire authorities, stakeholders, and public. The draft CWPP was posted on the Jefferson County Division of Emergency Management website to allow public review and comment. A two-week response period provided the public an opportunity to comment on the draft CWPP. In addition, a questionnaire was handed out at the two public meetings and other public events to provide opportunities for people to provide input on the CWPP. The final draft of the CWPP was formally adopted by the Core Team, composed of representatives from the EFPD, Jefferson County Division of Emergency Management, Jefferson County Open Space, and CSFS.

The EFPD CWPP provides the foundation and resources for understanding wildfire risk and presents opportunities to reduce potential losses from wildfire. Individual communities and private landowners can take action by developing specific fire plans or by participating in district-wide activities for prevention and protection.

The HFRA authority for the CWPP requires adoption of this plan, as does the FEMA Disaster Mitigation Act of 2000. With formal adoption by the Core Team, participating agencies and WUI neighborhoods will be competitive for available hazardous fuels and non-fuels mitigation funding that may assist with plan implementation. Furthermore,

adoption of this plan highlights a collaborative planning and development process between the EFPD, local government, public agencies, and neighborhood organizations.

## **7.2 Sustaining Community Wildfire Protection Plan Efforts**

A CWPP can serve as the foundation for a safer and healthier WUI through hazard assessment and strategic planning focusing on the threat of wildfire. The mitigation strategies outlined in this plan will greatly reduce that risk, but only if implemented. Converting strategy into action is the key to achieving this important goal.

Communities can be made safer, and this CWPP has outlined realistic measures to achieve that goal. The CWPP process encourages homeowners to take an active role as fuel treatment strategies are developed and prioritized. Ownership of CWPP implementation at that same local level is the most effective means to achieving successful results and sustaining the effort from year to year.

Proactive neighborhoods can seek support and guidance through a variety of local, state, and federal resources identified in this plan including the CSFS, Jefferson County Division of Emergency Management, and EFPD.

## **7.3 Community Wildfire Protection Plan Oversight, Monitoring, and Evaluation**

Maintaining the momentum created by this process is critical to successful implementation and ongoing community wildfire hazard reduction. Ownership of this responsibility lies with each community, neighborhood, and HOAs identified in the CWPP.

As wildfire hazard reduction efforts are implemented over time and the characteristics of particular WUIs change, neighborhoods may wish to reassess particular areas and update the findings of the original CWPP. Monitoring the progress of project implementation and evaluating the effectiveness of treatments are an important components of CWPP oversight and maintenance. The assessment methodology utilized in this plan is a standardized, well-documented hazard and risk survey approach that is designed to provide a benchmark against which future assessments can be compared. Successes, challenges, and new concerns should be noted and subsequently guide any modifications to the CWPP that better accommodate the changing landscape.

Stakeholders will be responsible for CWPP monitoring and evaluation through regular meetings, public involvement, and coordination with EFPD, neighborhood communities, and HOAs. Monitoring is the collection and analysis of information acquired over time to assist with decision making and accountability and to provide the basis for change. Evaluation includes analysis of the effectiveness of past fuels reduction and non-fuels mitigation projects, as well as recent wildfire suppression efforts. Monitoring and evaluation measures should progress overtime in a way that will determine whether the CWPP goals and objectives are being attained (Table 19).

**Table 19. Monitoring and Evaluation Tasks**

Objective	Tasks	Timeline
Risk Assessment	<ul style="list-style-type: none"> <li>▪ Use reliable data that is compatible among partner agencies.</li> <li>▪ Update the CWPP as new information becomes available.</li> <li>▪ Continue to assess wildfire risk to communities and private landowners.</li> </ul>	Annual Annual Biennial
Fuels Reduction	<ul style="list-style-type: none"> <li>▪ Identify and prioritize fuels treatment projects on public land through development of a 5-year plan.</li> <li>▪ Track fuels reduction projects and defensible space projects on private land.</li> <li>▪ Monitor fuels reduction projects on evacuation routes.</li> <li>▪ Track grants and other funding sources and make appropriate application.</li> </ul>	Annual Biennial Annual Ongoing
Emergency Management	<ul style="list-style-type: none"> <li>▪ Review suitability and the need for fuels reduction along evacuation routes.</li> </ul>	Annual
Public Outreach	<ul style="list-style-type: none"> <li>▪ Plan and hold Firewise education week.</li> <li>▪ Provide Firewise pamphlets at public events.</li> <li>▪ Evaluate techniques used to motivate and educate private landowners.</li> </ul>	Annual Annual Annual



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