West Metro Fire Protection District Community Wildfire Protection Plan

September 15, 2006
WEST METRO FIRE PROTECTION DISTRICT
COMMUNITY WILDFIRE PROTECTION PLAN

September 15, 2006

Prepared for: Jefferson County Department of Emergency Management
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WALSH Project Number: 7404-010
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<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFOP</td>
<td>Annual Fire Operating Plan</td>
</tr>
<tr>
<td>BLM</td>
<td>Bureau of Land Management</td>
</tr>
<tr>
<td>CAFS</td>
<td>Compressed Air Foam System</td>
</tr>
<tr>
<td>CAPCD</td>
<td>Colorado Air Pollution Control Division</td>
</tr>
<tr>
<td>CSFS</td>
<td>Colorado State Forest Service</td>
</tr>
<tr>
<td>CWPP</td>
<td>Community Wildfire Protection Plans</td>
</tr>
<tr>
<td>EV</td>
<td>Existing Vegetation</td>
</tr>
<tr>
<td>FEMA</td>
<td>Federal Emergency Management Agency</td>
</tr>
<tr>
<td>FBFM</td>
<td>Fire Behavior Fuel Model</td>
</tr>
<tr>
<td>FPD</td>
<td>Fire Protection District</td>
</tr>
<tr>
<td>FRCC</td>
<td>Fire Regime Condition Class</td>
</tr>
<tr>
<td>gpm</td>
<td>gallons per minute</td>
</tr>
<tr>
<td>HFRA</td>
<td>Healthy Forests Restoration Act</td>
</tr>
<tr>
<td>HOA</td>
<td>Home Owners Association</td>
</tr>
<tr>
<td>IC</td>
<td>Incident Commanders</td>
</tr>
<tr>
<td>JEFFCO</td>
<td>Jefferson County</td>
</tr>
<tr>
<td>NWCG</td>
<td>National Wildfire Coordinating Group</td>
</tr>
<tr>
<td>NEPA</td>
<td>National Environmental Protection Act</td>
</tr>
<tr>
<td>NFPA</td>
<td>National Fire Protection Association</td>
</tr>
<tr>
<td>PNV</td>
<td>Potential Natural Vegetation</td>
</tr>
<tr>
<td>psi</td>
<td>pounds per square inch</td>
</tr>
<tr>
<td>RFA</td>
<td>Rural Fire Assistance</td>
</tr>
<tr>
<td>USFWS</td>
<td>US Fish and Wildlife Service</td>
</tr>
<tr>
<td>USFS</td>
<td>US Forest Service</td>
</tr>
<tr>
<td>WFU</td>
<td>Wildland Fire Use</td>
</tr>
<tr>
<td>WMFPD</td>
<td>West Metro Fire Protection District</td>
</tr>
<tr>
<td>WUI</td>
<td>Wild Urban Interface</td>
</tr>
</tbody>
</table>
EXECUTIVE SUMMARY

The Healthy Forests Restoration Act (HFRA) of 2003 provides the impetus for wildfire risk assessment and planning at the county and community level. HFRA refers to this level of planning as Community Wildfire Protection Plans (CWPP). The CWPP allows a community to evaluate its current situation with regards to wildfire risk and devise ways to reduce risk for protection of human welfare and other important economic or ecological values. The CWPP may address issues such as community wildfire risk, structure flammability, hazardous fuels and non-fuels mitigation, community preparedness, and emergency procedures. A Core Team provides oversight to the development of the CWPP and its implementation in the assessment area.

The focus of this CWPP is on the Jefferson County town of Morrison and the communities of Ken-Caryl North Ranch, Ken-Caryl Ranch, Willow Brook, Willow Springs South, Willow Springs North, and Red Rocks. These communities are located in the West Metro Fire Protection District (WMFPD). Human life and welfare are values at risk to wildfire because of the buildup of hazardous fuels around communities and structures and poor emergency vehicle ingress and egress. Other economic values at risk include businesses, hunting and other recreational land, historic and cultural sites, and critical infrastructure.

Wildfire is a common occurrence in and around the assessment area with June, July, and October being the three busiest months for wildfires. From November 2002 through July 2006, WMFPD recorded 245 wildland fires for an average of over 49 wildfires per annum. Of these, 67 percent were lightning-caused, though four out of the five largest fires that burned on this district were human-caused.

Natural resource management policy and changing ecological conditions have interacted in ways that have resulted in hazardous fuel situations throughout the assessment area. These forces include historic fire suppression policy, juniper and ponderosa pine invasion into shrublands and grasslands, overstocked forests and open spaces, invasive weeds, and changing climatic patterns. The accumulation of hazardous fuels may set the stage for catastrophic wildfire occurrence, resulting in the loss of important economic and ecological values.

There are various fuels around communities and structures that create problems for fire protection. Fuels include ponderosa pine, Douglas-fir, juniper, mountain mahogany, Gambel oak, grasslands, and weed fields. Many of these fuels, such as dried grass and weeds, are highly flammable, burn rapidly, and resist control. A coordinated effort among all fire authorities and private landowners in the WMFPD is needed to manage hazardous fuels and reduce the risk of wildfire.

The WMFPD includes 15 fire stations in Golden, Lakewood, Morrison, Littleton, and Roxborough. Mutual Aid Agreements exist among the fire stations and other Jefferson
County Fire Protection Districts (FPDs) for mutual aid and support in the event of a wildfire incident.

Field surveys, interviews with WMFPD and County officials, and a public meeting were used to obtain various types of information to assess the wildfire risk in the West Metro area. All information was gathered, analyzed, and prepared in the CWPP format by Walsh Environmental Scientists and Engineers, LLC (Walsh). A project website was maintained by the Jefferson County Division of Emergency Management and project updates and information to promote public awareness and outreach were provided.

Public meetings were convened on July 27 and August 16, 2006 at 6:30 p.m. in the Red Rocks Country Club. The meetings were announced on the Jefferson County Department of Emergency’s website, in a newspaper release, by homeowner association (HOA) notification, and the posting of fliers in public locations. The purpose of the first meeting was to explain the wildfire risk assessment, present the findings of the risk assessment, and provide an opportunity for the public to participate in the process, review the findings, and comment on proposed mitigation possibilities such as hazardous fuels management and non-fuel projects. The purpose of the second meeting was to present the findings of the CWPP to the public. Questionnaires were distributed at meetings to obtain information on public opinion on the level of wildfire risk in the WMFPD, evaluate values at risk, and assess mitigation practices needed to reduce risk (Appendix C). Firewise pamphlets and brochures that explained proper home construction and landscaping practices to reduce the risk of wildfire loss were also handed out at the meetings. A draft report of the CWPP was posted on the County’s emergency website to encourage public review and comment.

The National Fire Protection Association (NFPA) Form 1144, Standard for Protection of Life and Property from Wildfire 2002 Edition, was used to assess the level of risk and hazard to communities and individual houses. The evaluation consisted of rating attributes such as means of access, surrounding vegetation (fuels), presence of defensible space, topography, roofing and other construction materials, available fire protection, and placement of utilities. Scores were assigned to each element and then totaled to determine the level of risk. Low, moderate, and high hazard categories were determined based on the total score. Field surveys were conducted during July, 2006 to assess the level of risk and hazard to the seven assessment areas located in the FPD.

Three of the seven communities received a high-hazard rating because of issues with hazardous fuels proximity, the use of combustible construction material, inadequate emergency ingress and egress, lack of defensible space around structures, and proximity of hazardous fuels. A summary of the community hazard ratings and contributing factors are provided on the following table.
<table>
<thead>
<tr>
<th>Community</th>
<th>Hazard Rating</th>
<th>Contributing Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morrison</td>
<td>Moderate</td>
<td>• Fuels of dried grass and weeds in proximity to structures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Structures in close proximity of one another</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Combustible components on homes/buildings</td>
</tr>
<tr>
<td>Ken-Caryl North Ranch</td>
<td>Moderate</td>
<td>• Fuels of short grass, mountain mahogany, and dense Gambel oak in proximity to structures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Combustible roof or siding on some homes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Exposed, wooden decks in some areas</td>
</tr>
<tr>
<td>Ken-Caryl Ranch</td>
<td>Moderate</td>
<td>• Fuels of short grass, mountain mahogany, and dense Gambel oak in proximity to structures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Combustible roof or siding on some homes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Areas of densely landscaped shrubs</td>
</tr>
<tr>
<td>Willow Brook</td>
<td>High</td>
<td>• Fuels of short grass, mountain mahogany, and dense Gambel oak around the edges of the community</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• All roads bottleneck into a single entrance point</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Street signs are non-reflective</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Lack of defensible space around some homes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Combustible roof, siding, and decks on some homes</td>
</tr>
<tr>
<td>Willow Springs South</td>
<td>High</td>
<td>• Dense fuels of short grass, mountain mahogany, and Gambel oak in proximity to structures.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Steep slopes in/around the community</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Wood shake roofs on many homes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• All roads bottleneck into a single entrance point</td>
</tr>
<tr>
<td>Willow Springs North</td>
<td>Low</td>
<td>• Flat terrain</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Area partially surrounded by a golf course</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Cul-de-sacs for turn around are common</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• New construction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Prevalence fire resistive construction</td>
</tr>
<tr>
<td>Red Rocks</td>
<td>High</td>
<td>• Dense fuels of short grass, mountain mahogany, and Gambel oak in proximity to structures.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Lack of structure defensible space</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Combustible roofs, siding, and/or decks on some homes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Limited emergency ingress and egress</td>
</tr>
</tbody>
</table>
Priority hazardous fuel projects include defensible space, community fuel breaks, and management of vegetation to reduce Fire Regime Condition Class (FRCC) classification from FRCC 3 to FRCC 1. The development of defensible spaces around structures needs to occur. This is especially needed for structures in close proximity to forestland, oak brush, or grasslands. Strategically placed fuel breaks around communities would reduce the exposure of communities to wildfire. The herbaceous vegetation around many communities presents a hazardous situation as it dries in late summer; mowing would be one way to reduce fuel load and continuity. Woody fuels could be reduced by mechanical or hand removal. Finally, vegetation classified as FRCC 3 should be managed to change it to the lower risk classification of FRCC 1. A variety of treatments could be used to achieve this including prescribed fire, mechanical treatments, or hand crews on steep slopes.

Table ES-2. Fuel Mitigation Priorities for Communities

<table>
<thead>
<tr>
<th>Priority</th>
<th>Project</th>
<th>Actions</th>
<th>Concerns</th>
<th>Community Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Implement fuel breaks west of Ken-Caryl and Willow Springs</td>
<td>Create fuel breaks along trails west of Communities. Possible methods include manual or mechanical thinning. Evaluate the need for seeding with native grasses.</td>
<td>Cost. Air quality issues if pile burning. Access if using mechanical treatments. Temporary impacts to wildlife and open space users. Disposal of woody debris.</td>
<td>1. Willow Springs North 2. Ken-Caryl Ranch / Ken-Caryl North Ranch</td>
</tr>
<tr>
<td>Priority</td>
<td>Project</td>
<td>Actions</td>
<td>Concerns</td>
<td>Community Priority</td>
</tr>
<tr>
<td>----------</td>
<td>---------</td>
<td>---------</td>
<td>----------</td>
<td>-------------------</td>
</tr>
</tbody>
</table>
| 4        | Prescribed fire in grasslands | • Continue and expand prescribed fire in Ken-Caryl and Jefferson County Open Spaces  
• Explore using prescribed fire in Willow Springs Open Spaces and Red Rocks Park  
• Evaluate the need for seeding with native grasses | • Air quality issues  
• Potential for escape  
• Safety | 1. Ken-Caryl Ranch / Ken-Caryl North Ranch  
2. Willow Springs South  
3. Red Rocks |
| 5        | Implement thinning projects west of Ken-Caryl and Willow Springs | • Thin per existing prescriptions using manual or mechanical methods  
• Evaluate the need for seeding with native grasses | • Cost  
• Disposal of woody debris  
• Air quality issues if pile burning  
• Temporary wildlife habit impacts | 1. Ken-Caryl Ranch / Ken-Caryl North Ranch  
2. Willow Springs South and North |

Non-fuels mitigation recommendations are as follow:

- **Street Signs** - Most communities could benefit from clearer street sign and house numbers. According to NFPA 1144 guidelines, street signs should be a minimum of 4 inches in height and be one-half inch in stroke, reflective, and letter color should contrast with the background color. House numbers should be reflective, clearly displayed, and of sufficient size to be easily read from the street.

- **Access Roads** – Each community should review access roads for emergency equipment and evacuation. NFPA 1144 recommends that access/evacuation roads be designed and constructed for simultaneous ingress and egress, and be at least 20-feet wide with 14 feet of vertical clearance. Private landowners should evaluate their emergency routes to public roads for needed action to meet NFPA 1144 guidelines.

- **Fire Protection Authority Communication and Coordination** - Continue the cooperation and communication among WMFPD Fire Stations, the US Forest Service (USFS), and private landowners concerning wildfire issues. Collective action is needed to reduce the threat of wildfire through implementation of this plan. Yearly meetings and/or newspaper releases are needed to inform the public of projects implemented in the last year and of proposed action for the near future. This type of teamwork and coalition building among federal, state, counties, and private landowners is supported by the National Fire Plan and HFRA.

- **Community Firewise Outreach** - The purposes of community outreach are to provide information on ways to reduce human-caused fire and to urge
landowners to take action by using Firewise landscaping and construction practices to limit the risk of wildfire loss.

- Water Tender - WMFPD currently relies on a mutual aid agreement with neighboring FPDs to provide water tenders when needed. WMPFD should evaluate the need and consider obtaining at least one tender, such as a 2,000 gallon type 3 tactical water tender.

Implementing and sustaining the CWPP is key to success. This is the responsibility of the Core Team. Building partnerships among community-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.

The Core Team will oversee the implementation of and monitoring of the CWPP by working with fire authorities, community organizations, private landowners, and public agencies to coordinate hazardous fuels management and other mitigation projects.
1 INTRODUCTION

1.1 CWPP Purpose and Process

The Healthy Forests Restoration Act (HFRA) of 2003 provides the impetus for wildfire risk assessment and planning at the county and community level. HFRA refers to this level of planning as Community Wildfire Protection Plans (CWPP). The purpose of the CWPP is for communities to take full responsibility and advantage of wildland fire and hazardous fuel management opportunities offered under HFRA legislation. The CWPP provides for the US Forest Service (USFS) and the Bureau of Land Management (BLM) to give consideration to the priorities of local communities for forest and open space management as well as hazardous fuel reduction projects.

The CWPP allows a community to evaluate its current situation with regards to wildfire risk and plan ways to reduce risk for protection of human welfare and other important economic or ecological values. The CWPP may address issues such as community wildfire risk, structure flammability, hazardous fuels and non-fuels mitigation, community preparedness, and emergency procedures. The CWPP should be tailored to meet the needs of the community. The CWPP process consists of the following steps:

- Organize the CWPP Committee – The committee should consist of city and county government, local fire authority, and state agencies responsible for forest management.
- Federal Agency Involvement – Representatives from the USFS and/or BLM should be engaged in the CWPP process as consultants.
- Community Interested Parties – The CWPP committee must involve interested community members, private landowners, business, stakeholders, and interest groups in the planning process.
- Community Base Map – A community base map illustrates important features such as landownership, structures, roads, surface water, fire districts, or major utility corridors. The map’s importance is that it illustrates community values from which recommendations concerning wildfire planning can occur.
- Develop a Community Wildfire Risk Assessment – The risk assessment will provide critical information to the CWPP committee to make informed decisions. Members should be actively involved in this step. Items that may be addressed include such things as risk of wildfire occurrence, structure hazard and risk,
economic and ecological values at risk, local fire authority, preparedness and capability, and hazardous fuels.

- Hazard Reduction Priorities and Recommendations to Reduce Structure Flammability – Mitigation projects are identified and designed to reduce the risk of wildfire loss to the community and other values. Mitigation projects should be prioritized and may include such things as hazardous fuels management, improving the wildfire suppression capability of the local fire authority, developing a permanent water supply, reducing structure flammability, improving emergency procedures, and increasing public education.

- Develop an Action Plan and Assessment Strategy – The action plan should identify who will do what and when. Identify areas of concern and integrate common values. Community funds for hazard reduction projects through grants need to be obtained. The finished CWPP is essential for seeking grant money. Also, an assessment strategy needs to be in place to ensure that the CWPP remains current and relevant for future years.

- Finalize the CWPP – The committee needs to agree and approve the CWPP and make sure that the recommended actions are implemented in a timely manner. In addition, the CWPP needs to be approved by Jefferson County and the Colorado State Forest Service (CSFS).

1.2 West Metro Fire Protection District’s need for a CWPP

The focus of the West Metro Fire Protection District (WMFPD) CWPP is on the town of Morrison and the communities of Ken-Caryl North Ranch, Ken-Caryl Ranch, Willow Brook, Willow Springs South, Willow Springs North, and Red Rocks. The Willow Springs community was addressed as “north” and “south” assessment zones along West Belleview Avenue due to different WUI characteristics. The CWPP assessment area does not include the entirety of the WMFPD. The boundaries of the assessment area are West Deer Creek Canyon to the south, I-70 to the north, the eastern base of the Dakota hogback formation (just west of C470) to the east, and the first ridge-top to the west of the hog back formation (Map 1).

Wildland fire is a common occurrence in the WMFPD. Historic fire occurrence was a major ecological influence in shaping the natural vegetation. Lightning-caused fires have been the dominant ignition source for hundreds of years and it continues to be the main cause of fire. However, human-caused fires have occurred and their frequency will likely become more numerous as the area’s population grows and outdoor recreation increases.

Wildfire risk to human welfare and economic and ecological values is more serious today than in the past because of the buildup of hazardous fuels, construction of houses in proximity to forests and open spaces, increased outdoor recreation, and a lack of public appreciation of wildfire. Natural resource management policy and changing ecological conditions have interacted in ways that resulted in hazardous fuel situations throughout
the assessment area. These forces include historic fire suppression policy, juniper and ponderosa pine invasion into shrublands and grasslands, overstocked forests, invasive weeds, and changing climatic patterns. The accumulation of hazardous fuels may set the stage for catastrophic wildfire occurrence in the assessment area, resulting in the loss of important economic and ecological values.

There are a variety of fuels around communities and structures that create problems for fire protection. These fuels are any potentially combustible material in the wildland environment that can potentially burn in a wildfire. These include both dead and live plant materials in ponderosa pine and Douglas-fir forests, juniper woodlands, oak shrublands, grasslands, and weed fields. Many of these fuels, such as dried grass and weeds, are highly flammable, burn rapidly, and resist control. Structures are also a fuel source in the wildland urban interface (WUI). A coordinated effort between the WMFPD and private landowners in the assessment area is needed to manage hazardous fuels and reduce the risk of wildfire.

Currently, fire suppression authorities within the WMFPD include 15 individual fire stations in Golden, Morrison, Lakewood, Littleton, and Roxborough. The fire stations offer mutual aid and support to one another in the event of a wildfire incident. An Intergovernmental Agreement for Mutual Aid between fire departments exists between the WMFPD and the other fire departments in Jefferson County in order to provide coverage for very large incidents with many participants (like wildfire or flood). In the case of large-scale incidents, all of the fire departments in Jefferson County, the CSFS, and USFS participate in the Annual Fire Operating Plan (AFOP) for wildfire. The CWPP provides the means to identify wildfire risk, prioritize mitigation projects, improve public awareness, and improve fire authority coordination to better manage wildfire and hazardous fuels.

1.3 Wildland Fire Management Primer

Wildland fire, defined as any fire burning wildland fuels, includes prescribed fire, wildland fire use, and wildfire. Prescribed fires are planned fires ignited by land managers to accomplish resource management 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 is known as wildland fire use (WFU). Wildfires are unwanted and unplanned fires that result from natural ignition, unauthorized human-caused fire, escaped WFU, or escaped prescribed fire. WMFPD actively suppresses all wildfires. WFU is not authorized in the WMFPD.

Prescribed fire in Jefferson County is used to accomplish a number of resource management objectives, such as reducing the amount of hazardous fuels, improving plant species diversity, abating noxious and invasive weeds, and improving wildlife habitat. Multiple resource management objectives are often achieved concurrently. However, the use of prescribed fire must meet strict air quality requirements of the CSFS and the Colorado Air Pollution Control Division (CAPCD).
Prescribed fire may be conducted either in a defined area or in localized burn piles. Area prescribed fires are used to burn vegetation in place and can vary in the number of acres burned. Burn piles are heaps of woody fuel that are collected after a mechanical treatment. CSFS and county policy would be maintained during prescribed fires. Acceptable burn days would be determined in consultation with CSFS and local agencies.

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 terrain and weather. The nature of fuels, terrain, 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, loading, vertical arrangement, and moisture content. Structures are also a fuel source. Fire tends to burn more rapidly and intensely upslope than on level terrain. However, evening “chinook” winds may rapidly drive wildfire downslope. Weather conditions such as high ambient temperatures, low relative humidity, and windy conditions favor fire ignition and erratic fire behavior. Wind can be the driving force in destructive WUI fires and it can be the driving force in fire spread and intensity.

Natural and human-caused fire has long been an integral part of vegetation communities in the assessment area. Lightning-ignited fire is a natural 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, land clearing, and in warfare. As such, many of the plant species and communities are 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. European settlers in Jefferson County changed the natural fire regime in several interrelated ways. The nature of vegetation (fuel) changed due to 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. In addition, continuous stretches of forest and open space fuels were broken-up by land-clearing activities. The removal of the natural vegetation allowed introduced weedy plants to colonize and occupy, in many instances, large expanses of land. The establishment of cheatgrass and other annual weeds are examples. Many of these weedy plants become flashy fuels as they age, causing fires to burn faster and hotter than with normal wildland fuels. The invasion of Rocky Mountain juniper into oakbrush stands and grasslands has also increased fuel loads and changed the nature of fire in these ecosystems.

In addition, more than a century of fire-suppression policy has resulted in an unusually large accumulation of hazardous fuels such as oakbrush and western juniper in many forest and open space ecosystems. The presence of flashy fuels coupled with the large
accumulation of naturally occurring fuels has created hazardous situations for public safety and fire management.

Modern-day land managers continue the use of fire by using prescribed fire as a tool to improve wildlife habitat, control noxious weeds, or to reduce hazardous fuels. Their primary efforts in managing fuels and fire are to protect human life, economic values, and ecological values. Proactive and vigilant fire and fuels management is necessary to protect human welfare, as well as economic and ecological values from fire loss.

Wildfire behavior and severity are dictated by fuel type, weather conditions, and terrain. Fuel is the only variable that can be managed by reducing such attributes as load, continuity, or size class distribution. Such things as fuel breaks, tree and shrub thinnings, defensible space, grass mowing or grazing, and green strips are ways to manipulate fuels to reduce the chances of fire occurrence or limit its severity. The CWPP focuses on fuel management on both private and public lands as a means to reduce its risk throughout the assessment area of the WMFPD.

1.4 Regulatory Framework

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

- Healthy Forest Restoration Act (2003) – Federal legislation to promote healthy forest and open space management, hazardous fuels reduction on federal land, community wildfire protection planning, and biomass energy production.


1.5 West Metro Fire Protection District Wildfire Management Goals and Objectives

The several goals and objectives for the CWPP process, which are summarized on Table 1.
Table 1. West Metro Fire Protection District Goals and Objectives for Wildfire Management Planning

<table>
<thead>
<tr>
<th>Goals</th>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facilitate a CWPP in the West Metro Fire Protection District of</td>
<td>• Provide oversight to all activities related to the CWPP.</td>
</tr>
<tr>
<td>Jefferson County</td>
<td>• Ensure representation and coordination among agencies and interest groups.</td>
</tr>
<tr>
<td></td>
<td>• Develop a long-term framework for sustaining CWPP efforts.</td>
</tr>
<tr>
<td>Conduct a wildfire risk assessment</td>
<td>• Conduct a county-wide wildfire risk assessment.</td>
</tr>
<tr>
<td></td>
<td>• Identify communities at risk and contributing factors.</td>
</tr>
<tr>
<td></td>
<td>• Determine the level of risk that structures in the rural county are to wildfire and</td>
</tr>
<tr>
<td></td>
<td>contributing factors.</td>
</tr>
<tr>
<td>Develop a mitigation plan</td>
<td>• Identify and prioritize hazardous fuel treatment projects.</td>
</tr>
<tr>
<td></td>
<td>• Identify and prioritize non-fuels mitigation needs.</td>
</tr>
<tr>
<td>Manage hazardous fuels</td>
<td>• Sustain a long-term, landscape approach to fuels management that focuses on</td>
</tr>
<tr>
<td></td>
<td>high wildfire risk areas.</td>
</tr>
<tr>
<td></td>
<td>• Identify priority fuel treatments based on risk assessment and apply for National Fire</td>
</tr>
<tr>
<td></td>
<td>Plan grants and other funding sources.</td>
</tr>
<tr>
<td></td>
<td>• Focus strategic hazardous reduction projects on communities at high risk.</td>
</tr>
<tr>
<td>Facilitate emergency planning</td>
<td>• Develop strategies to strengthen emergency management, response, and evacuation capabilities</td>
</tr>
<tr>
<td></td>
<td>for wildfire.</td>
</tr>
<tr>
<td></td>
<td>• Build relationships among county government, fire authorities, and communities.</td>
</tr>
<tr>
<td>Facilitate public outreach</td>
<td>• Develop strategies to increase citizen awareness and action for Firewise practices.</td>
</tr>
<tr>
<td></td>
<td>• Promote public outreach and cooperation for all fuels reduction projects to solicit</td>
</tr>
<tr>
<td></td>
<td>community involvement and private landowner cooperation.</td>
</tr>
</tbody>
</table>
2 WEST METRO FIRE PROTECTION DISTRICT PROFILE

2.1 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 estimated at 529,401 people with approximately 184,640 people living in the incorporated areas of Jefferson County. The WMFPD is located in central Jefferson County, in north central Colorado (Map 1). The population of WMFPD is approximately 265,000, with an estimated 10,000 people living in the assessment area.

The assessment area covers approximately 10,700 acres (Map 1) and has boundaries of West Deer Creek Canyon to the South, I-70 to the north, the eastern base of the Dakota hogback formation (just west of C470) to the east, and the first ridge-top to the west of the hog back formation. Elevations range from 5,700 to 7,500 feet. Vegetation throughout the WMFPD is diverse and varies from forest at the higher elevations on steep slopes to shortgrass prairie at the lower elevations and on relatively flat ground (Map 4).

The economy of WMFPD is primarily supported by the service, retail, and finance industries. Most residents of the communities in the assessment area commute to jobs in nearby Denver. Recreation is also economically important to these communities. The area ecological resources such as Pike, Roosevelt, and Arapahoe National Forests; Golden Gate Canyon State Park; the Chatfield State Recreation Area; and nationally recognized Open Space areas draw hikers, geologists, bikers, and bird watchers from around the country.

2.2 Communities

There are six rural, unincorporated communities (Ken-Caryl North Ranch, Ken-Caryl Ranch, Willow Brook, Willow Springs South, Willow Springs North, and Red Rocks) and one incorporated community (Morrison) included in the WMFPD CWPP (Map 2). The Willow Springs community was addressed as “north” and “south” assessment zones along West Belleview Avenue due to different WUI characteristics. These communities are protected by WMFPD Fire Stations 9, 11, and 13 (Map 3). The 15 WMFPD is protected by 15 stations, staffed by fulltime fire chiefs and career staff.
Table 2. Community Summary Information

<table>
<thead>
<tr>
<th>Community</th>
<th>Location</th>
<th>Fire Authority</th>
<th>Surrounding Fuels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morrison</td>
<td>West of Highway 70, along Bear Creek</td>
<td>West Metro Fire Protection District</td>
<td>Shrubland on steep slopes to north, mesic shrubs/grasses along Bear Creek to the south</td>
</tr>
<tr>
<td>Ken-Caryl North Ranch</td>
<td>Immediately west of US Highway 470</td>
<td>West Metro Fire Protection District</td>
<td>Native grass/shrubland around the community, irrigated grasses/shrubs around homes</td>
</tr>
<tr>
<td>Ken-Caryl Ranch</td>
<td>West of Highway 470 and South of Ken-Caryl North Ranch</td>
<td>West Metro Fire Protection District</td>
<td>Native grass/shrubland around the community, irrigated grasses/shrubs around homes</td>
</tr>
<tr>
<td>Willow Brook</td>
<td>West of Highway 470 on Belleview Ave</td>
<td>West Metro Fire Protection District</td>
<td>Shrubland/grasses on east and west, and residential areas to the north and south, irrigated grasses/shrubs around homes</td>
</tr>
<tr>
<td>Willow Springs South</td>
<td>West of Highway 470 on Belleview Ave, west of Willow Brook</td>
<td>West Metro Fire Protection District</td>
<td>Shrubland/grasses on east and west, and residential areas to the north and south, irrigated grasses/shrubs around homes</td>
</tr>
<tr>
<td>Willow Springs North</td>
<td>West of Highway 470 on Belleview Ave, north of Willow Springs</td>
<td>West Metro Fire Protection District</td>
<td>Shrubland/grasses to the north, irrigated grasses/shrubs around homes</td>
</tr>
<tr>
<td>Red Rocks</td>
<td>Off of Highway 8 and Bear Creek Ave, north of Highway 285</td>
<td>West Metro Fire Protection District</td>
<td>Shrubland/grasses, weeds</td>
</tr>
</tbody>
</table>

2.3 Climate

WMFPD climate is semi-arid with mild winters and dry summers (Table 3). The area receives 255 days of sunshine per year and receives an average of 15 inches of annual precipitation. Winter temperatures are typically in the low thirties. Temperatures for January average 30 degrees Fahrenheit (F). In July, the average high is 86 degrees F, with an annual average temperature of 52 degrees F. The area receives an annual average snowfall of 60.3 inches with the most precipitation occurring in May (average of 15.4 inches). The frost-free period extends from the last day of spring with a minimum temperature of 32 degrees F or below, to the first day of fall with a minimum temperature of 32 degrees F or below. The low precipitation months are December, January, and February.
Table 3. Average Monthly Climate Summary for Morrison, Colorado

<table>
<thead>
<tr>
<th>Climate Attribute</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Annual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Temperature (°F)</td>
<td>44</td>
<td>47</td>
<td>53</td>
<td>59</td>
<td>68</td>
<td>80</td>
<td>86</td>
<td>84</td>
<td>76</td>
<td>65</td>
<td>51</td>
<td>45</td>
<td>63.2</td>
</tr>
<tr>
<td>Minimum Temperature (°F)</td>
<td>13</td>
<td>16</td>
<td>22</td>
<td>30</td>
<td>39</td>
<td>49</td>
<td>55</td>
<td>53</td>
<td>43</td>
<td>32</td>
<td>21</td>
<td>14</td>
<td>32.3</td>
</tr>
<tr>
<td>Total Precipitation (inches)</td>
<td>0.48</td>
<td>0.46</td>
<td>1.37</td>
<td>2.08</td>
<td>2.59</td>
<td>2.17</td>
<td>1.87</td>
<td>1.83</td>
<td>1.45</td>
<td>1.02</td>
<td>1.14</td>
<td>0.60</td>
<td>17.06</td>
</tr>
</tbody>
</table>

2.4 Wildland Vegetation and Fuels of the Assessment Area

The vegetation of the assessment area is diverse and typical for the Colorado Front Range. Map 4 illustrates existing vegetation (EV) that was derived from 2006 ASTER remote imagery. EV is current vegetation cover. Map 5 presents the potential natural vegetation (PNV) of the assessment area (source: [http://wildfire.cr.usgs.gov](http://wildfire.cr.usgs.gov)). PNV is vegetation that would occur in the absence of human intervention. Since the assessment area has been greatly disturbed by such things as human settlement, road construction, agriculture and livestock grazing, PNV does not occur. Instead the EV exists under current conditions.

The EV of the assessment area includes grasslands, shrublands, and relatively small areas of forest (Map 4). The vegetation is predominantly shortgrass prairie mixed with trees and shrubs. Mesic areas (i.e., areas with high soil water conditions) may be found along portions of the intermittent streams and drainages of the area. Areas of ponderosa pine, Douglas-fir, Gambel oak, and mountain mahogany become dominant as elevation rises on the hogback and foothills. Wetlands are confined to areas along Dutch Creek, Massey Draw, Docmann Gulch, Bear Creek, and other isolated lakes. Cropland and hay fields occur, but are not common. These fields may be considered hazardous fuels in the late summer and fall as the crops and hay dry out. Irrigated fields are not a hazardous fuel. Vegetation types such as ponderosa pine, Douglas-fir, aspen, juniper, mountain mahogany, Gambel oak, and the different grasses can all be hazardous fuels given the accumulation of dead plants, unnaturally high plant density and cover, and/or low water content of tissues. Annual grasslands are widespread and dominated by cheatgrass. Cheatgrass is a highly flammable, flashy fuel when it dries in early summer; thus, it can extend the fire season by one to two months. Cheatgrass is highly competitive with native vegetation and may readily become established on disturbed sites.
EV (Map 4) derived from 2006 ASTER remote imagery was used to characterize the fire behavior fuel model (FBFM) and fire regime condition class (FRCC) for the assessment area (Maps 5 and 6). FBFM and FRCC are attributes of wildland vegetation specifically defined to describe wildland fuels and make judgments on the degree of fuel hazard.

There are 13 different FBFMs, which are divided into four groups: grass, shrub, timber, and slash. Map 7 illustrates the arrangement FBFMs within the assessment area. The FBFM map was generated in part from fuels information developed by the US Geological Survey (source: http://wildfire.cr.usgs.gov) and field verified based on the EV map.

The FBFMs are used as input into fire behavior prediction models that are based on weather and fuel conditions. The differences among the 13 models relate to fuel load and the distribution of fuel-size classes. FBFM descriptions provide information on anticipated fuel load and fire behavior under normal conditions. FBFMs are valuable to planning and prioritizing fuel management projects. Reconnaissance of a one-mile circumference around the communities demonstrated seven different FBFMs (Table 4).

<table>
<thead>
<tr>
<th>Fire Behavior Fuel Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong> Grass Group – Fire spread is determined by the fine, very porous, and continuous herbaceous fuels that have cured or are nearly cured. Fires are surface 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 is up to 78 chains (5,148 ft.) per hour with flame lengths of 4 ft.</td>
<td></td>
</tr>
<tr>
<td><strong>2</strong> Grass Group – Fire spread occurs through curing of dead herbaceous fuels. These are surface fires where downed woody debris from the shrub and tree component adds to fire intensity. Opened shrub lands, pine stands, or oak stands that cover from one-third to two-thirds of the area generally fit this model.</td>
<td></td>
</tr>
<tr>
<td><strong>3</strong> Grass Group – These fires are the most intense in the Grass Group. The fires can demonstrate high rates of spread under windy conditions. Grass stands are usually about three feet tall with considerable variation. About one-third of the stand consists of cured or dead plant material. Tallgrass prairie, grass crops, and marshlands are examples of this FBFM.</td>
<td></td>
</tr>
<tr>
<td><strong>4</strong> Shrub Group – The foliage and fine woody material of the shrub crown cover supports fast-spreading and intense fires. Dead woody material contributes to fire intensity. A deep litter layer may carry fire and hamper its suppression. These shrub stands are greater than six feet tall. Gambel oak and mountain mahogany stands that meet the height requirement are examples of this FBFM.</td>
<td></td>
</tr>
<tr>
<td><strong>6</strong> Shrub Group – Fire spreads though the shrub layer with flammable foliage but requires moderate winds to maintain the foliage fire. Fire will drop to the ground in low wind situations. Shrubs are mature with height less than 6 feet. These stands include Gambel oak less than six feet tall. Fire rate of spread can be rapid with flame lengths of 6 ft.</td>
<td></td>
</tr>
</tbody>
</table>
Timber Group – These fuels produce slow-burning ground fires with low flame lengths. Occasional “jackpots” may occur. Only under severe weather conditions with high temperatures, low humidity, and high winds do the fuels pose a fire hazard. These are mixed conifer stands with little undergrowth. Fire rate of spread is up to 106 ft. per hour with flame lengths of one foot.

Timber Group – Fires run through the surface litter faster than in model 8 and have longer flame lengths. These are semi-closed 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 will contribute to tree touching, spotting, and crowning. Fire rate of spread is up to 495 ft. per hour with flame lengths of 3 ft.

FRCC estimates the degree of departure of EV from PNV. The degree of departure may result from difference in vegetation (i.e., fuels), attributes (i.e., composition and structure), or historical fire regime (i.e., return frequency of fire and its severity). Three classes are used to describe FRCC (Table 5). FRCC 1, FRCC 2, and FRCC 3 may be viewed as low-, moderate-, and high-hazard fuels, respectively.

Table 5. Fire Regime Condition Class Descriptions (http://www.frcc.gov)

<table>
<thead>
<tr>
<th>Fire Regime Condition Class</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fire behavior, effects, and other associated disturbances are similar to those that occurred prior to fire exclusion (suppression) and other types of management that do not mimic the natural fire regime and associated vegetation and fuel characteristics. Composition and structure of vegetation and fuels are similar to the natural (historical) regime. Risk of loss of key ecosystem components (e.g. native species, large trees, and soil) is low.</td>
</tr>
<tr>
<td>2</td>
<td>Fire behavior, effects, and other associated disturbances are moderately departed (more or less severe). Composition and structure of vegetation and fuel are moderately altered. Uncharacteristic conditions range from low to moderate. Risk of loss of key ecosystem components is moderate.</td>
</tr>
<tr>
<td>3</td>
<td>Fire behavior, effects, and other associated disturbances are highly departed (more or less severe). Composition and structure of vegetation and fuel are highly altered. Uncharacteristic conditions range from moderate to high. Risk of loss of key ecosystem components is high.</td>
</tr>
</tbody>
</table>

Grasslands
Approximately 70 percent (6,904 acres) of the assessment area is grassland, comprised largely of native short and mid-grass species such as blue grama, western wheatgrass, needle-and-thread, and prairie Junegrass (Map 4). Tallgrass species such as big bluestem and prairie sandreed are much less common but can also be found in these grasslands. Introduced grasses such as smooth brome, intermediate wheatgrass, and crested wheatgrass also occur on graded areas adjacent to developments. Grass fuels are a large concern for the communities within these areas because it is the predominant fuel type near homes bordering open spaces. Grasses typically benefit from fast moving, cool fire as it will remove excessive dried biomass and add nutrients to the soil. However, high
intensity, hot fires during dry soil conditions may have damaging affects, such as reducing grass cover, which could allow weeds to establish and soil erosion to increase.

The grasslands in the assessment area are rated as FRCC 3, or high departure from historic conditions (Map 7). This is due in a large part to fire exclusion from this ecosystem that is adapted to frequent fire. Fire return intervals for these grasslands range from approximately 10 to 35 years. The short- and mid-grass prairie is FBFM 1 (Map 6). FBFM 2 occurs where scattered brush or open forest occurs with the grasses. Pockets of tallgrass are considered to be FBFM 3. Though fire behavior in grass fuels is less intense than in brush or timber, the potential impact of grass fires should not be underestimated. These light, flashy fuels are a risk to firefighter safety and can pose a serious threat to homes.

Shrublands
Shrubland cover is approximately 24 percent (2,432 acres) of the assessment area and is dominated with Gambel oak stands found in a range of ages. While a typical oak thicket is around 6 to 10 feet tall, younger oak is predictably shorter and older stands may grow to 20 feet tall. The typical stand can become incredibly dense and is best represented by FBFM 4 (Map 4). Locally, stand ages range from 1 to 40 years, and the typical age of mortality for Gambel oak is 90 years. FRCC varies from 2 to 3 (Map 7). The frost kill that occurred in 2003 has added significant dead woody debris to these stands, exacerbating the hazards of this fuel type.

Mountain mahogany is also found throughout the assessment area. It is generally 3 to 5 feet tall and tends to grow in less dense stands than Gambel oak. FBFM 6 best represents a typical stand. FRCC varies from 2 to 3. A variety of other shrub species, such as chokecherry and rabbit brush, are common. Rocky Mountain juniper is scattered throughout some shrublands and is most common in the foothills to the west of the communities, especially in the northern portions of the assessment area.

Forest
Forests dominated by Douglas-fir comprise approximately six percent (625 acres) of the assessment area. These areas are in good health and relatively young at 50 to 70 years of age. Forests favor the north facing slopes above 6500 feet. The understory tends to be timber litter with forbs and scattered grass. FBFM 8 or 10 best represent this forest type in areas of heavy dead and down material (Map 6). Douglas-fir can also be found with a brush understory, where it is encroaching into Gambel oak stands due to fire exclusion (FBFM 6). Its FRCC rating is 2 and 3 (Map 7).

Ponderosa pine in the assessment area is in generally good health and is typically found as a successor to Gambel oak. Ponderosa pine is also found mixed-in with Douglas-fir stands (FBFM 8), scattered throughout the shrublands (FBFM 4 or 6), and in limited cases as its own distinct stand type (FBFM 9). FRCC is 2 and 3. There are also two small and remote aspen stands within the assessment area that are less than 10 acres each.
2.5 Water Resources

Fire hydrants that supply a minimum of 500 gpm (gallons per minute) occur throughout the planning area and are typically located within 500 to 1200 ft of each other (Map 3). Surface water is located sporadically in the WMFPD as lakes, streams, and reservoirs (Map 3). Reliable water supplies are essential for supplying engines and reducing water tender shuttle times in wildfire suppression and structure defense operations. Available surface waters include Bear Creek, Willow Springs Reservoir, King Fisher Lake Reservoir, Ken-Caryl Reservoir, Bergen Reservoirs 1 and 2 (just west of the WMFPD), Chatfield Lake (southeast of the WMFPD) and various other unnamed small ponds and lakes in the assessment area. The Red Rocks golf course also has two large ponds. These could be used as draft sites for engines or dip sites for helicopters. Obtaining pre-approval from the pond owners for these emergency uses should be considered.

The Willow Brook Water and Sanitation District maintains three water storage tanks, with a total two million gallon maximum capacity. These tanks supply the communities of Willow Brook and Willow Springs by gravity feed. Flow ranges from 1200 to 2000 gpm and from 35 to 200 psi (pounds per square inch) depending on the diameter of the water main, location of the hydrant, and tank water level. Each tank is maintained at a minimum of 50 percent capacity. Power supply to the water pumps is via underground lines, and two of the pumps have backup generators. A third generator is slated for installation. In the event of a fire, the fire department can contact the water district by phone in order to adjust the system for increased emergency water demand.

2.6 Fire Protection Authority

The WMFPD is a special government district that maintains a force of 313 career firefighters from 15 stations who serve the district’s 265,000 residents over 110,000 square miles. The WMFPD provides fire and rescue services to the City of Lakewood, Town of Morrison, unincorporated communities southeast Jefferson County, and parts of Douglas County, including Roxborough and Waterton Canyon.

The WMFPD was established January 1, 1995 when Lakewood and Bancroft Fire Protection Districts consolidated services. WMFPD is a special district in the state of Colorado and is governed by a board of seven publicly elected officials. An Intergovernmental Agreement for Mutual Aid between fire departments exists between the WMFPD and the other fire departments in Jefferson County in order to provide coverage for very large incidents with many participants (like wildfire or flood). In the case of extreme emergencies, all of the fire departments in Jefferson County, the CSFS, and USFS participate in the Annual Fire Operating Plan (AFOP) for wildfire.

WMFPD requires all of its firefighters to be paramedics and wildland firefighters. The firefighters receive over 188 hours of training per year. WMFPD is also one of four Colorado fire departments to participate in a national certification program for firefighter training. Although it varies from station to station, each of the 15 WMFPD stations are equipped with at least one fire engine outfitted with compressed air foam, which is used
to protect structures from wildfire. WMFPD currently staffs 8 ambulances and 5 wildland fire engines.

2.7 Values at Risk

Human life and welfare are at risk to wildfire in the assessment area because of the buildup of hazardous fuels around communities and structures, poor emergency vehicle ingress and egress, and lack of defensible space around structures. Throughout the assessment area, there are scattered small communities and houses and outbuildings without structural fire protection because of their location and/or surroundings. Other economic values at risk include businesses, hunting and recreational land, watersheds, and critical infrastructure. The town of Morrison and communities of Ken-Caryl North Ranch, Ken-Caryl Ranch, Willow Brook, Willow Springs South, Willow Springs North, and Red Rocks are at risk to wildfire for one or more of the following reasons:

- Buildup of hazardous fuels such as juniper, oak brush, annual weeds, or seasonal dry grasses
- Limited emergency vehicle access
- Not adhering to county approved fire-use procedures and restrictions for such things as burn barrels or burn piles
- Structures lacking Firewise landscaping and construction

In addition, numerous isolated structures are at risk to wildfire for one or more of the following reasons:

- Hazardous fuels in vicinity of structure and along private access roads
- Poor emergency ingress or egress
- Lack of defensible space
- Lack of use of non-combustible building materials
- Lack of available or sufficient water tender support

Ecological values within the assessment area are important for continued economic growth and human welfare. The degree of loss will depend on wildfire severity and time of recovery. Wildfire is a natural part of ecology and normally occurring fire is necessary to maintain many desirable attributes such as wildlife habitat and livestock forage. Under a normally occurring fire regime, many ecological values will recover within a few years. Air quality should recover within days after a fire but wildlife habitat may take years. However, catastrophic wildfire may change wildlife habitat beyond it capacity to return to its present condition if the biophysical nature of the soil, vegetation, and watershed are altered. In addition, wildfire may produce conditions conducive to the spread of noxious and invasive weeds, which will further the degradation of open space. Ecological values at risk to wildfire include such things as:

- Wildlife and aquatic habitat
- Forests
- Watersheds
- Scenic areas
- Water quality
- Air quality
- Natural vegetation communities
- Cultural and historic sites

3 CWPP PROCESS

3.1 West Metro Fire Protection District CWPP Requirements

The eight steps to developing a CWPP are listed in Table 6. These steps are defined in the handbook, *Preparing a Community Wildfire Protection Plan*.

Table 6. Eight Steps to Developing a CWPP for the WMFPD

<table>
<thead>
<tr>
<th>Step</th>
<th>Task</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>Convene Decision Makers</td>
<td>Form a Core Team made up of representatives from local governments, fire authorities, and Colorado Department of Forestry.</td>
</tr>
<tr>
<td>Two</td>
<td>Involve Federal Agencies</td>
<td>Engage local representatives of the BLM and USFS and other land management agencies as appropriate.</td>
</tr>
<tr>
<td>Three</td>
<td>Engage Interested Parties</td>
<td>Contact and encourage participation from a broad range of interested organizations and stakeholders.</td>
</tr>
<tr>
<td>Four</td>
<td>Establish a Community Base Map</td>
<td>Develop a base map of the district base map that defines communities at risk, critical infrastructure, and forest/open space at risk.</td>
</tr>
<tr>
<td>Five</td>
<td>Develop a Community Risk Assessment</td>
<td>Develop a risk assessment that considers fuel hazards, risk of wildfire occurrence, homes, business, and at risk infrastructure and other values, and preparedness capability. Rate the level of risk and incorporate into the base map as appropriate.</td>
</tr>
<tr>
<td>Six</td>
<td>Establish Community Priorities and Recommendations</td>
<td>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.</td>
</tr>
<tr>
<td>Seven</td>
<td>Develop an Action Plan and Assessment Strategy</td>
<td>Develop a detailed implementation strategy and a monitoring plan that will ensure long-term success.</td>
</tr>
<tr>
<td>Eight</td>
<td>Finalize the CWPP</td>
<td>Finalize the District CWPP and communicate the results to interested parties and stakeholders.</td>
</tr>
</tbody>
</table>
3.2 West Metro Fire Protection District CWPP Core Team

The initial step in developing the WMFPD CWPP is to organize a core, decision-making team. The members of this team have the responsibility for CWPP implementation and oversight. The WMFPD team is composed of local fire authorities and a CSFS representative (Table 7). Representatives from organizations such as communities, utilities, Chambers of Commerce, hunting clubs, water districts, and homeowners associations may choose to participate, as appropriate.

Table 7. WMFPD CWPP Core Team Members

<table>
<thead>
<tr>
<th>Team Member</th>
<th>Organization</th>
<th>Phone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bill DeWolf</td>
<td>Willow Springs Open-Space HOA</td>
<td>303-697-0345</td>
</tr>
<tr>
<td>Michael Murphy</td>
<td>WMFPD District Chief/ Wildland Coordinator</td>
<td>303-989-4307</td>
</tr>
<tr>
<td>Fire Captain Pete Andersen</td>
<td>WMFPD Fire Captain (Station 11)</td>
<td>303-697-9103</td>
</tr>
<tr>
<td>Allen Gallamore</td>
<td>Colorado State Forest Service</td>
<td>303-278-9757 ex.302</td>
</tr>
</tbody>
</table>

3.3 Federal Agency Collaboration

Federal agencies, such as the USFS, may participate in the CWPP planning process as interested stakeholders. WMFPD is a special district in the state of Colorado. An Intergovernmental Agreement for Mutual Aid between fire departments exists between the WMFPD and the other fire departments in Jefferson County in order to provide coverage for very large incidents with many participants (like wildfire or flood). In the case of extreme emergencies, all of the Fire Departments in Jefferson County and the CSFS and USFS participate in the Annual Fire Operating Plan (AFOP) for wildfire. Wildfire does not respect political boundaries, so all fire authority organizations must work together to reduce the risk of wildfire.

4 WILDLIFE RISK ASSESSMENT

4.1 Approach to the Wildfire Risk Assessment

The assessment area is in south-central Jefferson County, approximately 1 mile west of the Denver Metro area (Map1). The boundaries are roughly West Deer Creek Canyon to the South, I-70 to the north, the eastern base of the Dakota hogback formation (just west of C470) to the east, and the first ridge-top to the west of the hog back formation.
The assessment focused on the communities lying within the study area. Communities were evaluated in terms of wildfire hazard and risk exposure. Wildland fuels within a 1-mile perimeter of these communities were then evaluated in terms of potential fire behavior and departure from historic conditions.

For the purposes of this assessment, fire hazard refers to vegetation or wildland fuel in terms of its fire behavior characteristics and resistance to control. Risk is the wildland fuels’ probability of ignition. Hazard is the occurrence of wildland fuel. Values-at-risk include infrastructure, buildings, improvements, and natural resources that are likely to suffer long-term damage from the direct impacts of a wildfire.

Community assessments were conducted to determine wildfire hazard and risk based on access, adjacent vegetation (fuels), defensible space, topography, roof and building characteristics, available fire protection, and placement of utilities. The fuels within a mile of the communities were evaluated based on satellite imagery, field observations, and information from local experts.

Public meetings were convened on July 27 and August 16, 2006 at 6:30 p.m. in the Red Rocks Country Club. The meetings were announced on the Jefferson County Department of Emergency’s website, in a newspaper release, by homeowners association (HOA) notification, and the posting of flyers in public locations. The purpose of the first meeting was to explain the wildfire risk assessment; present the findings of the risk assessment; and provide an opportunity for the public to participate in the process, review the findings, and comment on proposed mitigation possibilities such as hazardous fuels management and non-fuel projects. The purpose of the second meeting was to present the findings of the CWPP to the public. Questionnaires were distributed at meetings to obtain information on public opinion on the level of wildfire risk in the WMFPD, evaluate values at risk, and assess mitigation practices needed to reduce risk (Appendix C). Firewise pamphlets and brochures that explained proper home construction and landscaping practices to reduce the risk of wildfire loss were also handed out at the meetings. A draft report of the CWPP was posted on the County’s emergency website to encourage public review and comment.

**Terrain**

The study area includes the Dakota and Lyons hogback formations on the east, the eastern most slopes of the Front Range foothills on the west, and the 1-mile wide valley in between. Elevation ranges from 5,700 to 7,500 feet. Slopes range from relatively flat and open terrain to vertical rock escarpments. While the communities lie in the valley between the hogbacks and foothills, steep surface grades can be found within these communities.

**Potential Fire Behavior**

Fire behavior is the severity and rate that fire may burn through a certain vegetation type. Fire severity is judged on flame length, i.e., the longer the flame length, the greater the fire severity. Rate of fire spread is measured in chains (one chain = 66 feet). BehavePlus
is software that was used to assess potential fire behavior given the identified FBFMs, local topography, and local weather conditions. Weather and fuel moisture conditions were derived from data from the Bailey and Sugarloaf weather stations (1977-2005). The Bailey station is 15 miles to the southwest of the study area at 7,982 ft. It is missing all data from 1993 thru 1999. The Sugarloaf station is located 25 miles to the north at 6,733 feet and is missing all data from 1993. These are the two closest stations with similar elevations that provide the fuel moisture data required by the BehavePlus. Fire behavior simulations were conducted for average (50th percentile) and severe (90th percentile) conditions for the fire season, typically May through October. Grass fuels were modeled on a 10 percent slope, representative of the terrain found around many of the homes in this assessment. Timber and brush fuels were modeled at 30 percent slope, representative of the steeper conditions that they favor for growth.

<table>
<thead>
<tr>
<th>Vegetation Type</th>
<th>Flame Length, (ft)</th>
<th>Rate of Spread (chains / hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average Conditions</td>
<td>Average Conditions¹</td>
</tr>
<tr>
<td>Short grass</td>
<td>5</td>
<td>96</td>
</tr>
<tr>
<td>Short grass with scattered shrubs or open timber</td>
<td>7</td>
<td>41</td>
</tr>
<tr>
<td>Tall grass over 3 ft tall</td>
<td>14</td>
<td>119</td>
</tr>
<tr>
<td>Shrub over 6 ft tall</td>
<td>20</td>
<td>80</td>
</tr>
<tr>
<td>Shrub under 6 ft tall</td>
<td>6</td>
<td>38</td>
</tr>
<tr>
<td>Closed timber litter</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Closed timber with heavy dead and down woody debris</td>
<td>5</td>
<td>9</td>
</tr>
</tbody>
</table>

¹ One chain = 66 feet

4.2 Wildfire History

The forests and shrublands of the Colorado Front Range are products of a mixed fire regime. Fire return intervals vary from less than 15 to over 40 years (over 100 years in some montane forests of this region) with fire intensity being similarly variable from low intensity surface fires to crown fires. Recent studies concur that fire frequency increased during Euro-American settlement of the area in the late 19th century, and then decreased significantly with the grazing and fire management practices of the 20th century. Fire suppression has had a more significant impact in the lower montane areas (~5,500-7,200 feet) where fires were historically more frequent than the upper montane areas (~7,200-9,000 feet).

Wildfire records for WMFPD are available for November 2002 through July 2006 (Figure 1). In descending order, July, June, and October are the three busiest months for
fire suppression. During this period, 245 wildfires were recorded for an average of over 49 wildfires per annum (Table 9). The majority of wildfires burn less than 0.25 acres.

![Figure 1. Average Number of West Metro Wildfires per Month](image)

The Murphy Gulch fire is the largest wildfire within this assessment area in recent history, scorching 3,300 acres along the western edge of Ken-Caryl Ranch in 1978. In the last decade the potential for catastrophic wildfires has repeatedly approached West Metro’s back door. The Buffalo Creek (1996) and Hi Meadow (2000) fires burned to within ten miles of Ken-Caryl Ranch. The Schoonover (2002) and Hayman fires (2002) burned to within ten miles of the southwestern edge of West Metro’s District. A wildland fire near the assessment area was the Rooney Fire that burned 200 acres in December 1993. This fire was north of Alameda Parkway on the eastern slope of the Dakota Ridge Hogback. Other recent fires within Jefferson County and in similar fuel types and different seasons are: Plainview (2,700 acres/January, 2006), Rocky Flats (1,000 acres/April, 2006), North Table Mountain (800 acres/July, 2005), and Tripp Ranch (63 acres/April, 2002).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A (0 - 0.25)</td>
<td>800</td>
<td>205</td>
</tr>
<tr>
<td>B (0.25 - 9.9)</td>
<td>390</td>
<td>38</td>
</tr>
<tr>
<td>C (10 - 99.9)</td>
<td>18</td>
<td>1</td>
</tr>
<tr>
<td>D (100 - 299.9)</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>E (300 - 999.9)</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>F (1,000 - 4,999.9)</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>G (5,000 - 9,999.9)</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>
The U.S. Forest Service (USFS) South Platte District of the Pike National Forest adjoins the southwestern boundary of the West Metro Fire Protection District (Figure 2). Thirty-two years of wildfire data show 1,220 fires on the forest district. The majority of fires (67 percent) were lighting-caused. Four out of the five largest fires during the 32-year period were human caused. The majority of wildfires burn fewer than 10 acres (Table 9).

![Figure 2. Average Number of South Platte Ranger District Wildfires per Month](image)

### 4.3 Wildfire Risk to Communities

**Values at Risk**

Community assessments were conducted during July, 2006 to determine wildfire hazard and risk. The National Fire Protection Association (NFPA) Standard for Protection of Life and Property from Wildfire (NFPA 1144, 2002) was used to rate communities based on access, adjacent vegetation (fuels), defensible space, topography, roof and building characteristics, available fire protection, and placement of utilities. Since the NFPA 1144 form is designed to be used for individual structures as well as communities, specific adaptations were adopted for its use. The community roof rating was based on the estimated percent of homes with wood shake roofs. Where a range of conditions was found a corresponding range of values was awarded. The final rating was based on the range and median of the final total value and the assessor’s observations.

Three of the seven communities received a high hazard rating because of issues with hazardous fuels proximity, the use of combustible construction material, inadequate emergency ingress and egress, and lack of defensible space around structures. An action that can be taken immediately to reduce the hazard ratings is the development of
defensible space around homes and other structures. A functional defensible space consists of non-flammable vegetation no closer than 30 feet to the structure, the use of low flammability landscaping plants, mowed grass, lack of firewood stacks, and absence of fuel tanks (see Appendix D for complete instructions). The defensible space should be larger for structures built on slopes.

Table 10. Community Hazard Rating and Contributing Factors

<table>
<thead>
<tr>
<th>Community</th>
<th>Hazard Rating</th>
<th>Contributing Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morrison</td>
<td>Moderate</td>
<td>• Fuels of dried grass and weeds in proximity to structures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Structures in close proximity of one another</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Combustible components on homes/buildings</td>
</tr>
<tr>
<td>Ken-Caryl North Ranch</td>
<td>Moderate</td>
<td>• Fuels of short grass, mountain mahogany, and dense Gambel oak in proximity to structures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Combustible roof or siding on some homes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Exposed, wooden decks in some areas</td>
</tr>
<tr>
<td>Ken-Caryl Ranch</td>
<td>Moderate</td>
<td>• Fuels of short grass, mountain mahogany, and dense Gambel oak in proximity to structures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Combustible roof or siding on some homes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Areas of densely landscaped shrubs</td>
</tr>
<tr>
<td>Willow Brook</td>
<td>High</td>
<td>• Fuels of short grass, mountain mahogany, and dense Gambel oak around the edges of the community</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• All roads bottleneck into a single entrance point</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Street signs are non-reflective</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Lack of defensible space around some homes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Combustible roof, siding, and decks on some homes</td>
</tr>
<tr>
<td>Willow Springs South</td>
<td>High</td>
<td>• Dense fuels of short grass, mountain mahogany, and Gambel oak in proximity to structures.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Steep slopes in/around the community</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Wood shake roofs on many homes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• All roads bottleneck into a single entrance point</td>
</tr>
<tr>
<td>Willow Springs North</td>
<td>Low</td>
<td>• Flat terrain</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Area partially surrounded by a golf course</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Cul-de-sacs for turn around are common</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• New construction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Prevalence of fire resistive construction</td>
</tr>
</tbody>
</table>
Dried grass and weeds were prevalent in and around all communities and are a serious fuel concern during the late summer and fall months. These flashy fuels are highly flammable and cause fire to spread rapidly. Firebrands carried by the wind from a distant wildfire could ignite a spot fire in a community. When in close proximity to homes, grasses and weeds should be mowed in the late summer to reduce the risk of wildfire loss.

The nature of wildland fuel (i.e., vegetation) around a community will influence its risk to wildfire. Fuels management should consider not only the area immediately around a community but neighboring areas as well. Fuels within one-mile of communities were assessed for this CWPP. Wildfire can spread rapidly given flammable fuels (e.g., juniper, dried grass, and oak brush), windy conditions, and sloping terrain. The FRCC around the communities was used to assess hazardous fuels (Map 7). Low-, moderate-, and high-hazard fuels were classified as FRCC 1, FRCC 2, or FRCC 3, respectively (Table 2).

## 5 WILDFIRE MITIGATION PLAN

### 5.1 Approach to Mitigation Planning

Wildfire mitigation is defined as the reduction of the probability and negative impacts of wildfire. This can be accomplished through wildland fuels management, non-fuels mitigation measures, and public outreach. Results are often most effective when these three approaches are pursued by governmental entities, citizen groups, and individuals in concert.

Hazardous fuels and non-fuels mitigation projects were identified based on the findings of field surveys (completed when assessing community and structure risk to wildfire), interviews with county fire suppression experts, and through a questionnaire that was posted on the Jefferson County website and handed out at the first community meeting. Fuels mitigation projects were identified and prioritized based on proximity to community, hazardous fuel load and continuity, terrain, and professional experience.

This CWPP is not a legal document, but rather a planning 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 Protection Act (NEPA). Action on private land may require compliance with county land use codes, building codes, and local covenants.

5.2 Suggested Actions to Achieve Desired Results

The CWPP provides recommendations for hazardous fuels reduction, defensible space, building materials, education, outreach, infrastructure needs, water availability, and access. However, WMFPD is limited in their ability to affect action on private lands. The most effective form of mitigation is education and outreach. The purpose of a community-wide education program is to: 1) educate the public to the risks of wildfire to property and life (during the summer months); 2) urge property owners to take responsibility in reducing the risk of wildfire and to create defensible space around their structures; 3) teach the benefits of different types of fire resistant building materials; and 4) increase awareness of the natural role of low-intensity fire in grassland and woodland ecosystems and make known the benefits from thinning fuel loaded areas. Education makes other mitigation programs possible.

Defensible Space: Defensible space is high priority for fuels management. The creation of defensible space can maintain privacy and esthetics if done thoughtfully. Special attention should be paid to reducing concentration of fuels near particularly susceptible attributes of the home, including wood shake roofs and wood decks. Each property needs to be evaluated on its own fire susceptible characteristics to develop an adequate defensible space.

Many properties in the assessment area have dry native grasses in close proximity to unpruned landscaped conifers. These conifers are often within 15 feet of a wood deck. So, while there may be over 30 feet of space between the home and wildland fuels, fire driven by even a moderate wind could travel along this chain of combustible elements to the home. Low flammable shrubs and trees should be planned with adequate spacing among canopies. Trees should be spaced with 10 to 20 feet between canopies and limbs pruned to within 10 feet from the ground. For homes adjacent to open spaces, communities may want to allow mowing 10 to 20 feet or so into the open space in strategic locations. Reconnaissance will identify areas where mowing would be appropriate. Post-mowing cleanup will depend on the amount of herbaceous material left on the ground, aesthetics, and proximity to structures.

Within the Ken-Caryl Ranch and Ken-Caryl North Ranch communities there are several parks, vegetated drainages, and natural area corridors that deserve attention. These areas often seem benign as they are isolated from true wildlands and often mesic (require moderate levels of moisture) in nature. During the dry summer months this vegetation is capable of producing intense, if brief, fires and can prove a genuine hazard to homes. Juveniles misusing fire or fireworks often cause ignitions. These areas may be desirable for wildlife habitat and privacy screening, but it should be possible to maintain these characteristics while trimming back limbs and thinning out dead materials. Examples of these areas may be found south of Shore Pine Dr., on the south side of Brannon Gearhart Park, and north of Kokanee.
The potential volatility of Gambel oak should be recognized and guarded against. There are many areas with inadequate defensible space near oakbrush, typically on steep slopes. A home built on a steep slope above this fuel type will find 30 feet of defensible space inadequate against flame lengths of 20 to 45 feet. Therefore, defensible space should approach 100 feet or greater. Areas of concern include the northern and eastern sides of the Crestbrook Dr. Loop, the Falcon Ridge area, and some homes on Wild Plum Cir.

Standard recommendations are provided below, but these guidelines must be adapted to each structure depending on such things as slope, fuel type, and construction material (Appendix D).

**Zone 1** (30 feet from structure): Within 3 to 5 feet of the structure, decorative rock or mowed, irrigated grass is recommended. Well-spaced and pruned low flammable plants are acceptable if the structure has noncombustible siding. In the remainder of Zone 1, trees’ lower branches should be pruned 10 feet above the ground (not to exceed one third of the tree height). Dead wood, tall grass, and ladder fuels (low limbs, small trees, and shrubs that may carry fire into tree crowns) should be removed from this area. Leaves and overhanging branches should be removed from the roof and gutters. The 30-ft area should be irrigated as appropriate. Woodpiles should be removed and stored in Zone 2.

**Zone 2** (greater than 30 feet from structure or to the property line): The size of this zone is dependent upon slope. Treatment of ground fuels and ladder fuels is generally the same as 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 as they dry in late summer.

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

**Building Improvements:** The most significant improvement that can be made to many of the homes in the assessment areas, is replacing wood shake roofs with noncombustible roofing material. All homeowners, and especially those with wood roofs, should keep roofs and gutters clear of leaves and pine needles. Embers can travel surprising distances (over one mile) and ignite receptive pockets of fuel far from the main fire. Screening of gutters and roof vents should be considered.

Enclosing the underside of wood porches can help protect the structure. Even homes that appear to have noncombustible siding often have exposed wooden joists on the underside of decks. Other openings such as attic vents should be screened to prevent embers from entering. Each structure needs to be evaluated on its own merits to determine specific actions needed to reduce its susceptibility to wildfire.
Jefferson County has building regulations that require Class A roofing materials and construction of defensible space. These regulations are for homes within the “Red Zone.” These regulations are for new construction and for remodels of more than 400 square feet. The Red Zone is defined for homes above 6500 feet elevation. However, no homes within the assessment area are above 6500 feet. WMFPD should petition the county to include the assessment area in the Red Zone because of hazardous fuels and high-risk to wildfire.

**Hazardous Fuel Management:** Wildfires frequently burn across jurisdictional boundaries. Communities, homeowners, and other private lands in the assessment area are at risk. The objectives of these vegetative treatments are to manage the buildup of hazardous fuels to alter fire behavior (i.e., rate of spread and burning intensity) and allow firefighters a chance of suppression. Hazardous fuels, such as those classified as FRCC 3 (Map 7), need to be managed to restore forest or grassland health and manage vegetation to FRCC 1. This may occur by breaking up fuel continuity and reducing fuel load. Weedy vegetation also contributes to fuel hazards. Weed abatement programs will reduce fuel hazard around and within communities. The seeding of native grasses and forbs on highly disturbed sites could be beneficial. Private landowners, WMFPD, and CSFS may choose to enter into agreements to reduce the accumulation of hazardous fuels in the assessment area. Long-term and project-specific planning is required to ecologically, economically, and effectively manage hazardous fuels within the assessment area (Map 8).

Each community in the assessment area needs to evaluate its own situation and in conference with WMFPD develop a fuels management plan. Ideally, each community would develop its own CWPP that would tier to this one.

Project specific and long-term fuels reduction projects are recommended (Map 8). High priority, short-term projects are the development of strategic fuel breaks around communities. Fuel breaks are created through reducing vegetation and dead materials with the intent of reducing fire intensity and rate of spread. By interrupting the wildland fuel continuity, fuel breaks provide corridors for firefighters to enact containment efforts. Mowing would be an effective method to reduce herbaceous fuel. Hand crews or hydro-axes could manage woody vegetation. The width of fuel breaks may vary depending on terrain, fuel type, and proximity to values being protected. Consultation with WMFPD may be needed to determine adequate width.

Grass and weed growth within communities needs to be mowed in late summer to reduce fire risk from firebrands or human neglect. Grassland weed control needs to occur annually. Woody plant control should occur as needed. An integrated weed management program would help reduce the contributions that weeds make to hazardous fuels.

Lower priority would be fuel management on those areas classified as FRCC 3 that occur within the 1-mile buffer area of communities (Map 8). The objective would be to breakup woody fuel continuity and reduce fuel load. Mechanical treatment would occur
where slope is not limiting; otherwise, hand crews would be effective. Those areas closest to communities should be treated first.

There are a variety of tools available for hazardous fuel treatments including prescribed fire, mechanical (mastication), hand crews, herbicides, livestock grazing, or a combination of the above. Specific planning is needed for each treatment area to determine the best ecological and economical approach. Treatments will depend on fuel location, terrain, spatial extent, proximity to values at risk, and fuel attributes. Hazardous fuels management will potentially result in large amounts of woody plant materials that will need to be disposed. Appropriate disposal practices will depend on the amount of woody material generated and they may include spreading the debris over a large area, burning, chipping and spreading, or burying in a landfill facility. Economical use of the woody debris such as small-diameter wood products or biomass energy production should be explored. Livestock grazing could be used to reduce herbaceous plant materials to the greatest extent possible.

All treatments would be implemented following appropriate HOA, open space, or County policy. Post-treatment management such as the seeding of native grasses and spreading mulch may be necessary to ensure that a productive plant community will establish and not weeds. Monitoring will determine the need for additional management.

Hazardous fuels management can be resource intensive. Coordination with the WMFPD, CSFS, and USFS, and project planning will allow resources to be used in the most efficient manner possible. Possession of this CWPP will enable the WMFPD, homeowner associations, or the County to apply for grant money for fuels reduction projects (see Section 8).

**Water Storage Facilities:** Virtually all of the residential areas are serviced by fire hydrants (Figure 3). While these systems seem to be reliable, a water main break or the demands of a large-scale suppression operation could result in long travel times to a secondary supply source. WMFPD currently relies on mutual aid from neighboring volunteer fire departments to provide water tenders, and should examine purchasing a tender.

Static water sources west of the hogback include the Ken-Caryl, Willow Springs, and King Fisher reservoirs and are potential draft sites for engines. These are but a few of the potential dip sites for helicopters conducting bucket work. Arrangements for access to these water sources via ground and air should be explored before the need arises.

**Access:** Most of the areas assessed would benefit from clearer address markers and street signs. This is beneficial for emergency response in general. Street signs with 4-inch reflective lettering are desirable.

Improved access routes for several communities are recommended. In the event of a large incident, multiple pieces of heavy fire apparatus will be responding at the same time.
that residents are attempting to evacuate. Single lane dirt tracks are inadequate means of secondary access in this event. Additionally, locked gates may impede egress of citizens and ingress of firefighters.

Paving and widening of the secondary access points and ensuring that citizens and emergency responders can quickly open gates should be examined for such places as:

- The south end of Tamarade Dr. (Ken-Caryl Ranch)
- Between Golden Eagle Ln. and Willow Springs Dr. (between North Ranch and Willow Springs)

The issue of access through locked gates should also be addressed to ensure access along the dirt portion of North Ranch Road to Bellevue Ave. It would seem a fairly simple matter to create an access point between this portion of North Ranch Road and Crestbrook Drive. Optimally, there should be unhindered emergency access between North Ranch, Willow Springs, and Willow Brook.

5.3 Hazardous Fuels Projects and Priorities

The following are proposed hazardous fuel mitigation projects for the WMFPD. The projects are associated with communities and prioritized based on efficacy in reducing fire behavior near structures, FRCC, and ease of implementation (Map 8 and Table 11).

<table>
<thead>
<tr>
<th>Priority</th>
<th>Project</th>
<th>Actions</th>
<th>Concerns</th>
<th>Community Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Defensible space</td>
<td>• Public education and outreach</td>
<td>• Difficulty of engaging homeowners</td>
<td>1. Willow Brook</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Reduce fuels near structures per WMFPD and CSFS guidelines</td>
<td>• Lack of uniformity in compliance</td>
<td>2. Willow Springs South</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Cost</td>
<td>3. Ken-Caryl North Ranch</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Disposal of woody debris</td>
<td>4. Ken-Caryl Ranch</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5. Morrison / Red Rocks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6. Willow Springs North</td>
</tr>
<tr>
<td>2</td>
<td>Community fuel breaks</td>
<td>• Mow or allow mowing 20 feet into grasslands</td>
<td>• Disturbance to natural areas</td>
<td>1. Ken-Caryl Ranch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Mow along roads and trails</td>
<td>• Cost</td>
<td>2. North Ranch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Treat hazard fuels in parks and drainage corridors that are close to</td>
<td></td>
<td>3. Willow Brook</td>
</tr>
<tr>
<td></td>
<td></td>
<td>structures</td>
<td></td>
<td>4. Willow Springs South</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Strategically plan fuel breaks to optimize resources</td>
<td></td>
<td>5. Red Rocks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Evaluate the need for seeding with native grasses</td>
<td></td>
<td>6. Morrison / Willow Springs North</td>
</tr>
</tbody>
</table>

Table 11. Fuel Mitigation Priorities for Communities
<table>
<thead>
<tr>
<th>Priority</th>
<th>Project</th>
<th>Actions</th>
<th>Concerns</th>
<th>Community Priority</th>
</tr>
</thead>
</table>
| 3       | Prescribed fire in grasslands | • Continue and expand prescribed fire in Ken-Caryl and Jefferson County Open Spaces  
• Explore using prescribed fire in Willow Springs Open Spaces and Red Rocks Park  
• Evaluate the need for seeding with native grasses | • Air quality issues  
• Potential for escape  
• Safety | 1. Ken-Caryl Ranch / Ken-Caryl North Ranch  
2. Willow Springs South  
3. Red Rocks |
| 4       | Prescribed fire in grasslands | • Continue and expand prescribed fire in Ken-Caryl and Jefferson County Open Spaces  
• Explore using prescribed fire in Willow Springs Open Spaces and Red Rocks Park  
• Evaluate the need for seeding with native grasses | • Air quality issues  
• Potential for escape  
• Safety | 1. Ken-Caryl Ranch / Ken-Caryl North Ranch  
2. Willow Springs South  
3. Red Rocks |
| 5       | Implement thinning projects west of Ken-Caryl and Willow Springs | • Thin per existing prescriptions using manual or mechanical methods  
• Evaluate the need for seeding with native grasses | • Cost  
• Disposal of woody debris  
• Air quality issues if pile burning  
• Temporary wildlife habit impacts | 1. Ken-Caryl Ranch / Ken-Caryl North Ranch  
2. Willow Springs South and North |

Fuels management to create defensible space, as discussed in Section 5.2, is the top priority treatment for enhancing the resistance of structures to wildfire. The reason for this is that firebrands carried on the wind from distant wildfire may ignite spot fires in and around communities. Large-scale fuels management is also needed, not only to reduce the potential for catastrophic wildfire, but also to maintain and improve ecosystem health and wildlife habitat. This is especially true in areas like the montane zone of the Colorado Front Range, where fire exclusion and other human activities have had a documented impact.

Cost estimates for treatments should be considered as very general guidelines. Costs can vary tremendously based on fuel prices, terrain, accessibility, size of project, and individual prescription requirements. 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.

**Grasslands**
The grasslands in the assessment area require fire to remain healthy and vigorous, and fire exclusion has put much of the area’s grasslands into FRCC 3. The need to reintroduce fire has been recognized by the Ken-Caryl and Jefferson County land managers as well as WMFPD. The “Ken-Caryl Ranch Open Space Comprehensive
Management Plan” calls for grass mowing and other appropriate action to reduce the risk of wildfire.

Grass fuels, the predominant fuels adjacent to homes, are relatively easy and inexpensive to treat. They are categorized as FRCC 3; as such, treatment in the grass fuels is a top priority. The recommended treatment methods in native grasses are prescribed fire and mowing. Mowing is recommended for creating fuel breaks close to structures, trails, and roads. Prescribed fire is more appropriate for larger treatments away from homes, where reintroducing this natural process is desired.

In areas that have appropriate staff and equipment, the cost of mowing can be kept to labor and equipment operation costs. Where a contractor is required, costs are estimated at $90 to $200 per acre. Access, steepness of slope, and the presence of large rocks are variables that must be considered. A tractor mower can typically operate across slopes up to 30 percent depending on the equipment and operator. In less accessible areas, ATVs can be equipped with mower decks. In either case, the presence of rocks can damage machinery and even be a fire hazard if sparks are created by contact with the mower blade. In some cases it may be advisable to assess the treatment area (marking large rocks, removing wire, and mitigating other hazards), mow at a high level (6-8 inches), and then reassess the treatment area before a lower pass (4-6 inches) with the mower.

Prescribed fire can be a cost effective tool for reducing hazardous fuel accumulations and returning areas to the state of FRCC 1. Prescribed fire can maintain healthy and vigorous native grasslands, reducing encroaching shrubs, and abate weeds. While vegetation will often increase after fire, it is typically less volatile than brush and invasive grasses. Major concerns in using prescribed fire are smoke management, avoiding an escape, and possibly not facilitating the invasion of non-native species. Weather conditions, air quality, and staffing issues can all make prescribed fires difficult to execute. Reseeding with native grasses may be desirable in some areas.

Prescribed fire currently occurs on Ken-Caryl and Jefferson County open spaces, but not in Red Rocks Park. Increasing interagency cooperation and the size of prescribed fire projects will help reduce the cost per acre. For example planning costs, prescription conditions, scheduling issues, and staffing costs vary little between a 40-acre and 200 acre prescribed fire in grass. Ken-Caryl Open Spaces and the City of Fort Collins Natural Areas burn in similar fuels using similar resources and generally keep overt costs to less than $2,000 per project. Like many local agencies, WMFPD helps defray the cost of equipment and personnel by utilizing prescribed fires as training opportunities. Establishing an interagency prescribed fire consortium may facilitate strategic planning and prioritization of projects. All prescribed fires must be in compliance with CAPCD and WMFPD regulations.

Recommendations:
Mowing
- Allow homeowners to mow up to 30 feet from their yards into the open spaces depending on surface slope and proximity to structures. Reconnaissance will allow strategic placement of fuel breaks. The need for post-mowing cleanup will depend on aesthetics, accumulated biomass, and proximity to structures or other values.
- Prioritize and execute mowing projects to create community fuel breaks along trails and roads.
- Cost: Labor and equipment overhead or $90 to $200 per acre for contractor.
- Consider seeding with native grasses in appropriate areas.

Prescribed Fire
- Continue, and expand as appropriate, the current prescribed fire program in support of management objectives.
- Plan prescribed fire according to WMFPD and CAPCD regulations.
- Develop a strategic, rather than a project-by-project, approach to prescribed fire.
- Consider forming a local inter-agency prescribed fire consortium to facilitate strategic planning and the sharing of resources.
- Cost: $1,500 to $2,000 per prescribed fire.
- Consider seeding with native grasses in appropriate areas.

Shrublands
Treatment of shrub fuels, primarily Gamble oak, is essential when it grows in close proximity to structures. Shrublands can produce high intensity fire behavior in open space areas. Shrublands within the assessment area can be found in all three of the FRCC classes, but thinning and prescribed fire treatments will be generally beneficial regardless of the condition class. The treatment of shrub fuels is addressed in three categories:

1) Through the creation of defensible space (see section 5.2)
2) Through the maintenance of native grasslands using prescribed fire (see Grasslands section above)
3) Through the creation of fuel breaks

Attempts to eradicate or control Gambel oak are typically temporary or only partially successful. Gambel oak will vigorously re-sprout from extensive root systems after mechanical treatments or fire, and may create thickets that are denser and less desirable than the original stand. Conversely, treatments can replace older decadent pockets of brush with less volatile young growth, which is also more palatable for wildlife.

Mechanical and fire treatments are most effective during periods of low carbohydrate reserve and when combined with a follow-up herbicide treatment (e.g., Garlan 4, Arsenal, Round-up). The use of goats as a follow-up to an initial mechanical treatment has met with success in some areas.
Where oakbrush compromises defensible space but is esthetically desirable, it may be thinned and limbed to the earlier stated defensible space guidelines. Dead leaves and twigs need to be raked regularly. There are many areas where the steepness of slope and dense stands will require complete removal of brush for some distance from the structure. When considering fuel breaks in shrub fuels, good examples of treatment prescriptions may be found in the Forest Stewardship Plans for Willow Springs and Ken-Caryl Ranch. In brief, oak is to be removed 10 to 30 feet from the trail or road and further thinned in mosaic patterns. This could be achieved by masticators or chainsaws as appropriate. These same mechanical treatments could be applied to create or maintain defensible space.

Some management goals may be supported by the use of prescribed fire in shrub fuels. Both Gambel oak and mountain mahogany can benefit from prescribed fire. Mountain mahogany stands can also be converted to grass with severe fire application. Gambel oak can be reduced by repeated application of fire during the growing season. Burning brush in the wildland-urban interface can often create undesired fire behavior intensities. However, the brush stands along the hogbacks may present some interesting prescribed fire opportunities. The brush stands are surrounded by lighter grass fuels and tend to be higher on the hogbacks. By firing in close succession from multiple flanks (or ring-firing) containment concerns may be mitigated while fire behavior intensity capable of carrying the smoke high into the atmosphere is generated.

Cost for mechanical treatment of brush fuels will vary depending on access, terrain, thickness of fuels, and size of the project. For slopes less than 30 percent and material less than 10 inches in diameter, a Hydro-axe can be utilized at costs generally ranging from $300 to $500 per acre.

Recommendations:

- Treat brush fuels in proximity to structures per defensible space guidelines and as part of community fuel break projects.
- Treat brush fuels as required to establish fuel breaks outlined in the Ken-Caryl and Willow Springs Forest Stewardship Plans.
- Examine the potential benefits of similar fuel breaks along the roads in Red Rocks Park and along the Castle and Turkey Trot trails in Mount Falcon Park west of the Morrison area.
- Burn pockets of brush when required for land management objectives in grassland prescribed fires.
- Cost: For Hydro-axe treatment, $300 to $500 per acre.
- Woody vegetation removed could be transported to biomass and slash collection sites if feasible. Otherwise, the woody debris should be piled and burned or transported to a designated landfill.
- Evaluate the need to re-seed with native herbaceous species.
Forest
The forests in the assessment area are generally in good health and show moderate departure from historic reference conditions or FRCC 2. The Douglas-fir and ponderosa pine stands will benefit from active forest management. The comprehensive forest stewardship plans for Ken-Caryl Ranch and Willow Springs address the majority of forested lands within the study area. Recommendations focus on thinning from below, eliminating poorly formed and diseased trees, and creating fuel breaks. From a fire behavior standpoint, these treatments should reduce the probability of crown fire initiation and propagation. Fuel breaks will create anchor points or potential control lines for fire suppression, and break-up fuel continuity. These treatments will not only help protect communities within West Metro’s district, but will also afford mitigation for those communities to the west. There are corresponding mitigation projects planned for the lands to the west.

The shaded fuel break prescriptions in the forest stewardship plans follow the Colorado State Forest Service fuel break guidelines. They provide for areas 300 to 500 feet wide where the understory, low limbs, and dead materials are reduced. Weak, diseased, and poorly formed trees should be removed from the overstory to produce 10 to 20 feet of clearance among crowns.

The areas of general thinning follow a thin-from-below prescription, focusing on the removal of smaller trees and opening up the forest canopy enough to increase the vigor of remaining trees without over stimulating new growth.

Manual thinning and pile burning or chipping may cost $300 to $1200 per acre. Mechanical thinning costs also run from $300 to $1,200, with substantial increases in costs when slope exceeds 30 percent or materials to be treated exceed 10 inches in diameter.

Recommendations:

- Implement planned fuel breaks in the Ken-Caryl and Willow Springs open spaces.
- Implement planned forest thinning projects in the Ken-Caryl and Willow Springs open spaces.
- Cost: $300 to $1,200 per acre.
- Woody vegetation removed should be transported to biomass and slash collection sites if feasible. Otherwise, the woody debris should be piled and burned or transported to a designated landfill.
- Evaluate the need to re-seed with native plants.

5.4 Non-Fuels Mitigation Needs
The proposed non-fuels mitigation needs are a mixture of specific and on-going projects. Ideally, these non-fuel mitigation needs would occur concurrently with the fuels
treatment projects. The following are the proposed non-fuels mitigation needs presented in order of priority.

**Street Signs**

Most communities could benefit from clearer street sign and house numbers. According to NFPA 1144 guidelines, street signs should be a minimum of 4 inches in height and be one-half inch in stroke, reflective, and letter color contrasting with the background color. House numbers should be reflective, clearly displayed and of sufficient size to be easily read from the street.

**Access Roads**

Each community should review access roads for emergency equipment and evacuation. NFPA 1144 recommends that access/evacuation roads be designed and constructed for simultaneous ingress and egress, and be at least 20-feet wide with 14 feet of vertical clearance. Private landowners should evaluate their emergency routes to public roads for needed action to meet NFPA 1144 guidelines.

**Fire Protection Authority Communication and Coordination**

Continue the cooperation and communication among West Metro Fire Stations, USFS, and private landowners concerning wildfire issues. Collective action is needed to reduce the threat of wildfire through implementation of this plan. Yearly meetings and/or newspaper releases are needed to inform the public of projects implemented in the last year and of proposed action for the near future. The National Fire Plan and HFRA support this type of teamwork and coalition building among federal, state, counties, and private landowners.

**Community Firewise Outreach**

The purposes of the community Firewise program are to:

- Provide information on ways to reduce human-caused fires.
- Urge landowners to take action to construct and maintain defensible space around their homes and structures.
- Encourage the use of non-flammable roofs and siding on new construction and the retrofit of existing houses.
- Increase the awareness of the natural role of fire in ecosystems and the need for hazardous fuel management.

An annual “Firewise Clean-Up Week” held in the spring and/or in October in association with National Fire Prevention Week is recommended to encourage residents to create defensible space around their residence. In conjunction with the Firewise Clean-Up Week, specific demonstration projects may be designed and utilized to educate residents about longer-term investments they could make to increase fire safety. The clean-up week would occur in conjunction with public demonstrations, education programs, and speakers on wildfire and Firewise practices. The “Ken-Caryl Ranch Open Space
Comprehensive Management Plan,” which addresses wildfire prevention, is an example that other communities could follow in developing wildfire protection guidelines.

5.5 Protection of Home and Structures

The first important principle concerning structure ignitability and protection is that structures are a source of fuel and may burn just as readily as juniper or oakbrush given the conditions for combustion. Structure loss to wildfire can occur by conduction, convection, or firebrand. Conduction is the fire flame coming in contact with the structure. Convection occurs where the structure becomes hot enough to combust without direct flame contact. Firebrands are embers or burning pieces of limbs, leaves, or twigs that are blown onto a structure. Firebrands may lodge in crevices of roofs, eaves, or side paneling and smolder for several hours before causing combustion. Firebrands ride on air currents resulting from the fire and may be carried over several hundred feet to a mile from the fire front. Recent studies have shown that structure ignitability is the principle cause of structure loss during a wildland fire and not the character of the wildland fuel or fire intensity per se.

Fire spread occurs by a propagating process, not as a moving mass such as water in a flood. For fire to spread, material such as a tree, shrub, 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 in a wildland fire situation is almost never limiting. Heat is supplied by the flame front. Potential fuel in the path of the flame that meets the conditions of combustion will ignite. If fuel does not meet the conditions of combustion, it will not ignite. This explains why some trees, patches of vegetation, or structures may survive a wildland fire and others in the near vicinity are completely burned.

Radiant heat, embers, and/or direct flame impingement ignite homes. Experiments suggest that even the intense radiant heat of a crown fire is unlikely to ignite a structure that is over 30 feet away as long as there is no direct flame impingement. 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. Direct flame impingement and embers may play a large role in these statistics. Citizens in the wildland-urban interface should realize that their efforts not only make the home less ignitable but also more defensible and safer for firefighters.

Structure ignitability and not the nature of wildland fuels, is the main cause of structure loss during wildfires. Critical factors that increase the chances of structure loss are flammable roofing materials (e.g., cedar shingles), and flammable fuels (e.g., ornamental trees, shrubs, and debris/wood piles) near the structure. A wildland fire does not burn a structure unless it meets fuel and heat requirements sufficient for ignition and continued combustion. With this understanding of fire behavior, the flammability of the structure and its immediate surroundings can be managed to reduce the chances of ignition and loss during a fire incident. The primary and ultimate responsibility for structure
protection during wildland fire lies with the owner. The following are two actions that homeowners can take to reduce the chances of wildfire burning their structures:

- Develop a defensible space around the structure that is at least 30 feet wide, use low-combustible plant material for landscaping, and remove woodpiles (Appendix D). If the structure occurs on a slope, the defensible space must be greater on the downslope side of the house corresponding to the steepness of the slope.

- Use non-combustible construction material to the highest extent possible. At minimum, use non-combustible roofing material.

Participation and action by the private resident of the wildland-urban interface is the cornerstone of the CWPP process. Recommendations will reflect this plan’s emphasis on the protection of residential communities. The homeowner is the most powerful actor in preventing the loss of his or her home, if action is taken before the fire.

5.6 Need for Action

Wildfire occurrence in the WMFPD is common. Ignition usually results from natural causes, although human-caused fire potential is high. The hazard of wildland fire is high because of extensive grasslands, ladder fuels and overstock ponderosa pine stands, juniper invasion into oak brush and grasslands, overstock oak brush stands, and the pervasiveness of weeds. Fire risk is extreme during the late-summer and fall months when grasses and weeds are dry. These flashy fuels are easily ignited and burn rapidly, especially on windy days.

Both general and specific actions are needed to mitigate wildfire risk, improve forest and open space health, and enhance vegetative diversity. General actions include the adherence to Firewise practices on a continual basis. Oak brush, weeds, and grasses growing around many structures and along roads need to be maintained at an acceptable level. The recommended Firewise distance to achieve a survivable space is a 30-foot perimeter around a home or structure, which should also be properly landscaped with fire-resistant vegetation. Greater distances are needed if the structure is located on a slope. Prescribed methods to maintain the vegetation are the use of hand tools, mechanical removal, or herbicidal treatments (limited use). All woody vegetation removed should be transported to biomass and slash collection sites, if feasible. Otherwise, the woody debris should be piled and burned, or transported to a designated landfill. These Firewise practices are general, but long-term in nature because they require continual adherence to reduce the hazard of wildfire.
6  EMERGENCY OPERATIONS

6.1  Wildfire Response Capability and Recommendations

Response
WMFPD maintains a fleet of five Type-6 brush engines and has eleven Type-1 engines (plus six Type-1 reserve engines). The majority of the Type-1 engines are equipped for minimal wildland fire operations. Five stations on the western and southern edge of the district are considered interface stations; each of which is equipped with a Type-6 engine and an interface equipped Type-1 engine. The majority of the Type-1 engines have foam capability. Engine No. 9 is equipped with a Compressed Air Foam System (CAFS).

WMFPD Station 9 is the wildland fire station (Map 3). The captain assigned to this station is the wildland fire coordinator. All spare equipment is housed here.

Type-6 engines are not staffed. When the unit is dispatched, the engine crew will detach a driver and respond with the engine (called a brush company). During heavy use or large incidents, the Type-6 engine may be staffed on an overtime basis.

The standard response is a single engine during low fire danger, and is increased during red flag conditions to include a brush company and an additional Type-1 engine (at the district chief’s discretion). Additional wildland fire alarms include an additional Type-1 engine, a Type-6 engine, and a medic unit. When structures are involved, a full structure response will be sent. This includes:

- Two Type-1 engines
- One medic unit
- One district chief
- One tower
- One heavy rescue
- One Rapid Intervention Team (RIT)
- Safety and Medical Officer

The District does maintain a wildland team. This team consists of 48 members with a variety of certifications and is used to staff the district’s deployment engines. The department does have a Type-1 engine and a Type-6 engine available for national deployment.

Mutual Aid
The district participates in the Jefferson County Resource Groups. These groups are pre-organized task forces used for structure protection or a squad for a hand crew. All Incident Commanders (IC) and District Chiefs are authorized to request Mutual Aid from any agency. WMFPD may respond to mutual aid requests from other agencies if no or
limited incidents are occurring within the district. WMFPD also participates in the C-470 Wildland Task Force along with South Metro, Parker, and Littleton. When needed, these departments jointly stage resources at WMFPD Station 9 and deploy as a unified force.

**Wildfire Suppression Capability**

Currently, all wildfires within the West Metro FPD are aggressively suppressed regardless of cause. The closest station is usually the responding force. A Mutual Aid Agreement exists among all Jefferson County fire departments to provide appropriate response as needed. The responding fire station determines the needed for mutual aid upon initial attack and may request additional aid from other WMFPD stations or from other Jefferson County FPDs. The County is a close partner with CSFS relative to wildfire suppression and management and would request their aid if conditions are warranted. The USFS would also partner if wildfire threatened federal land.

WMFPD responds to three types of wildfire emergencies: fires within the urban/interface, fires mixed within the urban areas, and fires on public or private lands out of reach of structures. Fires such as structure, vehicle, or grass/weed/trash within the urban area are outside the scope of this CWPP. These areas are generally surrounded by roads or homes and can be suppressed using the district’s non-wildland fire resources. The FPD’s resources are adequate for the vast majority of these incidents and will not be discussed within this plan.

Access by emergency vehicles is generally good within the majority of the assessment area with the exception of the western boundary. The fuels in the assessment area include oak brush in Waterton Canyon and a mixture of grasses and oak/mountain mahogany brush elsewhere. WMFPD is in need of hand crews to suppress fires within these areas.

Table 12 shows “Line Production Rates for Initial Action by Engine Crews” and the “Acreage Determination Factors” charts in the National Wildfire Coordinating Group (NWCG) Fireline Handbook. Other mitigating factors that could affect these estimates are if the crews need to construct sustained lines, burnout or holding operations. These are the rates for estimating initial action productivity only. But this does provide a good estimate of the wildland fire capability of the district.

**Table 12. Wildland Fire Production Rates**

<table>
<thead>
<tr>
<th>Anderson Fire Behavior Fuel Model</th>
<th>Chains</th>
<th>Acreage</th>
<th>Firefighter Capability (acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grass</td>
<td>24</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Short grass with scattered shrubs or open timber</td>
<td>15</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Tall grass over 3 ft tall</td>
<td>10</td>
<td>0.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Shrubs under 6 ft. tall – Brush</td>
<td>12</td>
<td>0.75</td>
<td>4.25</td>
</tr>
<tr>
<td>Wildland Fire Production Rates Per Hour Using Type-6 Engine (4 firefighters)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Grass</td>
<td>35</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>Short grass with scattered shrubs or open timber</td>
<td>21</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Tall grass over 3 ft tall</td>
<td>14</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Shrub under 6 ft. tall – Oak Brush/Mtn. Mahogany</td>
<td>15</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Shrub over 6 ft. tall – Brush</td>
<td>16</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Closed timber litter</td>
<td>20</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Closed timber with heavy dead and down woody debris</td>
<td>16</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Brush</td>
<td>16</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Oak Brush/Mtn. Mahogany</td>
<td>6</td>
<td>0.5</td>
<td>2.5</td>
</tr>
</tbody>
</table>

1 Based on five Type-6 engines; capacity of companies 4, 9, and 13 of 3 firefighters; capacity of companies 11 and 15 of 4 firefighters.

The structure protection table (Table 13) 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. The district’s ability to prepare a structure is based on only using the interface stations. Other engines can be called upon, but do not have the training or the equipment.

### Table 13. Structural Protection Rates

<table>
<thead>
<tr>
<th>Structural Protection Rates Per Hour Using Type-1 Engines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stations</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>4, 9, &amp; 13</td>
</tr>
<tr>
<td>11 &amp; 15</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

All firefighters have received NWCG S-130/190 training (only wildland fire team members have the yearly safety class) and have maintained the arduous conditioning required for re-certification. Seventeen team members have advanced wildland fire training as NWCG-qualified Squad Boss or higher certification.

WMFPD has many areas where engines will not be able to respond because of such things as terrain and road limitations. These areas are along the Dakota Hogback, Waterton Canyon, and areas along the foothills on the western edge of the assessment area. In these areas, WMDFPD will need to dismount crews from the engines or call in off duty wildland team members to establish handcrews.
Recommendations:

Wildland Fire Attack
Correlating Table 6 BehavePlus Predictions of Fire Behavior and Table 8 Wildland Fire Production Rates the district will not be able to suppress the majority of the incidents with the present capability if the fires move past initial attack. Initial attack becomes critical to stopping the fires prior to developing into fires the district will not be able to manage. Factors that influence initial attack capability are: 1) adequate staffing, 2) equipment, and 3) training.

- **Adequate Staffing** - The district responds with five Type-6 engines that are staffed with crews from the Type-1 engine assigned to the interface station. This response is adequate for the majority of incidents.

  During high fire danger or during multiple incidents this staffing may not be adequate. The crews assigned to the interface stations may not be members of the wildland team and these crews are not adequately trained to NWCG standards. Assembling trained crews from on-duty forces or bringing in off-duty personnel is a slow process that may close the initial attack window. The district should develop a staffing procedure for high fire danger to include a process for determining fire danger (National Fire Danger Rating System [NFDRS]).

- **Equipment: Water Tender** - WMFPD currently relies on a mutual aid agreement with neighboring FPDs to provide water tenders when needed. WMFPD should evaluate the need and consider obtaining at least one tender such as a 2,000 gallon Type-3 tactical water tender. The tender could be garaged at WMFPD Station 11.

- **Training** – Training should be based on response standards. These standards provide a focal point to move the program forward. The following response standards should be considered:

  **Initial Attack**
  The following events should occur when WMFPD receives a smoke report for non-WUI fires:

  - WMFPD will complete a size-up and have the wildfire scouted by basic wildland qualified personnel 30 minutes from the initial smoke report.

  - WMFPD will have a full red card certified, 20-person hand crew, with a crew boss, two squad bosses at staging within 30 minutes of the smoke report. A “red card” is a certification program sponsored by NWCG.

  - WMFPD will have a hand crew on the fire line within one hour of the original smoke report. WMFPD has the capability to form its own red-carded hand crew but under low turnout periods the crew can be filled-out using the other outside hand crew teams.
- WMFPD will be able to supply 30 gallons per minute from at least two 1 ½” lines within 90 percent of the district boundaries, and within 2,500 feet of access of apparatus within the wild areas on the western portion of the District.
- WMFPD will have qualified personnel predict fire behavior using weather information, fuel loading, and fire danger ratings and communicate the prediction to operations/planning within 30 minutes of the smoke report.
- WMFPD will be able to activate air support within 30 minutes of the smoke report.
- WMFPD shall have the capability for sustained operations when the fire moves into extended attack operations. The District will be able to maintain Incident Management until relieved by the Jefferson County IMT Type III. The District will be able to maintain a single 20-person hand crew for the duration of the incident.

The following events should occur when a smoke report is received for WUI incidents:

- WMFPD will complete a size-up and have the wildfire scouted by basic wildland qualified personnel ten minutes from the initial smoke report.
- WMFPD will have a full-red card certified, wildland task force, with a task force leader, at staging within 20 minutes of the smoke report. This task force shall include two Type-engines, two wildland water tenders, two Type-6 engines and 20 personnel.
- WMFPD will be able to prepare a single structure for structural protection every 20 minutes.
- WMFPD will be able to protect four structures with each task force and suppress two spot fires within 20 minutes. This includes having two 1 ½” lines surrounding the structure, placement of a wet line, firing out for a distance to safely protect the structure without direct intervention by the engine crews, and preparing the structure for the fire front.
- WMFPD will use direct fire attack whenever possible to stop the fire prior to the need to perform indirect structural protection.
- WMFPD will have qualified personnel predict fire behavior using weather information, fuel loading, and fire danger ratings and communicate the prediction to operations/planning within 20 minutes of the smoke report.
- WMFPD will be able to activate air support within 10 minutes of the smoke report.

**Extended Attack**

WMFPD has the capability for sustained operations when the fire moves into extended attack operations. WMFPD will be able to maintain an Incident Management Team Type (IMT) IV organization until relieved by the Jefferson County IMT Type III. WMFPD
will be able to maintain a single 20-person wildland task force for the duration of the incident.

6.2 Emergency Procedures and Evacuation Routes

In the event that the County 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.

Before residents leave, they should take every precaution to reduce the chance of structure loss as time allows. Human safety is the number one concern in an evacuation. Action could include thoroughly irrigating the defensible space, watering down the roof, and removing all debris from rain gutters. Remove all flammable materials 30 feet or more from the house such as woodpiles, leaves, debris, and patio furniture. Windows and doors should be closed but not locked. Other openings should be covered. A ladder should be placed for roof access by firefighters. A fully charged hose that reaches around the house should also be available for firefighter use.

Families should have meeting locations in place and phone numbers to call in case family members are separated. Families should take with them important papers, documents, pets, food, water, and other essential items. The exterior of the house should be monitored for smoke for several hours after return. Embers may lodge in small cracks and crevices and smolder for several hours or days before flaming.

Major evacuation routes for each community are listed in Table 14. The emergency roads listed are Federal, State, or County roads and do not require specific fuels reduction along them as long as regular roadside vegetation management occurs. However, homeowners need to evaluate evacuation routes from their property to a major road and determine the need for fuels treatment or road improvement.

Table 14. Emergency Evacuation Routes

<table>
<thead>
<tr>
<th>Community</th>
<th>Evacuation Route</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morrison</td>
<td>Morrison Road/Bear Creek Avenue</td>
</tr>
<tr>
<td>Ken-Caryl North Ranch</td>
<td>Ken-Caryl Avenue</td>
</tr>
<tr>
<td>Ken-Caryl Ranch</td>
<td>Ken-Caryl Avenue</td>
</tr>
<tr>
<td>Willow Brook</td>
<td>Colorow Drive, Bellevue Avenue</td>
</tr>
<tr>
<td>Willow Springs South</td>
<td>Willow Springs Drive, Golf Course Drive, Bellevue Avenue</td>
</tr>
<tr>
<td>Willow Springs North</td>
<td>Fox Hills Drive, Bellevue Avenue</td>
</tr>
<tr>
<td>Red Rock</td>
<td>State Highway 8</td>
</tr>
</tbody>
</table>
7 WEST METRO FIRE PROTECTION DISTRICT CWPP MONITORING AND EVALUATION

7.1 CWPP Plan Adoption

A meeting was convened on August 16, 2006 at the Red Rocks Country Club to present the WMFPD CWPP to the Core Team, fire authorities, stakeholders, and public. The draft CWPP will be posted on Jefferson County’s website to allow public review and response. A 10-day public response period occurred before the CWPP was finalized and presented to the Core Team.

The WMFPD 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 authorities for Community Wildfire Protection Plans require adoption of this plan, as does the FEMA Disaster - Mitigation Act of 2000. With formal adoption of this plan by the Core Team, Jefferson County, and CSFS, the WMFPD will be competitive for hazardous fuels and non-fuels mitigation funding that may assist with plan implementation. Furthermore, adoption of this plan highlights the partnerships among fire stations, local government, community-based organizations, and public agencies.

7.2 Sustaining CWPP Efforts

Implementing and sustaining the CWPP is key to success. This is the responsibility of the Core Team. Building partnerships among community-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 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.

The WMFPD is committed to supporting the local fire stations in their fire protection efforts, both short and long-term. The district will continue to provide support in maintaining risk assessment information and emergency management coordination. The Core Team will work on implementing the fire plan by working with fire authorities, community organizations, private landowners, and public agencies to coordinate hazardous fuels management and other mitigation projects.

7.3 CWPP Oversight, Monitoring and Evaluation

The Core Team will be responsible for CWPP monitoring and evaluation through regular meetings, public involvement, and coordination with WMFPD and HOAs (Table 15). 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 will include 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 if the CWPP goals and objectives are being obtained.

Table 15. Monitoring and Evaluation Tasks

<table>
<thead>
<tr>
<th>Objective</th>
<th>Tasks</th>
<th>Timeline</th>
<th>Oversight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Assessment</td>
<td>• Use reliable data that is compatible among partner agencies</td>
<td>Annual</td>
<td>CSFS</td>
</tr>
<tr>
<td></td>
<td>• Update the CWPP as new information becomes available</td>
<td>Annual</td>
<td>Core Team</td>
</tr>
<tr>
<td></td>
<td>• Continue to assess wildfire risk to communities and private landowners</td>
<td>Biennial</td>
<td>HOA</td>
</tr>
<tr>
<td>Fuels Reduction</td>
<td>• Identify and prioritize fuels treatment projects on public land through development of a 5-year plan</td>
<td>Annual</td>
<td>WMFPD/CSFS</td>
</tr>
<tr>
<td></td>
<td>• Track fuels reduction projects and defensible space projects on private land</td>
<td>Biennial</td>
<td>WMFPD/CSFS</td>
</tr>
<tr>
<td></td>
<td>• Monitor fuels reduction projects on evacuation routes</td>
<td>Annual</td>
<td>WMFPD/CSFS</td>
</tr>
<tr>
<td></td>
<td>• Track grants and other funding sources and make appropriate application</td>
<td>On-going</td>
<td>WMFPD/CSFS</td>
</tr>
<tr>
<td>Emergency Management</td>
<td>• Review suitability and the need for fuels reduction along evacuation routes</td>
<td>Annual</td>
<td>WMFPD</td>
</tr>
<tr>
<td>Public Outreach</td>
<td>• Plan and hold Firewise education week</td>
<td>Annual</td>
<td>WMFPD/CSFS</td>
</tr>
<tr>
<td></td>
<td>• Provide Firewise pamphlets at public events</td>
<td>Annual</td>
<td>WMFPD/CSFS</td>
</tr>
<tr>
<td></td>
<td>• Evaluate techniques used to motivate and educate private landowners</td>
<td>Annual</td>
<td>WMFPD/CSFS</td>
</tr>
</tbody>
</table>
8 BIBLIOGRAPHY


Dennis, F.C. undated. Fuelbreak Guidelines for Forested Subdivisions & Communities. Colorado State Forest Service, Fort Collins, CO. (Internet access at www.colostate.edu/library/)


APPENDIX A
MAPS

MAP 1   ASSESSMENT AREA OVERVIEW
MAP 2   COMMUNITIES MAP
MAP 3   FIRE PROTECTION INFRASTRUCTURE
MAP 4   EXISTING VEGETATION (ASTER)
MAP 5   POTENTIAL NATURAL VEGETATION
MAP 6   FIRE BEHAVIOR FUEL MODEL
MAP 7   FIRE REGIME CONDITION CLASS
MAP 8   HAZARDOUS FUELS MITIGATION
Figure 4
Existing Vegetation (ASTER)

Legend
- CWPP Assessment Area
- 1 mile community buffer
- Lakes
- Streams

Vegetation Class (acres)
- Non Vegetated (739.79)
- Grass (4728.33)
- Grass & Shrub (2175.97)
- Shrub (2431.84)
- Forest (624.47)

West Metro Fire Protection District
Jefferson County, Colorado

Project # 7404
Date: 9/2006

Colorado State Plane Central NAD 1983
Potential Natural Vegetation (acres)
- Gambel Oak (403)
- Mountain Mahogany Shrubland (414)
- Rocky Mountain Juniper (121)
- Ponderosa Pine Douglas-Fir (666)
- Ponderosa Pine Gambel Oak (102)
- Ponderosa Pine Grassland (317)
- Riparian Deciduous Woodland (12)
- Shorgrass Prairie with Trees (8148)
- Shortgrass Prairie (482)

Legend
- CWPP Assessment Area
- 1 mile community buffer
- Lakes
- Streams

Figure 5
Potential Natural Vegetation
Proj # 7404
Date: 09/2006

Originator: United States Forest Service
Publication Date: 2006
Title: LANDFIRE_RA_PNVG
APPENDIX B
WILDLAND FIRE RISK AND HAZARD SEVERITY ASSESSMENT FORM
WILDLAND FIRE RISK AND HAZARD SEVERITY ASSESSMENT FORM

Assign a value to the most appropriate element in each category and place the number of points in the column on the right.

<table>
<thead>
<tr>
<th>Element</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Means of Access</strong></td>
<td></td>
</tr>
<tr>
<td>1. Ingress and egress</td>
<td></td>
</tr>
<tr>
<td>a. Two or more roads in/out</td>
<td>0</td>
</tr>
<tr>
<td>b. One road in/out</td>
<td>7</td>
</tr>
<tr>
<td>2. Road width</td>
<td></td>
</tr>
<tr>
<td>a. ≥7.3 m (24 ft)</td>
<td>0</td>
</tr>
<tr>
<td>b. ≥6.1 m (20 ft) and &lt;7.3 m (24 ft)</td>
<td>2</td>
</tr>
<tr>
<td>c. &lt;6.1 m (20 ft)</td>
<td>4</td>
</tr>
<tr>
<td>3. All-season road condition</td>
<td></td>
</tr>
<tr>
<td>a. Surfaced road, grade &lt;5%</td>
<td>0</td>
</tr>
<tr>
<td>b. Surfaced road, grade &gt;5%</td>
<td>2</td>
</tr>
<tr>
<td>c. Non-surfaced road, grade &lt;5%</td>
<td>2</td>
</tr>
<tr>
<td>d. Non-surfaced road, grade &gt;5%</td>
<td>5</td>
</tr>
<tr>
<td>e. Other than all-season</td>
<td>7</td>
</tr>
<tr>
<td>4. Fire Service Access</td>
<td></td>
</tr>
<tr>
<td>a. ≤91.4 m (300 ft) with turnaround</td>
<td>0</td>
</tr>
<tr>
<td>b. &gt;91.4 m (300 ft) with turnaround</td>
<td>2</td>
</tr>
<tr>
<td>c. &lt;91.4 m (300 ft) with no turnaround</td>
<td>4</td>
</tr>
<tr>
<td>d. ≥91.4 m (300 ft) with no turnaround</td>
<td>5</td>
</tr>
<tr>
<td>5. Street signs</td>
<td></td>
</tr>
<tr>
<td>a. Present [10.2 cm (4 in.) in size and reflectorized]</td>
<td>0</td>
</tr>
<tr>
<td>b. Not present</td>
<td>5</td>
</tr>
<tr>
<td><strong>B. Vegetation (Fuel Models)</strong></td>
<td></td>
</tr>
<tr>
<td>1. Characteristics of predominate vegetation within 91.4 m (300 ft)</td>
<td></td>
</tr>
<tr>
<td>a. Light (e.g., grasses, forbs, sawgrass, and tundra)</td>
<td>5</td>
</tr>
<tr>
<td>NFDRS Fuel Models A, C, L, N, S, and T</td>
<td></td>
</tr>
<tr>
<td>b. Medium (e.g., light brush and small trees)</td>
<td>10</td>
</tr>
<tr>
<td>NFDRS Fuel Models D, E, F, H, P, Q, and U</td>
<td></td>
</tr>
<tr>
<td>c. Heavy (e.g., dense brush, timber, and hardwoods)</td>
<td>20</td>
</tr>
<tr>
<td>NFDRS Fuel Models B, G, and O</td>
<td></td>
</tr>
<tr>
<td>d. Slash (e.g., timber harvesting residue)</td>
<td>25</td>
</tr>
<tr>
<td>NFDRS Fuel Models J, K, and L</td>
<td></td>
</tr>
<tr>
<td>2. Defensible space</td>
<td></td>
</tr>
<tr>
<td>a. More than 30.48 m (100 ft) of vegetation treatment from the structure(s)</td>
<td>1</td>
</tr>
<tr>
<td>b. 21.6 m to 30.48 m (71 ft to 100 ft) of vegetation treatment from the structure(s)</td>
<td>3</td>
</tr>
<tr>
<td>c. 9.14 m to 21.3 m (30 ft to 70 ft) of vegetation treatment from the structure(s)</td>
<td>10</td>
</tr>
<tr>
<td>d. &lt;9.14 m (30 ft) of vegetation treatment from the structure(s)</td>
<td>25</td>
</tr>
<tr>
<td><strong>C. Topography Within 91.4 m (300 ft) of Structure(s)</strong></td>
<td></td>
</tr>
<tr>
<td>1. Slope &lt;9%</td>
<td>1</td>
</tr>
<tr>
<td>2. Slope 10% to 20%</td>
<td>4</td>
</tr>
<tr>
<td>3. Slope 21% to 30%</td>
<td>7</td>
</tr>
<tr>
<td>4. Slope 31% to 40%</td>
<td>8</td>
</tr>
<tr>
<td>5. Slope &gt;41%</td>
<td>10</td>
</tr>
</tbody>
</table>

FIGURE A.4.2 Example of Hazard Assessment Form

2002 Edition
### D. Additional Rating Factors (rate all that apply)

1. Topographical features that adversely affect wildland fire behavior  
   - Points: 0–5
2. Areas with a history of higher fire occurrence than surrounding areas due to special situations (e.g., heavy lightning, railroads, escaped debris burning, and arson)  
   - Points: 0–5
3. Areas that are periodically exposed to unusually severe fire weather and strong dry winds  
   - Points: 0–5
4. Separation of adjacent structures that can contribute to fire spread  
   - Points: 0–5

### E. Roofing Assembly

1. Class A roof  
   - Points: 0
2. Class B roof  
   - Points: 3
3. Class C roof  
   - Points: 15
4. Nonrated  
   - Points: 25

### F. Building Construction

1. Materials (predominate)
   - Points: 0
   - a. Noncombustible/fire-resistant siding, eaves, and deck (see Chapter 8)  
     - Points: 5
   - b. Noncombustible/fire-resistant siding and combustible deck  
     - Points: 10
2. Building setback relative to slopes of 30% or more
   - Points: 1
   - a. ≥9.14 m (30 ft) to slope  
     - Points: 5
   - b. <9.14 m (30 ft) to slope

### G. Available Fire Protection

1. Water source availability
   - Points: 0
   - a. Pressurized water source availability
     - Points: 0
     - 1892.7 L/min (500 gpm) hydrants ≤304.8 m (1000 ft) apart
   - b. Nonpressurized water source availability (off site)
     - Points: 1
     - 946.4 L/min (250 gpm) hydrants ≤304.8 m (1000 ft) apart
   - Points: 3
   - a. ≥946.4 L/min (250 gpm) continuous for 2 hours
     - Points: 5
   - b. <946.4 L/min (250 gpm) continuous for 2 hours
   - c. Water unavailable  
     - Points: 10
2. Organized response resources
   - Points: 1
   - a. Station ≤8 km (5 mi.) from structure  
     - Points: 3
   - b. Station >8 km (5 mi.) from structure
3. Fixed fire protection
   - Points: 0
   - a. NFPA 13, 13R, 13D sprinkler system  
     - Points: 5
   - b. None

### H. Placement of Gas and Electric Utilities

1. Both underground  
   - Points: 0
2. One underground, one aboveground  
   - Points: 3
3. Both aboveground  
   - Points: 5

### I. Totals for Home or Subdivision (Total of all points)

<table>
<thead>
<tr>
<th>Hazard Assessment</th>
<th>Total Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low hazard</td>
<td>&lt;40</td>
</tr>
<tr>
<td>Moderate hazard</td>
<td>40–69</td>
</tr>
<tr>
<td>High hazard</td>
<td>70–112</td>
</tr>
<tr>
<td>Extreme hazard</td>
<td>&gt;112</td>
</tr>
</tbody>
</table>

(NFPA 1144, 2 of 2)

FIGURE A.4.2  Continued
APPENDIX C
QUESTIONNAIRE ON WEST METRO FIRE PROTECTION DISTRICT WILDLAND FIRE ASSESSMENT
**Questionnaire for West Metro Fire Protection**  
**District Community Wildfire Protection Plan (CWPP)**

**July 24, 2006**

Walsh Environmental Scientists and Engineers LLC—under contract with Jefferson County—is assessing the risk of wildfire and identifying hazardous fuel and non-fuel mitigation actions to reduce its risk. You can help by providing information and suggestions on your perceptions of wildland fire and potential mitigation projects.

1. **What community do you live in or are closest to?** (please write in)

2. **How great of risk does wildfire pose to your community?**
   - [ ] Extreme Risk
   - [ ] Moderate Risk
   - [ ] Low Risk
   - [ ] No Risk

3. **What areas are at extreme fire hazard and pose a risk to homes or property?**
   - [ ] Forestlands
   - [ ] Grasslands
   - [ ] Shrublands
   - [ ] Juniper Stands
   - [ ] Other Areas: __________
   
   **Location:**

4. **What is the best way to mitigate or reduce wildfire hazards?**
   - [ ] Reduce vegetation (grasses, trees, etc.) on public lands by controlled burns.
   - [ ] Reduce vegetation (grasses, trees, etc.) on public lands by mechanical treatments.
   - [ ] Increase firefighting equipment (more trucks, water tenders, etc.)
   - [ ] Increase number of fire department volunteers
   - [ ] Increase water availability
   - [ ] Encourage private landowners to reduce fuels and develop defensible spaces around structures.
5. What **recent actions** have been taken to reduce the risk of wildfire to your community?
   - None that I am aware of.
   - If you know of actions that have been taken, please explain:

6. What **fire education programs** have occurred in your community?
   - None that I am aware of.
   - If you know of programs that have occurred, please explain:

7. Is the community **prepared** to combat wildfire?
   - No, if not, why:
   - Yes, if so, how come:
   - I do not know

8. What **actions** do you think need to be taken to reduce the risk of wildland fire?

**Additional Comments:**

Please provide **contact information** in case we have further questions:

<table>
<thead>
<tr>
<th>Name</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Address</td>
<td></td>
</tr>
<tr>
<td>Phone</td>
<td></td>
</tr>
</tbody>
</table>

**Please fill out this survey and mail, fax, or email your response to:**

<table>
<thead>
<tr>
<th>Walsh Environmental</th>
<th>Jeffco Emergency Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lauren Barringer</td>
<td>Rocco Snart</td>
</tr>
<tr>
<td>303-443-0367 (fax)</td>
<td>303-271-4905 (fax)</td>
</tr>
<tr>
<td>4888 Pearl E. Circle, Suite 108</td>
<td>800 Jefferson County Parkway</td>
</tr>
<tr>
<td>Boulder, CO 80301-2475</td>
<td>Golden, CO 80419</td>
</tr>
<tr>
<td><a href="mailto:lbarringer@walshenv.com">lbarringer@walshenv.com</a></td>
<td><a href="mailto:rsnart@jeffco.us">rsnart@jeffco.us</a></td>
</tr>
</tbody>
</table>
APPENDIX D
FIREWISE BROCHURE
Firefighters need your help. Use these tips to PREPARE your home and PROTECT your family and pets. BEWARE of accidentally starting a wildfire!

FOR MORE INFORMATION, VISIT THESE HELPFUL WEBSITES:

USDA FOREST SERVICE
www.fs.fed.us

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
BUREAU OF INDIAN AFFAIRS
FISH & WILDLIFE SERVICE
NATIONAL PARK SERVICE
www.doi.gov/bureaus.html

NATIONAL ASSOCIATION OF STATE FORESTERS
www.stateforesters.org

NATIONAL FIRE PROTECTION ASSOCIATION
www.nfpa.org

U.S. FIRE ADMINISTRATION
www.usfa.fema.gov

FEDERAL EMERGENCY MANAGEMENT AGENCY
www.fema.gov

ARE YOU FIREWISE OKLAHOMA?

Oklahoma Firewise Communities

FOR MORE INFORMATION CONTACT:
FIREWISE COMMUNITIES
1 BATTERYMARCH PARK - QUINCY, MA 02269

To create your FIREWISE structure, remember that the primary goals are fuel and exposure reduction.

- Use construction materials that are fire-resistant or non-combustible wherever possible.
- Consider using materials such as Class-A asphalt shingles, steel or clay tile, metal, or stucco and concrete products for roof covering.
- Construct a fire-resistant sub-roof for added protection.
- Use fire-resistant materials such as stucco for exterior walls. These materials are much safer than wood or vinyl siding.
- Consider using materials for eaves, smaller valleys, and gutters to limit how far flames can travel.
- Outside wall cladding and tempered glass are more effective than single pane glass, plastic skylights are hazardous.
- Prevent sparks from entering your house through vents, by covering exterior attic and underfloor vents with wire mesh no larger than 1/8 of an inch.
- Keep your gutters, eaves and roof clear of leaves and other debris.
- Use deadwood and dense vegetation within at least 30 feet from your house, and remove brush away from your fence or electrical lines if there are trees.

Any structure attached to the house, such as decks, porches, fences and sheds should be considered part of the home's fuel load. It is important to control these from becoming uncontrolled wildfire fuel.

If you want to retain an elevated area in your yard, use materials such as stone or brick. Use fire-resistant plant materials such as concrete, stucco or masonry for exterior walls.

Use non-flammable metal when constructing a trellis and cover with high-moisture, fire-resistant vegetation. Prevent combustible materials and debris from accumulating beneath patio deck or elevated porches; screen underneath or box in areas below the deck or porch with wire mesh no larger than 1/8 of an inch.

Zone 1
This well-irrigated area encircles the structure for at least 30 feet on all sides, providing space for fire suppression equipment in the event of an emergency. Plants should be non-flammable, such as the Habitat System should extend into this section.

Zone 2
Fire resistant plant materials should be used here. Plants should be low-growing, and the irrigation system should extend into this zone. Above the deck or porch, keep the volume of vegetation low.

Zone 3
This zone should be a natural area. Thin non-flammable vegetation here.

To create a landscape that will make your home less vulnerable to wildfire, the primary goal is fuel reduction. Think of the area around your home in zones. Zone 1 is closest to the structure, Zone 4 is the farthest away.

Zone 1
Think of the area around your home in zones. Zone 1 is closest to the structure, Zone 4 is the farthest away. The zone closest to the structure should be a natural area. Thin non-flammable vegetation here. Above the deck or porch, keep the volume of vegetation low.

Zone 2
This well-irrigated area encircles the structure for at least 30 feet on all sides, providing space for fire suppression equipment in the event of an emergency. Plants should be non-flammable.

Zone 3
This zone should be a natural area. Thin non-flammable vegetation here. Above the deck or porch, keep the volume of vegetation low.

Zone 4
This furthest zone from the structure is a natural area. Thin non-flammable vegetation here.

Also remember to:
- Carefully space the trees you plant.
- Take out the “ladder fuels” – vegetation that serves as a link between grass and tree tops. These fuels can carry fire from vegetation to a structure or from a structure to vegetation.

When maintaining a landscape:
- Keep trees and shrubs pruned. Prune all trees six to 10 feet from the ground.
- Water and maintain your lawn regularly.
- Mow dry grass and weeds.
- Dispose of cuttings and debris promptly.
- Landscape with less-flammable plants. Contact your local state forester, county extension office or landscape specialist for plant information.
LEAN, CLEAN AND GREEN
LANDSCAPING
With firewise landscaping, you can create defensible space around your home that reduces your wildfire threat. Large, leafy, hardwood trees should be pruned so that the lowest branches are at least 6 to 10 ft high to prevent a fire on the ground from spreading up to the tree tops. Within the defensible space, remove flammable plants that contain resins, oils and waxes that burn readily: Ornamental junipers, yaupon holly, red cedar, and young pine. A list of less-flammable plants can be found within this brochure.

Although mulch helps retain soil moisture, when dry, it can become flammable. Mulch as well as all landscaping should be kept well watered to prevent them from becoming fire fuel.

DEFENSIBLE SPACE
Do you have at least 30 ft of space surrounding your home that is Lean, Clean and Green?
The objective of Defensible Space is to reduce the wildfire threat to your home by changing the characteristics of the surrounding vegetation.

Lean – Prune shrubs and cut back tree branches, especially within 15 ft of your chimney.
Clean – Remove all dead plant material from around your home. This includes dead trees, clip grass and even remove brush.
Green – Plant fire-resistant vegetation that is healthy and green throughout the year.

FIRE-RESISTANT ATTACHMENTS
Attachments include any structure connected to your home such as decks, porches or fences. If an attachment to a home is not fire-resistant, then the home as a whole is not firewise.

A DISASTER PLAN
The time to plan for a fire emergency is now. Take a few minutes to discuss with your family what actions you will need to take.

• Post your local firefighting agency’s telephone number in a visible place.
• Decide where you will go and how you will get there. Inform your neighbors if you are unable to leave because of heat or smoke.
• Keep your keys, cash, medications, important documents, materials and valuables in a fireproof safe.
• Have a meeting place away from your home.

FIRE-RESISTANT ROOF
CONSTRUCTION
Firewise construction materials include Class-A asphalt shingles, metal, cement and concrete products. Additionally, the inclusion of a fire-resistant sub-roof offers protection.

FIRE-RESISTANT EXTERIOR
CONSTRUCTION
The materials that make your home and frame include brick, cement, stucco, stone and concrete aggregate. Double pane windows can make a home more resistant to wind driven embers.

EMERGENCY ACCESS
Identify your home and neighborhood with legible and clearly marked street names and numbers on emergency vehicles providing at least an additional 30 ft clear of all obstructions. When wildfires are predicted, each home should be surrounded by a defensible space of 15 feet – to provide access to emergency apparatus.
APPENDIX E
LIST OF PREPARERS
<table>
<thead>
<tr>
<th>Preparer</th>
<th>Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jerry Barker, Ph.D, Rangeland and Fire Ecologist, Project Manager</td>
<td>Walsh Environmental Scientists and Engineers, LLC</td>
</tr>
<tr>
<td>Fred Groth, Director of Geospatial Technologies</td>
<td>Walsh Environmental Scientists and Engineers, LLC</td>
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<tr>
<td>Lauren Barringer, Staff Biologist</td>
<td>Walsh Environmental Scientists and Engineers, LLC</td>
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<td>Geoff Butler, Wildland Fire Specialist</td>
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<td>Kelly Close, Fire Behavior Specialist</td>
<td>Alpenfire, LLC</td>
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<tr>
<td>Scott Wells, CPP, CFE, ALCM</td>
<td>Paradigm Risk Management Associates, LLC</td>
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<tr>
<td>Peter Anderson, Fire Captain</td>
<td>WMFPD</td>
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