Foothills Fire Protection District, C0

Community Wildfire Protection Plan Update

December 2020

ANCHORPOINT
WILDLAND FIRE SOLUTIONS

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MUTUAL AGREEMENT PAGE

This Community Wildfire Protection Plan developed by the Foothills Fire Department:

- Was collaboratively developed. Interested parties, fire management agencies and state and county land management agencies managing land in and/or adjacent to the study area have been consulted.
- This plan identifies and prioritizes areas for hazardous fuel reductions treatments and recommends the types and methods of treatment that will aid in protecting communities in the study area.
- This plan recommends measures to reduce ignitability of structures throughout the area addressed by the plan.

The following entities attest the standards listed above have been met and mutually agree with the content of this Community Wildfire Protection Plan:

Foothills Fire Protection District, by Alan Anderson, Chief

Colorado State Forest Service, Golden District, by _____

Jefferson County Division of Emergency Management, by _____

INTRODUCTION

This CWPP update was developed at the request of the Foothills Fire Department (FFD) with support of Jefferson County, Colorado and the Colorado State Forest Service (CSFS). Information in this plan will be provided at the level of specificity determined by the community and appropriate agencies.

This document is the result of a study to identify and quantify changes in conditions or values at risk that could affect fire protection planning and response in the Wildland-Urban Interface (WUI) and Wildland Intermix (WI) portions of the study area. The WUI is also known as the Urban Edge Ember Zone. It is the area where encroaching wildland fuels could create a fire hazard to what would, in a different setting, be an urban development. The WI consists of communities where homes are surrounded by wildland fuels. This report neither replaces nor intends to duplicate information found in the 2008 joint Jefferson County and Foothills Fire Protection District Community Wildfire Plan. The original CWPP was a county wide effort and as such was developed at a macro level. This study provides a more detailed analysis of the WUI and WI areas included in the Foothills Fire Protection District (FFPD) boundary. As such, it should be considered an addendum to the 2008 CWPP. It focuses on the areas of greatest residential density and deals primarily with life safety and structural ignitability. Future updates may be useful should the need arise to focus on unpopulated or sparsely populated areas or other values at risk and areas of special interest.

This report updates information found in the 2008 CWPP. This includes a current analysis of the probability of a severe fire occurrence and expected severity of fire effects using updated technology as well as a detailed discussion of structural ignitability. This information allows for the prioritization of mitigation efforts. From an analysis of this data, solutions and mitigation recommendations are offered that will aid land managers, residents, fire officials and other collaborators in planning and implementation. This format is designed to help communities clarify and refine priorities for the protection of life, property, and critical infrastructure in the WUI/WI. It can also lead community members through valuable discussions regarding management options and implications for any areas of special interest.

Definitions

For the purposes of this report the following definitions apply:

FireShed - No-HARM divides the landscape into units based on topography. FireSheds tend to correlate to the vegetation and the direction fires will burn in the absence of wind. FireSheds are useful for dividing the landscape into planning units and providing data in a spatial context that matches fire behavior. FireShed units tend to be roughly 150 to 200 acres in size.

Frequency - A simulation-based prediction of the probability of future wildfire occurrences derived from No-HARM. No-HARM assigns a numeric value of 1-50 where 1 is the least likely for a wildfire occurrence and 50 is the most likely. Frequency is different from probability of ignition in that frequency only considers ignitions likely to develop into fires large enough to create a significant threat to Values at Risk.

Hazard - The combination of the Wildfire Hazard Ratings (WHR) of the WUI/WI neighborhood surveys and the analysis of fire behavior potential, which is derived from No-HARM Severity analysis outputs. The principle elements of the WHR analysis have been integrated into the No-HARM model in this report to provide a single measure of hazard in the developed portions of the study area. Hazard attempts to quantify the severity of undesirable outcomes to the values at risk.

No-HARM - The National Hazard and Risk Model (No-HARM) is a decision support tool for wildfire hazard assessment. No-HARM calculates relative fire danger ratings by taking the predicted severity and the predicted frequency of wildfire in a given location and incorporating elements that affect the vulnerability of structures in and around communities. No-HARM gives a comprehensive view of the threat context a structure, or group of structures, is exposed to during a wildland fire.

Probability - The likelihood of a significant fire occurrence. This is primarily determined by the fire history of the area and a probability model (Frequency) derived from No-HARM.

Risk 50 - The result of the No-HARM composite analysis of Frequency, Severity and other input variables. By combining the likelihood of a significant fire occurrence and the severity of undesirable fire effects to the values at risk, Risk 50 assigns a numeric value to FireSheds where a 1 represents the lowest level of risk and 50 represents the most extreme level of risk.

Severity - An estimate derived from No-HARM of how severe fire behavior would be in the event of an ignition. No-HARM assigns a numeric value of 1-50 where 1 is the lowest severity and 50 is the highest.

Values at Risk - The tangible values identified by citizens and collaborators as being important to sustainable life in the study area (e.g., life safety, property conservation and critical infrastructure.)

Web Map Interface (WMI) -A web-based user interface specifically designed to warehouse and utilize the No-HARM data and the integration of community assessments. This enables users to visualize a community or parcel-level map with their wildfire hazards.

Wildfire Hazard Rating (WHR) - A model designed to evaluate communities within the Wildland Urban Interface/Wildland Intermix (WUI/WI) for their relative wildfire hazard. WHR focuses on structural ignitability and suppression factors and uses a different rating system from No-HARM which focuses on the Frequency and Severity of fire in the wildland fuels of the FireSheds. The analysis in this report incorporates the principle elements of the WHR model into the No-HARM model to provide a complete analysis in one rating system.

Wildland Intermix (WI) – Areas of concentrated residential development (communities) where homes are surrounded by wildland fuels. Homes in these areas exist in the context of natural fuels rather than as typical urban development.

Wildland-Urban Interface (WUI) – (AKA Urban Edge Ember Zone). The area where encroaching wildland fuels could create a fire hazard to structures that would in a different setting be considered a traditional urban development.

GOALS AND OBJECTIVES

Strategic goals for this project include the following:

1. Enhance life safety of the residents, visitors, and responders.
2. Present methods to mitigate undesirable fire effects to property, infrastructure and the environment.
3. Enhance previous and existing efforts.

To accomplish these goals the following objectives have been identified for this report:

1. Establish an approximate level of probability (the likelihood of a significant wildfire event in the study area).
2. Provide a scientific analysis of the fire behavior potential of the study area.
3. Group relatively densely populated areas into residential "Hazard Zones" that represent relatively similar hazard factors.
4. Identify and quantify factors that limit (mitigate) undesirable fire effects to the Values at Risk and recommend actions to reduce those hazards.
5. Quantify any significant changes related to hazards or Values at Risk that have taken place since the FFPD CWPP was written in 2008.

FFPD recognizes the potential for complex problems associated with the mission of achieving fire safety and healthy forest management and a need to balance this mission with environmental and economic concerns of the residents.

Understanding No-HARM Ratings

No-HARM Severity ratings attempt to quantify the severity of fire effects on values at risk and the ecosystem by combining flame length and crown fire development into a single rating. Like other numeric ratings generated by No-HARM, Severity assigns a value between 1 and 50 to each FireShed based on an aggregation of all the pixels in that FireShed. A value of one indicates the lowest severity of damaging fire effects and 50 the highest. It is important to understand the Severity model may under-predict the effects of ember cast, especially under extreme weather conditions.

The No-HARM Risk 50 rating is a mathematical model combining Severity with Frequency. That is to say the model takes into account both the likelihood of a significant fire developing within the rated FireShed and the severity of damaging fire effects to create a composite rating of fire risk in that FireShed. Although the majority of the weighting in the model is in these two elements, other factors are included in the Risk 50 rating and vary depending on whether FireSheds are located in the Wildland-Urban Interface (WUI), Wildland Intermix (WI) or wildland. As with other No-HARM ratings, a value of one indicates the lowest risk and 50 the highest.

No-HARM is based on an analysis of wildland fire behavior and, other than the exclusion of non-burnable areas, does not take structural flammability into consideration. In order to provide a complete analysis in a single rating scale the principle elements of the WHR model of structural ignitibility and operational response factors have been incorporated into the No-HARM Risk 50 rating for the residential hazard zones described in this study.

WHR was developed specifically to evaluate communities within the WUI/WI for their relative wildfire hazard. The WHR model combines physical infrastructure such as structure density and roads, and the fire behavior Severity modeling of No-HARM, with the field experience and knowledge of wildland fire experts. It has been proven and refined by use in rating thousands of neighborhoods throughout the United States. Much of NFPA 1144 has been integrated into this methodology to ensure compatibility with national standards. Additionally, aspects of NFPA 1142 regarding water supply for rural and suburban firefighting are included in the assessments by looking at proximity and capacity of the water supply.

This model was developed from the perspective of performing structural triage on a threatened community in the path of an advancing wildfire with No-HARM predicted fire behavior for average conditions on a fire season day. The WHR survey and fuel model ground-truthing are accomplished by field surveyors with WUI/WI fire experience. WHR ratings are related to what's customary for the area. For example, a high-hazard area on the plains of Kansas may not look like a high-hazard area in the Sierra Nevada. The system creates a relative ranking of community hazards in relation to the other communities in the study area. For the No-HARM analysis of the residential Hazard Zones described in the *Community Ignitability Analysis* section of this report WHR ratings have been incorporated into the No-HARM Risk 50 rating for each Hazard Zone.

COMMUNITY IGNITABILITY ANALYSIS AND RECOMMENDATIONS

Purpose

The purpose of dividing residential areas into hazard zones is to perform a structural ignitability analysis in order to sort residential areas into hazard categories for prioritization of recommendations. This is accomplished by the use of No-HARM ratings weighted with the Wildfire Hazard Rating (WHR) tool, which is intended to analyze Wildland Urban Interface and Wildland Intermix (WUI/WI) development.

Methodology

No-HARM Risk 50 ratings, weighted with the WHR model as described above, have been included in the description of the residential Hazard Zones presented below. Adjective ratings in No-HARM are as follows: 10 or less = Low, 11-20 = Moderate, 21-35 = High, 36-42 = Very High and >42 = Extreme. For an introduction to the methodology behind these ratings please see the *Understanding No-HARM Ratings* section of this report. For a more complete understanding of No-HARM ratings and their context in this study area please see the WMI. A field analysis by a Wildland Fire Mitigation Specialist verifies this information and adjusts the final ratings if necessary.

Description

There are sixteen residential hazard zones in the study area. No-HARM calculates a Risk 50 score that sorts these zones into one of five adjective rating categories: low, moderate, high, very high and extreme. These residential hazard zone boundaries are somewhat different from the "community" boundaries described in the 2008 CWPP due to physical changes caused by additional development, improvements in hazard and probability analysis methodology and additional information provided by No-HARM.

The following Hazard Zone descriptions focus on the general characteristics of the area. They focus on the built environment and vegetation and are based on field observations. They are not intended to describe every home or street but rather the average or majority of what is represented in the zone. These reports will be available through the Web Map Interface. The WMI will allow the user to zoom in to any area and get more specific information about the physical environment and a breakdown of the Risk 50 points.

Table 1 Hazard Zones in Project Area

Hazard Zone/Rating	Location/Description
A Extreme	located in the northwest corner of the study area and includes primarily the Rainbow Hills neighborhood
B Extreme	located immediately east of Hazard Zone A and consists primarily of the neighborhood accessed by Moss Rock Road and Summit Ranch Road.
C Moderate	located in the southwest end of the study area and consists primarily of the Spring Ranch neighborhood as well as the Chief Hosa campground and lodge.
D Very High	located in the north end of the Mt. Vernon Country Club neighborhood.
E High	includes homes located in the study area accessed from Genesee Mountain Road.
F Moderate	includes most of the homes located in the Mt. Vernon Country Club neighborhood.
G Very High	includes most of the homes in the Cody Park neighborhood.
H High	includes homes accessed by Krestview Lane, Hess Avenue and Aspen Lane.
I Moderate	includes homes accessed by Indian Paintbrush Drive and South Lookout Mountain Road.
J High	includes the neighborhood between US 40 and I-70 west of Hazard Zones I and L.
K High	includes the neighborhood between Hazard Zone I and the Lookout Mountain Nature Center open space and is accessed from Colorow Road and South Lookout Mountain Road.
L Low	located south of Hazard Zones H and K and includes most of the Paradise Hills neighborhood.
M Moderate	includes homes located between Lookout Mountain Road and Apex Open Space Park including most of the Panorama neighborhood.
N Moderate	includes residential development in the district south of I-70 and north of Shingle Creek Road including the Riva Chase neighborhood.
O Extreme	includes homes on Lininger Mountain south of Hazard Zone N.
P Very High	includes the southeast end of the study area including the town of Idledale.

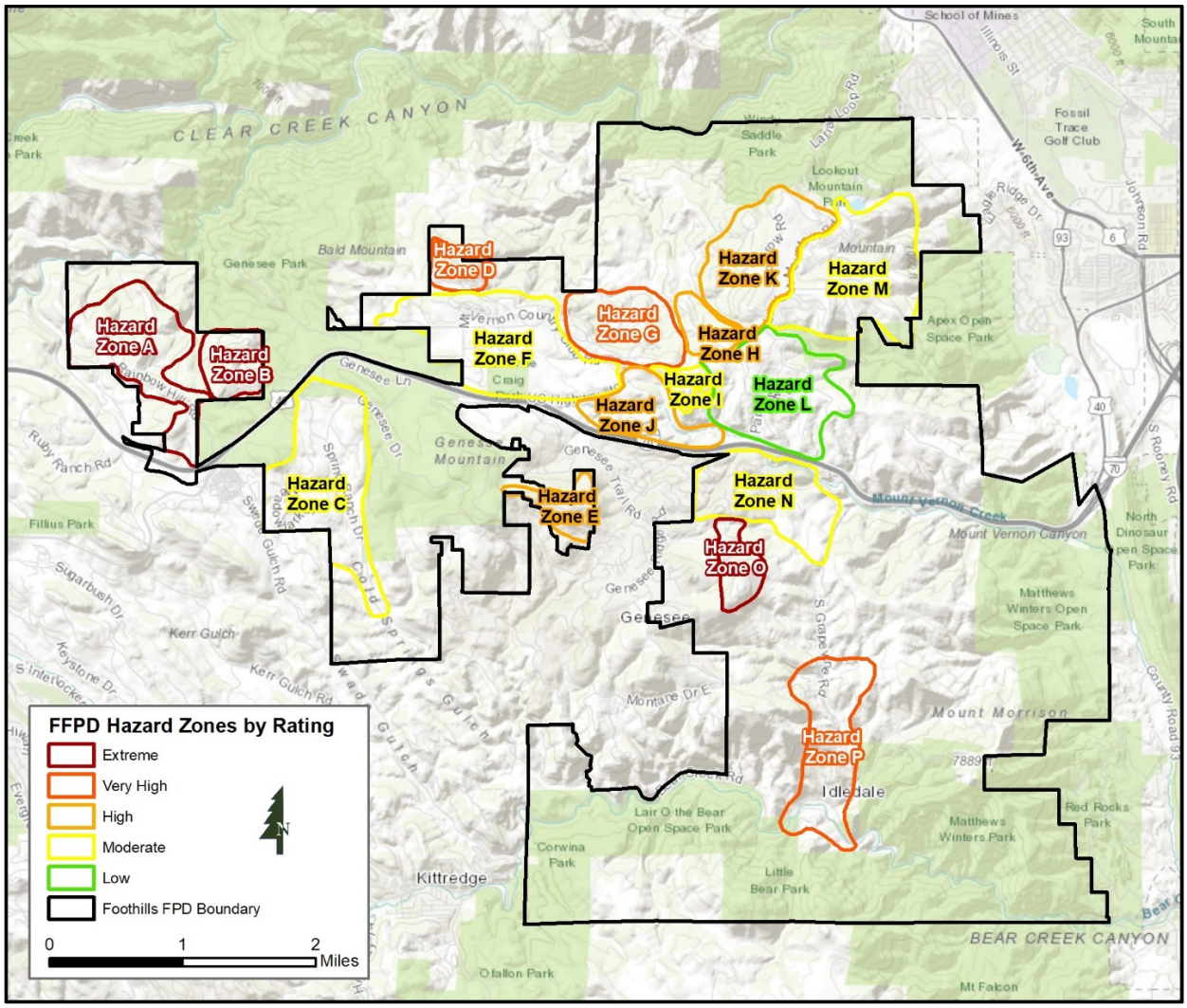

Figure 1 Hazard Zones with No-HARM Ratings

Structural Ignitability Discussion – Hazard Zone A

Hazard Zone A

Hazard Rating:	**Extreme**
Utilities Above or Below Ground:	Above
General Construction:	Wood siding, ignition resistant roofs
Average Lot Size:	Moderate to large
Dual Access Roads:	No
Road Widths, Slope and Surface:	Variable, see text
Water Supply:	One cistern, see text
Proximity to Fire Station:	Rainbow Hills Station, 28812 Rainbow Hill Road.

Zone Characteristics and Hazards

Single-family homes on large to moderate size lots are the dominant structures. There is a mix of older and newer residences, but older construction is more common and homes are generally small to medium size, however, some of the newer homes are larger. Lots tend to be moderate to large and density is fairly low. Most homes have combustible siding with an asphalt shingle or other ignition resistant roof. Many homes have flammable decks, projections or fences and most have flammable ornamental plantings or native vegetation too close to the structure. There are also several homes with flammable outbuildings. Most homes do not have any defensible space. The electricity in this zone is provided by overhead power lines. Most homes have propane tanks. This community is completely surrounded by and located in heavy conifer forest. The understory is generally grass but is heavier in some areas, especially along drainages. Ornamental plantings and some deciduous species occur in small groups near some homes and in drainages. The terrain is complex with steep slopes below homes, especially in the northern part of this zone. The paved access roads have generally good surfaces but are narrow in sections and native vegetation grows right up to the road edges along most sections. Many homes are

accessed by private roads or common driveways. All of these are dirt and surrounded by heavy vegetation. All the roads are dead-ends and Rainbow Hill Road is the only way in and out. While there may be some turnarounds located at individual residences, the only good turn around on a paved access road is where Rainbow Hill Road ends and becomes a private access dirt road. The only water supplies for fire suppression is a 30,000 gallon cistern at the intersection of Skyhill Drive and Rainbow Hill Road and at the Rainbow Hills Fire Station located near the southern end of this zone.

Recommendations

- Defensible space is the highest priority in this zone. Homes are too spread out for linked defensible space to create a practical fire break. An effective landscape fuelbreak is also unlikely to be practical to implement and maintain due to the diversity of ownership and access issues. It is therefore, of critical importance that every home have defensible space. This is especially important for homes located in the northwest part of this zone. Their position at the top of steep slopes that run up from US-40 make them especially vulnerable to ignitions occurring along the highway. See *Appendix A, Creating Defensible Space* for detailed recommendations.
- Along with defensible space it is highest priority for homes in this zone to be fire hardened to the greatest extent practical. Heavy fuels, complex topography and the lack of water for suppression makes the ability of these homes to be fire resistive a critical factor in structure survivability. See *Appendix B, Reducing Structural Ignitability* for detailed recommendations.
- Improving the water supply for fire suppression is also a critical need in this zone. Currently the closest water source available for fire suppression is the only cistern at the intersection of Skyhill Drive and Rainbow Hills Road or a hydrant located at the Rainbow Hills Fire Station. We recommend a network of cisterns be installed with fire department connections appropriate for Foothills Fire apparatus. At a minimum there should be a cistern of at least 10,000 gallons installed at or near the end of Rainbow Hill Road, and near the end of S. Rainbow Trail. The turnaround at the end of Rainbow Hill Road would be a good location for one of these cisterns. Rapid access to water for suppression during a fire event is important to responder life safety as well as property preservation. All cisterns should include markers to aid responders in locating them. See the *General Recommendations* section for details.
- Evacuation will be critically important for life safety during a fast moving wildfire. Due to steep topography near homes and the continuous fuel bed, this zone could be threatened by fast moving, intense fires resulting from ignitions on the slopes below. Although public roads are generally paved and of adequate width, moderate to heavy vegetation grows right up to the roadside. The private roads and common driveways are dirt, often narrow and have heavy vegetation growing up to and over the road. We recommend Foothills Fire partner with private property owners to develop, implement and maintain a vegetation management plan for all access roads in this zone. We also recommend an evacuation plan be developed to assist in the most efficient evacuation of residents and visitors. Public education will be necessary to familiarize residents with the evacuation plan. This plan should be reviewed on a regular basis to ensure its continued viability. For more information on roadside vegetative management and evacuation

planning see the *"Access/Egress Routes and Evacuation Recommendations"* in this document.

- Although public street signs are well marked at intersections with reflective signage the private roads and common driveways are not named or marked, other than by "Private Road" or "No Trespassing" signs. Address markers are either missing or not reflective throughout this zone and placement is inconsistent. Many home addresses are only marked on mailboxes, often grouped with several others at the end of private roads and driveways. We recommend a program of installing reflective addressing that can be read at the street to assist responders in locating properties during an emergency. This can be especially critical during a large fire event for out of district responders who are not familiar with the area. For more information see the *Access/Egress Routes and Evacuation Recommendations* section of this document.

Structural Ignitability Discussion – Hazard Zone B

Hazard Zone B

Hazard Rating:	**Extreme**
Utilities Above or Below Ground:	Above
General Construction:	Primarily combustible siding with mixed roofs
Average Lot Size:	Variable. some large, most moderate to small
Dual Access Roads:	No
Road Widths, Slope and Surface:	Paved and dirt. Steep, narrow and winding
Water Supply:	Three cisterns, no hydrants
Proximity to Fire Station:	Rainbow Hills Station, 28812 Rainbow Hill Road

Zone Characteristics and Hazards

This zone is a mix of older and newer construction. Most of the homes along Summit Ranch Road are newer and of moderate to large size on large lots. Homes along both upper and lower Moss Rock Road are smaller and older, some are seasonal cabins, however throughout this zone older, smaller homes and seasonal cabins are slowly being replaced with newer homes. Lot sizes in this area range from small to large, however overall density is higher than on Summit Ranch Drive. Although some homes have ignition resistant features, almost all have at least some wood construction. Wood siding with asphalt shingle, or other ignition resistant roofing material, is dominant. There are, however, some homes and outbuildings with flammable roofs. Many homes have flammable decks, projections and/or exterior stairs. Some homes have wooden fences and some have firewood piles stacked too close to the structure. Although some of the newer homes have partial defensible space, most homes have either none or inadequate defensible space. Electricity is supplied by overhead powerlines and most homes have propane tanks. Moderate to heavy loads of mixed conifer with grass understory are continuous throughout this zone, however, stand density varies. Terrain is steep and complex throughout this zone. Public street signs are well marked at intersections with reflective signage, but address markers are either

missing or not reflective throughout this zone and placement is inconsistent. Evacuation would be difficult due to steep, narrow, winding roads and possible choke points. There are also private dirt roads which are the only access to some homes in this zone. Although some homes, especially on Summit Ranch Drive, may have driveway turnarounds large enough for apparatus, the only good turnarounds on public roads are at the ends of Summit Ranch Drive, Upper Moss Rock Road and Lower Moss Rock Road. There is a 4,000 gallon cistern located at 28900 Upper Moss Rock Road, a 30,000 gallon cistern located at the cul-de-sac of Summit Ranch Way and a 12,000 gallon cistern located at 29,155 Summit Ranch Drive. The nearest hydrant is located at Chief Hosa Lodge (27661 Genesee Drive). Rainbow Hills is the closest fire station and is approximately two miles from the main access to homes in this zone.

Recommendations

- Defensible space is the highest priority in this zone. Homes are too spread out for linked defensible space to create a practical fire break. It is therefore, of critical importance that every home have defensible space. This is especially important for homes located along Upper and Lower Moss Rock Roads due to the poor access and steep terrain in these areas. See *Appendix A, Creating Defensible Space* for detailed recommendations.
- Along with defensible space, it is a high priority for homes in this zone to be fire hardened to the greatest extent practical. Heavy fuels, complex topography and the lack of water for suppression makes the ability of these homes to be fire resistive a critical factor in structure survivability. See *Appendix B, Reducing Structural Ignitability* for detailed recommendations.
- Although there are three reliable cisterns in this zone, there are no hydrants. Improving the water supply for fire suppression is recommended. At a minimum there should be a cistern of at least 10,000 gallons installed somewhere along both Upper and Lower Moss Rock Road and another east of where these two roads join to become Moss Rock Road, which is the only public entrance to this zone. All cisterns should include markers to aid responders in locating them. See the *General Recommendations* section for details.
- Evacuation will be difficult in this zone due to steep, narrow and winding roads with uneven dirt surfaces. Moderate to heavy vegetation grows right up to the roadside along most of the access roads. Roadside fuels reduction is highly recommended for all access roads and long private driveways. We recommend an evacuation plan be developed to assist in the most efficient evacuation of residents and visitors. Public education will be necessary to familiarize residents with the evacuation plan. This plan should be reviewed on a regular basis to ensure its continued viability. For more information on roadside vegetative management and evacuation planning see the *Access/Egress Routes and Evacuation Recommendations* section where an alternate emergency escape route for this zone is discussed.
- Although public street signs are well marked at intersections with reflective signage, address markers are either missing or not reflective throughout this zone and placement is inconsistent. We recommend a program of installing reflective addressing that can be read at the street to assist responders in locating properties during an emergency. This can be especially critical during a large fire event for out of district responders who are not familiar with the area. For more information see the *Access/Egress Routes and Evacuation Recommendations* section of this document.

Structural Ignitability Discussion – Hazard Zone C

Hazard Zone C

Hazard Rating:	**Moderate**
Utilities Above or Below Ground:	Above ground
General Construction:	Mix of IR and combustible siding. Ignition resistant roofs
Average Lot Size:	Large
Dual Access Roads:	No
Road Widths, Slope and Surface:	Good
Water Supply:	15 cisterns and two large ponds
Proximity to Fire Station:	Rainbow Hills Station, 28812 Rainbow Hill Road

Zone Characteristics and Hazards

Residences in this zone are primarily large, single-family homes of newer construction. Most are built on large lots and density is low. Most homes have at least some ignition resistant construction, however, several have some wood construction including flammable decks, projections and/or exterior stairs. Some homes have flammable outbuildings, but even most of these have ignition resistant roofs. Although some homes have at least partial defensible space, most have flammable native and/or ornamental vegetation growing too close to the structure. Although there are some power lines in the zone, most homes have underground utilities. Light to moderate loads of mixed conifer exist in stringers and patches with the rest of the fuels in this zone consisting primarily of short grasses. Terrain is gently to moderately rolling throughout this zone, but there are homes located mid-slope and on ridges. Genesee Drive is the only direct access to homes in this zone. Public street signs are well marked at intersections, but not all street signage is reflective. Most address markers are either missing or not reflective and placement is inconsistent. The open nature and relatively gentle terrain allows for easy apparatus turnarounds in most of this zone. There are likely to be several homes that have driveway turnarounds large enough for apparatus. Although there are two large ponds and several cisterns that could be used for dip or draft water sources, there are no hydrants in this zone. The Rainbow

Hills Fire Station is the closest fire station and is approximately 1.5 miles from the main access to homes in this zone.

Recommendations

- Although homes in this zone are on large lots and many have some IR construction, there are still many homes with flammable features and few have adequate defensible space. Defensible space is, therefore, still a high priority in this zone. See *Appendix A, Creating Defensible Space* for detailed recommendations.
- Along with defensible space, it is also high priority for homes in this zone to be fire hardened to the greatest extent practical. See *Appendix B, Reducing Structural Ignitability* for more detailed recommendations.
- There are at least two large ponds near homes in this zone, both are in the southern part off Cold Springs Road. There are also 15 cisterns scattered throughout this zone, however, most of these cisterns aren't well marked. All cisterns should include markers to aid responders in locating them. See the *General Recommendations* section for details.
- Although most of the access roads do not have a heavy accumulation of fuels immediately adjacent, there are some road segments where there are fuels that should be thinned and limbed. See the *Access/Egress Routes and Evacuation Recommendations* section for more information on roadside vegetative management.
- Although public street signs are generally well marked at intersections most street markers are not reflective in this zone. Some street markers are painted wood on wooden posts. Address markers are either missing or not reflective throughout this zone and placement is inconsistent. We recommend a program of installing reflective, non-flammable street signs and reflective addressing that can be read at the street to assist responders in locating properties during an emergency. This can be especially critical during a large fire event for out of district responders who are not familiar with the area. For more information see the *Access/Egress Routes and Evacuation Recommendations* section of this report.

Structural Ignitability Discussion – Hazard Zone D

Hazard Zone D

Hazard Rating:	**Very High**
Utilities Above or Below Ground:	Above
General Construction:	Primarily combustible siding with ignition resistant roofs
Average Lot Size:	Small to moderate
Dual Access Roads:	No
Road Widths, Slope and Surface:	Mostly dirt, some narrow and winding
Water Supply:	Hydrants
Proximity to Fire Station:	Mount Vernon Station, 25191 Aspen Way

Zone Characteristics and Hazards

Residences in this zone are mostly older single-family homes and seasonal cabins. Most homes are small to moderate size on small to moderate sized lots. Wood siding or log with an asphalt shingle, or metal roof, is the dominant construction type. Some properties also have flammable outbuildings some with wood shake roofs. Many homes have flammable decks, projections and/or exterior stairs. Some homes have wooden fences and some have firewood piles and other flammable jackpots close to the structure. Most homes have either none or inadequate defensible space. Electricity is supplied by overhead powerlines and most homes have propane tanks. Moderate to heavy loads of mixed conifer with grass understory are continuous throughout this zone, however, stand density varies. Terrain is steep to moderately steep and complex. Public street signs are well marked at intersections with reflective signage, but address markers are either missing or not reflective and placement is inconsistent. Evacuation would be difficult due to steep, narrow, winding roads and possible choke points. Although a few homes may have driveways adequate for apparatus turn arounds, there are few places for large apparatus to turn around along the narrow access roads. Water supply for this zone is provided by a municipal hydrant system. Mount Vernon Station is the closest fire station and is approximately ½ mile from the main access to homes in this zone.

Recommendations

- Defensible space is the highest priority in this zone. Homes are too spread out for linked defensible space to create a practical fire break. It is therefore, of critical importance that every home have defensible space. See *Appendix A, Creating Defensible Space* for detailed recommendations.
- The Mount Vernon Metro District and the CSFS are working in fuels treatment units on the north side of this zone. Their work should be completed and expanded. See the *Landscape Scale Recommendations* section for details.
- Along with defensible space, it is a high priority for homes in this zone to be fire hardened to the greatest extent practical. Heavy fuels, poor access and complex topography makes the ability of these homes to be fire resistive a critical factor in structure survivability. See *Appendix B, Reducing Structural Ignitability* for detailed recommendations.
- Evacuation will be difficult in this zone due to steep, narrow and winding roads with uneven dirt surfaces. All the roads out of this zone converge at one point that is the only way in or out. A high-tension power line crosses the road at this convergence. Moderate to heavy vegetation grows right up to the roadside along many segments of the roads. Roadside fuels reduction is highly recommended for all roads and long private driveways. We recommend an evacuation plan be developed to assist in the most efficient evacuation of residents and visitors. Public education will be necessary to familiarize residents with the evacuation plan. This plan should be reviewed on a regular basis to ensure its continued viability. For more information on roadside vegetative management and evacuation planning see the *Access/Egress Routes and Evacuation Recommendations* section.
- Although public street signs are well marked at intersections with reflective signage, address markers are either missing or not reflective throughout this zone and placement is inconsistent. We recommend a program of installing reflective addressing that can be read at the street to assist responders in locating properties during an emergency. This can be especially critical during a large fire event for out of district responders who are not familiar with the area. For more information see the *Access/Egress Routes and Evacuation Recommendations* section of this report.

Structural Ignitability Discussion – Hazard Zone E

Hazard Zone E

Hazard Rating:	**High**
Utilities Above or Below Ground:	Above ground
General Construction:	Primarily combustible siding with mixed roof types
Average Lot Size:	Small to moderate
Dual Access Roads:	Yes, see text
Road Widths, Slope and Surface:	Variable, see text
Water Supply:	Three cisterns of various capacity
Proximity to Fire Station:	Mount Vernon Station, 25191 Aspen Way

Zone Characteristics and Hazards

Residences in this zone are a mix of newer and older single-family homes and seasonal cabins. Most homes are small to moderate size on small to moderate sized lots, but some of the newer properties are larger and there are also a few large lots. Although most of the newer homes have at least some ignition resistant construction, wood siding or log with an asphalt shingle, or other ignition resistant roof, is the dominant construction type. Some properties also have flammable outbuildings and there are homes with wood shake roofs. Many homes have flammable decks, and projections. Some homes have firewood, slash piles and other flammable jackpots close to the structure. Most homes have either none or inadequate defensible space. Electricity is supplied by overhead powerlines and most homes have propane tanks. Moderate to heavy loads of mixed conifer with a grass or shrub understory are continuous throughout this zone, however, stand density varies with the heaviest stands in the north part of this zone. Terrain is steep to moderately steep and complex throughout. Public street signs are marked at intersections with reflective signage, but address markers are either missing or not reflective throughout this zone and placement is inconsistent. Evacuation would be difficult as all the exit roads converge to a single exit on Genesee Avenue. Slash piles and vegetation near the road make the only access to I-70 (Genesee Mountain Road) potentially dangerous. While Choke Cherry Lane could be used as an alternate exit to Genesee, it is gated, rough and runs through heavy fuels. There are few places for large apparatus to turn around along the narrow access roads. There is a 10,000 gallon cistern located on Visionary Trail, a 100,000 gallon cistern located on Genesee Avenue and another 100,000 gallon cistern located on Grandview. The nearest hydrant is located on Genesee

Mountain Road near I-70. Mount Vernon Station is the closest fire station and is approximately three miles from the main access to homes in this zone, however a mutual aid station operated by the Genesee Fire Department is about 1 ¼ miles away via Choke Cherry Lane.

Recommendations

- Defensible space is the highest priority in this zone. Homes are too spread out for linked defensible space to create a practical fire break, except for possibly along the north side of Genesee Avenue and Ski Hill Drive. It is therefore, of critical importance that every home have defensible space. See *Appendix A, Creating Defensible Space* for detailed recommendations.
- Consider partnering with property owners along Genesee Avenue and Ski Hill Drive to develop a fuel break using linked defensible spaces to separate homes from the heavy fuels to the north. This project would also improve evacuation safety.
- Along with defensible space, it is a high priority for homes in this zone to be fire hardened to the greatest extent practical. Heavy fuels, complex topography, poor access and the lack of water for suppression makes the ability of these homes to be fire resistive a critical factor in structure survivability. See *Appendix B, Reducing Structural Ignitability* for detailed recommendations.
- Although there are three cisterns located in this zone, the nearest hydrant is located on Genesee Mountain Road over a mile from the entrance to this zone. We also recommend at least one additional cistern of at least 10,000 gallons be located somewhere in the southern portion of this zone along either Genesee Spring Road or Choke Cherry Lane. All cisterns should include markers to aid responders in locating them. See the *General Recommendations* section for details.
- Evacuation will be difficult in this zone due to steep, narrow and winding roads with rough dirt surfaces. The four major roads in this zone all come together and exit to Genesee Mountain Road via Genesee Avenue which could create a serious choke point for evacuating residents and guests. Moderate to heavy vegetation grows right up to the roadside along some portions of the access roads. Roadside fuels reduction is highly recommended for all access roads and long private driveways. We recommend an evacuation plan be developed to assist in the most efficient evacuation of residents and visitors. Public education will be necessary to familiarize residents with the evacuation plan. This plan should be reviewed on a regular basis to ensure its continued viability. For more information on roadside vegetative management and evacuation planning see the *Access/Egress Routes and Evacuation Recommendations* section where an alternate emergency escape route for this zone is discussed.
- Although public street signs are marked at intersections with reflective signage, address markers are either missing or not reflective throughout this zone and placement is inconsistent. We recommend a program of installing reflective addressing that can be read at the street to assist responders in locating properties during an emergency. This can be especially critical during a large fire event for out of district responders who are not familiar with the area. For more information see the *Access/Egress Routes and Evacuation Recommendations* section.

Structural Ignitability Discussion – Hazard Zone F

Hazard Zone F

Hazard Rating:	**Moderate**
Utilities Above or Below Ground:	Underground
General Construction:	Primarily combustible siding with ignition resistant roofs
Average Lot Size:	Moderate to large
Dual Access Roads:	Yes
Road Widths, Slope and Surface:	Good
Water Supply:	Hydrants
Proximity to Fire Station:	Mount Vernon Station, 25191 Aspen Way

Zone Characteristics and Hazards

Residences in this zone are primarily small to moderate size single-family homes of newer construction. There are some large properties on large lots, but they are not the dominant type of residence. Density is still relatively low due to large open spaces. Some homes have decorative brick work or similar ignition resistant architectural details however, flammable siding is dominant. Some homes also have flammable decks and projections. Although some of the larger, newer homes homes have partial defensible space, most homes have flammable native and/or ornamental vegetation growing too close to the structure and little or no defensible space. There are power lines in the zone but, many homes have underground utilities. Some of the older homes, however, have propane tanks. Heavy to moderate loads of mixed conifer exist in stringers and patches broken by large expanses of short grasses. There is also at least one large, irrigated sports field. Terrain is gently to moderately rolling throughout, but there are homes located above steeper slopes along the northern edge. There are multiple ways in and out of this zone and roads are generally good. Public street signs are well marked at intersections, but not all street signage is reflective. Many address markers are either missing or not reflective and placement is inconsistent. The open nature and relatively gentle terrain allows for easy apparatus turnarounds in most of this zone. Water supply is provided by a municipal hydrant system. The Mount Vernon Fire Station is located in this zone.

Recommendations

- Defensible space is the highest priority. Although fuels are discontinuous there are still many homes in pockets of timber stands and few homes have any defensible space. Every home should have defensible space. See *Appendix A, Creating Defensible Space* for detailed recommendations.
- The Mount Vernon Metro District and the CSFS are working in fuels treatment units on the north and east sides of this zone. Their work should be completed and expanded. See the *Landscape Scale Recommendations* section for details.
- It is also a high priority for homes to be fire hardened to the greatest extent practical. Most homes in this zone are constructed with some or all flammable siding. Many also have flammable decks and projections. Along with defensible space, the ability of these homes to be fire resistive are the most critical factors in structure survivability. See *Appendix B, Reducing Structural Ignitability* for detailed recommendations.
- Although many of the roads are not impinged by heavy fuels, there are some road sections where heavy timber exists right up to the road. In these areas roadside limbing and thinning are recommended. For more information on roadside vegetative management see the *Access/Egress Routes and Evacuation Recommendations* section.
- Although public street signs are well marked at intersections many of those markers are not reflective and quite a few are painted wooden signs on wooden poles. Address markers are either missing or not reflective throughout this zone and placement is inconsistent. We recommend a program of installing ignition resistive, reflective street signage and address markers that can be read at the street to assist responders in locating properties during an emergency. This can be especially critical during a large fire event for out of district responders who are not familiar with the area. For more information see the *Access/Egress Routes and Evacuation Recommendations* section.

Structural Ignitability Discussion – Hazard Zone G

Hazard Zone G

Hazard Rating:	**Very High**
Utilities Above or Below Ground:	Above
General Construction:	Primarily combustible siding with ignition resistant roofs
Average Lot Size:	Small to moderate
Dual Access Roads:	No, see text
Road Widths, Slope and Surface:	Generally dirt, steep and narrow in sections
Water Supply:	One hydrant, may not be reliable
Proximity to Fire Station:	Lookout Mountain Station, 67 S. Lookout Mountain Road

Zone Characteristics and Hazards

Primarily single-family homes and seasonal cabins. Most of the homes are small to moderate size on small to moderate sized lots. There are a few larger agricultural lots in the lower elevations. Mostly older construction with wood or log siding being the most common construction type. Most homes have asphalt shingle or metal roofs, but some of the smaller cabins have tar paper roofs. Many homes have flammable decks, projections or fences and most have native vegetation too close to the structure. There are some properties with flammable outbuildings. Most homes do not have any defensible space. The electricity in this zone is provided by overhead power lines and most homes have propane tanks. This community is completely surrounded by and located in heavy conifer forest, except for the lower elevations where conifers thin out to stringers and patches and grasses become the dominant fuels. The terrain is steep and complex with homes located mid-slope and at the top of ravines. Most of the roads are dirt. They are narrow, winding and steep in most of this zone. Thick native vegetation grows right up to the road edges along most sections. Many homes are accessed by private roads or common driveways. All of these are dirt and surrounded by heavy vegetation. All the roads are dead-ends except for Cody Park Road which connects to Mistletoe Road but is closed off by a locked gate and “No Trespassing” signage, however, the fire department and adjacent property

owners can open this gate. There are very few turnarounds for apparatus. There is only one hydrant which is fed by a 4" lateral pipe that may be unreliable. There is a pond near this zone on Valley Creek Road, but there is no fire department connection and suction is required to draft from it. The closest fire station is the Lookout Mountain Station, which is a little more than half a mile from the junction of Cody Park Road and South Lookout Mountain Road.

Recommendations

- Although most homes in this zone have ignition resistant roofs there are few, if any, with any ignition resistant siding. Most also do not have defensible space. Defensible space is a high priority in this zone. See *Appendix A, Creating Defensible Space* for detailed recommendations.
- Along with defensible space, it is a high priority for homes in this zone to be fire hardened to the greatest extent practical. See *Appendix B, Reducing Structural Ignitability* for more detailed recommendations.
- Improving the water supply for fire suppression is an important need. The small lateral pipe feeding the hydrant should be improved, if possible, to provide a more reliable water source. At least one cistern of 10,000 gallons or more should be installed near the intersection of Cody Park Road and South Pine Road to serve the southern (upper) part of this zone and another located on Black Birch Road or Silver Willow Road to service northern part of this zone. All cisterns should include markers to aid responders in locating them. See the *General Recommendations* section for details.
- Most of the roads have a heavy accumulation of fuels immediately adjacent that should be thinned and limbed where practical. See the *Access/Egress Routes and Evacuation Recommendations* section for more information on roadside vegetative management.
- Evacuation will be difficult in this zone due to steep, narrow and winding roads with some rough dirt surfaces. We recommend an evacuation plan be developed to assist in the most efficient evacuation of residents and visitors. Public education will be necessary to familiarize residents with the evacuation plan. This plan should be reviewed on a regular basis to ensure its continued viability. For more information see the *Access/Egress Routes and Evacuation Recommendations* section where evacuation possibilities and a potential safety zone is discussed for Cody Park.
- Although public street signs are generally well marked and reflective, address markers are either missing or not reflective and placement is inconsistent. We recommend a program of installing reflective addressing that can be read at the street to assist responders in locating properties during an emergency. This can be especially critical during a large fire event for out of district responders who are not familiar with the area. For more information see the *Access/Egress Routes and Evacuation Recommendations* section.

Structural Ignitability Discussion – Hazard Zone H

Hazard Zone H

Hazard Rating:	**High**
Utilities Above or Below Ground:	Above
General Construction:	Primarily combustible siding with ignition resistant roofs
Average Lot Size:	Moderate to large
Dual Access Roads:	No
Road Widths, Slope and Surface:	Variable, see text
Water Supply:	Hydrant
Proximity to Fire Station:	Lookout Mountain Station, 67 S. Lookout Mountain Road

Zone Characteristics and Hazards

Residences in this zone are primarily large to moderate size single-family homes of newer construction. Most of these are on large to moderate size lots and structure density is low. Some homes have decorative brick work or similar ignition resistant architectural details however, flammable siding with an asphalt shingle, or other ignition resistant roofing type, is dominant. Some homes also have flammable decks and projections. Most homes have no or inadequate defensible space with flammable native and/or ornamental vegetation growing too close to the structure. Power lines are above ground and some of the older homes may have propane tanks. Heavy to moderate loads of mixed conifer are continuous on the north and east sides of this zone, becoming more broken by grassy openings on the south and west sides. Terrain is moderately to steeply sloping with homes located mid-slope and on high points. Krestview Lane, and Hess Avenue are the only ways into this zone. Both are dead ends and do not connect to each other. These main access roads are paved and in generally good condition however, both Old Y Road and Aspen Lane are dirt. Aspen Lane is 4WD only in some sections. There are no good turnarounds for apparatus, except for perhaps in some private driveways. Some roads and

common driveways are narrow. Public streets are marked at intersections, but street signage is not reflective. Many address markers are either missing or not reflective and placement is inconsistent. There is one hydrant at the Lookout Mountain Fire Station, which is located at the entrance to this zone. Another hydrant is marked on the FFPD hydrant map as being located on Krestwiew Lane, but this location could not be verified in the field. The Lookout Mountain Fire Station is located in this zone.

Recommendations

- Most homes do not have defensible space. Defensible space is a high priority in this zone. See *Appendix A, Creating Defensible Space* for detailed recommendations.
- Along with defensible space, it is also high priority for homes in this zone to be fire hardened to the greatest extent practical. See *Appendix B, Reducing Structural Ignitability* for more detailed recommendations.
- Improving the water supply for fire suppression is also an important need. Consider constructing at least one cistern of at least 10,000 gallons near the intersection of Krestview lane and Aspen Lane and another near the end of Hess Avenue. If possible, it would be desirable to also add another cistern near the end of Old Y Road. This is especially important if the hydrant marked as being on Krestview Lane near the Old Y Road intersection is missing or non-functional. All cisterns should include markers to aid responders in locating them. See the *General Recommendations* section for details.
- Some road segments have heavy fuels immediately adjacent that should be thinned and limbed where practical. See the *Access/Egress Routes and Evacuation Recommendations* section for more information on roadside vegetative management.
- Although public streets are generally marked most street signs are not reflective. Address markers are either missing or not reflective and placement is inconsistent. We recommend a program of installing reflective street signs and address markers that can be read from the street to assist responders in locating properties during an emergency. This can be especially critical during a large fire event for out of district responders who are not familiar with the area. For more information see the *Access/Egress Routes and Evacuation Recommendations* section.

Structural Ignitability Discussion – Hazard Zone I

Hazard Zone I

Hazard Rating:	**Moderate**
Utilities Above or Below Ground:	Underground
General Construction:	IR and combustible siding with ignition resistant roofs
Average Lot Size:	Small to moderate
Dual Access Roads:	No
Road Widths, Slope and Surface:	Good
Water Supply:	Hydrants
Proximity to Fire Station:	Lookout Mountain Station, 67 S. Lookout Mountain Road

Zone Characteristics and Hazards

Residences in this zone are primarily large single-family homes of newer construction. Most of these are on large to moderate size lots and structure density is low. Most of these homes have at least some ignition resistant siding, however, most also have at least some flammable siding and a few are constructed of primarily flammable siding. All these homes have an asphalt shingle, or other ignition resistant, roofing type. Some homes also have flammable decks and projections. Most homes have no or inadequate defensible space with flammable native and/or ornamental vegetation growing too close to the structure. Utilities are underground. Heavy to moderate loads of mixed conifer occur in stringers and patches near and below homes but are broken by large grassy openings creating a discontinuous fuel bed. Most homes are located along the top of a steep ridge or mid-slope on moderate to steep slopes. Access roads and driveways are all dead ends and access to these homes is one way in and out. Roads and drives are generally good and of adequate width. There is a good turnaround for apparatus at the end of Indian Paintbrush Road and some driveways have adequate turnarounds. Although Indian Paintbrush road has a reflective sign at its junction with South Lookout Mountain, most of the driveways do not have reflective address markers at the road. Address markers are either not visible from the street or not reflective. Water supply for this zone is provided by a municipal hydrant system. The Lookout Mountain Fire Station is located less than ½ mile from this zone.

Recommendations

- Defensible space is the highest priority. Although fuels are discontinuous there are still homes in pockets of timber stands and few homes have any defensible space. Every home should have defensible space. See *Appendix A, Creating Defensible Space* for detailed recommendations.
- It is also a high priority for homes to be fire hardened to the greatest extent practical. Although most homes in this zone are constructed with some or all flammable siding, several also have flammable decks and projections. Along with defensible space, the ability of these homes to be fire resistive are the most critical factors in structure survivability. See *Appendix B, Reducing Structural Ignitability* for detailed recommendations.
- Address markers are either not visible from the road or not reflective and placement is inconsistent. We recommend a program of installing reflective address markers that can be read at the street to assist responders in locating properties during an emergency. This can be especially critical during a large fire event for out of district responders who are not familiar with the area. For more information see the *Access/Egress Routes and Evacuation Recommendations* section.

Structural Ignitability Discussion – Hazard Zone J

Hazard Zone J

Hazard Rating:	**High**
Utilities Above or Below Ground:	Above ground
General Construction:	Combustible siding with IR roofs
Average Lot Size:	Moderate to large
Dual Access Roads:	No
Road Widths, Slope and Surface:	Improved dirt, narrow and steep in spots
Water Supply:	Two small ponds. No other water.
Proximity to Fire Station:	Lookout Mountain Station, 67 S. Lookout Mountain Road

Zone Characteristics and Hazards

Residences in this zone are primarily moderate to large single-family homes of older construction. Homes are on large to moderate sized lots and density is low. There is one small apartment building in this zone. Some homes have decorative brick work or similar ignition resistant architectural details however, flammable siding is dominant. Some homes also have flammable decks, projections and/or outbuildings. The historic church and community center is all wood construction and over 100 years old. Although some of the larger, properties have partial defensible space, many homes and the apartment building have flammable native and/or ornamental vegetation growing too close to the structure. Power lines are above ground and some of the older homes may have propane tanks. Heavy to moderate loads of mixed conifer exist in stringers and patches broken by large expanses of short grasses. There is also a corridor of moderately dense riparian vegetation along the valley bottom. This community is in a steep valley with complex topography. Although some homes are located in the valley bottom, most are located mid slope and at the top of ridges. There are three entrance roads, but all are dead end and none of them connect. Most roads are dirt and some sections are steep and narrow. Streets are marked, but most address markers are either missing or not reflective and placement is

inconsistent. There are no turnarounds for apparatus on the narrow roads, but some driveways may have adequate turnarounds. There are two small ponds that could be used for dip/draft. One on Rockland Road and one on Valley Creek Road. The Lookout Mountain Station is about two miles from this zone.

Recommendations

- Most homes do not have defensible space. Defensible space is a high priority in this zone. See *Appendix A, Creating Defensible Space* for detailed recommendations.
- Along with defensible space, it is also a high priority for homes in this zone to be fire hardened to the greatest extent practical. See *Appendix B, Reducing Structural Ignitability* for more detailed recommendations.
- Improving the water supply for fire suppression is also an important need. Consider constructing at least one cistern of at least 10,000 gallons near the intersection of Rockland Road and Blue Ridge Road and another on Valley Creek Road.
- A few road segments have heavy fuels immediately adjacent that should be thinned and limbed where practical. See the *Access/Egress Routes and Evacuation Recommendations* section for more information on roadside vegetative management.
- Some intersections are not marked. Reflective street signs should be added at any intersection that is not already marked. Address markers are either missing or not reflective throughout this zone and placement is inconsistent. We recommend a program of installing reflective address markers that can be read from the street to assist responders in locating properties during an emergency. This can be especially critical during a large fire event for out of district responders who are not familiar with the area. For more information see the *Access/Egress Routes and Evacuation Recommendations* section.

Structural Ignitability Discussion – Hazard Zone K

Hazard Zone K

Hazard Rating:	**High**
Utilities Above or Below Ground:	Above ground
General Construction:	Combustible siding with IR roofs
Average Lot Size:	Moderate
Dual Access Roads:	Yes
Road Widths, Slope and Surface:	Paved and dirt, narrow and steep in spots
Water Supply:	Hydrants.
Proximity to Fire Station:	Lookout Mountain Station, 67 S. Lookout Mountain Road

Zone Characteristics and Hazards

Residences in this zone are primarily moderate size single-family homes of older construction. Most homes are on moderate sized lots, but there are some large lots and horse properties. Some homes have decorative brick work or similar ignition resistant architectural details however, flammable siding is dominant. Many homes also have flammable decks, fences and/or outbuildings. There are wood piles and other flammable jackpots of fuels close to some structures and some properties have flammable liquid storage tanks, most likely gasoline, in their yards. Most homes do not have defensible space and fuels are continuous right up to the structure. Powerlines are above ground and many homes have propane tanks. High tension lines run close to several homes. Heavy to moderate loads of mixed conifer exist throughout this zone, but are broken by the high-tension power line cut and grassy openings. This zone is bordered by open space on the north and east sides. Topography is steep and complex with many homes located mid slope and at the top of ridges. There are two ways in and out, but both rely on Colorow Road. Most roads are dirt or gravel. Many sections are steep and narrow and there are some very bad surfaces. Flammable native vegetation grows up to and over most roads. Most roads and community driveways are dead ends. Streets have good reflective markers, but most

address markers are either missing or not reflective and placement is inconsistent. There are no turnarounds for apparatus on the narrow roads, but some private driveways may have turnarounds. Water supply for this zone is provided by a municipal hydrant system. The Lookout Mountain Station is less than half a mile from this zone.

Recommendations

- Most homes do not have defensible space and there are several with woodpiles, flammable liquid tanks and other hazards close to homes. Defensible space is a high priority in this zone. See *Appendix A, Creating Defensible Space* for detailed recommendations.
- Along with defensible space, it is also high priority for homes in this zone to be fire hardened to the greatest extent practical. See *Appendix B, Reducing Structural Ignitability* for more detailed recommendations.
- Most roads have heavy fuels immediately adjacent that should be thinned and limbed where practical. Some of the rougher roads should be improved for better emergency equipment access, to improve access and evacuation times and help prevent bottlenecks. See the *Access/Egress Routes and Evacuation Recommendations* section for more information on roadside vegetative management.
- Address markers are either missing or not reflective throughout this zone and placement is inconsistent. We recommend a program of installing reflective address markers that can be read from the street to assist responders in locating properties during an emergency. This can be especially critical during a large fire event for out of district responders who are not familiar with the area. For more information see the *Access/Egress Routes and Evacuation Recommendations* section.

Structural Ignitability Discussion – Hazard Zone L

Hazard Zone L

Hazard Rating:	**Low**
Utilities Above or Below Ground:	Above ground
General Construction:	IR and combustible siding with IR roofs
Average Lot Size:	Moderate to large
Dual Access Roads:	Yes
Road Widths, Slope and Surface:	Generally good
Water Supply:	Hydrants
Proximity to Fire Station:	Lookout Mountain Station, 67 S. Lookout Mountain Road

Zone Characteristics and Hazards

Residences in this zone are primarily moderate to large single-family homes. Homes are on large to moderate sized lots. Most of the never homes have at least some ignition resistant construction, but there are still many with flammable siding. Many homes also have flammable decks, projections and/or fencing. Although some properties have partial defensible space, many homes have flammable native and/or ornamental vegetation growing too close to the structure. Power lines are above ground and some of the older homes may have propane tanks. Fuels are primarily grasses with scattered conifer patches in the southern part of this zone. Heavier loads of mixed conifer exist on the north and east sides but are still broken by large expanses of short grasses. There are also light to moderate loads of riparian vegetation along drainage bottoms. This general topography is moderate to steeply rolling hills. Although some homes are located in the gentler terrain, many are located mid slope and at the top of ridges in the steeper areas. There are many are dead end roads, but there are also multiple ways in and out of this zone. Most roads are paved and of adequate width. There are several places to turnaround apparatus. Streets are well marked with reflective signage, but many address markers are either not visible from the

street or not reflective. Water supply for this zone is provided by a municipal hydrant system. The Lookout Mountain Station is less than half a mile from this zone.

Recommendations

- Most homes do not have defensible space. Defensible space is a high priority in this zone. See *Appendix A, Creating Defensible Space* for detailed recommendations.
- Along with defensible space, it is also a high priority for homes in this zone to be fire hardened to the greatest extent practical. See *Appendix B, Reducing Structural Ignitability* for more detailed recommendations.
- A few road segments have heavy fuels immediately adjacent that should be thinned and limbed where practical. See the *Access/Egress Routes and Evacuation Recommendations* section for more information on roadside vegetative management.
- Address markers are either not visible from the street or not reflective throughout this zone. We recommend a program of installing reflective address markers that can be read from the street to assist responders in locating properties during an emergency. This can be especially critical during a large fire event for out of district responders who are not familiar with the area. For more information see the *Access/Egress Routes and Evacuation Recommendations* section.

Structural Ignitability Discussion – Hazard Zone M

Hazard Zone M

Hazard Rating:	**Moderate**
Utilities Above or Below Ground:	Above ground
General Construction:	Mostly combustible siding with IR roofs
Average Lot Size:	Moderate to large
Dual Access Roads:	Yes
Road Widths, Slope and Surface:	Main roads good, others narrow gravel/dirt
Water Supply:	Hydrants
Proximity to Fire Station:	Lookout Mountain Station, 67 S. Lookout Mountain Road

Zone Characteristics and Hazards

Residences in this zone are primarily moderate size single-family homes. Homes are on large to moderate sized lots. The homes in this zone are mostly older construction, but there are some newer homes with at least partial IR siding. Most roofs are asphalt shingle, but there are a few older homes with flammable composition roofs. Many homes also have flammable decks, projections and/or fencing. Although some properties have partial defensible space, many homes have flammable native and/or ornamental vegetation growing too close to the structure. There are some homes with slash piles, firewood and other fuels near structures. Powerlines are above ground and most of the older homes have propane tanks. Fuels are primarily conifer patches with grass understory broken by grassy openings however, three large swaths of heavy conifer fuels cross this zone. One is shown in the photo above. Terrain is complex with moderate to steep slopes. Many homes are located mid slope, at the top of ridges and above ravines. Although there are many are dead end roads, there are multiple ways in and out of this zone. The main roads have good surfaces and are of adequate width. There are several turnarounds for apparatus. Streets are marked with reflective signage, but many address markers are either not visible from the street or not reflective. Water supply for this zone is provided by a municipal hydrant system. The Lookout Mountain Station is about a mile from the central access road to this zone.

Recommendations

- Most homes do not have defensible space. Defensible space is a high priority in this zone. See *Appendix A, Creating Defensible Space* for detailed recommendations.
- Along with defensible space, it is also high priority for homes in this zone to be fire hardened to the greatest extent practical. See *Appendix B, Reducing Structural Ignitability* for more detailed recommendations.
- Some road segments have heavy fuels immediately adjacent that should be thinned and limbed where practical. See the *Access/Egress Routes and Evacuation Recommendations* section for more information on roadside vegetative management.
- Address markers are either not visible from the street or not reflective throughout this zone. We recommend a program of installing reflective address markers that can be read from the street to assist responders in locating properties during an emergency. This can be especially critical during a large fire event for out of district responders who are not familiar with the area. For more information see the *Access/Egress Routes and Evacuation Recommendations* section.

Structural Ignitability Discussion – Hazard Zone N

Hazard Zone N

Hazard Rating:	**Moderate**
Utilities Above or Below Ground:	Above ground
General Construction:	Mostly combustible siding with IR roofs
Average Lot Size:	Moderate to large
Dual Access Roads:	Yes
Road Widths, Slope and Surface:	Main roads good, others narrow gravel/dirt
Water Supply:	Hydrants
Proximity to Fire Station:	Grapevine Station, 893 S. Grapevine Road

Zone Characteristics and Hazards

Residences in this zone are primarily large, newer single-family homes. Homes are on large to moderate sized lots. There is a mix of ignition resistant and combustible siding, but most homes have at least some flammable surfaces. Roofs are ignition resistant with asphalt shingle, tile and metal being the most common types. Many homes also have flammable decks, projections and/or fencing. Most homes have flammable native and/or ornamental vegetation growing too close to the structure and few have any defensible space. Utilities are underground. Fuels are primarily heavy to moderate conifer stands with grass understory broken by grassy openings. Terrain is complex with steep slopes. Many homes are located mid slope, at the top of ridges and above ravines. Although there are many are dead end roads, there are multiple ways in and out of this zone, but the main accesses are gated. Most roads are good with paved surfaces, but there are many steep, narrow driveways. There are very few turnarounds and most of those are not adequate for large apparatus. Streets are marked with reflective signage, but many address markers are either not visible from the street or not reflective. Water supply for this zone is provided by a municipal hydrant system and there are at least two ponds that could be used for dip/draft. The Grapevine Station is located in this zone.

Recommendations

- Most homes do not have defensible space. Defensible space is a high priority in this zone. See *Appendix A, Creating Defensible Space* for detailed recommendations.
- Along with defensible space, it is also high priority for homes in this zone to be fire hardened to the greatest extent practical. See *Appendix B, Reducing Structural Ignitability* for more detailed recommendations.
- Some road segments have heavy fuels immediately adjacent that should be thinned and limbed where practical. See the *Access/Egress Routes and Evacuation Recommendations* section for more information on roadside vegetative management.
- An evacuation preplan is recommended for this zone due to relatively high density, steep, winding road sections and gated access that could create choke points.
- Address markers are either not visible from the street or not reflective throughout this zone. We recommend a program of installing reflective address markers that can be read from the street to assist responders in locating properties during an emergency. This can be especially critical during a large fire event for out of district responders who are not familiar with the area. For more information see the *Access/Egress Routes and Evacuation Recommendations* section.

Structural Ignitability Discussion – Hazard Zone O

Hazard Zone O

Hazard Rating:	**Extreme**
Utilities Above or Below Ground:	Above ground
General Construction:	Mostly combustible siding with IR roofs
Average Lot Size:	Moderate to large
Dual Access Roads:	Yes
Road Widths, Slope and Surface:	Main roads good, others narrow gravel/dirt
Water Supply:	One hydrant and one cistern
Proximity to Fire Station:	Grapevine Station, 893 S. Grapevine Road

Zone Characteristics and Hazards

Residences in this zone are primarily older, moderate size single family homes and seasonal cabins mixed with a few larger, newer homes. Most homes are on small to moderate sized lots. Some of the newer homes have some ignition resistant siding, but combustible siding is dominant. Roofs are generally ignition resistant types. Many homes have flammable decks, projections and/or outbuildings. Most homes have flammable native and/or ornamental vegetation growing too close to the structure and few (if any) have any defensible space. Powerlines are above ground and propane tanks are common. Fuels are primarily heavy conifer stands with some grassy openings. Terrain is complex with very steep slopes. Many homes are located mid slope, at the top of ridges and above ravines. There is only one way in and out of this zone. Roads are paved, but they are steep, winding and narrow in spots. There are very few turnarounds and no good places to turnaround large apparatus. Some streets are not well marked and most address markers are not present, not visible from the street, or not reflective. There is one hydrant indicated on the FFPD hydrant map and one suction-only 10,000 gallon cistern on Spruce Road. The Grapevine Station is located approximately one mile from this zone.

Recommendations

- Although most homes in this zone have ignition resistant roofs there are few with any ignition resistant siding. Most also do not have defensible space. Defensible space is a high priority in this zone. See *Appendix A, Creating Defensible Space* for detailed recommendations.
- Along with defensible space, it is also high priority for homes in this zone to be fire hardened to the greatest extent practical. See *Appendix B, Reducing Structural Ignitability* for more detailed recommendations.
- Improving the water supply for fire suppression is also an important need. At least two cisterns of at least 10,000 gallons fitted with fire department appropriate connections should be installed. One in the north end of this zone and another in the south.
- Most of the roads have a heavy accumulation of fuels immediately adjacent that should be thinned and limbed where practical. See the *Access/Egress Routes and Evacuation Recommendations* section for more information on roadside vegetative management.
- Evacuation will be difficult in this zone due to steep winding roads with several possible choke points. We recommend an evacuation plan be developed to assist in the most efficient evacuation of residents and visitors. Public education will be necessary to familiarize residents with the evacuation plan. This plan should be reviewed on a regular basis to ensure its continued viability. For more information see the *Access/Egress Routes and Evacuation Recommendations* section.
- Some streets are not well marked. Address markers are either missing or not reflective and placement is inconsistent. We recommend a program of installing reflective street signage at all intersections and where streets change names. Reflective address markers that can be read at the street to assist responders in locating properties during an emergency are also needed. This can be especially critical during a large fire event for out of district responders who are not familiar with the area. For more information see the *Access/Egress Routes and Evacuation Recommendations* section.

Structural Ignitability Discussion – Hazard Zone P

Hazard Zone P

Hazard Rating:	**Very High**
Utilities Above or Below Ground:	Above ground
General Construction:	Mostly combustible siding with IR roofs
Average Lot Size:	Small to moderate
Dual Access Roads:	Yes
Road Widths, Slope and Surface:	Steep, narrow. Several bad roads
Water Supply:	Hydrants, but see text
Proximity to Fire Station:	Idledale Station, 21698 Miller Lane

Zone Characteristics and Hazards

In the northern part of this zone there are some large homes with newer, and at least partially ignition resistant construction, but these are all located on dead end roads above steep slopes. In the rest of this zone, including the town of Idledale, most properties are small, single-family homes and seasonal cabins. These are of older wood siding construction and although most have asphalt shingle roofs, there are some with tar paper or flammable composition roofs. Many homes have flammable decks, projections and/or outbuildings. Most homes have flammable native and/or ornamental vegetation growing too close to the structure and few (if any) have any defensible space. Powerlines are above ground and propane tanks are common. Fuels are primarily heavy conifer stands with some grassy openings. There are also moderate to heavy loads of riparian vegetation along drainage bottoms and Bear Creek. Other than the valley bottom along Bear Creek, the terrain is complex with steep slopes. Many homes are located mid slope, at the top of ridges and above ravines. Both Grapevine Road and Hwy 74 access this zone, but there are hazardous sections along both. Roads are steep, winding and very narrow in spots. Most are not paved and heavy fuel loads exist right up to the edges. There are very few turnarounds for apparatus. Some streets are not well marked and most address markers are not present, not visible from the street or not reflective. Although there are hydrants in Idledale there

are none in the northern area, but there are several cisterns of at least 10,000 gallons. This area also receives a large number of visitors due to open space parks. The Grapevine Station is located in this zone.

Recommendations

- Although most homes in this zone have ignition resistant roofs there are few with any ignition resistant siding. Most also do not have defensible space. Defensible space is a high priority in this zone. See *Appendix A, Creating Defensible Space* for detailed recommendations.
- Along with defensible space, it is also high priority for homes in this zone to be fire hardened to the greatest extent practical. See *Appendix B, Reducing Structural Ignitability* for more detailed recommendations.
- All cisterns should include markers to aid responders in locating them. See the *General Recommendations* section for details.
- Most of the roads have a heavy accumulation of fuels immediately adjacent that should be thinned and limbed where practical. See the *Access/Egress Routes and Evacuation Recommendations* section for more information on roadside vegetative management.
- Evacuation will be difficult in this zone due to narrow, steep, winding roads and many homes located on dead end roads and long driveways. Evacuation is also complicated here due to a high volume of visitors. We recommend an evacuation plan be developed to assist in the most efficient evacuation of residents and visitors. Public education will be necessary to familiarize residents with the evacuation plan. This plan should be reviewed on a regular basis to ensure its continued viability. For more information see the *Access/Egress Routes and Evacuation Recommendations* section.
- Some streets are not well marked. Address markers are either missing or not reflective throughout this zone and placement is inconsistent. We recommend a program of installing reflective street signage at all intersections and anywhere streets change names. Reflective address markers that can be read at the street to assist responders in locating properties during an emergency are also needed. This can be especially critical during a large fire event for out of district responders who are not familiar with the area. For more information see the *Access/Egress Routes and Evacuation Recommendations* section.

General Recommendations

The two most important recommendations in this report are;
1) to incorporate defensible space techniques and ignition resistant construction in future development plans, and 2) for existing structures to be fire hardened to the greatest extent practical. Detailed information on achieving these goals is available on the WMI and in *Appendix A, Creating Defensible Space* and *Appendix B, Reducing Structural Ignitibility*.

The following general measures listed below should be practiced throughout the study area. Some of these recommendations may already be in place in some areas.

1. There are 40 cisterns suitable for fire suppression use scattered throughout the district (see Figure 2). Foothills Fire maintains a map with addresses and capacities, however, these cisterns are not marked and many could be difficult to locate. All these cisterns should be clearly marked by placing a reflective sign and reflectors on a three-foot metal post. Ideally the sign should indicate the capacity of the cistern and whether or not there is a fire department connection. Placing large rocks approximately 12 inches in front of any pipes or connections is recommended to help avoid accidental collisions.
2. Clean roofs and gutters at least twice a year. It is especially important to remove pine needles and other flammable litter from the roof.
3. Don't store firewood or other combustibles under decks or wooden projections.
4. Maintain an irrigated greenbelt or other non-combustible ground cover around buildings.
5. Maintain and clean spark arresters on any chimneys.
6. Connect and have available a minimum of 50 feet of garden hose near all buildings to extinguish small fires before they spread. For large buildings two or more hoses may be required to provide adequate coverage.
7. Trees, large shrubs and other vegetation along roads and driveways should be pruned as necessary to maintain a minimum of 15 feet of vertical clearance for emergency vehicle access. Ladder fuels (low-lying branches allowing fire to climb from the ground into trees) should be removed to a height of at least 15 feet above the ground or no more than 1/3 the tree height, whichever is less. This includes both conifers and deciduous trees.
8. Maintain the defensible space around buildings by:
    a. Mowing grass and weeds to a height of four inches or less
    b. Removing any branches overhanging roofs or chimneys.
    c. Removing all trash, debris and cuttings from the defensible space. Debris and cuttings should be completely removed from the area and never dumped into adjacent wildlands or vacant lots.

It is very important to remember that fire mitigation is not a one-time job. Defensible space should be maintained year-round and reducing structural ignitibility is an on-going process. For more information, please see *Appendix A, Creating Defensible Space* and *Appendix B, Reducing Structural Ignitibility* and the WMI.

The WMI should be reviewed and continuously updated to ensure the information regarding hazards and recommended solutions as well as other important information presented there stays current.

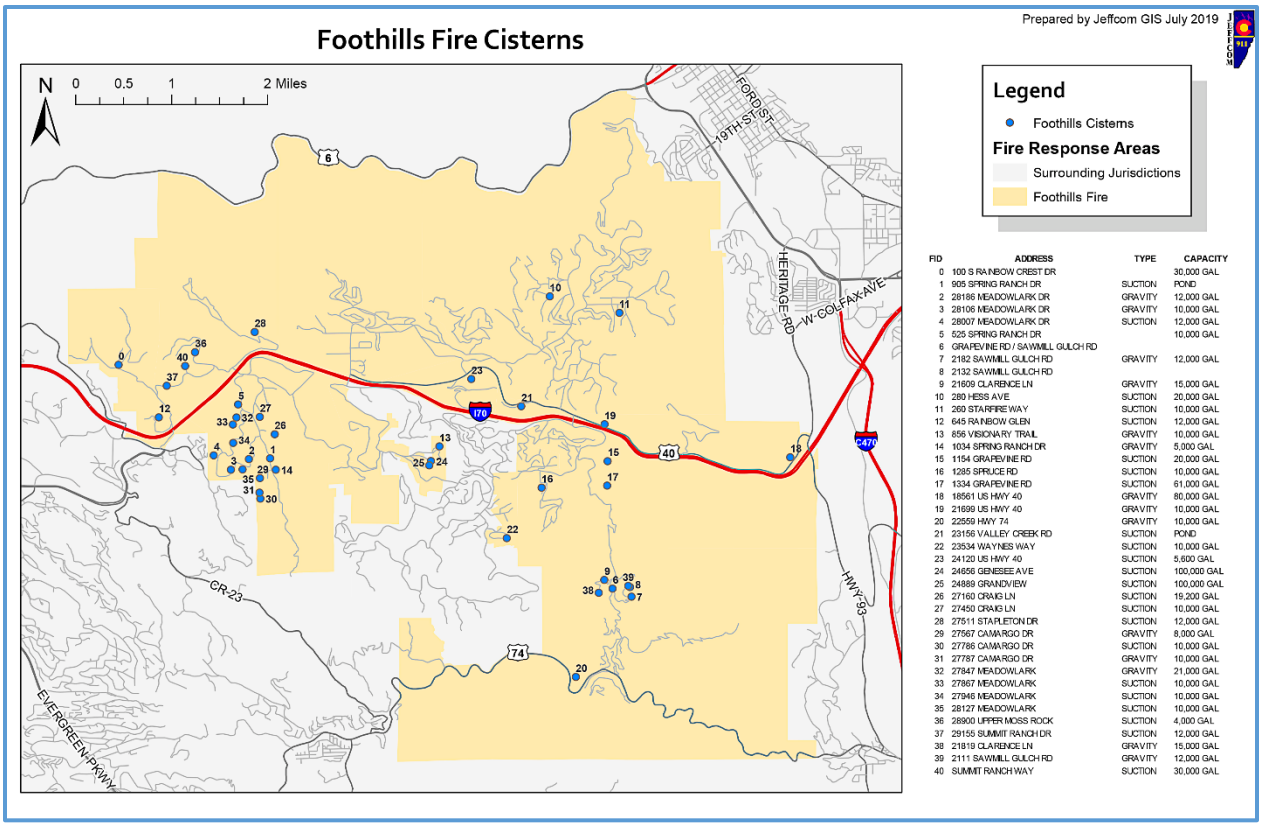

Figure 2, Foothills Fire Cistern Locations

Access/Egress Routes & Evacuation Recommendations

I-70 is the main east/west corridor through the central portion of the study area. Hwy 74 (Bear Creek Road) is the primary east/west route out of the southern part of the district. Hwy 45 (Grapevine Road) and Lookout Mountain Road provide the primary north/south access. US 40 is also an important east/west route. Time Until Fire Arrival (TUFA) has been modeled for these main access routes. TUFA is a tool that combines GIS spatial analysis with rate of spread modeling. It calculates the time for a wildfire to arrive at the selected points of interest. TUFA uses a fixed wind and moisture profile but adjusts for slope, aspect and fuel models to derive a rate of spread for every point on the landscape. Since it isn't possible to predict exactly where an ignition resulting in a significant wildfire will occur, this is a useful way to analyze multiple areas on the landscape. In the case of this analysis, the time it would take fire to impact the primary egress routes listed above from ignitions occurring in wildland fuels within and adjacent to the district. Detailed results are available on the Web Map Interface (WMI) and should be used to aid evacuation planning for the district.

Significant alternative access routes include:

- Summit Ranch Road to Rainbow Hill Road
- Genesee Mountain Road to Chief Hosa exit on I-70
- Cody Park Road to Mistletoe Road
- Pine Road to Krestview Lane in Cody Park

Although many of the neighborhoods in the study area are one way in and out, access to at least one of the main roads out of the district is generally paved, of good quality and the most direct way out is obvious. There are some neighborhoods, however, particularly in Hazard Zones A, B, D, E, G, N, O and P where evacuation could be difficult due to road and fuel conditions. The alternative access routes listed above could provide possible options in these areas should the main access become compromised by fire or congestion.

Summit Ranch Road to Rainbow Hill Road (approximately .3 miles)
From the cul-de-sac at the end of Summit Ranch Road this route follows a dirt road marked "private" going west and passing a cistern on the right. Just after the cistern this route turns right at a fork. The left fork dead ends in a driveway. The right fork descends to Rainbow Hill Road. There are no gates on this route, but marking and roadside thinning are recommended. See the recommendations section below for details.

Genesee Mountain Road to Chief Hosa exit on I-70 (1.52 miles gate to gate)
Hazard Zone E is an isolated part of the district bordered on the west by Genesee Mountain Park and separated from the main section of the Town of Genesee by rough terrain. Access is by Genesee Mountain Road from I-70. The land surrounding this road has numerous small slash piles and moderate to heavy loads of conifer with grass understory that could threaten egress should an ignition in the park become a significant fire. The proposed alternative route is gated on both ends. It is a well-maintained gravel road of adequate width and although the public is allowed to hike and bike this road private cars are not allowed. The upper gate is at Cold Springs Road and the lower exit is at the Chief Hosa Campground. Quite a bit of fuels maintenance work

has been done here and spacing and limbing are generally good near the road. A resident Bison herd helps keep grasses short. Maintenance of the roadside thinning specifications listed in the recommendations section below are recommended along this entire route. Both gates should be marked as an emergency wildfire evacuation route as described in the recommendations section.

Cody Park Road to Mistletoe Road (direct connection)
At the end of Cody Park Road there is a locked gate marked "no trespassing" but otherwise Cody Park Road connects directly with Mistletoe Road and both roads are passable by passenger cars. This gate should be marked as an emergency wildfire evacuation route as described in the recommendations below and roadside thinning is recommended for both Cody Park Road and Mistletoe Road. This will provide an additional evacuation route connecting Hazard Zone G with Hazard Zones D and F.

Pine Road to Krestview Lane
This rough, potentially hazardous route should not be used to evacuate residents and visitors, but could be improved to provide firefighter access to the lower sections of Cody Park so as not to conflict with residents evacuating by taking Spruce and Pine Roads to South Lookout Mountain Road. This road is narrow and steep, but surface improvements and roadside thinning of fuels could be used to improve responder safety. To discourage the use by residents this route should be marked at both ends as for emergency vehicles only and/or gated.

There is a very rough road from the bottom of Cody Park through the Clear Creek Conservation Easement. This road is not passable for passenger cars and could be difficult and dangerous for even 4WD emergency vehicles. It is not recommended as an evacuation route, however, there is a possibility of creating a last resort safety zone as described in the recommendations below. Although ownership issues prevent improvements to this road, it should be maintained as much as possible to provide firefighter access and a potential control line.

Recommendations

Some of the alternative access roads mentioned above are marked as "no trespassing" and/or "private road." A few of these have locked gates. This could create confusion for visitors and some residents should the need arise to use these routes for evacuation during a fire, even if the gates are unlocked by firefighters. We recommend adding signs at every gate and junction along these routes as well as at any point where there is a private road or no trespassing sign with a sign marking the route as a wildfire evacuation route similar to the example in Figure 3. All the primary and alternative roads should be inspected periodically at junctions to be sure they have reflective signage with at least 4" tall characters.

Figure 3 Evacuation signage route example

While street signs throughout the district are generally good and consistent, there are many homes in FFPD that do not have an address marker visible from the street. Where address markers do exist, they vary in size, reflectivity and position. Although mapping applications such as Google Map and Waze have made it easier for responders to locate specific structures, reflective addressing visible from the street is still desirable. Most applications relying on GPS technology have difficulty pinpointing addresses from time to time. While some residents may consider reflective address signage to be unattractive, it is a desirable aid for quick and effective response. The value to responders, especially at night and under difficult conditions, is not to be underestimated. This is especially true during large wildland fires where poor addressing will create an additional challenge for outside responders who do not have local knowledge and training regarding access.

Although consistent, reflective address markers seem less important with today's technology it's important to remember that technology does fail and a program of improving address markers throughout the study area is still desirable. We recommend FFPD, all existing or planned HOAs, the town government of Genesee, and property owners work together to create and implement a consistent system of reflective address markers. If the residence is not visible from the street, an address marker should be located on the street at the entrance to the driveway. An additional address marker showing all residences located on communal driveways should be placed at the point where the private drive joins a public road.

Access road vegetation management is recommended for all the primary and alternate routes described in this section. Fuels should be monitored along all these routes to be sure flammable vegetation does not compromise their use during wildfire events. Limbing and thinning should be conducted in any section where fuels are found near the road. Hazardous trees and shrubs should be removed within 10 feet of the roadway and any grasses mowed to a height of no greater than four inches. Trees should be trimmed to at least a height of eight feet for trees 25

feet or taller and 1/3 the tree height for smaller trees within 30 feet of the roadway to prevent surface fires from laddering into the canopy near the road.

Evacuation is the first priority for homes throughout the study area threatened by wildfire, however in Hazard Zone G the lower section of Cody Park could face evacuation challenges created by steep, narrow roads, distance from the main access at South Lookout Mountain Road, heavy fuels and the lack of water for fire suppression. A large meadow exists in the conservation easement at the bottom of Cody Park that could be pre-planned as a last resort safety zone should evacuation become impossible. This meadow is accessed by a paved driveway located at 355 Black Birch Road. An address marker is located at the junction of this driveway and the road. We recommend an additional reflective marker be added if the meadow is developed and preplanned as a safety zone. A 10 to 12 foot gate should be installed in the fence separating this meadow from the access driveway to allow access for fire apparatus. Grasses should be mowed from the fence and this gate to a maximum height of four inches for 300 feet in all directions and homes within 300 feet should have linked defensible space as described earlier in this report.

The WMI should be utilized to be sure information regarding evacuation routes is updated frequently during the fire season and remains current.

Shelter-in-Place

Traditionally in the United States the preferred method of protecting the public from an advancing wildfire is evacuation and involves relocation of the threatened population to a safer area. When this tactic is impractical or too hazardous another possibility is to instruct people to remain inside specially prepared buildings until the danger passes. This concept is controversial regarding wildfire in the United States, but not for hazardous materials incident response where time, nature of the hazards, and sheer logistics often make evacuation impossible. It is the dominant modality for public protection from wildfires in Australia where a dispersed population and fast moving, non-persistent fires in light fuels make evacuation impractical. The success of this tactic depends on a detailed preplan that takes into account the construction type and materials of the building used, topography, depth and type of the fuel profile, as well as current and expected weather and fire behavior.

Shelter–in-place should only be considered when the structure is determined to be “stand alone” in structural triage terms. To be “stand alone” a combination of ignition resistant construction, and fuels reduction is necessary to provide reasonable protection to people inside from a wildfire and create an environment safe for firefighters to defend the structure. The building must have ventilation that can be easily shut down and isolated from outside air to retard smoke infiltration. In order to be “stand alone”, buildings must be of ignition resistant construction and have adequate defensible space.

Ignition resistant construction is necessary for shelter-in-place tactics. Structures with wooden roofs, flammable decks or projections or untreated wooden sidings are particularly hazardous and should not be considered. Structures should have ignition resistant roofs and ignition resistant siding, such as stucco or concrete, especially close to the ground. Eves should be enclosed and any holes in the foundation, siding, or eves should be covered to prevent embers

from entering. Buildings with large areas of non-burnable surfaces adjacent to them, such as paved parking lots and bare earth are desirable.

Defensible space fully conforming to the most current standards is also a requirement. For a detailed discussion of defensible space see *Appendix A, Creating Defensible Space.*

Although evacuation is preferred under most conditions there may be some areas where high numbers of people attempting to evacuate on residential streets may create a more dangerous situation than pre-planning shelter-in-place safety zones for residents and visitors. Schools and other public buildings may work well for this purpose. We recommend FFPD, local government and law enforcement work together to identify neighborhoods where pre-planning shelter-in-place locations could be a desirable alternative to evacuation.

Access Routes for Suppression Resources

In addition to the routes above, which unless otherwise indicated are designed to be used to evacuate residents and visitors as well as provide access to responders, there are other roads/trails that may be useful for emergency access by suppression resources only. In general these routes are difficult (high clearance, 4WD only, etc.), dangerous or may have restricted access. Foothills Fire maintains Google Earth files showing these routes, but we also recommend printed maps and descriptions of these routes become part of an Incident Response Plan which is updated annually to be sure any significant changes are captured. Printed versions allow distribution to outside resources and are not dependent on electricity or computer infrastructure. We also recommend fuels and surface conditions be maintained to the greatest extent practical so these routes do not become more hazardous to responders. They should also be evaluated annually to be sure they are still reasonable for responder use. The Google Earth files maintained by FFPD of these routes should also be included in the WMI where they can be easily updated.

In addition to the Pine Road to Krestview Lane route mentioned above the other existing routes of this type include the following:

- Coleman Fire Access Road
- Columbine Glen Fire Access Road
- Mount Vernon Treatment Plant Fire Access Road
- Silver Willow Fire Access Road
- Spruce Fire Access Road
- Well Road Fire Access Road
- Well Road to Bald Mountain Fire Access Road

LANDSCAPE SCALE RECOMMENDATIONS

When most people think of a fuel break they envision a line, usually 10 to 30 feet wide, where all vegetation has been removed to mineral soil; however, the concept of a fuel break can describe any area where fuels have been manipulated to strategically reduce the spread and intensity of wildfire. Since the concept of a fuel break is more nebulous than the specific definitions of "fireline" and "firebreak" as used by wildland firefighters, the effectiveness of fuel breaks has been the subject of debate among fire scientists and forest managers for many years. The concept of a "shaded fuel break" is most applicable to forested areas. Unlike firebreaks, which imply the removal of all vegetation down to mineral soil, shaded fuel breaks are created by altering the surface fuels, increasing the height to base of the live crown and opening the canopy by removing trees. It is important to note the purpose of a fuel break is not to stop a fire, but to give firefighters a higher probability of successfully attacking the fire. Once installed, fuel breaks require regular maintenance to ensure they will perform the task of altering the behavior of fire entering the treated area. Some of the concepts of shaded fuel break creation and maintenance may also be applicable to shrub lands, depending on the type, canopy height and density of shrubs.

There is much discussion as to how far fuels modifications must extend for fuel breaks to be effective. In this report when distances are given they are intended as minimums. Depending on the fuels and topography, larger treatment areas may be necessary. The recommendations in this report are general in nature and the specific design of any fuel break should be referred to qualified experts familiar with both the vegetation and fire behavior of the area. Standards and guidance provided by the Colorado State Forest Service should be a primary source for this information.

The Mount Vernon Metro District has done extensive work to create a fuel break along the north and east ends of Zones D and F. The treatment areas for this fuel break are shown in Figure 4. This fuel break ties into an existing cut for high tension power lines. The power line cut is also recommended for fuels reduction maintenance, see the recommendations below.

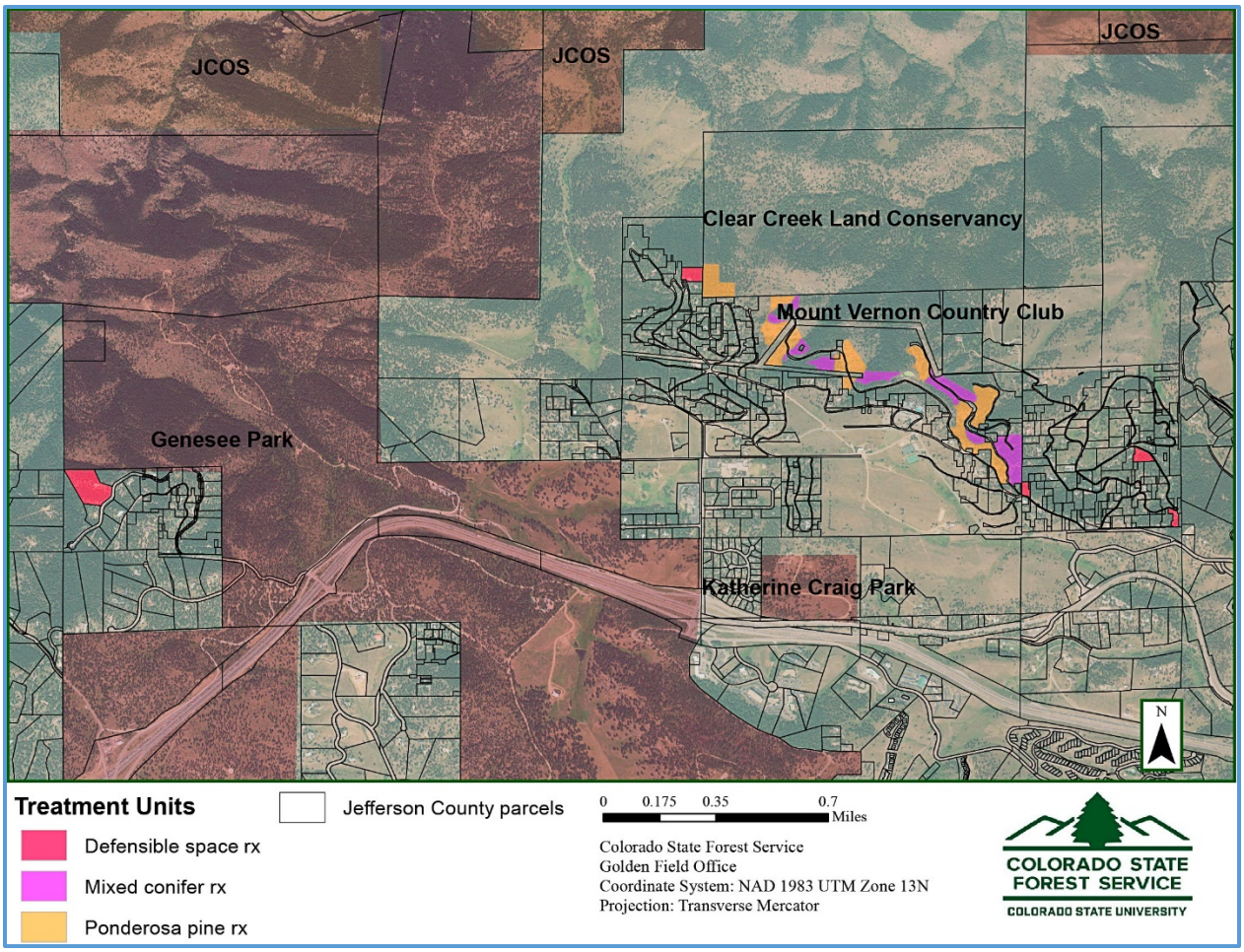

Figure 4, Mount Vernon Fuel Break Treatments

Recommendations

- The existing treatment units should be completed and maintained in accordance with standards provided by the Colorado State Forest Service.
- The existing treatment units should be expanded wherever practical to complete a shaded fuel break around the north and east sides of hazard zones D and F in accordance with standards provided by the Colorado State Forest Service.
- The high-tension lines should have the following vegetation management implemented and maintained for a distance of at least 15 feet to either side of the edges of the tower structure or to the edge of the power line easement. At ground level flammable materials including not only live vegetation, but also ground litter, duff and dead vegetation that will propagate fire should be removed. From ground level to eight feet, brush and grasses higher than six inches should be cut and any live trees should be limbed to a height of 8 feet. From 8 feet to the horizontal plane of the highest conductor attachment any dead or diseased limbs should be removed from live trees and any diseased, dying or dead trees removed in their entirety. The power line cut should be evaluated by the Colorado State Forest Service for any further specific treatments that may be necessary.

Areas of Special Interest Recommendations

Introduction

Areas of Special Interest (ASI) are non-residential areas considered to contain physical properties or values likely to have considerable effect on people, property or the environment of the study area in the event of damage from a significant wildfire. The following ASIs were identified in the study area:

- Communication towers and facilities
- State and county parks and open space

Communication Towers and Facilities

This study area contains two critical communications sites. The site on Lookout Mountain is located at 2119 Cedar Lake Road. This is the site of a broadcast super tower that transmits most of the commercial radio and TV signals for the Denver metro area. This facility also houses the radio broadcast transmitters and antennas for Jefferson County government entities.

The site on Mount Morrison also contains communication infrastructure, but unlike Lookout Mountain is not near homes or private property. It is accessed by a gated road that is long, steep and rocky. Heavy loads of conifers and shrubs grow up to the edges of the access road along most of its length.

Both areas have both overhead lines and buried power. Some of the overhead lines are very high power and in the case of Mount Morrison, cross the road several times. Both sites have large (1,000 gallons or larger) diesel fuel tanks to power emergency generators. The Lookout Mountain site also has above ground propane tanks. Fortunately, buildings at both sites are of ignition resistant construction and have defensible space. For the latest and most complete information regarding this ASI, please visit the WMI.

Figure 5 Lookout Mountain Communication Towers

Recommendations

- Foothills Fire Department should consider collaborating with the management of the Mount Morrison facility to plan and coordinate roadside thinning for the access road.
- Defensible space maintenance is critical at all communication facilities to prevent loss of infrastructure and provide safer access to firefighters.
- Power lines, especially high-tension lines should have the following vegetation management implemented and maintained for a distance of 15 feet to either side of the centerline of the powerline. At ground level flammable materials including not only live vegetation, but also ground litter, duff and dead vegetation that will propagate fire should be removed. From ground level to eight feet, brush and grasses higher than six inches should be cut and any live trees should be limbed to a height of 8 feet. From 8 feet to the horizontal plane of the highest conductor attachment any dead or diseased limbs should be removed from live trees and any diseased, dying or dead trees removed in their entirety. This is especially important along the access road to the Mount Morrison facilities where powerlines cross the road or run nearby.

State and County Parks and Open Space

Denver Mountain Parks and Jefferson County Open Space own and maintain several parks, public events venues and visitor attractions in and adjacent to the study area. The following is a list of the largest and most popular of these.

- Mother Cabrini Shrine – Several buildings, most with ignition resistant construction. Light fuels, but steep complex topography
- Lookout Mountain Park (Denver Mountain Parks) – Includes Buffalo Bill's grave and museum. Picknick area and hiking trails. Steep terrain with heavy timber. Surrounded by Windy Saddle Open Space Park.
- Lookout Mountain Preserve and Nature Center (Jefferson County Open Space) – 100 acres with 2.6 miles of trail. Borders Windy Saddle on its north side. Visitor's center with ignition resistant construction. Hiking trails. The Boettcher Mansion and gardens is also here which receives regular public visitation and is used as an event center.
- Genesee Mountain Park (Denver Mountain Parks) – This large open space park with hiking trails is the home of a Buffalo heard that helps keep surface fuels short. There is, however, heavy conifer fuels on steep, complex terrain throughout this part. There are also hundreds of small slash piles near the access road (Genesee Mountain Road).
- Windy Saddle Park (Jefferson County Open Space) – 755 acres with 4 miles of trail. Hiking, biking, rock climbing and equestrian use. Steep terrain and heavy timber. Other than public restrooms there are no permanent structures.
- Apex Park (Jefferson County Open Space) – 697 acres with 9.7 miles of trail. Hiking, biking and equestrian use. Steep terrain and heavy timber. Other than public restrooms and a picknick area there are no permanent structures.
- Lair o' the Bear Park - (Jefferson County Open Space) – 394 acres with 4.7 miles of trail. Hiking, biking and equestrian use. Located along the south side of Bear Creek. This park is accessed from the southwest corner of Hazard Zone P. Steep terrain and heavy timber on both sides of Bear Creek. Other than public restrooms at the parking lot and some bridges there are no permanent structures.
- Bear Creek Canyon Open Space Park, located to the east of Hazard Zone P, is on both sides of the Mount Morrison Road.

Figure 6 Apex Park, Jefferson County Open Space

Recommendations

- The highest priority recommendation for these parks and public venues is for the slash piles near Genesee Mountain Road to be consolidated and either chipped or burned when conditions allow to reduce the surface fuel loads and help prevent the development of crown fire. Genesee Mountain Road is the primary access to Hazard Zone E and fires in Genesee Park could spread to other developed areas in the study area.
- Although Mother Cabrini Shrine and Lookout Mountain Park both have permanent structures, there are no residences or guest lodging at either. Defensible space is recommended for any permanent structure in the study area, but these sites are low priority for mitigation. These sites should be straightforward to close and evacuate in the event of a nearby fire and should not represent a threat to life safety.
- Jefferson County Parks and Open Space properties have minimal permanent construction, most of which is ignition resistant, and are only open to non-motorized recreation. These are high use areas and a public education campaign to raise awareness regarding wildfire danger and promote fire safe use of these public properties should be an on-going project. These properties are kept in a natural condition and no other recommendations regarding fuels, water supply or operational factors are applicable.

CONCLUSION

The scientific analysis performed during the preparation of this report shows a significant potential for wildfires to affect the study area. Due to high numbers of visitors, fires in this area have a notable potential for loss of life and damage to property. This is especially true in light of the popularity of this area as a summer getaway for the Denver metro area. In addition to residents, hundreds of visitors could be endangered by wildfire. The following summary is a distillation of what we think should be the highest priority actions to preserve life and property:

- Individual property owners must realize the survival of their homes will rely heavily on their ability and willingness to create defensible space and harden their structures to the greatest extent practical against ignitability from embers and firebrands.
- FFD, Jefferson County and CSFS should support mitigation efforts of residents by advising and assisting those efforts wherever possible and by ensuring any existing statutes regarding fire hazard abatement are enforced, even if property owners are not residents of the study area.
- The existing fuel break project by the Mount Vernon Metro District and CSFS should be completed and expanded as practical.
- Coordination of fuels mitigation efforts between FFD, CSFS, Jefferson County and neighboring fire departments will be needed to produce the most efficient fuels management in the study area. The WMI should be utilized to assist in coordinating and tracking evolution of fuels management projects.
- Efforts to monitor and remove any dangerous fuel loads along primary and alternative access roads that could threaten access and egress should be a priority. These efforts must continue on an ongoing basis to be effective.
- Several of the hazard zones have very limited water for fire suppression. Development of an adequate water supply for fire suppression is a critical need in these areas.
- Efforts to improve addressing and street markers will be needed along with pre-planning and public awareness of alternate evacuation routes to prevent bottlenecking and delays in evacuation and responder access during a fire.

GRANT RESOURCES

One of the biggest obstacles to overcome when trying to implement CWPP recommendations and wildfire mitigation projects is funding. A certified CWPP opens a multitude of funding sources to complete work outlined in the plan. For many mitigation projects, federal, state and county funds are available to begin work. The list below is not inclusive, but rather serves as a starting point for the most commonly available sources of funding and outreach.

Federal Emergency Management Agency (FEMA)

- **Assistance to Firefighters Grant Program**
  - Purpose: to improve firefighting operations, purchase firefighting vehicles, equipment and personal protective equipment; fund fire prevention programs; and establish wellness and fitness programs.
  - Necessary information includes a DUNS number, Tax ID number and Central Contractor Registration
  - **https://www.fema.gov/welcome-assistance-firefighters-grant-program**
- **SAFER: Staffing for Adequate Fire and Emergency Response**
  - Purpose: to provide funding directly to fire departments and volunteer firefighter interest organizations in order to help them increase the number of trained, "front line" firefighters available in their communities. The goal of SAFER is to enhance the ability of local fire departments to comply with staffing, response and operational standards established by NFPA and OSHA.
  - **https://www.fema.gov/staffing-adequate-fire-emergency-response-grants**
- **Fire Prevention and Safety Grants (FP&S)**
  - Purpose: FP&S Grants are part of the Assistance to Firefighters Grants and are under the purview of the Grant Programs Directorate in FEMA. Their purpose is to support projects that enhance the safety of the public and firefighters from fire and related hazards.
  - **https://www.fema.gov/fire-prevention-safety-grants**
- **Hazard Mitigation Assistance Grant Program (HMA)**
  - Purpose: to provide grants to state and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The goal of HMA is to reduce the loss of life and property due to natural disasters and enable mitigation measures to be implemented during the immediate recovery from a disaster.
  - **https://www.fema.gov/media-library-data/1441133724295-0933f57e7ad4618d89debd1ddc6562d3/FEMA_HMA_Grants_4pg_2015_508.pdf**

- **Pre-Disaster Mitigation Grant Program (PDM)**
    - Purpose: to provide funds to states, territories, Tribal governments, communities, and universities for hazard-mitigation planning and the implementation of mitigation projects prior to a disaster event. Funding these plans and projects reduces the overall risks to the population and structures.
    - **https://www.fema.gov/pre-disaster-mitigation-grant-program**

Firewise Communities

- Purpose: a multi-agency organization designed to increase education of homeowners, community leaders, developers, and others regarding the Wildland-Urban Interface and the actions they can take to reduce fire risk to protect lives, property and ecosystems.
- **http://www.firewise.org**

National Volunteer Fire Council

- Purpose: to support volunteer fire protection districts. Includes both federal and non-federal funding options and grant writing assistance.
- **http://www.nvfc.org/**

National Resources Conservation Service Emergency Watershed Protection Program

- Purpose: to undertake emergency measures including the purchase of flood plain easements for runoff retardation and soil erosion prevention to safeguard lives and property from floods, drought, and the products of erosion on any watershed.
- **https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/ewp/**

USFS Cooperative Forestry Assistance

- Purpose: to assist in the advancement of forest resources management, the control of insects and diseases affecting trees and forests, the improvement and maintenance of fish and wildlife habitat, and the planning and conduct of urban and community forestry programs.
- **https://www.fs.fed.us/spf/coop/programs/loa/**