

# Stonewall Fire Protection District

## Community Wildfire Protection Plan

November 2014



# Stonewall Fire Protection District COMMUNITY WILDFIRE PROTECTION PLAN

November 2014

Prepared by the Stonewall Fire Protection District

With special appreciation and acknowledgements to Ouray County and Log Hill Mesa Fire Protection District and the Western Region Wildfire Council who allowed us to model our CWPP after theirs; the El Paso County Sheriff's Office who allowed us to use their *Ready, Set, Go! Emergency Preparedness Checklist*; the BarNI Ranch and the City of Trinidad who provided initial and critical funding; the Purgatoire Watershed Partnership and AmeriCorps VISTA (Elisa Dawson) who provided invaluable plan assistance; the Colorado State Forest Service (C.K. Morey and Mark Loveall) who assisted with every aspect of the analysis and creation of this document; and last but not least the following donors, without whom the project would not have been possible:

BarNI Ranch  
City of Trinidad  
Madrid Canyon Landowners Association  
North Fork Landowners Association  
Rancho La Garita Landowners Association  
Wet Canyon Landowners Association  
Pioneer Natural Resources, Inc.  
Spanish Peaks-Purgatoire River Conservation District  
Stonewall Country Club  
San Pablo Canyon Ranches  
XTO Energy  
Billy and Jean Barth  
James and Chong Meyer  
Tracy and Amy Dahl  
James and Eleanor Vigil  
Stella Barrett and Gary Niles  
TJ Gorden-Ross

A special appreciation to Stonewall Fire Protection District Fire Chief Loyd Holliman, who spent countless hours rounding up support for this project and countless more hours pouring over every detail.

Project Coordinator  
Penny Bieber

Cover photo courtesy of Shopping Bag, Stonewall, Colorado.

SIGNATURE PAGE

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# TABLE OF CONTENTS

|  |           |
|--|-----------|
| <b>Introduction.....</b>                       | <b>6</b>  |
| Goals and Outcomes.....                        | 7         |
| How to Use this Plan .....                     | 8         |
| Glossary.....                                  | 10        |
| The Planning Process .....                     | 14        |
| Relationship with Other Planning Efforts ..... | 15        |
| Stakeholder and Public Involvement .....       | 16        |
| Public Education .....                         | 19        |
| <br>   |           |
| <b>Section One.....</b>                        | <b>20</b> |
| Stonewall Fire Protection District.....        | 21        |
| Values at Risk .....                           | 23        |
| Life Safety and Homes.....                     | 24        |
| Commerce and Infrastructure.....               | 25        |
| Environmental Resources .....                  | 26        |
| Current Risk Situation.....                    | 27        |
| Historic Fires.....                            | 27        |
| Fire Behavior Analysis .....                   | 29        |
| Fuel Types .....                               | 29        |
| Suppression Difficulty.....                    | 29        |
| Flame Length .....                             | 30        |
| Rate of Spread .....                           | 31        |
| CO-WRAP Analysis.....                          | 31        |
| Vegetation Classifications Map .....           | 33        |
| Vegetation Classification by Area.....         | 34        |
| Surface Fuels Classification Map .....         | 35        |
| Surface Fuels Classification by Area.....      | 36        |
| Structure Risk Assessment .....                | 37        |
| Wildfire Risk Score Ranking .....              | 40        |
| Structure Assessment Results.....              | 41        |

|  |    |
|--|----|
| Stonewall Fire Protection District Preparedness .....      | 42 |
| Fire Fighting Capacity .....                               | 42 |
| Station Equipment.....                                     | 44 |
| Mitigation Priorities.....                                 | 51 |
| Recommendations for Improving Fire Fighting Capacity ..... | 53 |
| Recommendations for Mitigation Efforts.....                | 54 |
| Wildland Fire Assessment Program Flyer .....               | 55 |
| Stonewall Fire Protection District Station Map.....        | 56 |

**Section Two.....57**

|  |     |
|--|-----|
| Community Ignitability Analysis & Recommendations.....             | 58  |
| Adobe Ranch .....  | 60  |
| Arrowhead Ranchettes .....   | 64  |
| Aspen Rose Ranch .....   | 68  |
| BarNI Headquarters .....   | 72  |
| Big Pine Ranch .....   | 76  |
| Cielo Grande.....  | 80  |
| Cimarron Ranches Pine Valley/Cimarron Ranches (Northern Portion).. | 84  |
| Cimarron Ranches (Southern Portion) .....                          | 88  |
| Colorado Mountain Lake Estates .....                               | 92  |
| Cougar Ridge.....  | 96  |
| Cuchara Pass Ranch .....   | 100 |
| Eagles Landing/Eagle Mountain Estates .....                        | 104 |
| East Hwy 12 Corridor.....  | 108 |
| Glen Aspen .....   | 112 |
| Hwy 12 South District.....   | 116 |
| Long Canyon Ranch (Madrid Canyon).....                             | 120 |
| Long Canyon Ranch Phase 2 (Widow Woman) .....                      | 124 |
| North Fork Ranch.....  | 128 |
| North Lake/Camp Salvation .....                                    | 132 |
| Picketwire .....   | 136 |
| Pine Ridge Hideaway.....   | 140 |
| Primero .....  | 144 |
| Primero Ranch.....   | 148 |
| Rainbow Heights.....   | 152 |
| Rancho Escondido.....  | 156 |
| Rancho La Garita.....  | 160 |
| River Ranch Long Canyon .....                                      | 164 |
| Robinson Tracts.....   | 168 |
| San Juan Plaza.....  | 172 |
| San Pablo Canyon Ranch.....  | 176 |
| Segundo/Valdez .....   | 180 |
| Shafers Estates/Whiskey Creek.....                                 | 184 |
| Stonewall .....  | 188 |

|   |            |
|---|------------|
| Timber Ridge .....  | 192        |
| Torres/San Francisco Pass .....   | 196        |
| Trinidad Lake Estates .....   | 200        |
| Vigil Plaza .....   | 204        |
| West District.....  | 208        |
| Weston .....  | 212        |
| Wet Canyon Ranch.....   | 216        |
| Zamora Plaza .....  | 220        |
| <br>  |            |
| Areas of Special Interest .....   | 224        |
| Bosque del Oso State Wildlife Area .....  | 225        |
| Burro Canyon Electrical Sub-station.....  | 227        |
| Monument Lake .....   | 228        |
| New Elk Coal Mine.....  | 230        |
| North Lake State Wildlife Area .....  | 231        |
| Pioneer Natural Resources Complex .....   | 233        |
| Purgatoire Campground.....  | 234        |
| Robinson Sawmill .....  | 236        |
| Spanish Peaks Wildlife Area .....   | 237        |
| Trinidad Water Treatment Plant .....  | 239        |
| XTO Energy, Inc. ....   | 240        |
| <br>  |            |
| Countywide Fire Mitigation Recommendations .....  | 241        |
| <br>  |            |
| <b>Conclusions and Next Steps.....</b>  | <b>242</b> |
| Stonewall Fire Protection District Action Plan .....  | 243        |
| Funding Sources .....   | 246        |
| Plan Maintenance and Monitoring .....   | 251        |
| <br>  |            |
| <b>Appendixes .....</b>   | <b>252</b> |
| A. General Recommendations.....   | 252        |
| B. Additional Resources .....   | 255        |
| C. Protecting Your Home from Wildfire: Creating Wildfire-Defensible<br>Zones                  |            |
| D. FireWise Construction: Site Design & Building Materials                                    |            |
| E. Protect Your Property from Wildfire: Rocky Mountain Edition                                |            |
| F. Is Your Home Protected From Wildfire Disaster? A Homeowner’s Guide to<br>Wildfire Retrofit |            |
| G. Fuel Break Guidelines for Forested Subdivisions & Communities                              |            |
| H. Ready, Set, Go! Emergency Preparedness Checklist   |            |

# INTRODUCTION

The Stonewall Fire Protection District (SFPD) Community Wildfire Protection Plan is the result of more than eight months of planning, field data gathering and analysis. It has been prepared by a community-wide collaboration that includes the SFPD, the City of Trinidad, Las Animas County, the Colorado State Forest Service, area landowners and Land Owner Associations, the Purgatoire Watershed Partnership and a variety of state and federal agencies and interested parties.

The Stonewall Fire Protection District Community Wildfire Protection Plan (CWPP) is a response to the Healthy Forests Restoration Act of 2003 (HFRA). This legislation established unprecedented incentives for communities to develop comprehensive wildfire protection plans in a collaborative, inclusive process. The legislation also directs the Departments of Interior and Agriculture to address local community priorities in fuels reduction treatments on both federal and non-federal lands.

The HFRA emphasizes the need for federal agencies to collaborate with communities in developing hazardous fuels reduction projects, and places priority on treatment areas identified by communities through development of a CWPP. Priority areas include the wildland-urban interface (WUI), municipal watersheds and other local values at risk, areas impacted by wind-throw or insect or disease epidemics, and critical wildlife habitat that would be negatively impacted by a catastrophic wildfire.

The HFRA requires that the CWPP:

- Identify and prioritize areas for fuel reduction treatments
- Recommend treatments that will protect communities and infrastructure
- Recommend measures that homeowners and communities can take to reduce the ignitability of structures and reduce the risk of wildland fire
- Be developed in collaboration with stakeholders

# GOALS AND OUTCOMES

Goals for the CWPP project include:

- Enhance the safety of residents and responders
- Increase organizational and interagency readiness
- Reduce the risk of catastrophic wildland fires

Desired outcomes for the plan include:

- An improved community awareness of wildfire risks and mitigation options
- Development of a user-friendly set of resources for homeowners and communities to use to reduce wildfire risk
- A prioritized action list of mitigation projects to reduce wildfire risk in the District
- A reduction in the risk to watersheds and drinking water supplies
- Development of a comprehensive information tool that can be easily made available to Incident Management Teams or other emergency responders.
- Development of an exemplary plan, education tool and mitigation program that will serve as a pilot project for development of other Community Wildfire Protection Plans in the region

# HOW TO USE THIS PLAN

Successful wildfire risk mitigation begins with individual landowners, but landowners associations and other community organizations and entities also have a role to play. Individuals must work to reduce home ignitability and create defensible space. Community-wide collaborative efforts are required to improve ingress and egress, provide signage, develop water resources, and create evacuation plans. This CWPP identifies efforts required of everyone with an interest in the protection of our communities.

**Section One** of the plan is an overview of the Stonewall Fire Protection District. It provides a description of the district and identifies the risk factors the community faces. Section One also identifies the community values we seek to protect and the preparedness and capabilities of the Stonewall Fire Protection District.

**Section Two** identifies and evaluates 41 Wildland-Urban Interface (WUI) (communities) and 14 Areas of Special Interest. Each WUI write-up includes information about typical lot sizes or acreage, structure risk assessments, area fuel types, expected fire behavior, and risk mitigation recommendations and can serve as a stand-alone plan. Countywide mitigation recommendations are also identified.

Most subdivisions in the SFPD are treated as individual WUIs in this first CWPP. As communities come together to complete recommendations, and community leadership infrastructure is developed, it is anticipated that future revisions of the CWPP will identify fewer WUIs—combining subdivisions and areas with similar ecology, vegetation and terrain and shared boundaries. Once individual communities are successful in achieving initial mitigation efforts, the likelihood that large-scale landscape treatment projects involving multiple communities and landowners can be accomplished will improve.

**Conclusions and Next Steps** provides a summary of recommendations identified and an action plan for the Stonewall Fire Protection District. Potential funding sources for community plan development and mitigation efforts are also identified.

**Plan Appendixes** detail general information, the scientific and/or technical information used to generate the Plan and provide homeowners and community leaders extensive information on creating defensible space and improving home ignitability risks. Additional resources are also identified.

## **The Plan as a Living Document**

The Stonewall CWPP is a planning tool. As such, it will help to identify and guide mitigation efforts within the district. Its overall value, however, is directly related to the ongoing evaluation and improvement of the plan in the future. Future plans will re-evaluate risks as conditions change and as mitigation efforts are completed. The plan should be revisited at least on an annual basis, and should be formally updated every five years. As a living document, the plan relies on the input of all stakeholders. We invite you to be involved in that process.

# GLOSSARY

The following definitions apply to terms used in the Stonewall Fire Protection District Community Wildfire Protection Plan or referenced in supporting documents.

**1-hour time lag fuels:** Grasses, litter and duff; <1/4 inch in diameter

**10-hour time lag fuels:** Twigs and small stems; 1/4 inch to 1 inch in diameter

**100-hour time lag fuels:** Branches; 1 to 3 inches in diameter

**1000-hour time lag fuels:** Large stems and branches; >3 inches in diameter

**Active Crown Fire:** This is a crown fire in which the entire fuel complex – all fuel strata – become involved, but the crowning phase remains dependent on heat released from the surface fuel strata for continued spread (also called a Running Crown Fire or Continuous Crown Fire).

**Chain:** A chain is a unit of measurement that equals 66 feet. It is normally used as the measure of the rate of spread of wildfires or as a production rate for wildland fire apparatus or crews (chains per hour).

**Chimney:** A steep and narrow drainage that has the potential to funnel winds and greatly increase fire behavior. Due to this increase, the tops of chimneys are especially hazardous areas.

**Community Wildfire Risk Assessment:** The wildfire risk analysis is the foundation for the SFPD CWPP. It is based on research of the Home Ignition Zone concept

developed by Jack Cohen at the *Fire Science Lab* in Missoula, Montana and the latest research and findings from the *Institute for Business and Home Safety* (IBHA) on factors that play into a home's survivability during a wildfire.

**Crown Fire (Crowning):** The movement of fire through the crowns of trees or shrubs; may or may not be independent of the surface fire.

**Defensible Space:** An area around a structure where fuels and vegetation are modified, cleared or reduced to slow the spread of wildfire toward or from the structure. The design and distance of the defensible space is based on fuels, topography, and the design/materials used in the construction of the structure.

**Extended Defensible Space (also known as Zone 2 and 3):** This is a defensible space area where treatment is continued beyond the minimum boundary. These zones focus on forest management with fuels reduction being a secondary consideration.

**Fine Fuels:** Fuels that are less than 1/4-inch in diameter, such as grass, leaves, draped pine needles, fern, tree moss, and some kinds of slash which, when dry, ignite readily and are consumed rapidly.

**Fire Adapted Community:** A Fire Adapted Community takes responsibility for its wildfire risk. Actions address resident safety, homes, neighborhoods, businesses and infrastructure, forests, parks, open spaces, and other community assets. The more actions a community takes, the more fire adapted it becomes. See: <http://www.fireadapted.org/resources/what-is-a-fire-adapted-community.aspx>

**Fire Behavior Potential:** The expected severity of a wildland fire expressed as the rate of spread, the level of crown fire activity, and flame length. This is derived from fire behavior modeling programs using the following inputs: fuels, canopy cover, historical weather averages, elevation, slope, and aspect.

**Fire Hazard:** Given an ignition, the likelihood and severity of Fire Outcomes (Fire Effects) that result in damage to people, property, and/or the environment. The hazard rating is derived from the Community Assessment and the Fire Behavior Potential.

**Fireline Intensity:** The rate of heat energy related during combustion per unit length of fire front. It is usually expressed in BTUs/second/foot.

**Fire Mitigation:** Any action designed to decrease the likelihood of an ignition, reduce Fire Behavior Potential, or to protect property from the impact of undesirable Fire Outcomes.

**Fire Outcomes, Fire Effects:** This is a description of the expected effects of a wildfire on people, property and/or the environment, based on the Fire Behavior Potential and physical presence of Values at Risk. Outcomes can be desirable as well as undesirable.

**Fire Risk:** The probability that an ignition will occur in an area with potential for damaging effects to people, property, and/or the environment. Risk is based primarily on historical ignitions data.

**FireWise Community:** National Fire Protection Association's Firewise Communities Program encourages local solutions for safety by involving homeowners in taking individual responsibility for preparing their homes from the risk of wildfire. Firewise is a key component of Fire Adapted Communities – a collaborative approach that connects all those who play a role in wildfire education, planning and action with comprehensive resources to help reduce risk.

**Flame Length:** The distance between the flame tip and the midpoint of the flame depth at the base of the flame (generally the ground surface)—an indicator of fire intensity.

**Fuelbreak:** A natural or constructed discontinuity in a fuel profile that is used to isolate, stop, or reduce the spread of fire. Fuelbreaks may also make retardant lines more effective and serve as control lines for fire suppression actions. Fuelbreaks in the WUI are designed to limit the spread and intensity of crown fire activity.

**Incident Command System (ICS):** ICS is a standardized all-hazards management approach that establishes common procedures for responding to and managing emergency incidents; establishes a common communications protocol; and enables a coordinated response among multiple agencies and/or jurisdictions.

**National Fire Incident Reporting System (NFIRS):** A national database of fire incident information created by the National Fire Data Center of the United States Fire Administration. NFIRS is designed to help State and local governments gather fire incident data to develop fire reporting and analysis capabilities and to help assess and address fire danger in the United States. State and local participation in NFIRS is voluntary.

**Roadside thinning:** The primary purposes of roadside thinnings are to increase the ability of firefighters to successfully use the existing road as a control line in the event of a fire, to improve evacuation of civilian and fire traffic, and to reduce the fire impacts along the road.

**Dry Hydrant:** A fixed pipe attached to a water source located at an easily accessible point that allows firefighters to draft from the water source more efficiently.

**Surface Fire:** A fire that burns in the surface litter, debris, and small vegetation on the ground.

**Values at Risk:** People, property, ecological elements, and other human and intrinsic values within the project area. Values at Risk are identified by inhabitants as important to the way of life in the study area, and are particularly susceptible to damage from undesirable fire outcomes.

**WUI (Wildland Urban Interface):** The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.

# THE PLANNING PROCESS

The Stonewall Fire Protection District Fire Chief worked for two years to build the coalition required to undertake and complete a Community Wildfire Protection Plan. That effort resulted in an initial meeting of area stakeholders on February 12, 2014 at the BarNi Ranch in Stonewall. The following table lists participants in that initial meeting.

## Initial Organizing Group

| Name            | Title                                 | Organization                       |
|-----------------|---------------------------------------|------------------------------------|
| Loyd Holliman   | Fire Chief                            | Stonewall Fire Protection District |
| Jim Vigil       | Commissioner                          | CO Parks and Wildlife              |
| Mark Loveall    | Forester                              | CO State Forest Service            |
| Gilbert Ramirez | Senior Water Treatment Plant Operator | City of Trinidad                   |
| Stephan Hanks   | Manager                               | BarNI Ranch                        |
| Penny Bieber    | Project Coordinator                   | None                               |
| Bert Nale       | Landowner, Firefighter                | Rancho La Garita LOA, SFPD         |
| C.K. Morey      | Forester                              | CO State Forest Service            |
| Tom Perry       | President                             | Culebra Range Coalition            |
| Louis Feinberg  | Planner                               | City of Trinidad                   |
| Anthony Abeyta  | Commissioner                          | Las Animas County                  |
| Rob Cabot       | Landowner                             | BarNI Ranch                        |
| Emlen Cabot     | Landowner                             | BarNI Ranch                        |
| Levi Montoya    | District Conservationist              | NRCS                               |
| Kim Chavez      | HR/Emergency Manager                  | Las Animas County                  |
| Paul Branson    | CWPP Plan Coordinator                 | La Veta FPD                        |

|            |                           |                        |
|------------|---------------------------|------------------------|
| Bob Holder | District Wildlife Manager | CO Parks and Wildlife  |
| Tracy Dahl | Landowner                 | North Fork Ranches LOA |

Participants decided to create a core group of individuals to develop the CWPP and a list of interested individuals was established. The selected Core Planning Group consisted of eight individuals representing six stakeholder organizations and a Project Coordinator selected to organize the effort. The selected individuals and organizations are detailed in the **Core Planning Group** chart.

### Core Planning Group

| Name            | Title                  | Organization                       |
|-----------------|------------------------|------------------------------------|
| Loyd Holliman   | Fire Chief             | Stonewall Fire Protection District |
| Jim Vigil       | Commissioner           | CO Parks and Wildlife              |
| Mark Loveall    | Forester               | CO State Forest Service            |
| Gilbert Ramirez | Water Division         | City of Trinidad                   |
| Stephan Hanks   | Manager                | BarNI Ranch                        |
| Penny Bieber    | Project Coordinator    | None                               |
| Bert Nale       | Landowner, Firefighter | Rancho La Garita LOA, SFPD         |
| C.K. Morey      | Forester               | CO State Forest Service            |

The Core Planning Group met nine times between February 22, 2014 and October 17th, 2014 at the Stonewall Fire Protection District Stonewall Fire Station. During those meetings the Core Group:

- Developed a project budget and funding stream
- Developed an assessment plan and protocols
- Developed a firefighter assessment training program
- Developed a community education strategy
- Reviewed existing CWP Plans
- Reviewed the SFPD CWPP draft plan

### Relationship with Other Planning Efforts

The Stonewall Fire Protection District Community Wildfire Protection Plan builds upon other planning efforts in the community. These efforts include:

- Las Animas County Annual Operating Plan
- XTO Emergency Plan
- Pioneer Natural Resources, Inc Emergency Plan
- Las Animas County Emergency Operating Plan--under development
- Trinidad Source Water Protection Plan--under development

- Atlas Energy Inc. Raton Basin/New Mexico Office Emergency Response and Evacuation Plan

The SFPD CWPP serves as a pilot project for other Fire Protection Districts and other communities within Las Animas County.

### Stakeholder and Public Involvement

Core Group committee members met with seven area Landowners Associations to explain the scope of the CWPP project and ask for public input. Project goals and benefits and assessment methodology were also detailed. A Question and Answer session followed, and attendees were given packets containing an overview of the project and wildfire risk mitigation information.

#### Landowner's Association Meetings

| Date            | Landowners Association | # of Participants (Approximate) |
|-----------------|------------------------|---------------------------------|
| May 24, 2014    | Primero Ranches        | 30                              |
| May 25, 2014    | Rancho La Garita       | 15                              |
| June 7, 2014    | Madrid Canyon          | 25                              |
| July 5, 2014    | Cuchara Pass Ranches   | 30                              |
| July 6, 2014    | Stonewall Country Club | 20                              |
| July 12, 2014   | Wet Canyon             | 35                              |
| July 19, 2014   | San Pablo Canyon       | 30                              |
| August 24, 2014 | La Garita              | 25                              |

Two public meetings were held at the Primero Community Center. The first meeting was held on June 19, 2014, just prior to beginning structure assessments. Post cards informing area landowners about the meeting and the assessments were sent to every registered landowner in the district two weeks prior to the meeting. The Trinidad Chronicle News also published two press releases regarding the CWPP planning and announced the meeting in the second press release.

The Core Group, the firefighters assisting with the assessment, and numerous area stakeholders presented at the first public meeting. Discussion of project goals, assessment methodology, funding requirements, and opportunities for creating mitigation plans were outlined. Public input was encouraged, and a Question and Answer session concluded the meeting. Several participants asked to be included in further meetings and their names were added to the group lists.

The Draft CWPP was announced with a press release published by the Trinidad Chronicle News and notice of the release of the draft and of a public meeting was sent to every registered landowner in the district via post card. The draft CWPP was made available online via the SFPD website.

The second Public Information Meeting was held on November 6<sup>th</sup>, 2014 with 48 participants. The draft plan was presented at this meeting, and the public was invited to provide written comments online or at the meeting.

The following table summarizes the two public meetings.

### Public Information Meetings

| Date             | Meeting                  | # of Attendees | Presenters  |
|------------------|--------------------------|----------------|---|
| June 19, 2014    | Primero Community Center | 62             | Project Coordinator, SFPD Fire Chief, Firefighters (6), Purgatoire Watershed Partnership, City of Trinidad Water Department, NRCS, CSFS, Core Committee Members |
| November 6, 2014 | Primero Community Center | 48             | Firefighters, Purgatoire Watershed Partnership, CSFS, Core Committee members, LOA representatives and landowners  |

### Final Stakeholder Meeting

A final stakeholder meeting was held on October 29<sup>th</sup>, 2014 at the BarNI Ranch. The draft plan was submitted for review and comment. Written comments were accepted, and further comments were accepted online. The table on the following page details attendance.

| <b>Name</b>       | <b>Title</b>                          | <b>Organization</b>                |
|-------------------|---------------------------------------|------------------------------------|
| Jim Vigil         | Commissioner                          | CO Parks and Wildlife              |
| Mark Loveall      | Forester                              | CO State Forest Service            |
| Gilbert Ramirez   | Senior Water Treatment Plant Operator | City of Trinidad                   |
| Stephan Hanks     | Manager                               | BarNI Ranch                        |
| Penny Bieber      | Project Coordinator                   | SFPD                               |
| Bert Nale         | Landowner, Firefighter                | Rancho La Garita LOA, SFPD         |
| Loyd Holliman     | Fire Chief                            | Stonewall Fire Protection District |
| Levi Montoya      | District Conservationist              | NRCS                               |
| Kim Chavez        | HR/Emergency Management               | Las Animas County                  |
| Elisa Dawson      | AmeriCorps VISTA                      | Purgatoire Watershed Partnership   |
| Walter Williams   | Board                                 | NF Ranches                         |
| Tracy Dahl        | Landowner                             | NF Ranches LOA                     |
| Ed Skerjanec      | Fire Mitigation Specialist            | BLM                                |
| Paula Ozzello     | Board                                 | PEP, So. CO Environmental Council  |
| Kathy Hill        | Board                                 | PWP, So. CO Environmental Council  |
| Aaron Swallow     | Environmental Manager                 | Tercio Ranch                       |
| Michelle Williams | Landowner                             | North Fork Ranch                   |
| Rob Cabot         |                                       | BarNI                              |
| Bob Gill          | Operations Superintendent             | Pioneer Natural Resources          |
| Leeann Fabec      | Administrator                         | Las Animas County                  |
| Mack Loudon       | Commissioner                          | Las Animas County                  |
| Roland McGuire    | Fire fighter                          | Stonewall FPD                      |
| Mike Trujillo     | Area Wildlife Manager                 | Co Parks and Wildlife              |
| Craig Taggart     | Environmental Manager                 | Trinchera Ranch                    |

## Public Education

Initial public education efforts consisted of press releases regarding the CWPP in the Trinidad Chronicle News. In addition, during the assessment of each accessible structure in the district, a complete packet of information was distributed. This packet was also made available at each public and landowners association meeting. The contents of the packet are listed below.

### Educational Information in Distributed Packets

| <b>Title</b>   | <b>Publisher</b>  |
|--|---|
| Stonewall FPD CWPP Fact Sheet  | Stonewall FPD Core Group                                      |
| Protecting Your Home From Wildfire: Creating Wildfire-Defensible Zones | Colorado State Forest Service                                 |
| FireWise Construction: Site Design & Building Materials                | Colorado State Forest Service                                 |
| Communities Compatible with Nature                                     | Firewise Communities and National Fire Protection Association |
| Firewise Guide to Landscape and Construction                           | Firewise Communities  |
| Becoming a Recognized Firewise Community/USA                           | Firewise Communities  |

Additional information was provided at each homeowners association meeting and public meeting.

### Additional Education Materials Provided

| <b>Title</b>                         | <b>Publisher</b>                         |
|--------------------------------------|--|
| More Resources                       | Developed by Core Group                  |
| Ready, Set, Go! Evacuation Checklist | International Association of Fire Chiefs |

# SECTION ONE

# STONEWALL FIRE PROTECTION DISTRICT

The Stonewall Volunteer Fire Department was formed in 1949, and became a Fire Protection District in 1999. Since its formation in April 1999, the Stonewall Fire Protection District (SFPD) has taken a very active stance on wildfire and the protection of its residents. The Department is run on an almost exclusive volunteer basis, with the exception of the Chief and administrative staff. Currently, the department has approximately 50 dedicated volunteer firefighters providing year-round protection to the Districts' approximately 4,000 residents.

Stonewall Fire Protection District is organized and equipped to fight fires in the wildland urban interface. The Department handles both structure and wildland fires within the district. SFPD is also equipped to assist neighboring districts with incidents through Mutual Aid Agreements.

Stonewall Fire Protection District is commanded by the Fire Chief who is the primary incident commander on most incidents and is responsible for the safe operation of all fire scenes. An Assistant Fire Chief supports the Fire Chief and fills in during the Chief's absence and during complex fire assignments.

The Stonewall Fire Protection District is located in the western portion of Las Animas County, and provides services in an area of 547 square miles of Wildland/Urban Interface.

The SFPD consists of foothill terrain in the eastern end of the district to mountainous terrain in the western end. Altitudes range from of 6,000 feet in the foothills to 14,000 feet along the eastern slope of the Culebra Mountains. The District is bounded by New Mexico on the south, Costilla County to the west, Huerfano County and La Veta Fire Protection District on the northwest, the Spanish Peaks/Boncarbo Fire Protection District on the north and northeast, and the Fishers Peak Fire Protection District on the east.

The SFPD incorporates land with various ownership as summarized below:

| <b>Land Ownership</b>       | <b>Acres</b> | <b>Percentage</b> |
|-----------------------------|--------------|-------------------|
| Private                     | 268,507      | 79.22%            |
| BLM                         | 12,972       | 3.82%             |
| USFS                        | 13,809       | 4.07%             |
| Colorado State Land Board   | 4,149        | 1.22%             |
| Colorado Parks and Wildlife | 37,999       | 10.82%            |
| City of Trinidad            | 2,864        | 0.84%             |

State Hwy 12 provides the primary paved access in the District. Several canyons also have paved roads for a few miles off the Hwy 12 corridor. Large portions of roads within the district are county-maintained gravel roads of varying quality. These roads provide access to the various subdivisions and neighborhoods. Road quality within subdivisions ranges from good to poor. Driveway quality varies dramatically.

# VALUES AT RISK

Most of the Stonewall Fire Protection District is at some risk of wildland fire. Recent large fires in the state and across the west have focused concern and awareness of the need to mitigate for and prepare for wildland fires.

The many subdivisions and communities in the District attest to the public's desire to live in the area. The District's natural beauty, abundant wildlife, clean air and water and recreational opportunities have resulted in numerous Wildland- Urban-Interface areas (WUIs) in the area, each at some risk of wildland fires.

In addition to 41 plotted WUI subdivisions or WUI communities, 11 Areas of Special Interest exist in the District. The table below lists those areas.

## WUI and Special Areas of Interest in SFPD

| Name                                   | Type        |
|--|-------------|
| Adobe Ranch                            | Subdivision |
| Arrowhead Ranchettes                   | Subdivision |
| Aspen Rose Ranch                       | Subdivision |
| BarNI Headquarters                     | WUI area    |
| Big Pine Ranch                         | Subdivision |
| Cielo Grande                           | Subdivision |
| Cimarron - Pine Valley                 | Subdivision |
| Cimarron Ranch                         | Subdivision |
| Colorado Mountain Lake Estates         | Subdivision |
| Cougar Ridge                           | Subdivision |
| Cuchara Pass Ranch                     | Subdivision |
| Eagles Landing/ Eagle Mountain Estates | Subdivision |
| East Hwy 12 Corridor                   | WUI area    |
| Glen Aspen                             | Subdivision |
| Hwy 12 South District                  | WUI area    |
| Long Canyon Ranch (Madrid Canyon)      | Subdivision |

|   |                          |
|---|--------------------------|
| Long Canyon Ranch Phase 2 (Widow Woman) | Subdivision              |
| North Fork Ranch                        | Subdivision              |
| North Lake/Camp Salvation               | WUI area                 |
| Picketwire                              | WUI area                 |
| Pine Ridge Hideaway                     | Subdivision              |
| Primero                                 | WUI area                 |
| Primero Ranch                           | Subdivision              |
| Rainbow Heights                         | Subdivision              |
| Rancho Escondido                        | Subdivision              |
| Rancho La Garita                        | Subdivision              |
| River Ranch Long Canyon                 | Subdivision              |
| Robinson Tracts                         | Subdivision              |
| San Juan Plaza                          | WUI area                 |
| San Pablo Canyon Ranch                  | Subdivision              |
| Segundo/Valdez                          | WUI area                 |
| Shafers Estates/Whiskey Creek           | Subdivision              |
| Stonewall                               | WUI area                 |
| Timber Ridge                            | Subdivision              |
| Torres/San Francisco Pass               | WUI area                 |
| Trinidad Lake Estates                   | Subdivision              |
| Vigil Plaza                             | Subdivision              |
| West District                           | WUI area                 |
| Weston                                  | WUI area                 |
| Wet Canyon Ranch                        | Subdivision              |
| Zamora Plaza                            | Subdivision              |
| Bosque del Oso State Wildlife Area      | Area of Special Interest |
| Burro Canyon Electric Sub-station       | Area of Special Interest |
| Monument Lake                           | Area of Special Interest |
| New Elk Coal Mine                       | Area of Special Interest |
| North Lake State Wildlife Area          | Area of Special Interest |
| Pioneer Natural Resources complex       | Area of Special Interest |
| Purgatoire Campground                   | Area of Special Interest |
| Robinson Sawmill                        | Area of Special Interest |
| Spanish Peaks Wildlife Area             | Area of Special Interest |
| Trinidad Water Treatment Plant          | Area of Special Interest |
| XTO Headquarters                        | Area of Special Interest |

## Life, Safety and Homes

Most of SFPD is part of the Wildland Urban Interface, and wildland fires are a somewhat regular occurrence for the District's residents. The main concern is the personal safety of the residents of the District. The loss of their homes and property value losses are of

secondary concern. The majority of homes within the study area have roofs, decks and siding that are made of a mix of combustible materials.

Some communities have begun to address wildland fire risks but no fire protection plans exist at this time.

## **Commerce and Infrastructure**

### **Economic Values**

Wildland fires can directly impact an area's economy. A majority of the District consists of large ranches, multi-acre residential developments, small towns and unincorporated communities. Numerous residents return during the summer months, the primary wildfire season in Colorado. Economic losses will occur if residents are unable to work due to wildfires. Additional economic suffering could result because the area is served by only one major road--State Highway 12, which could be closed in a wildfire.

The Stonewall Fire Protection District encompasses significant coal-bed-methane gas fields operated by Pioneer Natural Resources, Inc., XTO Energy, Inc. and Atlas Energy, Inc. Pioneer Natural Resources, Inc. has approximately 2,000 wells and 8 compressor sites in the area, a majority of which are located within the District. Atlas Energy, Inc. operates 133 wells with 2 compressor sites, all of which are located within the District. XTO Energy, Inc. also has coal-bed-methane wells and compressor sites located within the SFPD. In all, approximately 2,900 gas wells and 15 compressor sites are located within the District. In addition to wells and compressor sites, there is above-ground and below-ground infrastructure consisting of valves and piping for gas transport.

A good mutual relationship exists between the District and the gas companies; companies have provided manpower and water resources in the past, and the Fire District has used well sites as staging areas/safety zones for fire suppression efforts. Well sites and compressor stations and other facilities are generally very well mitigated to reduce wildfire risk, and all companies have emergency plans in place.

### **Critical Infrastructure**

Critical infrastructure in SFPD includes water supply systems, telecommunication towers, power infrastructure, coal-bed-methane natural gas wells, compressor stations and transmission lines, and a school. Wildfires in the area can damage power lines, leading to power outages during times when power is needed most. Power lines can also be sources of wildfire ignitions when knocked down by wind or other means.

## Environmental Resources

The District's natural resources are one of the main reasons residents live in the area and why tourists come to visit.

The City of Trinidad's watershed is entirely located within the SFPD. That watershed provides drinking water for the City of Trinidad and numerous other small communities. The City of Trinidad partnered with the SFPD to assess watershed infrastructure elements and the SFPD and Purgatoire Watershed Partnership are collaborating with the City to create a Trinidad Source Water Protection Plan (SWAP). That plan will be completed by December 31st, 2014, and will then be added as an addendum to this CWPP.

In addition to the Trinidad watershed, the Bosque del Oso, North Lake and Spanish Peaks Wildlife Areas as well as numerous other areas critical to local wildlife are located in the SFPD. Taking action to prevent catastrophic wildfire within these areas is critical for maintaining biodiversity, ecosystem function, and watershed health.

Impacts of wildfires in the district can include soil degradation, increased soil erosion, changes in vegetation composition, loss of vegetation, destruction of animal habitats and death of animals, increased weed invasion, and degradation of water quality.

# CURRENT RISK SITUATION

This section examines the current wildland fire risk in the Stonewall Fire Protection District based on wildfire history and past or planned fire treatments.

Wildfire hazard ratings for SFPD CWPP communities range from low in some areas along the Highway 12 corridor to extreme in the steep mountain areas of the west in the district. This assessment is based on an analysis of multiple factors, including the district's wildland fire history, and information provided by experts and the Colorado State Forest Service CO-Wildfire Risk Assessment Portal. It should be noted that incomplete fire occurrence data results in understated wildland fire risk. The following information represents the most accurate information available.

## **Historic Fires**

Most fires in the SFPD are small (less than 10 acres) and lightning caused. However, even small fires can present a threat to life, safety, and property. This is based on the availability of fuel, both vegetative and man-made; the direct Wildland Urban Interface of subdivisions bordering fuel beds; community infrastructure, including access/egress routes, as well as weather and drought conditions. Wildfire history in the SFPD since 2000 is summarized below:

| Year  | Quantity of Fires | Size of Fire                 | Cause of Fire                                  |
|---|-------------------|------------------------------|--|
| 2000  | 8                 | 1-7 acres                    | lightning                                      |
|   | 2                 | 10 acre                      | lightning                                      |
|   | 2                 | 25 acre                      | lightning                                      |
|   | 1                 | 35 acre                      | lightning                                      |
|   | 1                 | 250 acre                     | human caused (slash pile embers)               |
|   | 1                 | 400 acre                     | human caused (slash pile embers)               |
| <b>Total in 2000</b>                        | <b>15</b>         | <b>510 acres</b>             |  |
| 2001  | 19                | 1-7 acres                    | lightning                                      |
|   | 3                 | 20 acre                      | lightning                                      |
|   | 1                 | 124 acre                     | human caused (slash pile embers)               |
|   | 1                 | 300 acre                     |  |
| <b>Total in 2001</b>                        | <b>24</b>         | <b>510 acres</b>             |  |
| 2002  | 19                | 1-4 acres                    | lightning                                      |
|   | 1                 | 27,500 acre<br>(Spring Fire) | human caused                                   |
| <b>Total in 2002</b>                        | <b>20</b>         | <b>27,528 acres</b>          |  |
| 2003  | 19                | 1-5 acres                    | lightning                                      |
|   | 1                 | 50 acre                      | lightning                                      |
| <b>Total in 2003</b>                        | <b>20</b>         | <b>79 acres</b>              |  |
| 2004  | 2                 | 1 acre                       | lightning                                      |
|   | 1                 | 80 acre                      | human caused (slash pile embers)               |
| <b>Total in 2004</b>                        | <b>3</b>          | <b>82 acres</b>              |  |
| 2005  | 12                | 1-2 acres                    | lightning                                      |
|   | 1                 | 820 acre                     | human caused                                   |
| <b>Total in 2005</b>                        | <b>13</b>         | <b>825 acres</b>             |  |
| 2006  | 27                | 1-5 acres                    | 26 lightning, 1 human caused                   |
| <b>Total in 2006</b>                        | <b>27</b>         | <b>35 acres</b>              |  |
| 2007  | 11                | 1-2 acre                     | lightning                                      |
|   | 1                 | 60 acre                      | lightning                                      |
| <b>Total in 2007</b>                        | <b>12</b>         | <b>72 acres</b>              |  |
| 2008  | 17                | 1-2 acres                    | 16 lightning, 1 human caused                   |
|   | 1                 | 112 acre                     | Power-line                                     |
| <b>Total in 2008</b>                        | <b>18</b>         | <b>130 acres</b>             |  |
| 2009  | 13                | 1-3 acres                    | lightning                                      |
|   | 1                 | 9 acre                       | lightning                                      |
| <b>Total in 2009</b>                        | <b>14</b>         | <b>23.5 acres</b>            |  |
| 2010  | 11                | 1 acre                       | 1 human caused, 10 lightning                   |
|   | 1                 | 5,100 acre                   | human caused                                   |
| <b>Total in 2010</b>                        | <b>12</b>         | <b>5,111 acres</b>           |  |
| 2011  | 16                | 1-2 acres                    | 15 lightning, 1 human caused                   |
| <b>Total in 2011</b>                        | <b>16</b>         | <b>17 acres</b>              |  |
| 2012  | 16                | 1-2 acre                     | 14 lightning, 2 human caused                   |
| <b>Total in 2012</b>                        | <b>16</b>         | <b>17 acres</b>              |  |
| 2013  | 19                | 1 acre                       | 1 human caused, 18 lightning                   |
|   | 1                 | 11 acre                      | lightning                                      |
| <b>Total in 2013</b>                        | <b>20</b>         | <b>30 acres</b>              |  |
| 2014 (as of<br>September 19,<br>2014)       | 23                | 1-2 acres                    | 20 lightning, 2 power lines, 1 human<br>caused |
| <b>Total</b>                                | <b>23</b>         | <b>27 acres</b>              |  |
| <b>Total Fires from<br/>2000-Sept. 2014</b> | <b>253 fires</b>  | <b>34,996.5 acres</b>        |  |

According to the available data, a total of 253 ignitions were reported in the SFPD between January 2000, and September 2014. Of these ignitions, lightning caused 236, downed power lines caused three and 14 fires were human caused. Most fires were one acre or less. However, the Spring Fire consumed 27,500 acres in 2002.

Larger fires have occurred outside the Stonewall Fire District over the last few years. In 2011 the Track fire burned 27,792 on the New Mexico/Colorado border east of the SFPD. The Track fire was human caused. In 2013 the East Peak fire burned 13,572 acres north and east of the SFPD. Lightening caused the East Peak fire.

## **Fire Behavior Analysis**

### **Fuel Types**

Fuel types are a classification system based on the size and arrangement of combustible material found across the landscape. Most commonly, fuel type is dictated by the type of vegetative cover found within in a particular area. In 1972, Richard Rothermel devised 11 fuel types from which estimates of fire behavior could be predicted. Further work in this area has now expanded to 40 models (Scott and Burgan 2005). The broad fuel categories are non-burnable, grass, grass-shrub, shrub, timber understory, timber litter, and slash-blowdown. Categories are further broken into sub-group models which are based upon the material most likely to carry a fire. Each model comes with an associated range of predicted fire behavior across a range of fuel moisture content and weather conditions.

Richard Rothermel's original fuel modeling efforts may be accessed at:  
[http://www.fs.fed.us/rm/pubs\\_int/int\\_rp115.pdf](http://www.fs.fed.us/rm/pubs_int/int_rp115.pdf)

Joe Scott and Robert Burgan's paper which elaborates on fuel models used in this document may be found at:  
[http://www.fs.fed.us/rm/pubs/rmrs\\_gtr153.pdf](http://www.fs.fed.us/rm/pubs/rmrs_gtr153.pdf)

### **Suppression Difficulty**

The amount of effort, risks present, the tactics and resources employed in suppression of wildland fires is dictated to a large extent by the current and predicted fire behavior. Other important factors may include resource availability, access, ownership and regulations. During the initial attack phase of a fire, the amount of difficulty suppression forces encounter in traveling to and attacking the fire is an important determinant of whether the fire will be quickly brought under control or rage out of control causing great expense and loss.

Two measures of fire behavior influenced by fuels present, weather and topography are Rate of Spread and Flame Length. High numbers in either or both of these measures can present substantial suppression difficulties to firefighting forces and merit further discussion.

## Flame Length

The National Wildfire Coordinating Group (NWCG) defines flame length as “The distance between the flame tip and the midpoint of the flame depth at the base of the flame (generally the ground surface), an indicator of fire intensity” (<http://www.nwcg.gov/pms/pubs/glossary/f.htm>, accessed 10 October 2014). This is a preferred measure over flame height, as under windy conditions or on steep slopes, flames may be tilted at an angle.

Since flame length describes the intensity of a fire, it follows that when lengths are low, firefighters and machinery can get close to flame front, and when lengths are high, these resources must be positioned further away.

A simple chart accessible to firefighters is found on page 79 of the Incident Response Pocket Guide (NWCG PMS 461 NFES 1077, January 2010) and provides decision-making tools based on flame lengths:

**Fire Behavior Hauling Chart**  
Tactical Interpretations from Flame Length

| Flame Length     | Interpretations  |
|------------------|--|
| Less than 4 feet | Fires can generally be attacked at the head or flanks by firefighters using hand tools. Handline should hold fire.   |
| 4 to 8 feet      | Fires are too intense for direct attack on the head with hand tools. Handline cannot be relied on to hold the fire. Dozers, tractor-plovers, engines and retardant drops can be effective. |
| 8 to 11 feet     | Fire may present serious control problems: torching, crowning, and spotting. Control efforts at the head will probably be ineffective.   |
| Over 11 feet     | Crowning, spotting, and major fire runs are probable. Control efforts at the head of the fire are ineffective.   |

## **Rate of Spread**

This measure of a fire is often expressed as a linear function, as in the distance a fire front moves over a period of time. In the fuel modeling equations developed by Scott and Burgan (2005) referred to in this document, the measure is chains (66 feet) per hour.

A fire's rate of spread also factors into the tactics and resources employed to fight it. Very low rates of spread mean that firefighters may be able to safely attack the fire from all directions, while a fire moving very quickly may only be safely attacked from the rear and sides (known as a "flanking attack") while the fire front is allowed to burn to a road or some other obstacle.

Predictions about rates and direction of a fire's spread also influence emergency managers' decisions regarding public safety. Determining areas for immediate evacuation versus those which may only be on alert are one such example.

The knowledge of how fuel types affect both fire intensity of rate of spread is important to landowners, foresters and fire managers as they seek to reduce risks to lives and property from wildfires. Not only do these measures dictate actions during a wildfire, they also must be considered when planning preventative measures, such as hazard reduction thinning or fuel break construction.

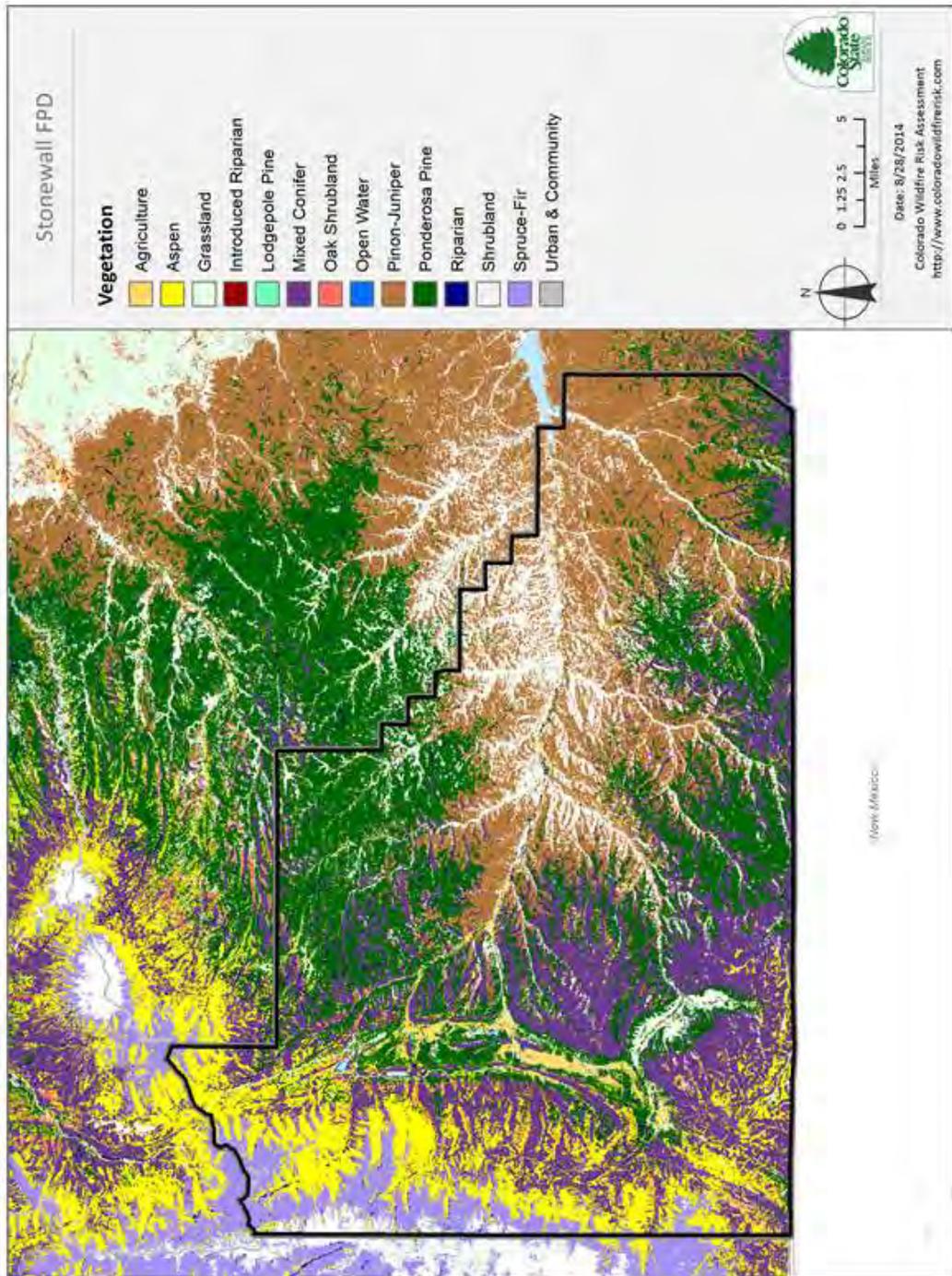
## **CO-WRAP Analysis**

The Colorado Wildfire Risk Assessment Portal (CO-WRAP) was used to generate reports on a variety of wildfire-oriented themes. Developed by the Colorado State Forest Service, it is a tool designed to provide wildfire risk information to both resource managers and any interested citizens. To access CO-WRAP, please go to the following URL: <http://www.coloradowildfirerisk.com/>

The digital boundaries of the Stonewall Fire Protection District were submitted to CO-WRAP on August 28, 2014 and from this information, a 78-page report was generated. Because CO-WRAP utilizes digital data at a resolution of 30 meter by 30 meter units (approximately 100 ft by 100 ft), smaller-scale differences are sometimes unable to be detected. Therefore where available, reliable local information was favored for inclusion in the CWPP over that generated by CO-WRAP. These limitations notwithstanding, CO-WRAP is proving to be a useful tool for the planning and implementation of wildfire hazard mitigation projects statewide.

Maps generated by CO-WRAP showing vegetative cover and fuel type are shown on the following pages. These are useful illustrations of how the forests within the district transition across a large area, and the amounts of each type found within the district. On any given parcel of land, there may be several different forest and fuel types present, which will not be reflected on these maps as per the reasons above. Nor do these maps provide any information as to important forest attributes such as tree density, size, age or overall health. These maps do provide information for landscape-scale project planning, but only on-the-ground examination can provide planners the necessary information for detailed project layout.

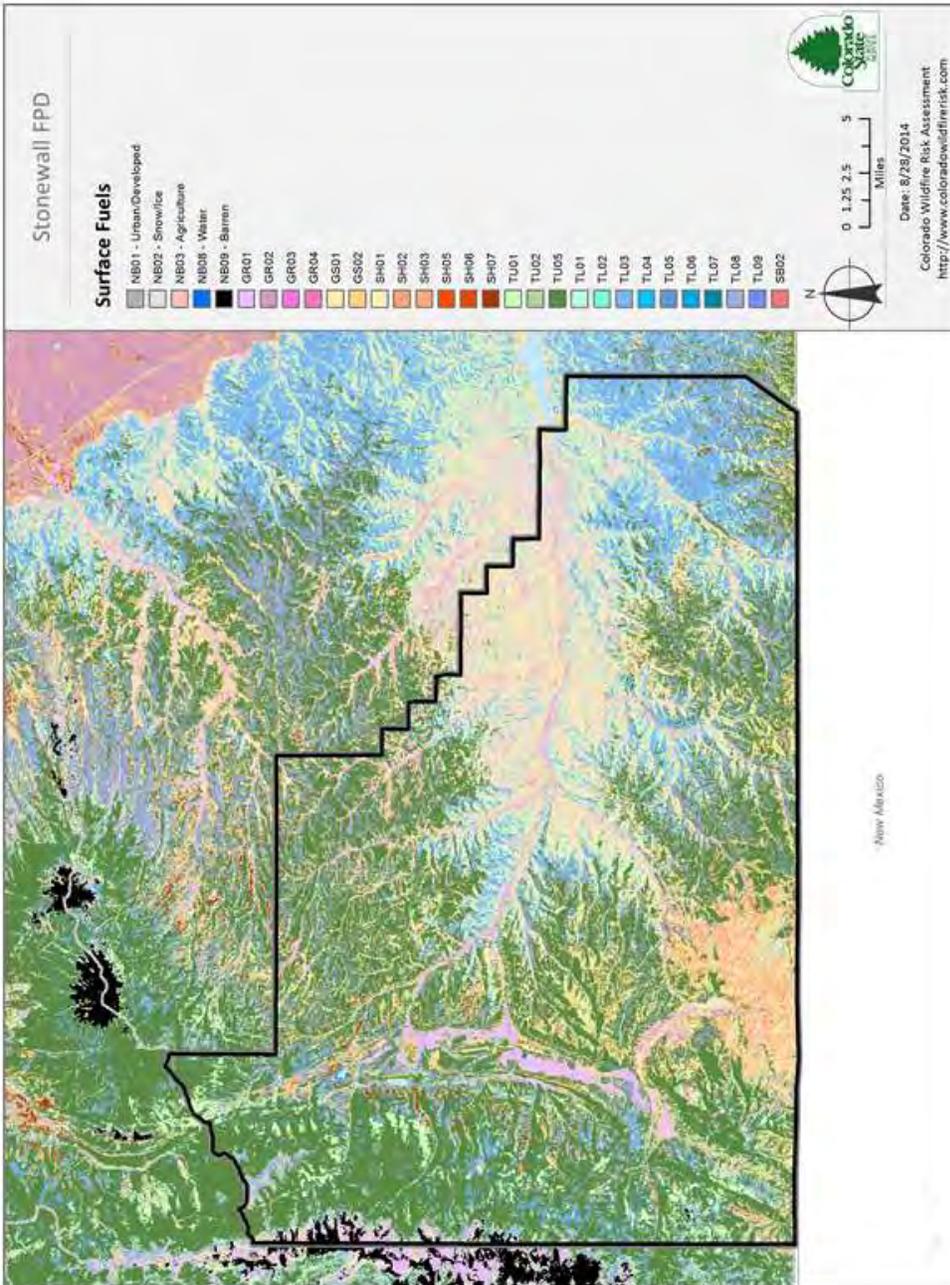
Vegetation Classifications within the Stonewall Fire Protection District, as reported by CO-WRAP (<http://www.coloradowildfirerisk.com>, report generated 8/28/14).



**Vegetation Classification by Area and Percentages Across the Stonewall Fire Protection District, as reported by CO-WRAP.**

|  | <b>Vegetation Class</b> | <b>Acres</b>   | <b>Percent</b> |
|--|-------------------------|----------------|----------------|
|  | Grassland               | 7,654          | 2.3%           |
|  | Shrubland               | 33,641         | 10.0%          |
|  | Aspen                   | 38,144         | 11.3%          |
|  | Lodgepole Pine          | 107            | 0.0%           |
|  | Ponderosa Pine          | 84,042         | 24.9%          |
|  | Spruce-Fir              | 14,538         | 4.3%           |
|  | Mixed Conifer           | 77,273         | 22.9%          |
|  | Oak Shrubland           | 3,810          | 1.1%           |
|  | Pinyon-Juniper          | 67,883         | 20.1%          |
|  | Riparian                | 4,400          | 1.3%           |
|  | Introduced Riparian     | 0              | 0.0%           |
|  | Agriculture             | 5,112          | 1.5%           |
|  | Open Water              | 270            | 0.1%           |
|  | Urban & Community       | 86             | 0.0%           |
|  | <b>Total</b>            | <b>336,959</b> | <b>100.0%</b>  |

**Surface Fuel Classifications within the Stonewall Fire Protection District, as reported by CO-WRAP**  
 (http://www.coloradowildfirerisk.com, report generated 8/28/14. For a description of each fuel type, refer to Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model (Scott JH and Burgan RE, United States Forest Service General Technical Report RMRS-GTR-153, June 2005).



## Surface Fuel Classification Area and Percentages Across the Stonewall Fire Protection District, as reported by CO-WRAP.

| Surface Fuels | Description  | FBPS Fuel Model Set | Acres          | Percent       |
|---------------|--|---------------------|----------------|---------------|
| GR 1          | Short, Sparse Dry Climate Grass (Dynamic)            | 2005                | 18,121         | 5.3%          |
| GR 2          | Low Load, Dry Climate Grass (Dynamic)                | 2005                | 5,866          | 1.7%          |
| GR 3          | Low Load, Very Coarse, Humid Climate Grass (Dynamic) | 2005                | 0              | 0.0%          |
| GR 4          | Moderate Load, Dry Climate Grass (Dynamic)           | 2005                | 0              | 0.0%          |
| GS 1          | Low Load, Dry Climate Grass-Shrub (Dynamic)          | 2005                | 15,638         | 4.6%          |
| GS 2          | Moderate Load, Dry Climate Grass-Shrub (Dynamic)     | 2005                | 28,943         | 8.5%          |
| SH 1          | Moderate Load, Humid Climate Grass-Shrub (Dynamic)   | 2005                | 23,515         | 6.9%          |
| SH 2          | Moderate Load, Dry Climate Shrub                     | 2005                | 4,978          | 1.5%          |
| SH 3          | Moderate Load, Humid Climate Timber-Shrub            | 2005                | 0              | 0.0%          |
| SH 5          | High Load, Humid Climate Grass-Shrub                 | 2005                | 0              | 0.0%          |
| SH 7          | Very High Load, Dry Climate Shrub                    | 2005                | 2,633          | 0.8%          |
| TU 1          | Light Load, Dry Climate Timber-Grass-Shrub           | 2005                | 50,360         | 14.8%         |
| TU 2          | Moderate Load, Humid Climate Timber-Shrub            | 2005                | 0              | 0.0%          |
| TU 5          | High Load, Conifer Litter                            | 2005                | 123,546        | 36.4%         |
| TL 1          | Low Load, Compact Conifer Litter                     | 2005                | 1,242          | 0.4%          |
| TL 2          | Low Load, Broadleaf Litter                           | 2005                | 2              | 0.0%          |
| TL 3          | Moderate Load, Conifer Litter                        | 2005                | 40,004         | 11.8%         |
| TL 4          | Small Downed Logs                                    | 2005                | 0              | 0.0%          |
| TL 5          | High Load, Conifer Litter                            | 2005                | 2              | 0.0%          |
| TL 6          | Moderate Load, Broadleaf Litter                      | 2005                | 78             | 0.0%          |
| TL 7          | Large Downed Logs, Heavy Load Forest Litter          | 2005                | 0              | 0.0%          |
| TL 8          | Long-needle Litter                                   | 2005                | 21,770         | 6.4%          |
| TL 9          | Very High Load, Broadleaf Litter                     | 2005                | 0              | 0.0%          |
| SB 2          | Moderate Load, Activity Fuel                         | 2005                | 0              | 0.0%          |
| NB 1          | Urban/Developed                                      | 2005                | 586            | 0.2%          |
| NB 2          | Snow/Ice   | 2005                | 7              | 0.0%          |
| NB 3          | Agricultural   | 2005                | 325            | 0.1%          |
| NB 8          | Open Water   | 2005                | 270            | 0.1%          |
| NB 9          | Bare Ground  | 2005                | 1,315          | 0.4%          |
| <b>Total</b>  |  |                     | <b>339,202</b> | <b>100.0%</b> |

## Structure risk assessment

The structure risk analysis was undertaken to obtain accurate, scientifically based data regarding structure vulnerability in the District. The analysis is modeled after an assessment undertaken by the Log Hill Mesa Fire Protection District in Ouray County. It is based on the Home Ignition Zone concept developed by Jack Cohen at the Fire Science Lab in Missoula, Montana.

All area residents received notification of the assessment survey and two-man teams completed on-site assessments. Seven trained fire fighters from the Stonewall Fire Protection District completed the assessments. Two attempts were made to access properties with locked gates. A total relative risk score was obtained for each residence and outbuilding that was accessible. The following elements were assessed:

**Addressing:** Having correct, visible and reflective addressing is a crucial component to any type of emergency response effort. Smokey environments during a wildfire event reduce firefighter visibility. Reflective, contrasting addressing is much easier to see in such conditions.

**Ingress/ Egress:** Knowing primary and secondary ingress/ egress routes are crucial for successful evacuation. Having more than one way in and out of a neighborhood reduces the risk of becoming trapped by a fast moving wildfire.

**Driveway Width:** It is important for firefighters to know that they can safely get their equipment in and out of a home's driveway.

**Dangerous Topography:** These are areas where wildfires can move quickly and increase in intensity. A home's location relative to dangerous topography can largely affect its survivability during a wildfire event. Dangerous topography can have severe impacts on fire behavior over a given landscape. Dangerous Topography is different than overall slope. Examples would be a home at the edge or overlooking a steep slope (40% or greater), narrow canyon or arroyo, which could funnel heat and embers toward the home. Heavy fuel is also a requirement; a house overlooking a cliff with primarily boulders below **would not** constitute dangerous topography in this instance.

**Surrounding Fuel:** The fuel type and density directly surrounding a home can affect the fire behavior in the particular area. Given varying weather conditions, grassy open meadows tend to be conducive to fast moving, yet low intensity fire behavior, whereas fire in heavily forested environments can be much more intense.

**Defensible Space:** Defensible space is “the natural and landscaped area around a home or other structure that has been modified to reduce fire hazard.” Defensible space “gives [a] home a fighting chance against an approaching wildfire.” (CSFS Quick Guide FIRE 2012-1, Protecting Your Home from Wildfire: Creating Wildfire-Defensible Zones) Whether or not a home has adequate defensible space is a factor that firefighters take into consideration when deciding where to allocate resources. It is also important to remember that during a large wildfire event, resources are often limited. Having defensible space can increase the chances of a home’s survivability without firefighter intervention.

While there are differing requirements for defensible space based upon distance from a structure (See CSFS Quick Guide FIRE 2012-1, Protecting Your Home from Wildfire: Creating Wildfire-Defensible Zones), it is recommended that defensible space be created to extend more than 100 feet from any given structure. General defensible space guidelines recommend that at least within 100 feet of a structure:

- Trees should be thinned to the point where there is at least 10 feet of space between crowns;
- Tree limbs should be pruned to at least 10 feet high, where applicable;
- Groups or clumps of shrubs and small trees should be spaced 2 ½ times the clump’s height away from the nearest clump or single larger tree;
- Ladder fuels (small trees or shrubs growing underneath larger trees) should be eliminated.

**Roofing Material:** A home’s roofing material has been proven to be a primary factor in a home’s survivability during wildfire event. Class A, non-combustible roof construction increases a home’s survivability, whereas wood shake shingle roofing material increases a home’s wildfire risk drastically.

Generally speaking, Class A denotes the highest fire-resistance rating, while Class C denotes the least. Without knowing the construction method and material underneath the roof, it may not be possible to determine a rating based on simply an outside view. For example, it is noted that “Conventional mineral reinforced asphalt shingles usually have a Class C rating,” but that newer types of fiberglass reinforced asphalt shingles are rated Class A. It is also noted that metal roofing can only achieve a Class A rating only if a gypsum underlayment is installed. (FireWise Construction: Site Design & Building Materials; CSFS 2012).

**Siding Material / Building Exterior:** Whether a home's siding is made out of combustible material or a non-combustible material also affects survivability. Vinyl/wood siding is more likely to fail or ignite than a heavy log, stucco or composite siding material. Just as with roofing construction however, invisible underlayment can greatly affect the outside material's fire resistance.

**Other Combustibles:** Firewood piles, patio or deck furniture, propane tanks and other combustibles near a structure can be factors that compromise a home's resistance to wildfire. Rankings are determined by distance such material is from a structure.

**Decking Material:** Decking material has also proven to be a potential vulnerability to a home's resistance to wildfire. In addition to combustible versus non-combustible materials used for decking, a well maintained wood deck could be less combustible than an unmaintained dry deck. If it cannot be determined from whether the decking is made with non-combustible material or wood, assume wood construction.

The following page shows the wildfire risk ranking completed for each structure.

## Wildfire Risk Score Ranking

|                                  |  |   |                |
|----------------------------------|--|---|----------------|
| <b>Access</b>                    | Address                                | Posted and reflective                             | 0              |
|                                  |  | Posted and non-reflective                         | 5              |
|                                  |  | No address posted                                 | 15             |
|                                  | Ingress and Egress                     | Two or more roads in/out                          | 0              |
|                                  |  | One road in/out                                   | 10             |
|                                  |  |   |                |
|                                  | Driveway width                         | Greater than 20'                                  | 0              |
|                                  |  | Less than 20'                                     | 10             |
| <b>Vegetation and Topography</b> | Distance to dangerous topography       | More than 150 feet                                | 0              |
|                                  |  | 50-150 feet                                       | 30             |
|                                  |  | Less than 50 feet                                 | 75             |
|                                  | Neighborhood background fuel           | Light (grasses, forbs, tundra)                    | 25             |
|                                  |  | Moderate (light brush, small trees)               | 50             |
|                                  |  | Heavy (dense brush or timber, down and dead fuel) | 75             |
|                                  | Defensible Space                       | More than 150 feet                                | 0              |
|                                  |  | 30-150 feet                                       | 50             |
|                                  |  | 10-30 feet  | 75             |
| Less than 10 feet                |  | 100   |                |
| <b>Structure</b>                 | Roofing material                       | Tile or composite                                 | 0              |
|                                  |  | Asphalt or Indeterminate                          | 50             |
|                                  |  | Shake   | 200            |
|                                  | Building Exterior                      | Non-combustible (stucco, cement, masonry)         | 0              |
|                                  |  | Log, heavy timbers                                | 20             |
|                                  |  | Wood, Vinyl or wood shake                         | 60             |
|                                  | Location of woodpiles and combustibles | None or > 30 feet from structure                  | 0              |
|                                  |  | 10-30 feet from structure                         | 10             |
|                                  |  | < 30 feet from structure                          | 30             |
|                                  | Balcony, deck or porch                 | None/non-combustible                              | 0              |
|                                  |  | combustible material                              | 20             |
|                                  |  |   |                |
|                                  | <b>Wildfire Risk Score</b>             | <b>Low</b>  | <b>0-150</b>   |
|                                  |  | <b>Moderate</b>                                   | <b>151-175</b> |
|                                  |  | <b>High</b>                                       | <b>176-270</b> |
|                                  |  | <b>Very High</b>                                  | <b>271-330</b> |
|                                  |  | <b>Extreme</b>                                    | <b>331+</b>    |

## Structure Assessment Results

In total, 2,808 structures were assessed within the Stonewall Fire Protection District. These structures include residences, barns, garages and outbuildings, as well as buildings housing area businesses. The results of the risk assessment for the district as a whole are represented in the table below. **More than 54% of assessed structures are at high, very high or extreme wildfire risk.**

### Structure Risk Assessment Results

| Ranking   | Total        | Number of structures | Percentage  |
|-----------|--------------|----------------------|-------------|
| Low       | 0-150        | 1055                 | 38%         |
| Moderate  | 151-175      | 236                  | 8%          |
| High      | 176-270      | 984                  | 35%         |
| Very High | 271-330      | 324                  | 12%         |
| Extreme   | 331+         | 209                  | 7%          |
|           | <b>Total</b> | <b>2808</b>          | <b>100%</b> |

The SFPD CWPP wildfire risk analysis provides information about relative risk, not absolute risk. Many other factors, including weather, drought, surrounding structures and response time influence actual risk for any structure. Individual risk rankings are available to landowners, but are not available to any other parties, including insurance providers. Insurance providers each use their own underwriting risk analysis procedures. Of course, a structure's risk score is no guarantee of outcome in the event of a fire. It is intended as an educational tool only, designed to assist landowners and communities in reducing their wildland fire risk.

# SFPD PREPAREDNESS

The Stonewall Fire Protection District covers over 547 square miles and is equipped with six fire stations located strategically throughout the district. The district maintains a fleet of 23 fire-fighting and other apparatus, and is staffed with an active crew of 50 trained men and women firefighters, EMTs, and search and rescue teams.

The SFPD is dedicated to protecting lives, quality of life, and natural and human resources. District volunteers respond to wildfires, vehicle accidents, medical emergencies, and structure fires, as well as search and rescue operations.

## **Fire Fighting Capacity**

### **Training**

Training is an essential part of ensuring firefighter and public safety. To assist the Chief, volunteer firefighters help develop and conduct the training. The SFPD maintains a monthly training calendar and conducts regularly scheduled training on various subjects including structure and wildland firefighting, search and rescue, vehicle fire and extrication techniques, basic medical care and safety. SFPD firefighters are encouraged to complete the basic wildland firefighter course (S-130, S-190) within the first year of joining the department.

### **Personal Protective Equipment**

Personal protective equipment is provided to firefighters. This includes Nomex pants and shirts, fire pack, and fire shelters and miscellaneous other items. Search and rescue, structure, and dive gear is also provided to trained personnel. Firefighters provide their own boots.

**Communications**

All firefighters are equipped with portable VHF radios, which are compatible with federal and state agencies. The chief, assistant chief and some firefighters also have portable 800 MHz radios. All fire apparatus is equipped with mobile VHF radios, and select vehicles also have mobile 800 MHz radios.

The District currently has an emergency response address location program installed on several computers. This program provides GPS location and route planning options.

**Equipment**

The following tables specify the major equipment at each of the stations within the district.

## Cuchara Pass Station



| Call # | Type   | Year & Make                 |
|--------|--|-----------------------------|
| E320   | <p><b>Type 5 - 400 gal. Mini-Pumper, 4x4</b><br/>                     E320 is a wildland urban interface engine whose primary mission is to respond quickly to structure fires throughout the District; carries 4 firefighters; and can be used to supplement the District's wildland fire capabilities if needed. E320 carries 4 Self Contained Breathing Apparatuses (SCBAs), which are essential equipment for fighting structure fires and providing firefighters with the capability to enter a burning structure. It also has the capability of producing firefighting foam.</p> | 2007 Ford                   |
| E415   | <p><b>Type 4 - 1000 gal. Engine, 6x6</b><br/>                     E415 is used to fight wildland fires throughout the District; carries 2 firefighters; has the capability of producing firefighting foam.</p>   | 1972<br>American<br>General |
| E430   | <p><b>Type 6 - 300 gal. Brush Truck, 4x4</b><br/>                     E430 is used to fight wildland fires throughout the District; carries 3 firefighters; also has the capability to produce firefighting foam.</p>  | 1997 Ford<br>450            |

## Stonewall Station



| Call # | Type  | Year & Make              |
|--------|---|--------------------------|
| E340   | <p><b>Type 5 - 400 gal. Mini-Pumper, 4x4</b><br/>                     E340 is a wildland urban interface engine whose primary mission is to respond quickly to structure fires throughout the District; carries 2 firefighters; and, can be used to supplement the District's wildland fire capabilities if needed. E340 carries 4 Self Contained Breathing Apparatuses (SCBAs), which are essential equipment for fighting structure fires and providing firefighters with the capability to enter a burning structure. It also has the capability of producing firefighting foam.</p> | 2011 Ford F550           |
| E405   | <p><b>Type 4 - 1000 gal. Engine, 6x6</b><br/>                     E405 is used to fight wildland fires throughout the District; carries 2 firefighters; has the capability of producing firefighting foam.</p>  | 1991 American General    |
| E435   | <p><b>Type 6 - 500 gal. Brush Truck, 4x4</b><br/>                     E430 is used to fight wildland fires throughout the District; carries 5 firefighters; also has the capability to produce firefighting foam</p>  | 2011 Dodge 5500          |
| T230   | <p><b>Type 2 - 2000 gal Tender</b><br/>                     Its primary mission is to carry 2000 gallons of water to assist firefighters in areas that are not serviced by fire hydrants. T230 is manned by a crew of 2 firefighters. It carries 4 SCBAs to supplement the supply carried on pumpers in the event of a large fire. As a secondary mission it is capable of performing structure protection missions.</p>  | 2013 International 17400 |
| Med 11 | <p><b>Ambulance</b><br/>                     On loan from Trinidad Ambulance District to facilitate medical emergencies at a great distance from Trinidad.</p>  |                          |

## Wet Canyon Station



| Call # | Type   | Year & Make           |
|--------|--|-----------------------|
| E350   | <p><b>Type 3 - 400 gal. Mini-Pumper, 4x4</b><br/>                     E350 is a wildland urban interface engine whose primary mission is to respond quickly to structure fires throughout the District; carries 2 firefighters; and can be used to supplement the District's wildland fire capabilities if needed. E350 carries 4 Self Contained Breathing Apparatuses (SCBAs), which are essential equipment for fighting structure fires and providing firefighters with the capability to enter a burning structure. It also has the capability of producing firefighting foam.</p> | 2011 Ford F550        |
| E400   | <p><b>Type 4 - 1000 gal. Engine, 6x6</b><br/>                     E400 is used to fight wildland fires throughout the District; carries 2 firefighters; has the capability of producing firefighting foam.</p>   | 1973 American General |
| E425   | <p><b>Type 6 - 500 gal. Brush Truck, 4x4</b><br/>                     E425 is used to fight wildland fires throughout the District; carries 5 firefighters; also has the capability to produce firefighting foam.</p>  | 2007 Ford F550        |
| E600   | <p><b>Type 6 - 225 gal. 3/4 ton 4x4</b><br/>                     E600 can be used as a secondary command vehicle and can be used to fight wildland fires. It can carry 5 firefighters.</p>   | 2001 Dodge            |
| C200   | <p><b>Command Vehicle - Expedition 4x4</b><br/>                     C200 is used as an incident command vehicle; carries 5 firefighters</p>  | 2009 Ford Expedition  |
| C300   | <p><b>Service Vehicle - 3/4 ton 4x4</b><br/>                     C300 can carry 2 firefighters</p>   | 2008 Ford F250        |
| Med 12 | <p><b>Medical Transport Vehicle, 4x4</b><br/>                     Used to provide a medical transport vehicle for areas requiring four wheel drive; additional medical transport during large events.</p>  | Ford Expedition       |

|                   |   |                   |
|-------------------|---|-------------------|
| T220              | <b>Type 2 - 4000 gal Tender</b><br>Its primary mission is to carry 4000 gallons of water to assist firefighters in areas that are not serviced by fire hydrants. T220 is manned by a crew of 2 firefighters. It carries 4 SCBAs to supplement the supply carried on pumpers in the event of a large fire. As a secondary mission it is capable of performing structure protection missions. | 2007<br>Sterling  |
| ATV               | <b>ATV 4x4 + MATTRAX</b><br>It is primarily used to scout wildland fires in rugged terrain.   | 2013 Honda        |
| HAZMAT<br>Trailer | <b>HAZMAT Trailer</b><br>Used to store and transport HAZMAT containment and protective equipment to incidents throughout the District.  | 2000<br>CargoMate |

## La Garita Fire Station



| Call # | Type   | Year & Make      |
|--------|--|------------------|
| E310   | <p><b>Type 5 - 400 gal. Mini-Pumper, 4x4</b><br/>                     E310 is a wildland urban interface engine whose primary mission is to respond quickly to structure fires throughout the District; carries 2 firefighters; and can be used to supplement the District's wildland fire capabilities if needed. E310 carries 4 Self Contained Breathing Apparatuses (SCBAs), which are essential equipment for fighting structure fires and providing firefighters with the capability to enter a burning structure. It also has the capability of producing firefighting foam.</p> | 2007 Ford F550   |
| E410   | <p><b>Type 6 - 500 gal. Brush Truck, 4x4</b><br/>                     E410 is used to fight wildland fires throughout the District; carries 5 firefighters; also has the capability to produce firefighting foam.</p>  | 2003 Ford F550   |
| E601   | <p><b>Type 6 - 200 gal. Brush Truck, 4x4</b><br/>                     E601 is used to fight wildland fires throughout the District; carries 2 firefighters</p>   | 1967 Kaiser 574T |
| T200   | <p><b>Type 2 - 3000 gal Tender</b><br/>                     Its primary mission is to carry 3000 gallons of water to assist firefighters in areas that are not serviced by fire hydrants. T200 is manned by a crew of 2 firefighters. It carries a deployable 3000 gallon water reservoir. It also carries 4 SCBAs to supplement the supply carried on pumpers in the event of a large fire. As a secondary mission it is capable of performing structure protection missions.</p>   |                  |
| R100   | <p><b>Water/High Angle Rescue Vehicle</b><br/>                     R100 is used to store and transport water &amp; high angle rescue equipment.</p>  | 1976 Dodge Van   |
| Boat   | <p><b>Boat &amp; Trailer</b><br/>                     Used to transport equipment &amp; personnel for water rescue incidents.</p>  | Vanguard         |

## Segundo Station



| Call # | Type   | Year & Make      |
|--------|--|------------------|
| E300   | <p><b>Type 1 - 750 gal. Class A Pumper, 4x4</b><br/>                     E300 is a wildland urban interface engine whose primary mission is to respond quickly to structure fires throughout the District; carries 5 firefighters; E300 carries 4 Self Contained Breathing Apparatuses (SCBAs), which are essential equipment for fighting structure fires and providing firefighters with the capability to enter a burning structure. It also has the capability of producing firefighting foam.</p> | 2003 Pierce Hawk |
| T210   | <p><b>Type 2 - 3000 gal Tactical Tender</b><br/>                     Its primary mission is to carry 3000 gallons of water to assist firefighters in areas that are not serviced by fire hydrants. T210 is manned by a crew of 2 firefighters. It carries a deployable 3000-gallon water reservoir. It also carries 4 SCBAs to supplement the supply carried on pumpers in the event of a large fire. As a secondary mission it is capable of performing structure protection missions.</p>            | 2010 Kenworth    |

## Long Canyon Station



| Call # | Type   | Year & Make    |
|--------|--|----------------|
| E330   | <p><b>Type 5 - 400 gal. Mini-Pumper, 4x4</b><br/>                     E330 is a wildland urban interface engine whose primary mission is to respond quickly to structure fires throughout the District; carries 2 firefighters; and can be used to supplement the District's wildland fire capabilities if needed. E330 carries 4 Self Contained Breathing Apparatuses (SCBAs), which are essential equipment for fighting structure fires and providing firefighters with the capability to enter a burning structure. It also has the capability of producing firefighting foam.</p> | 2006 Ford F550 |
| E420   | <p><b>Type 6 - 500 gal. Brush Truck, 4x4</b><br/>                     E420 is used to fight wildland fires throughout the District; carries 5 firefighters; also has the capability to produce firefighting foam.</p>  | 2004 Ford F550 |

## **Mitigation Priorities**

### **Water Supply**

The availability and location of water resources is an issue in all parts of the district. Only four functional fire hydrants exist at this time, and all are located along State Highway 12. Only a few cisterns exist within the district. Some wet weather ponds and holding structures exist in the district, but may be unreliable sources of water.

A plan is currently being developed with the City of Trinidad to add nine additional hydrants along State Highway 12 and at the Trinidad Water Treatment Plant. See the individual community area write-ups for details on water supply within the community/planning area.

### **Wildfire Risk Assessment Crews**

Currently six firefighters are certified through the Wildland Fire Assessment Program to complete homeowner assessments of wildfire risk. The program is offered as a low cost service and focuses primarily on low or no cost mitigation modifications.

### **Wildfire Mitigation Crews**

At this time the district has limited wildfire mitigation capabilities. As more communities and individuals become aware of wildland fire risks in the district, it is expected that the demand for mitigation services will increase. It is recommended that the district begin training and outfitting mitigation crews who can respond to that increased demand.

### **CWPP Mitigation Project Coordinator**

SFPD relies on a small staff (Fire Chief and 2 F.T.E. administration staff) and volunteers to provide fire protection and emergency response services in more than 547 square miles. Adding additional work such as identifying Wildfire Mitigation Advocates, seeking funding for district-wide, community-wide or individual projects, or assisting communities to establish FireWise communities will increase the workload for this dedicated but over-committed group.

To ensure this CWPP remains a vital guiding document, and to assist communities in advancing mitigation projects, this plan recommends establishing funding for a part-time Mitigation Project Coordinator.

The role of the Coordinator will be to:

- Assist communities in identifying Wildfire Mitigation Advocates
- Strengthen residents awareness of the importance of individual and community-wide mitigation
- Increase public participation in projects defined in the CWPP

- Promote and facilitate FireWise Councils
- Assist with developing funding opportunities

### **Identification of Community Wildfire Mitigation Advocates (WMA)**

At this time, many WUI areas have no formal infrastructure such as landowners associations to facilitate plan implementation. Identifying existing associations or other groups and community Wildfire Mitigation Advocates for each WUI will create a core group of individuals committed to implementation of the plan. The recommendation to designate a WMA does not imply creating an additional layer of management in areas with existing infrastructure. Rather, the identification of a WMA within existing groups or where no groups exist will assist the SFPD in educational and mitigation efforts within the district by providing a direct communication link to each WUI. The role of the WMA is:

- Act as a community liaison and maintain a working relationship with the project coordinator, fire chief, federal, state and county representatives
- Promote FireWise Councils and FireWise awareness and designations to district citizens
- Help their community connect with the resources and funding necessary to accomplish the mitigation recommendations outlined for their community

### **FireWise Communities**

The National Fire Protection Association's Firewise Communities Program focuses on what residents can do around their homes to reduce potential loss of life and property to wildfire. The creation of Firewise Councils or similar WUI citizen advisory committees to promote shared responsibility is a critical component of reducing wildland fire risk in the SFPD.

### **Wild Fire Mitigation Projects**

To facilitate action on recommended mitigation efforts, it is important that citizens have access to information, assessment opportunities, crews capable of conducting mitigation work and resources to deal with resulting slash and other by-products. It is also critical that cost share or other funding be identified and sought to improve homeowner's ability to cover the costs of mitigation efforts.

Wildfire mitigation demonstration sites located in strategic locations throughout the district will encourage further mitigation projects in the district and assist residents in understanding mitigation techniques.

Working with the Colorado State Forest Service, the BLM and other agencies to create large scale fuel breaks in the SFPD will increase the probability of containing wildland fires at manageable levels. Fuel breaks are strips of land in which fuel density is

reduced, thus improving fire control opportunities. Fuel breaks (or shaded fuel breaks) should not be confused with firebreaks, which are strips of land in which all vegetation is removed.

### Recommendations

To facilitate the protection of citizens and property, and to improve the wildland fire risk in the Stonewall Fire Protection District, the following actions are recommended:

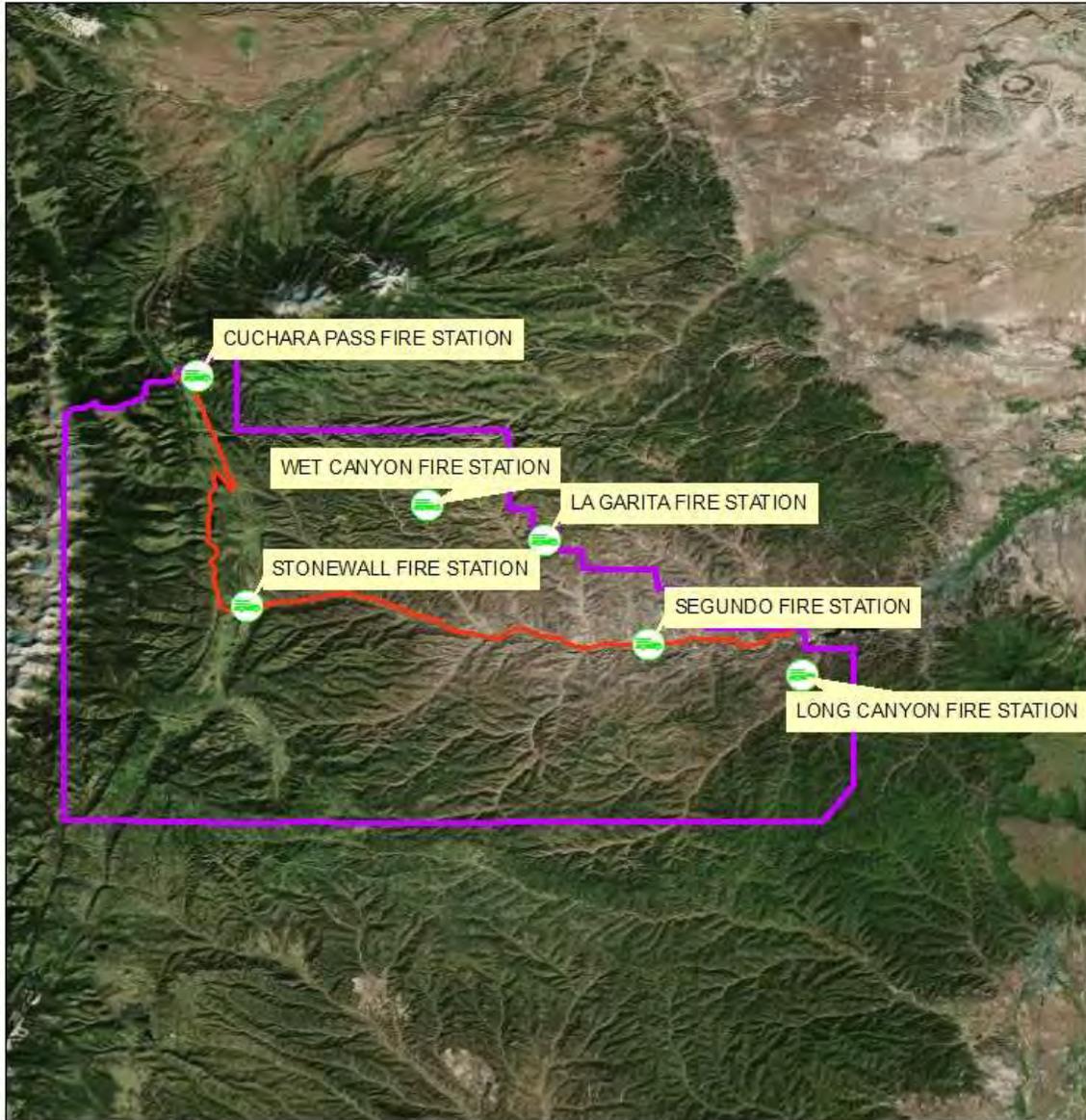
#### Recommendations for improving fire-fighting capacity

| Need               | Priority | Description  |
|--------------------|----------|--|
| Firefighter safety | 1        | Upgrade 30 SCBA units<br>Obtain 20 additional VHF radios<br>Obtain 10 additional wildland Nomex shirts/pants sets<br>Obtain 10 additional laptop computers for full computer mapping program use   |
| Training           | 1        | Continue to offer S-130 and S-190 training to new firefighters and as refresher courses<br>Continue to offer RT-130 Annual Wildland Safety refresher<br>Offer additional training courses to upgrade existing skill levels for all firefighters  |
| Water Supply       | 2        | Continue to work with the City of Trinidad to obtain nine additional fire hydrants. In order of priority these are:<br>1. Hwy 12 and CR 31.9 (Weston)<br>2. Hwy 12 at Segundo<br>3. Hwy 12 at Valdez<br>4. Hwy 12 at CR 41.7 (Sarcillo Canyon)<br>5. CR 13 and CR21.6 (Trinidad Water Treatment Plant)<br>6. Hwy 12 at Lower North Fork<br>7. Hwy 12 at Rancho Escondido<br>8. Hwy 12 at Madrid Canyon<br>9. Hwy 12 at Pioneer Resources, Inc. facility<br>Assist in developing a system of cisterns or other water storage in collaboration with communities within the district and map all existing water sources |

## Recommendations for Mitigation Efforts

| Need   | Priority | Description   |
|--|----------|---|
| Mitigation Project Coordinator                       | 1        | Hire part-time Project Coordinator for first two years of CWPP implementation   |
| Identify Community Wildfire Mitigation Advocates     | 2        | Identify Wildfire Mitigation Advocates to serve as primary contact resource for each WUI/community  |
| Wildfire Mitigation                                  | 3        | <p>Provide WFAP Home Assessments at no or low cost to District residents</p> <hr/> <p>Develop a trained mitigation crew capable of providing low-cost fuel reduction services within the district</p> <hr/> <p>Develop large scale shaded fuel break to enhance protection of the City of Trinidad Watershed above Monument and North Lake</p> <hr/> <p>Complete 5 demonstration projects within the district in strategic locations as examples of mitigation for wildland fire risk reduction</p> <hr/> <p>Secure required equipment (chippers, chain saws, dump apparatus) to conduct FireWise wildfire risk mitigation</p> <hr/> <p>Develop slash disposal areas and resources for disposal of mitigation by-products</p> <hr/> <p>Assist homeowners, landowners associations and WUI communities with mitigation projects</p> <hr/> <p>Conduct community chipping projects and slash burn projects</p> <hr/> <p>Work with the Colorado State Forest Service and other agencies to complete identified fuel breaks, see following map</p> |
| Assist Implementation of FireWise Community programs | 4        | Carry out activities under the FireWise Communities Program to provide homeowners education and assistance with implementing FireWise techniques  |

# Stonewall Fire Protection District Station Locations



# Will Your Home Survive a Wildfire?

Get your **free** wildland fire home assessment done today!



Every year, thousands of homes are damaged or destroyed due to wildfire. You live in the wildland-urban interface, which makes your family and your home more susceptible to this natural disaster. Both lives and properties are at risk, but YOU can take the necessary steps to protect your home and prepare your family.

**Contact your local fire department to schedule your **free** home assessment today!**

|                 |                                    |
|-----------------|------------------------------------|
| Department Name | Stonewall Fire Protection District |
| Phone           | 719 868-2249                       |
| Email Address   | SFPD.Project@gmail.com             |

*This program is brought to you by the National Volunteer Fire Council and the U.S. Forest Service.*

# Section Two

# COMMUNITY IGNITABILITY ANALYSIS AND RECOMMENDATIONS

This section identifies CWPP communities within the Stonewall Fire Protection District. These areas have been identified as Wildland Urban Interfaces (WUI).

According to the guide, *“Preparing a Community Wildfire Protection Plan: A Handbook for Wildland-Urban Interface Communities,”* “The wildland-urban interface (WUI) is commonly described as the zone where structures and other human development meet and intermingle with undeveloped wildland or vegetative fuels.”

Communities identified as WUIs represent a single geographic area that may encompass a variety of vegetation, topography and infrastructure. The list is primarily based on subdivisions located within the district. Additional areas were identified as geographic areas consisting of similar fire-risk conditions.

For the purposes of this plan, the community boundaries can serve as planning unit boundaries. Subdivisions offer a ready-made boundary with known ownership and possible leadership infrastructure (landowners associations or other community collaborations) appropriate to undertaking WUI-wide mitigation efforts. In areas without existing leadership, coordination of mitigation efforts might be more difficult. For these areas, mitigation recommendations include developing relationships or infrastructure, including identifying a Wildland Fire Mitigation Advocate that can support collaborative efforts within the community.

**To improve life safety and preserve property, every home in the SFPD should have compliant, effective defensible space.** Mitigation efforts designed to create defensible space are the recommended first priority for every identified community. Defensible space is determined to be the greatest benefit for the least cost for landowners, and is the MOST IMPORTANT action an individual can take. However, additional larger landscape-scale projects are also identified, including some projects

that require collaborative efforts from adjoining communities. Identifying these larger projects in surrounding areas will assist communities in obtaining grants to help fund all the projects.

Completing treatment along the roads in the district is a recommendation made throughout the Stonewall Fire Protection District. A few roads are specifically identified as needing treatment because of fuel loads and amount of traffic. However, all roads within the district boundaries should be considered for fuel reduction treatments, as they are used for access and egress. Particular attention should be paid to roads that offer the only access both in and out of subdivisions or communities.

Each community write-up that follows can be regarded as an individual document. As a result, you will see recommendations such as creating defensible space that apply to all communities.

Each community write-up also includes structure risk data. This data is an amalgam of individual risk assessments, and as such, quantifies a relative risk for each WUI. The community-level assessment identified one community in the study area is at extreme risk. Six communities were rated at very high risk, twenty were rated at high risk, and five were rated at moderate risk. The remaining ten were rated at low risk. Of course, this data can change as mitigation efforts are completed.

# ADOBE RANCH

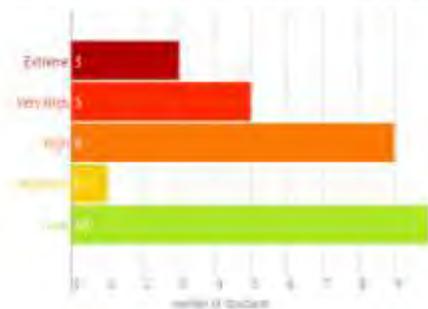


## Overall Hazard and Risk

The Adobe Ranch community is located within the eastern area of the Stonewall Fire Protection District south of Highway 12. Adobe Ranch encompasses 300 acres within the District. The overall topography of the land is open grassy meadows and shrub dominated areas with steeper sections of pinon-juniper, and the density of vegetation is moderate. The vegetation in the area is comprised of pinon-juniper and oak shrubland with cottonwood trees in riparian areas.

Much of this community is covered by pinon-juniper shrub lands, with smaller areas of grass fuel types. The shrub fuel model is mostly SH1, which is fairly sparse shrub cover with grass or low loads of litter in the understory, and correspondingly low rates of spread (2-3 chains per hour) and flame lengths (less than 1 foot) under adverse weather conditions. In areas where shrub densities and the amount of litter in the understory increase, flame lengths and rates of spread will predictably increase. Grasslands are mostly of the GR1 Fuel Model, with moderate rates of spread (40-80 chains per hour) but low flame lengths (5-7 feet) under adverse weather conditions.

## Individual Structure Breakdown



## Structure Risk Rating: **High**

**Average structure rating: 204.**

Adobe Ranch is moderately developed. There are 8 parcels within Adobe Ranch, and the SFPD was able to assess 28 structures. Parcel size ranges from 35-40 acres. Roads leading to structures are unpaved and structures generally have only one road leading to them. There are no noticeable street signs in Adobe Ranches. Few structure addresses are posted and are generally non-reflective and combustible. Building

materials vary widely throughout Adobe Ranch. Many structures have combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within Adobe Ranch is minimal. The main road is County Road 53.2 and is unpaved. There are many one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within Adobe Ranch and water storage is minimally available. The nearest fire district substation is Long Canyon Station. There are no fire protection capabilities within Adobe Ranch, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivision. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Adobe Ranch Homeowner Recommendations:

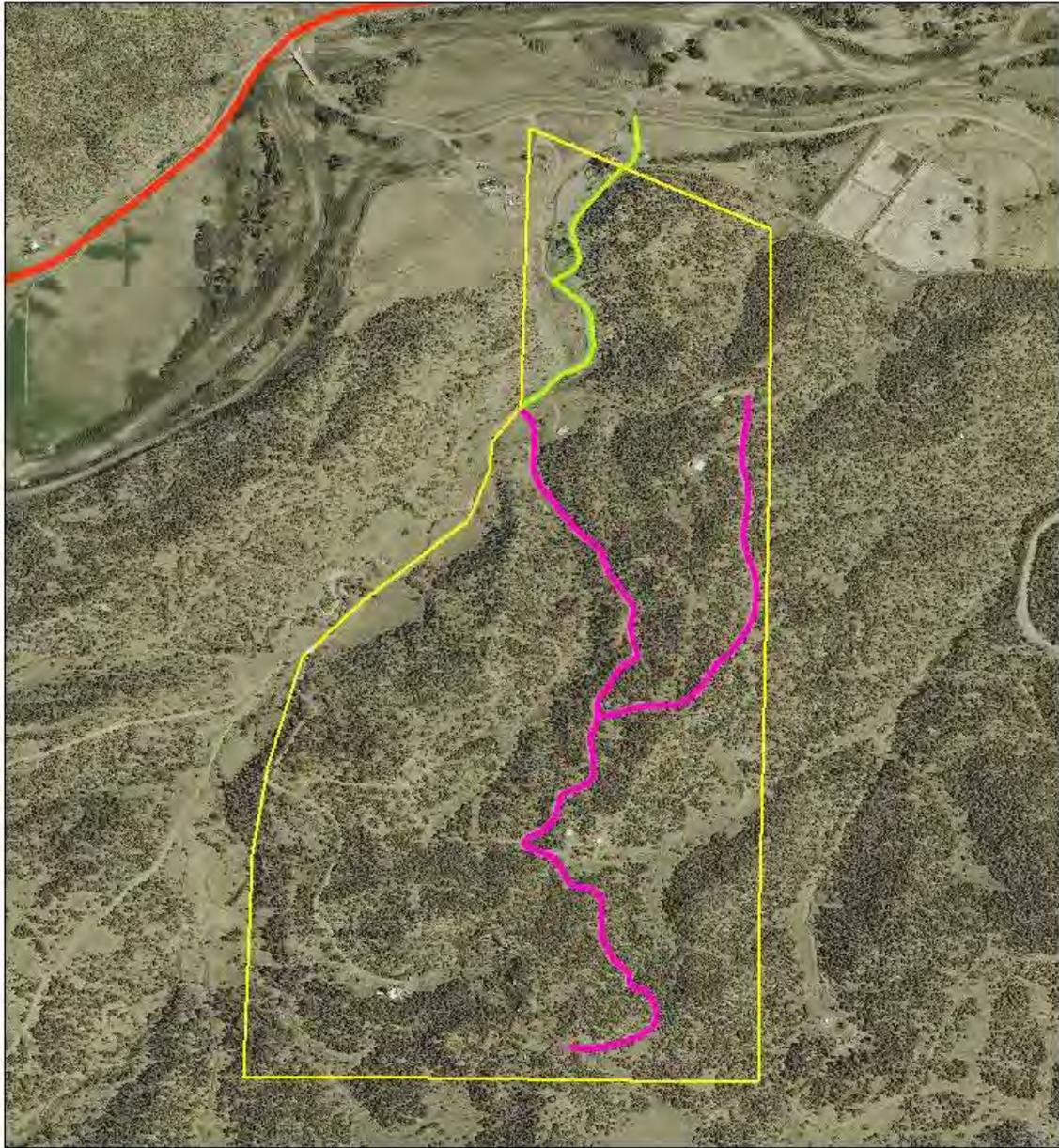
| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See “ <i>Ready, Set, Go! Emergency Preparedness Checklist</i> ” in Appendix  |
| <b>Defensible Space</b>               | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See “ <i>FireWise Construction: Site Design &amp; Building Materials</i> ” and “ <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> ” in Appendix |

## Adobe Ranch General Subdivision Wildfire Mitigation Recommendations:

| Category   | Priority | Description  |
|--|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>         | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended mitigation activities in coordination with the SFPD, Colorado State Forest Service and others</li> </ul>   |
| <b>Roadside Thinning of CR 53.2 and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings. This will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing. See <i>"Fuel Break Guidelines for Forested Subdivisions &amp; Communities"</i></li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>               | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>                                  | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Adobe Ranch



# ARROWHEAD RANCHETTES

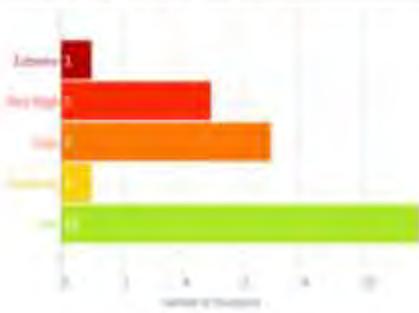


## Overall Hazard and Risk

The Arrowhead Ranchettes community is located within the north central area of the Stonewall Fire Protection District north of Highway 12. Arrowhead Ranchettes encompasses 882 acres within the District. The overall topography of the land is mountainous, and the density of vegetation is moderate to high. The vegetation in the area is comprised mainly of ponderosa pine/gambel oak interspersed with grass meadows, with pinon-juniper on drier and south facing slopes with some spruce/fir.

Most of this community is classified as the TU5 Fuel Model, which is characterized by Scott and Burgan (2005) as “heavy forest litter with a shrub or small tree understory.” Predicted rates of spread are moderate, but under dry windy conditions may be greater than 40 chains per hour. Flame lengths are also moderate, but under dry windy conditions may be greater than 15 feet, making control efforts very difficult. A much smaller area is occupied by the GR2 model, which is primary grass but may contain shrubs. When the grass is dry, flame lengths can be as high as 10 feet, and rates of spread can easily exceed 100 chains per hour.

### Individual Structure Breakdown



### Structure Risk Rating: **High**

**Average structure rating: 191**

Arrowhead Ranchettes is moderately developed. There are 22 parcels within the portion of Arrowhead Ranchettes within the district, and the SFPD was able to assess 26 structures. Parcel size ranges from 35-40 acres. Roads leading to structures are unpaved and structures have one road leading to them. There are no street signs and the few structure addresses that are posted

are generally non-reflective and combustible. Building materials vary widely throughout Arrowhead Ranchettes. Many structures have combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented.

## Protection and Management

Road accessibility for emergency responders within Arrowhead Ranchettes is moderate. The main road is Arrowhead Road and is unpaved. There are one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within Arrowhead Ranchettes and water storage is minimally available. The nearest fire district substation is La Garita Station. There are no fire protection capabilities within Arrowhead Ranchettes, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivision. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Arrowhead Ranchettes Homeowner Recommendations:

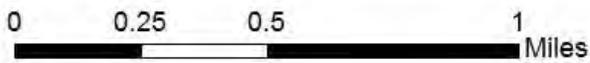
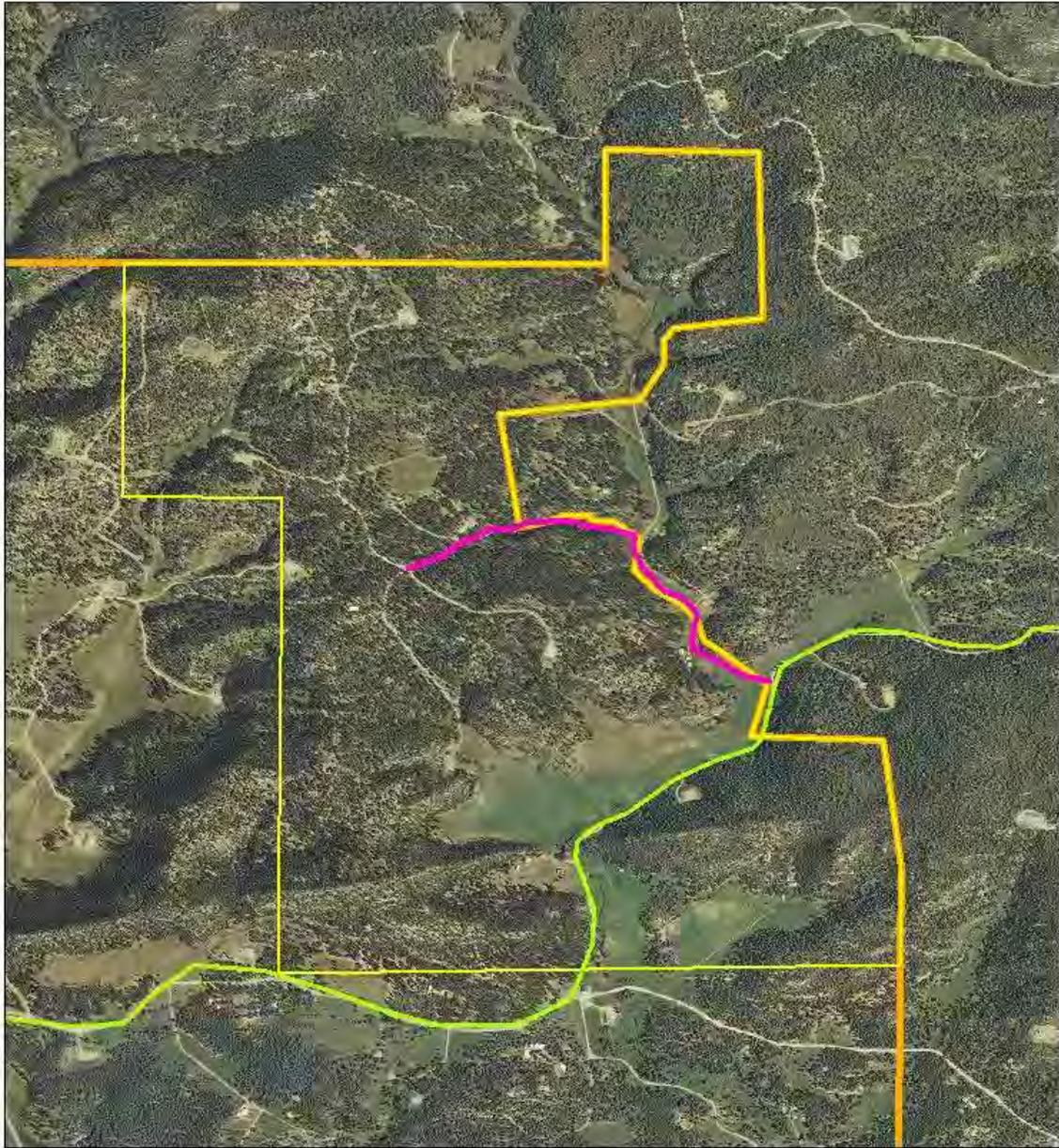
| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See <i>“Ready, Set, Go! Emergency Preparedness Checklist”</i> in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See <i>“FireWise Guide to Landscape and Construction”</i> in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See <i>“FireWise Guide to Landscape and Construction”</i> in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See <i>“FireWise Construction: Site Design &amp; Building Materials”</i> and <i>“Protect Your Property from Wildfire--Rocky Mountain Edition”</i> in Appendix |

## Arrowhead Ranchettes General Subdivision Wildfire Mitigation Recommendations:

| Category  | Priority | Description  |
|---|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>                | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended mitigation activities in coordination with the SFPD, Colorado State Forest Service and others</li> </ul>   |
| <b>Roadside Thinning of Arrowhead Road and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings. This will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing. See <i>"Fuel Break Guidelines for Forested Subdivisions &amp; Communities"</i></li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>                      | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>   | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Arrowhead Ranchettes



## Legend

 Arrow head Ranchettes

 Arrow head Road Recommended Thinning

 Stonewall FPD Boundary

 CR 30.1



# ASPEN ROSE RANCH

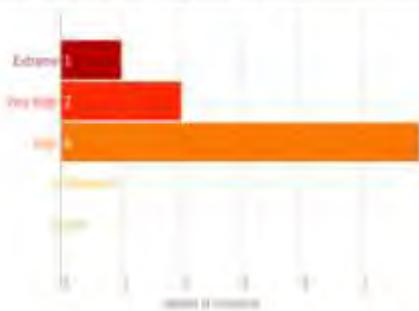


## Overall Hazard and Risk

The Aspen Rose Ranch community is located within the north central area of the Stonewall Fire Protection District north of Highway 12. Aspen Rose Ranch encompasses 1100 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the density of vegetation is high. The vegetation in the area is comprised of ponderosa pine, spruce-fir, and aspen with oak shrubland scattered throughout.

The forests with highest density in this community are of the TU5 Fuel Model, characterized by Scott and Burgan (2005) as “heavy forest litter with a shrub or small tree understory.” Predicted rates of spread are moderate, but under dry windy conditions may be greater than 40 chains per hour. Flame lengths are also moderate, but under dry windy conditions may be greater than 15 feet, making control efforts very difficult. Within the valley bottoms, the GR2 Fuel Model is common, where fire is carried by grass and occasional shrubs, where flame lengths can be as high as 10 feet, and rates of spread can easily exceed 100 chains per hour.

### Individual Structure Breakdown



## Structure Risk Rating: **High**

**Average structure rating: 266**

Aspen Rose Ranch is moderately developed. There are approximately 20 parcels within Aspen Rose Ranch, and the SFPD was able to assess 9 structures. Parcel size ranges from 35-40 acres. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs and structure addresses are posted, but generally are non-reflective and combustible. Building materials vary widely throughout Aspen Rose Ranch. Many structures

have combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within Aspen Rose Ranch is moderate to good. The main road is Aspen Road Drive and is unpaved. There are many one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within Aspen Rose Ranch and water storage is minimally available. The nearest fire district substation is Wet Canyon Station. There are no fire protection capabilities within Aspen Rose Ranch, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivision. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Aspen Rose Ranch Homeowner Recommendations:

| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See “ <i>Ready, Set, Go! Emergency Preparedness Checklist</i> ” in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See “ <i>FireWise Construction: Site Design &amp; Building Materials</i> ” and “ <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> ” in Appendix |

## Aspen Rose Ranch General Subdivision Wildfire Mitigation Recommendations:

| Category  | Priority | Description  |
|---|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>                  | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended mitigation activities in coordination with the SFPD, Colorado State Forest Service and others</li> </ul>   |
| <b>Roadside Thinning of Aspen Road Drive and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings. This will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing. See <i>"Fuel Break Guidelines for Forested Subdivisions &amp; Communities"</i></li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>                        | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>   | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Aspen Rose Ranch



0 0.25 0.5 1 Miles



### Legend

-  Aspen Rose Ranch
-  Aspen Rose Drive Recommended Thinning
-  Stonewall FPD Boundary



# BarNI HEADQUARTERS

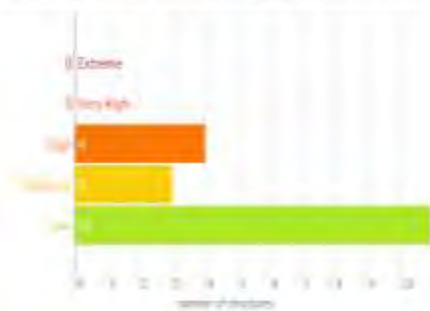


## Overall Hazard and Risk

The BarNI Headquarters community is located within the western area of the Stonewall Fire Protection District south of Highway 12. BarNI Headquarters encompasses 1492 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the density of vegetation is moderate. The vegetation in the area is comprised of ponderosa pine, oak shrubland, grassland, and riparian vegetation.

Most of the area surrounding the structures scattered about the Bar NI Ranch Headquarters are grasslands of the Fuel Model GR1. The large ponderosa pine trees present in this area are well-spaced, have thick fire-resistant bark and will not carry fire under most weather conditions. The grass understory is predicted to exhibit moderate rates of spread (40-80 chains per hour) but low flame lengths (5-7 feet) under adverse weather conditions. The predicted behaviors can vary depending on density, height and moisture content of the grass. As the land rises to the west, thicker pine and mixed conifer forests become the norm and are classified as Fuel Model TU5, with predicted rates of spread may be greater than 40 chains per hour and flame lengths greater than 15 feet under adverse weather conditions.

## Individual Structure Breakdown



## Structure Risk Rating: **Low**

**Average structure rating: 139**

BarNI Headquarters is minimally developed. There is one parcel within BarNI Headquarters, and the SFPD was able to assess 18 structures. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs and structure addresses are posted, but are non-reflective and combustible. Building materials vary widely throughout BarNI Headquarters. Some structures

have combustible materials within 10 feet of the structure. Defensible space has been implemented around some structures.

## Protection and Management

Road accessibility for emergency responders within BarNI Headquarters is moderate. The main road is Highway 12 and is paved. There are one-lane roads and turnarounds are infrequent. There is currently one dry fire hydrant available within BarNI Headquarters and water storage is moderately available. The nearest fire district substation is Stonewall Station. There are sprinkler systems on structures within BarNI Headquarters, but otherwise there are no fire protection capabilities. There are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the area. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### BarNI Headquarters Recommendations:

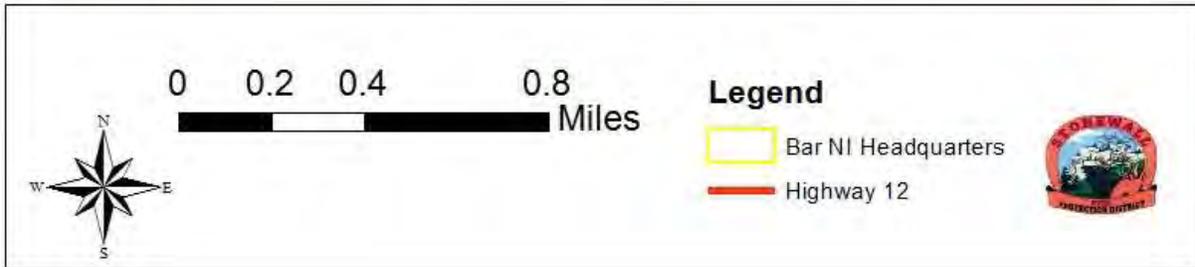
| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See “ <i>Ready, Set, Go! Emergency Preparedness Checklist</i> ” in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See “ <i>FireWise Construction: Site Design &amp; Building Materials</i> ” and “ <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> ” in Appendix |

## BarNI Headquarters General Wildfire Mitigation Recommendations:

| Category  | Priority | Description  |
|---|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>            | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended mitigation activities in coordination with the SFPD, Colorado State Forest Service and others</li> </ul>   |
| <b>Roadside Thinning of Highway 12 and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings. This will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing. See <i>"Fuel Break Guidelines for Forested Subdivisions &amp; Communities"</i></li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>                  | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>                                     | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Bar NI Ranch Headquarters Area



# Big Pine Ranch

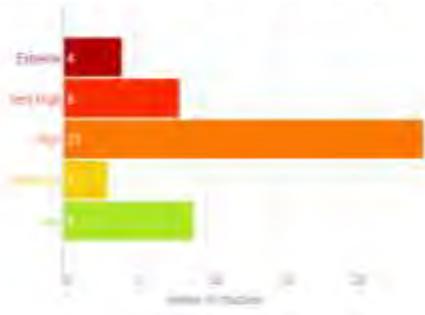


## Overall Hazard and Risk

The Big Pine Ranch community is located within the central area of the Stonewall Fire Protection District north of Highway 12. Big Pine Ranch encompasses 1200 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the majority of structures are built on the upper elevations and ridgelines of the subdivision. The density of vegetation is moderate. The vegetation in the area is comprised mainly of ponderosa pine/gambel oak, with pinon-juniper on drier and south facing slopes and with some spruce/fir, mostly on north facing slopes.

This community lies within the central portion of Wet Canyon and rises to the east. On northerly aspects are found the thickest forest coverage. These are mostly of the TU5 Fuel Model, which is characterized by Scott and Burgan (2005) as “heavy forest litter with a shrub or small tree understory.” Predicted rates of spread are moderate, but under dry windy conditions may be greater than 40 chains per hour. Flame lengths are moderate, but under dry windy conditions may be greater than 15 feet, making control efforts very difficult. Southern aspects are warmer and drier, with less tree coverage with some shrubs and grass in the understory. This is mostly of the TU1 Fuel Model, where fire is carried by a timber understory of grass or small amounts of shrub or litter. In these fuels under even the most adverse conditions, rates of spread are predicted to be relatively low (around 10-12 chains per hour) and flame lengths at 4 feet or less.

## Individual Structure Breakdown



## Structure Risk Rating: **High**

### Average structure rating: **221**

Big Pine Ranch is moderately developed. There are approximately 34 parcels within Big Pine Ranch, and the SFPD was able to assess 49 structures. Parcel size ranges from 35-40 acres. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs and structure addresses are posted, but generally are non-reflective and combustible. Building materials vary widely

throughout Big Pine Ranch. Many structures have combustible materials within 10 feet. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within Big Pine Ranch is moderate to good. The main road is Big Pine Ridge Road and is unpaved. There are many one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within Big Pine Ranch and water storage is minimally available. The nearest fire district substation is Wet Canyon Station. There are no fire protection capabilities within Big Pine Ranch, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivision. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Big Pine Ranch Homeowner Recommendations:

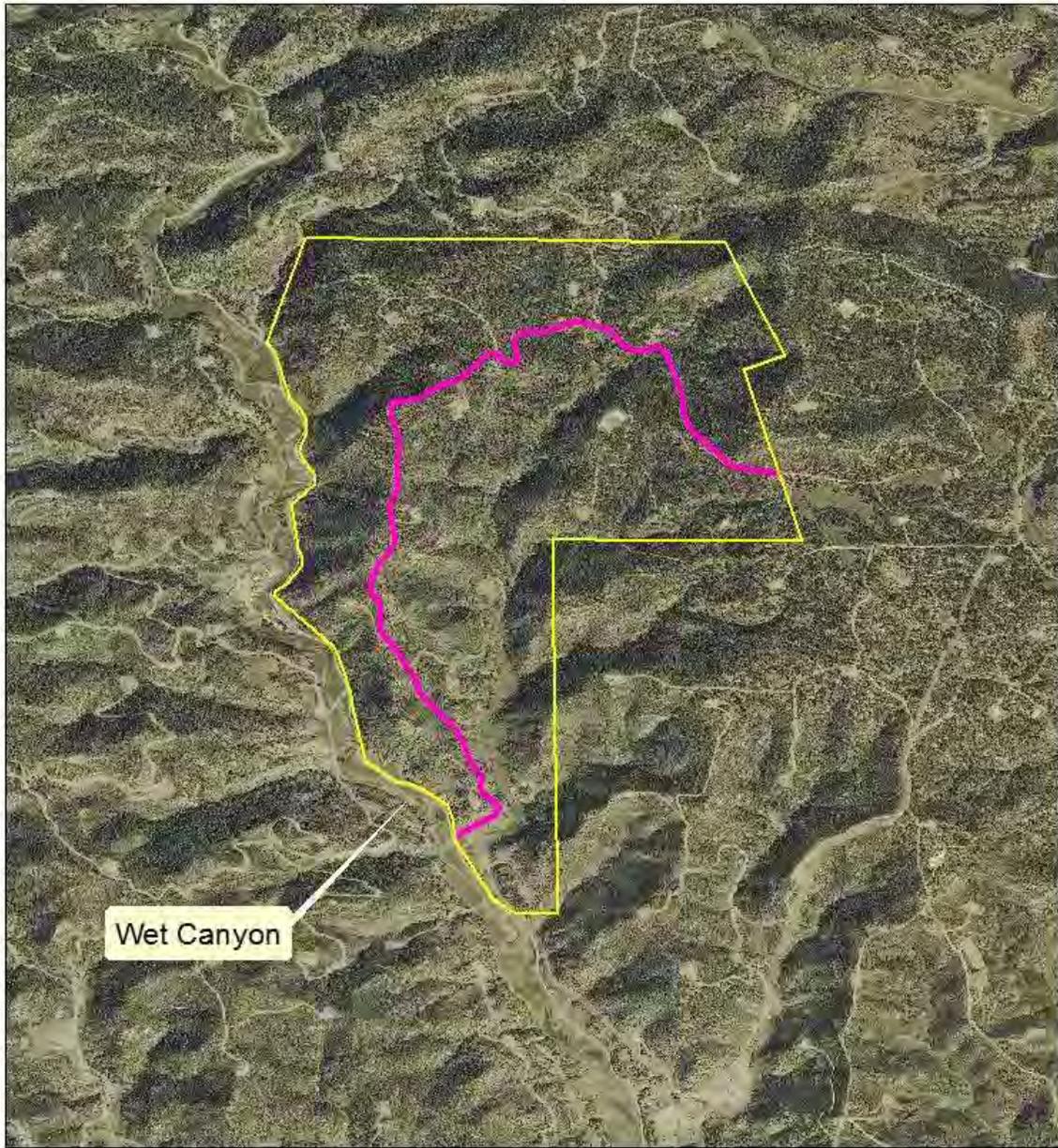
| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See <i>“Ready, Set, Go! Emergency Preparedness Checklist”</i> in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See <i>“FireWise Guide to Landscape and Construction”</i> in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See <i>“FireWise Guide to Landscape and Construction”</i> in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See <i>“FireWise Construction: Site Design &amp; Building Materials”</i> and <i>“Protect Your Property from Wildfire--Rocky Mountain Edition”</i> in Appendix |

## Big Pine Ranch General Subdivision Wildfire Mitigation Recommendations:

| Category   | Priority | Description  |
|--|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>                     | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended mitigation activities in coordination with the SFPD, Colorado State Forest Service and others</li> </ul>   |
| <b>Roadside Thinning of Big Pine Ridge Road and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings. This will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing. See <i>"Fuel Break Guidelines for Forested Subdivisions &amp; Communities"</i></li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>                           | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>  | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Big Pine Ranch



0 0.25 0.5 1 Miles



### Legend

- Big Pine Ranch
- Big Pine Ridge Road Recommended Thinning



# CIELO GRANDE

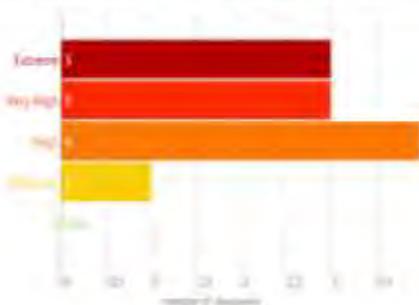


## Overall Hazard and Risk

The Cielo Grande community is located within the central area of the Stonewall Fire Protection District north of Highway 12. Cielo Grande encompasses 434 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the density of vegetation is moderate. The vegetation in the area is comprised of pinon-juniper, oak shrubland, and scattered ponderosa pine.

This community starts within the central portion of Wet Canyon and rises to the west. On northerly aspects are found the thickest forest coverage. These are mostly of the TU5 Fuel Model, which is characterized by Scott and Burgan (2005) as “heavy forest litter with a shrub or small tree understory.” Predicted rates of spread are moderate, but under dry windy conditions may be greater than 40 chains per hour. Flame lengths are also moderate, but under dry windy conditions may be greater than 15 feet, making control efforts very difficult. Southern aspects are warmer and drier, with a higher shrub component. Most of these lands contain the SH1 Fuel Model, comprised mostly of shrubs interspersed with grass. While predicted rates of spread and flame lengths are low (less than 3 chains per hour and 2 feet) in this fuel model, increased amounts of grass will result in higher rates of spread, and thick shrub cover will increase flame lengths and corresponding suppression difficulty.

## Individual Structure Breakdown



## Structure Risk Rating: **Very High**

**Average structure rating: 295**

Cielo Grande is a minimally developed gated community. There are approximately 12 parcels within Cielo Grande, and the SFPD was able to assess 11 structures. Parcel size ranges from 35-40 acres. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs and structure addresses are minimally posted. Building materials vary widely throughout Cielo Grande.

Many structures have combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within Cielo Grande is moderate. The main road is Cielo Grande Road and is unpaved. There are many one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within Cielo Grande and water storage is minimally available. The nearest fire district substation is Wet Canyon Station. There are no fire protection capabilities within Cielo Grande, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivision. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Cielo Grande Homeowner Recommendations:

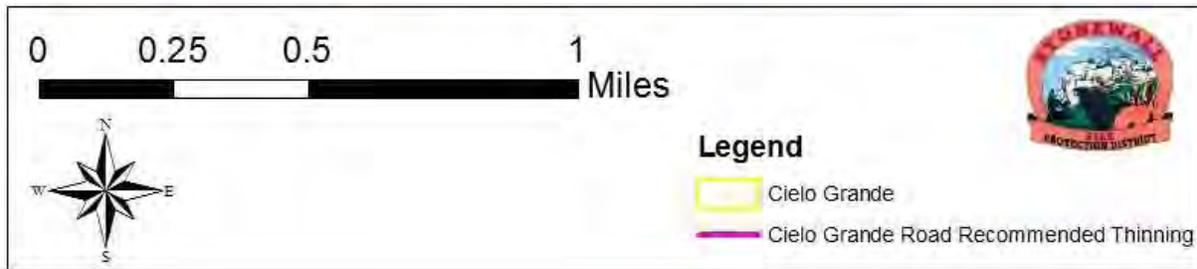
| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See “ <i>Ready, Set, Go! Emergency Preparedness Checklist</i> ” in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See “ <i>FireWise Construction: Site Design &amp; Building Materials</i> ” and “ <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> ” in Appendix |

## Cielo Grande General Subdivision Wildfire Mitigation Recommendations:

| Category   | Priority | Description  |
|--|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>                   | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended mitigation activities in coordination with the SFPD, Colorado State Forest Service and others</li> </ul>   |
| <b>Roadside Thinning of Cielo Grande Road and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings. This will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing. See <i>"Fuel Break Guidelines for Forested Subdivisions &amp; Communities"</i></li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>                         | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>  | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Cielo Grande



# Cimarron Ranches Pine Valley/ Cimarron Ranches (Northern Portion)

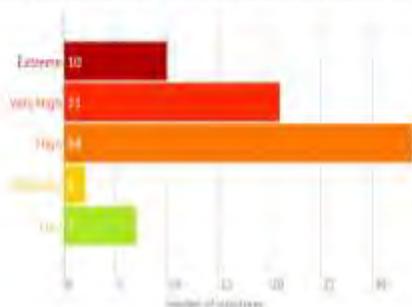


## Overall Hazard and Risk

The Cimarron Ranches Pine Valley/Cimarron Ranches (Northern Portion) community is located within the northwestern area of the Stonewall Fire Protection District north of Highway 12. Cimarron Ranches Pine Valley/Cimarron Ranches (Northern Portion) encompasses 2138 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the density of vegetation is moderate. The vegetation in the area is comprised of ponderosa pine, spruce-fir, and scattered oak shrubland interspersed with grassy meadows.

This community is located within the upper portion of Wet Canyon and the confluence of several smaller canyons. As a result, a substantial amount of area is valley-bottom grassland, classified as the GR2 Fuel Model. This is primarily grass but may include occasional shrubs, with predicted flame lengths as high as 10 feet, and rates of spread exceeding 100 chains per hour under adverse conditions. The surrounding hills transition from grass to forests, where the TU5 Fuel Model is most common, with predicted rates of spread of 40 chains per hour and flame lengths up to 10 feet under dry and windy conditions.

## Individual Structure Breakdown



## Structure Risk Rating: **High**

**Average structure rating: 268**

Cimarron Ranches Pine Valley/Cimarron Ranches (Northern Portion) is minimally developed. There are approximately 187 parcels within Cimarron Ranches Pine Valley/Cimarron Ranches (Northern Portion), and the SFPD was able to assess 74 structures. Parcel size ranges from 3-12 acres in Cimarron Ranches Pine Valley to 35-40 acres in Cimarron Ranches (Northern Portion). Roads leading to structures are

unpaved, and structures generally have one road leading to them. Street signs and structure addresses are minimally posted. Building materials vary widely throughout the Cimarron Ranches Pine Valley and Cimarron Ranches. Many structures have combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within the two areas is poor to moderate. The main road is County Road 31.9 and is unpaved. There are many one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available in the two areas and water storage is minimally available. The nearest fire district substation is Wet Canyon Station. There are no fire protection capabilities within the two areas, and there are currently no evacuation plans.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivision. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Cimarron Ranches Pine Valley/Cimarron Ranches (Northern Portion) Homeowner Recommendations:

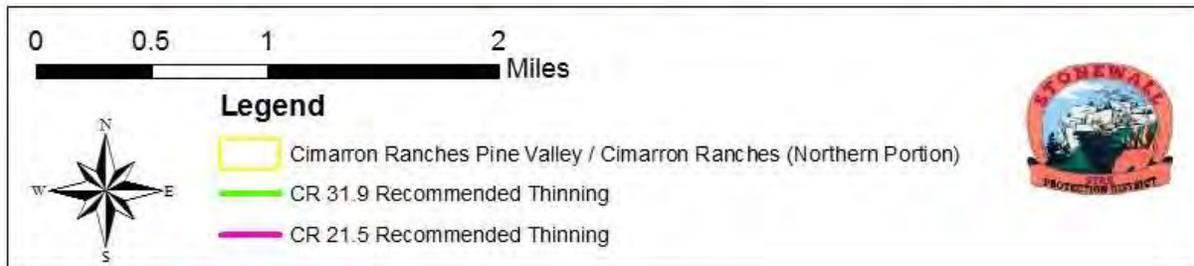
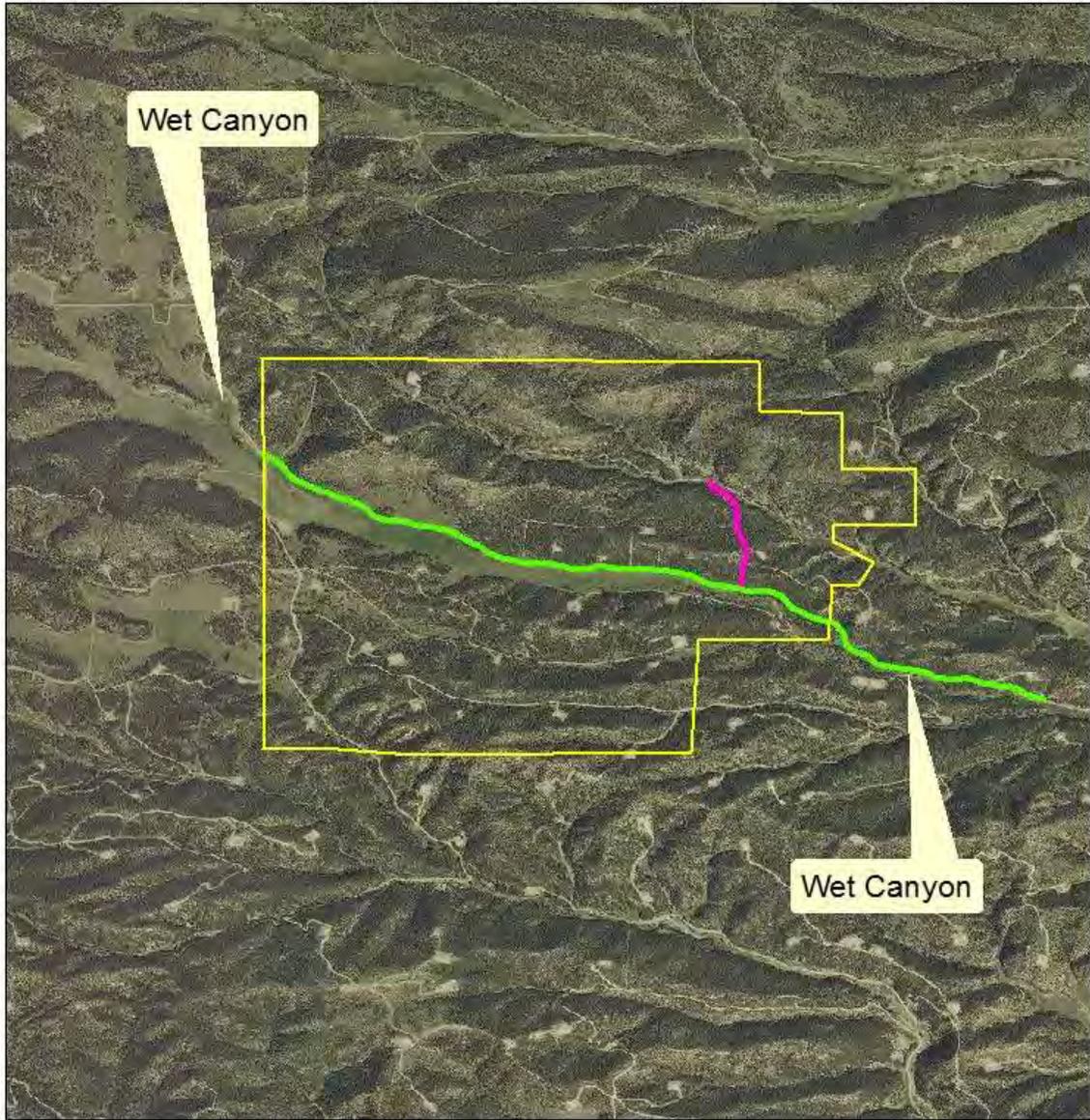
| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See “ <i>Ready, Set, Go! Emergency Preparedness Checklist</i> ” in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See “ <i>FireWise Construction: Site Design &amp; Building Materials</i> ” and “ <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> ” in Appendix |

## Cimarron Ranches Pine Valley/Cimarron Ranches (Northern Portion) Subdivision Wildfire Mitigation Recommendations.

| Category   | Priority | Description  |
|--|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>         | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended mitigation activities in coordination with the SFPD, Colorado State Forest Service and others</li> </ul>   |
| <b>Roadside Thinning of CR 31.9 and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings. This will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing. See <i>"Fuel Break Guidelines for Forested Subdivisions &amp; Communities"</i></li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>               | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>                                  | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Cimarron Ranches Pine Valley / Cimarron Ranches (Northern Portion)



# CIMARRON RANCHES (SOUTHERN PORTION)

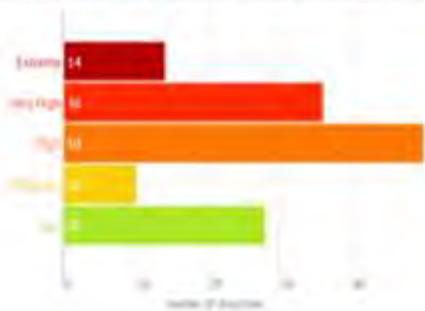


## Overall Hazard and Risk

The Cimarron Ranches community is located within the north central area of the Stonewall Fire Protection District north of Highway 12. Cimarron Ranches encompasses 5260 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the density of vegetation is moderate. The vegetation in the area is comprised of ponderosa pine, spruce-fir, and oak shrubland, interspersed with grassy meadows.

This community is large and contains several forest and fuel types. Most of this large area is classified as the TU5 Fuel Model, which is characterized by Scott and Burgan (2005) as “heavy forest litter with a shrub or small tree understory.” Predicted rates of spread are moderate, but under dry windy conditions may be greater than 40 chains per hour. Flame lengths are also moderate, but under dry windy conditions may be greater than 15 feet, making control efforts very difficult. A much smaller area is occupied by the GR2 model, which is primary grass but may contain shrubs. When the grass is dry, flame lengths can be as high as 10 feet, and rates of spread can easily exceed 100 chains per hour.

### Individual Structure Breakdown



## Structure Risk Rating: **High**

**Average structure rating: 233**

Cimarron Ranches is moderately developed. There are approximately 111 parcels within Cimarron Ranches, and the SFPD was able to assess 138 structures. Parcel size ranges from 35-40 acres. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs and structure addresses are minimally posted. Building materials vary widely throughout Cimarron

Ranches. Many structures have combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within Cimarron Ranches is moderate. The main road is 21.5 and is unpaved. There are many one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within Cimarron Ranches and water storage is minimally available. The nearest fire district substation is Wet Canyon Station. There are no fire protection capabilities within Cimarron Ranches, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivision. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Cimarron Ranches (Southern Portion) Homeowner Recommendations:

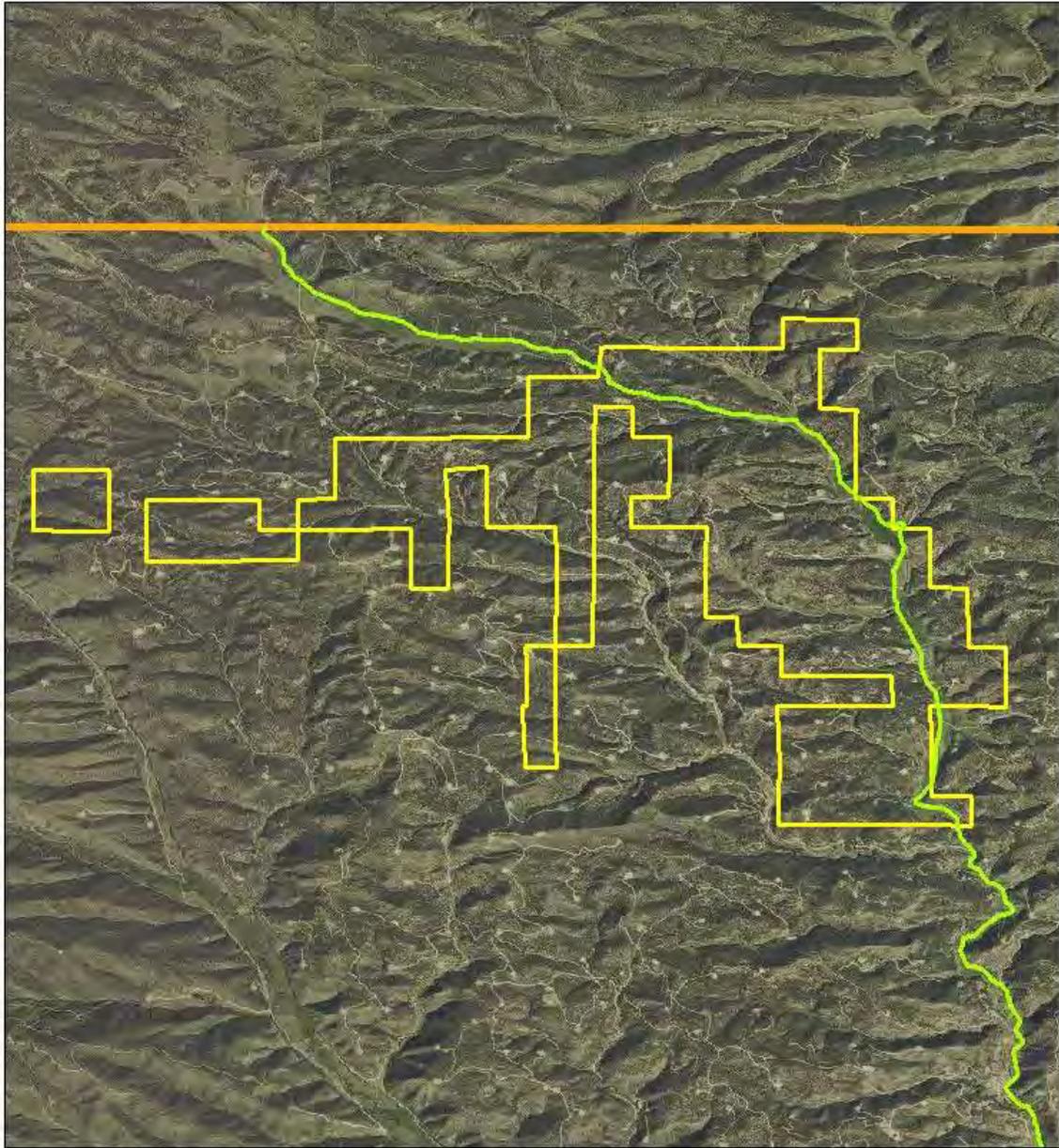
| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See “ <i>Ready, Set, Go! Emergency Preparedness Checklist</i> ” in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See “ <i>FireWise Construction: Site Design &amp; Building Materials</i> ” and “ <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> ” in Appendix |

## Cimarron Ranches (Southern Portion) General Subdivision Wildfire Mitigation Recommendations:

| Category   | Priority | Description  |
|--|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>           | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended mitigation activities in coordination with the SFPD, Colorado State Forest Service and others</li> </ul>   |
| <b>Roadside Thinning of 21.5 Road and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings. This will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing. See <i>"Fuel Break Guidelines for Forested Subdivisions &amp; Communities"</i></li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>                 | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>                                    | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

## Cimarron Ranches (Southern Portion)



# COLORADO MOUNTAIN LAKE ESTATES

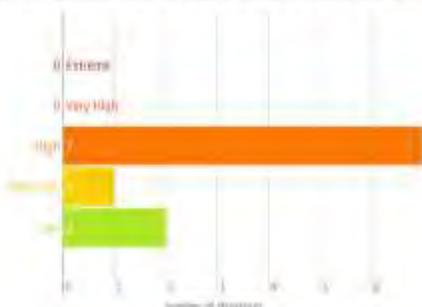


## Overall Hazard and Risk

The Colorado Mountain Lake Estates community is located within the eastern area of the Stonewall Fire Protection District south of Highway 12. Colorado Mountain Lake Estates encompasses 346 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the density of vegetation is moderate. The vegetation in the area is comprised of open grass and shrub areas with pinion-juniper.

This community, situated within the eastern portion of the district, contains drier conifer forests which are of the TL3 Fuel Model. Here, fire is most often carried by the materials deposited on the ground, and predicted rates of spread are less than 5 chains per hour and flame lengths of less than 2 feet. However, where litter accumulations are thicker or shrubs and small trees are present in the understory, flame lengths would be expected to be much greater. To a lesser extent, areas with mostly grass cover fit the GR1 Fuel Model, with moderate rates of spread (40-80 chains per hour) but low flame lengths (5-7 feet) under adverse weather conditions.

## Individual Structure Breakdown



## Structure Risk Rating: **High**

**Average structure rating: 206**

Colorado Mountain Lake Estates is moderately developed. There are approximately 65 parcels within Colorado Mountain Lake Estates, and the SFPD was able to assess 10 structures. Parcel size is less than 12 acres. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs and structure addresses are minimally posted.

Building materials vary widely throughout

Colorado Mountain Lake Estates. Many structures have combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within Colorado Mountain Lake Estates is poor to moderate. The main road is County Road 16 and is unpaved. Roads are one-lane and turnarounds are infrequent. There are currently no fire hydrants available within Colorado Mountain Lake Estates and water storage is minimally available. The nearest fire district substation is Long Canyon Station. There are no fire protection capabilities within Colorado Mountain Lake Estates, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivision. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Colorado Mountain Lake Estates Homeowner Recommendations:

| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See “ <i>Ready, Set, Go! Emergency Preparedness Checklist</i> ” in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See “ <i>FireWise Construction: Site Design &amp; Building Materials</i> ” and “ <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> ” in Appendix |

## Colorado Mountain Lake Estates General Subdivision Wildfire Mitigation Recommendations:

| Category   | Priority | Description  |
|--|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>       | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended mitigation activities in coordination with the SFPD, Colorado State Forest Service and others</li> </ul>   |
| <b>Roadside Thinning of CR 16 and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings. This will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing. See <i>"Fuel Break Guidelines for Forested Subdivisions &amp; Communities"</i></li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>             | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>                                | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Colorado Mountain Lake Estates



# COUGAR RIDGE

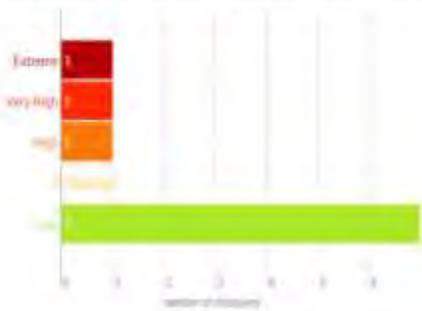


## Overall Hazard and Risk

The Cougar Ridge community is located within the north central area of the Stonewall Fire Protection District north of Highway 12. Cougar Ridge encompasses 506 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the density of vegetation is moderate. The vegetation in the area is comprised of ponderosa pine, oak shrubland, with some spruce-fir.

This community like others within Wet Canyon contains an abundance of ponderosa pine forests and is of the TU5 Fuel Model common in the area, with predicted rates of spread are moderate, but under dry windy conditions may be greater than 40 chains per hour. Flame lengths are also moderate, but under dry windy conditions may be greater than 15 feet, making control efforts very difficult. Less common grass-covered areas are of the GR1 Fuel Model, with moderate rates of spread (40-80 chains per hour) but low flame lengths (5-7 feet) under adverse weather conditions.

## Individual Structure Breakdown



## Structure Risk Rating: **Moderate**

**Average structure rating: 174**

Cougar Ridge is moderately developed. There are approximately 14 parcels within Cougar Ridge, and the SFPD was able to assess 10 structures. Parcel size ranges from 35-40 acres. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs and structure addresses are minimally posted. Building materials vary widely throughout Cougar Ridge. Many structures have

combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented around structures.

## Protection and Management

Road accessibility for emergency responders within Cougar Ridge is moderate. The main road is County Road 31.9 and is unpaved. There are many one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within Cougar Ridge and water storage is minimally available. The nearest fire district substation is Wet Canyon Station. There are no fire protection capabilities within Cougar Ridge, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivision. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Cougar Ridge Homeowner Recommendations:

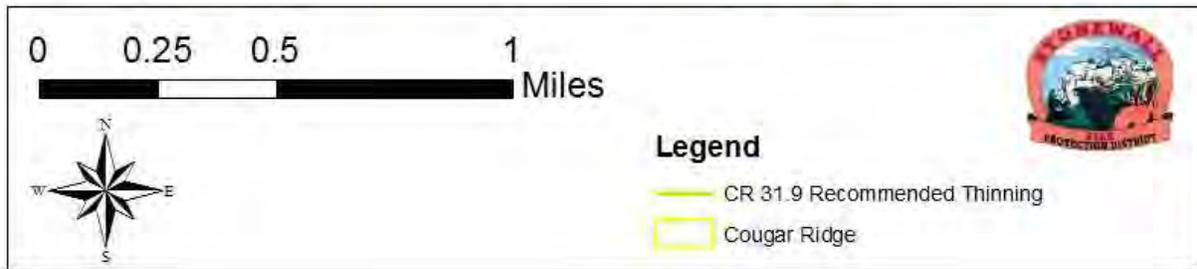
| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See " <i>Ready, Set, Go! Emergency Preparedness Checklist</i> " in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See " <i>FireWise Guide to Landscape and Construction</i> " in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See " <i>FireWise Guide to Landscape and Construction</i> " in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See " <i>FireWise Construction: Site Design &amp; Building Materials</i> " and " <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> " in Appendix |

## Cougar Ridge General Subdivision Wildfire Mitigation Recommendations:

| Category  | Priority | Description  |
|---|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>                  | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended mitigation activities in coordination with the SFPD, Colorado State Forest Service and others</li> </ul>   |
| <b>Roadside Thinning of County Road 31.9 and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings. This will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing. See <i>"Fuel Break Guidelines for Forested Subdivisions &amp; Communities"</i></li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>                        | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>   | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Cougar Ridge



# CUCHARA PASS RANCH

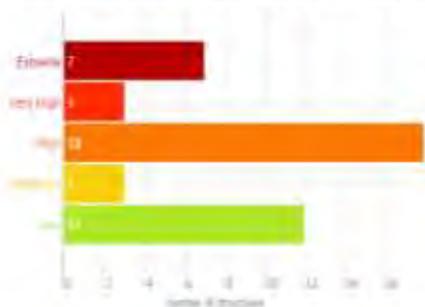


## Overall Hazard and Risk

The Cuchara Pass Ranch community is located within the north western area of the Stonewall Fire Protection District east of Highway 12. Cuchara Pass Ranch encompasses 2245 acres within the Stonewall Fire Protection District. The overall topography of the land is very mountainous, and the density of vegetation is high. The vegetation in the area is comprised of spruce-fir, aspen, and scattered ponderosa pine.

The mixed conifer and spruce-fir forests common throughout this community fall under the TU5 Fuel Model, characterized by Scott and Burgan (2005) as “heavy forest litter with a shrub or small tree understory.” Predicted rates of spread are moderate, but under dry windy conditions may be greater than 40 chains per hour. Flame lengths are also moderate, but under dry windy conditions may be greater than 15 feet, making control efforts very difficult. The aspen-dominated forests which are present to a lesser extent are mostly Fuel Model TU1, where fire is carried by a timber understory of grass or small amounts of shrub or litter. In these fuels under even the most adverse conditions, rates of spread are predicted to be relatively low (around 10-12 chains per hour) and flame lengths at 4 feet or less.

### Individual Structure Breakdown



### Structure Risk Rating: **High**

**Average structure rating: 216**

Cuchara Pass Ranch is moderately developed. There are approximately 29 parcels within Cuchara Pass Ranch, and the SFPD was able to assess 43 structures. Parcel size ranges from 35-40 acres. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs and structure addresses are posted, but generally are non-reflective and combustible. Building materials

vary widely throughout Cuchara Pass Ranch. Many structures have combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within Cuchara Pass Ranch is moderate. The main road is Arch Lane and is unpaved. There are many one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within Cuchara Pass Ranch and water storage is minimally available. The nearest fire district substation is Cuchara Pass Station. There are no fire protection capabilities within Cuchara Pass Ranch, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivision. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Cuchara Pass Ranch Homeowner Recommendations:

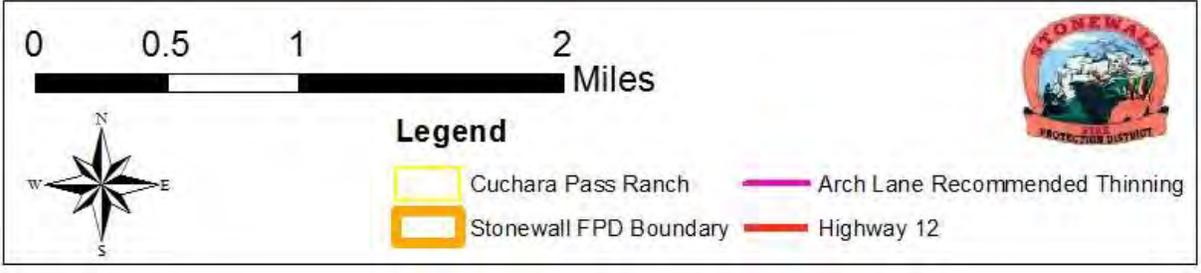
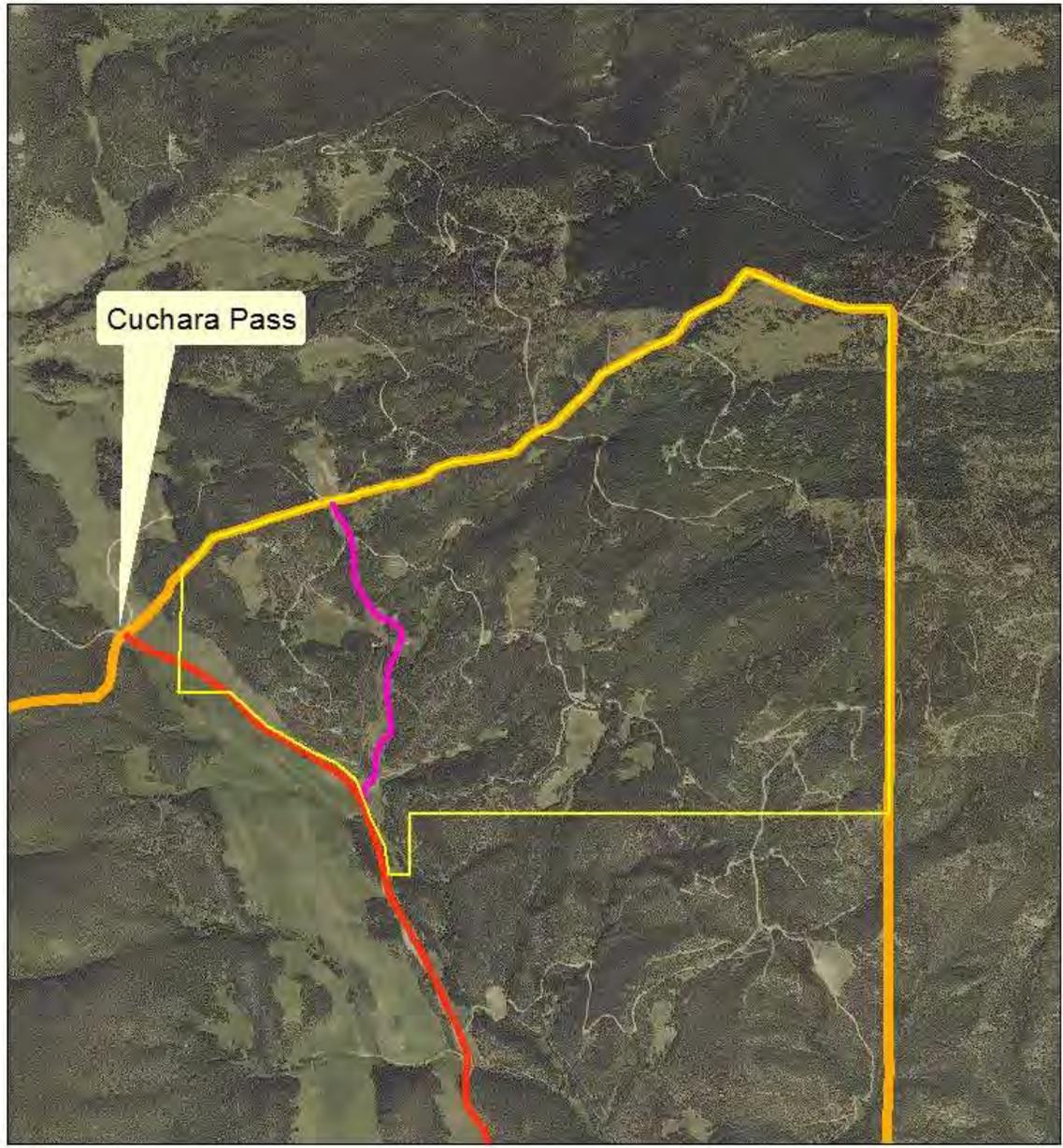
| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See " <i>Ready, Set, Go! Emergency Preparedness Checklist</i> " in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See " <i>FireWise Guide to Landscape and Construction</i> " in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See " <i>FireWise Guide to Landscape and Construction</i> " in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See " <i>FireWise Construction: Site Design &amp; Building Materials</i> " and " <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> " in Appendix |

## Cuchara Pass Ranch General Subdivision Wildfire Mitigation Recommendations:

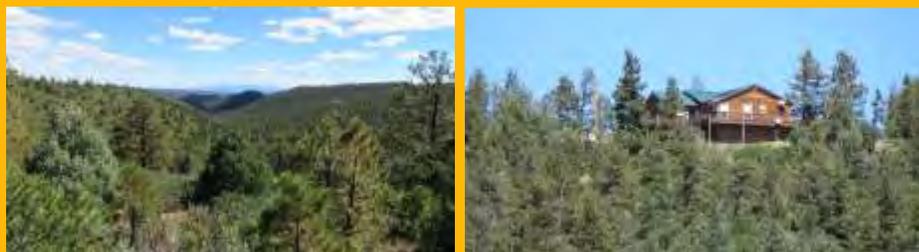
| Category   | Priority | Description   |
|--|----------|---|
| <b>Identify Wildfire Mitigation Advocate/s</b>           | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended mitigation activities in coordination with the SFPD, Colorado State Forest Service and others</li> </ul>  |
| <b>Roadside Thinning of Arch Lane and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings. This will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing. See <i>"Fuel Break Guidelines for Forested Subdivisions &amp; Communities"</i></li> </ul>   |
| <b>Preparedness Training/ Evacuation</b>                 | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment</li> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>                                    | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>  |

See map of recommendations on following page.

# Cuchara Pass Ranch



# EAGLES LANDING/EAGLE MOUNTAIN ESTATES

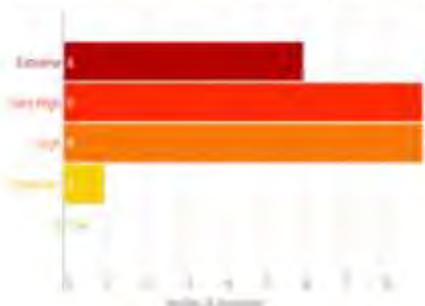


## Overall Hazard and Risk

The Eagles Landing/Eagle Mountain Estates community is located within the western area of the Stonewall Fire Protection District north of Highway 12. Eagles Landing/Eagle Mountain Estates encompasses 2352 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the density of vegetation is moderate. The vegetation in the area is comprised of spruce-fir, ponderosa pine, and oak shrubland.

These communities are located above and to the west of the North Fork Purgatoire River Canyon. The majority of the land is covered with mixed conifer and ponderosa pine forests, both of which are best described by the TU5 Fuel Model and characterized by Scott and Burgan (2005) as “heavy forest litter with a shrub or small tree understory.” Predicted rates of spread are moderate, but under dry windy conditions may be greater than 40 chains per hour. Flame lengths are also moderate, but under dry windy conditions may be greater than 15 feet, making control efforts difficult. Lower areas contain significant amounts of the SH2 Fuel Type, with predicted rates of spread of 30 chains per hour and flame lengths of 6 to 8 feet in adverse conditions.

## Individual Structure Breakdown



## Structure Risk Rating: **Very High**

**Average structure rating: 295**

Eagles Landing/Eagle Mountain Estates is moderately developed. There are approximately 53 parcels within Eagles Landing/Eagle Mountain Estates, and the SFPD was able to assess 25 structures. Parcel size ranges from 35-40 acres. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs and structure addresses are

posted, but generally are non-reflective and combustible. Building materials vary widely throughout Eagles Landing/Eagle Mountain Estates. Many structures have combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within Eagles Landing/Eagle Mountain Estates is moderate. The main road is Stonewall Parallel and is unpaved. There are many one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within Eagles Landing/Eagle Mountain Estates and water storage is moderately available. The nearest fire district substation is Stonewall Station. There are no fire protection capabilities within Eagles Landing/Eagle Mountain Estates, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivisions. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Eagles Landing/Eagle Mountain Estates Homeowner Recommendations:

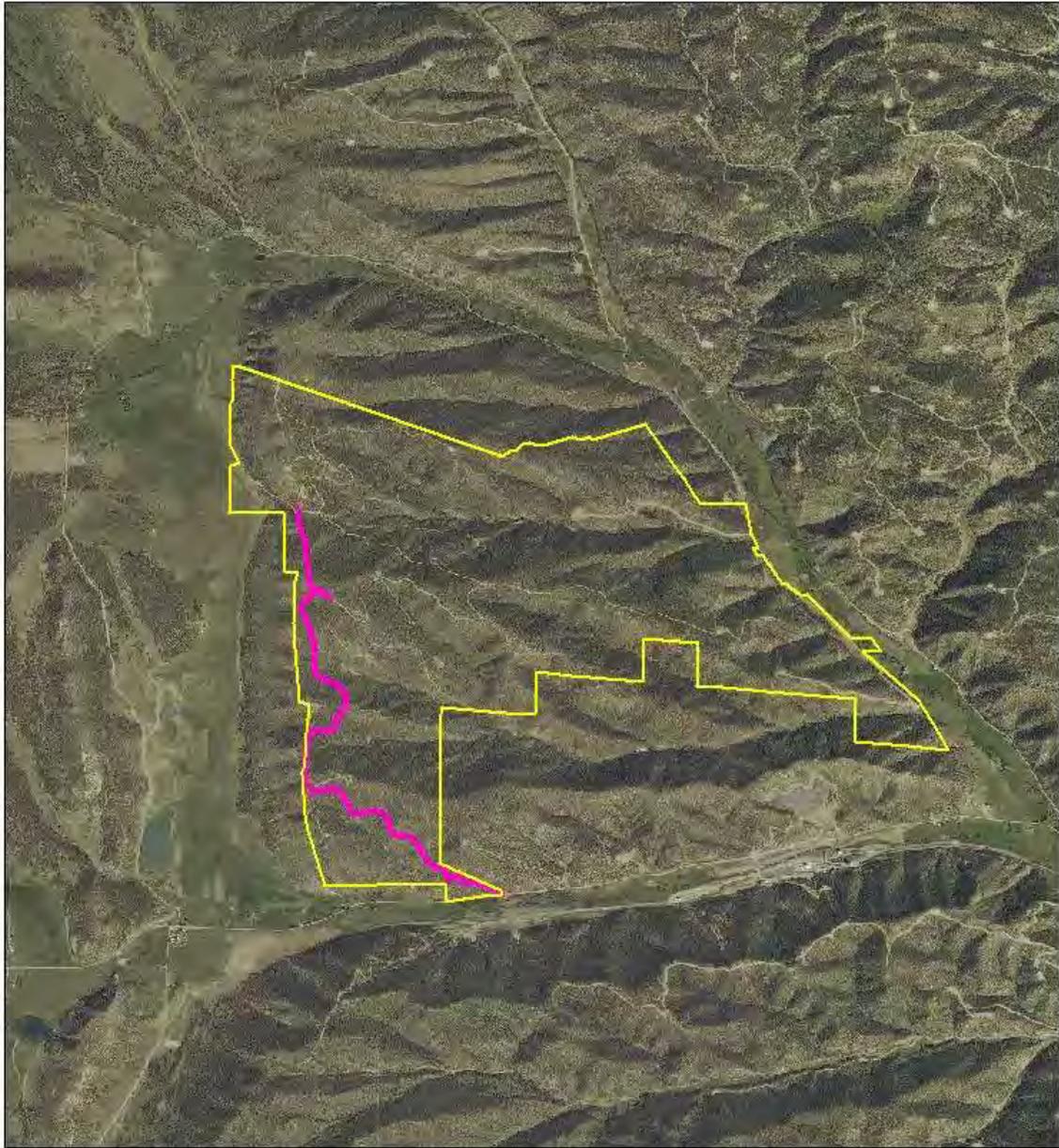
| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See <i>“Ready, Set, Go! Emergency Preparedness Checklist”</i> in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See <i>“FireWise Guide to Landscape and Construction”</i> in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See <i>“FireWise Guide to Landscape and Construction”</i> in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See <i>“FireWise Construction: Site Design &amp; Building Materials”</i> and <i>“Protect Your Property from Wildfire--Rocky Mountain Edition”</i> in Appendix |

## Eagles Landing/Eagle Mountain Estates General Subdivision Wildfire Mitigation Recommendations:

| Category  | Priority | Description  |
|---|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>                    | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended mitigation activities in coordination with the SFPD, Colorado State Forest Service and others</li> </ul>   |
| <b>Roadside Thinning of Stonewall Parallel and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings. This will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing. See <i>"Fuel Break Guidelines for Forested Subdivisions &amp; Communities"</i></li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>                          | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>   | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Eagles Landing / Eagle Mountain Estates



0 0.5 1 2 Miles



### Legend

-  Eagles Landing / Eagle Mountain Estates
-  Stonewall Parallel Recommended Thinning



# EAST HWY 12 CORRIDOR

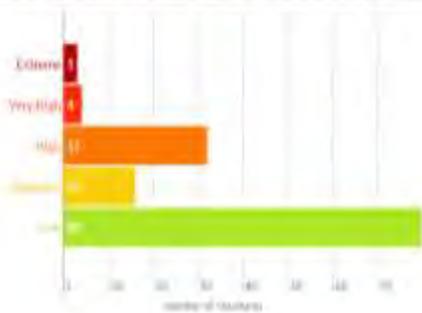


## Overall Hazard and Risk

The East Hwy 12 corridor community is located within the eastern area of the Stonewall Fire Protection District. The East Hwy 12 corridor encompasses 5367 acres within the Stonewall Fire Protection District. The overall topography of the land is hills and river bottom, and the density of vegetation is low. The vegetation in the area is comprised of pinon-juniper and cottonwood in riparian areas, interspersed with gassy meadows and/or irrigated farmland.

This area includes areas along the highway and Purgatoire River that are not part of any designated community. The vegetation coverage generally proceeds from grasslands along the river and canyon bottoms, transitioning to grass and shrub mixtures along lower hillsides, with pinon-juniper woodlands of varying densities at the higher elevations. Rates of spread are expected to be highest in areas with significant grass cover, with flame lengths generally low but dependent on depth and moisture content of the grass. Fire may spread fairly rapidly where shrubs are occasionally mixed with grass with slight increases in flame heights. In pinon-juniper woodlands rates of spread would be expected to decrease with the addition of larger fuel sizes. Control efforts may be complicated by greater flame lengths and distance from roads in some of these areas.

## Individual Structure Breakdown



## Structure Risk Rating: **Low**

**Average structure rating: 149**

East Hwy 12 corridor is moderately developed. The SFPD was able to assess 135 structures. Parcel size is highly varied. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs and structure addresses vary widely. Building materials also vary widely throughout the East Hwy 12 corridor. Defensible space varies around current structures is minimally implemented.

## Protection and Management

Road accessibility for emergency responders within East Hwy 12 corridor is high. The main road is Highway 12 and is paved. There are one-lane roads and turnarounds are infrequent on those roads. There are currently no fire hydrants available within East Hwy 12 corridor and water storage is minimally available. The nearest fire district substation is Segundo Station. There are no fire protection capabilities within East Hwy 12 corridor, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the area. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### East Hwy 12 corridor Homeowner Recommendations:

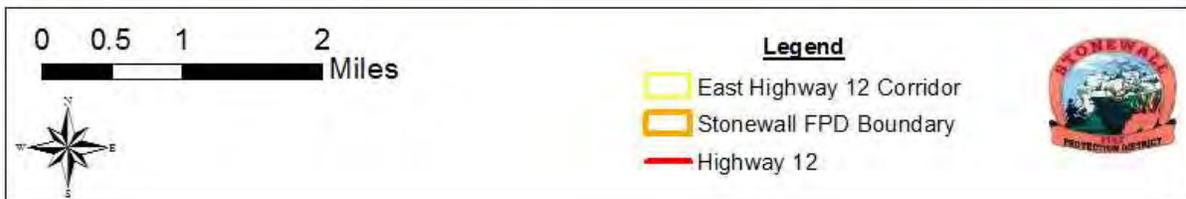
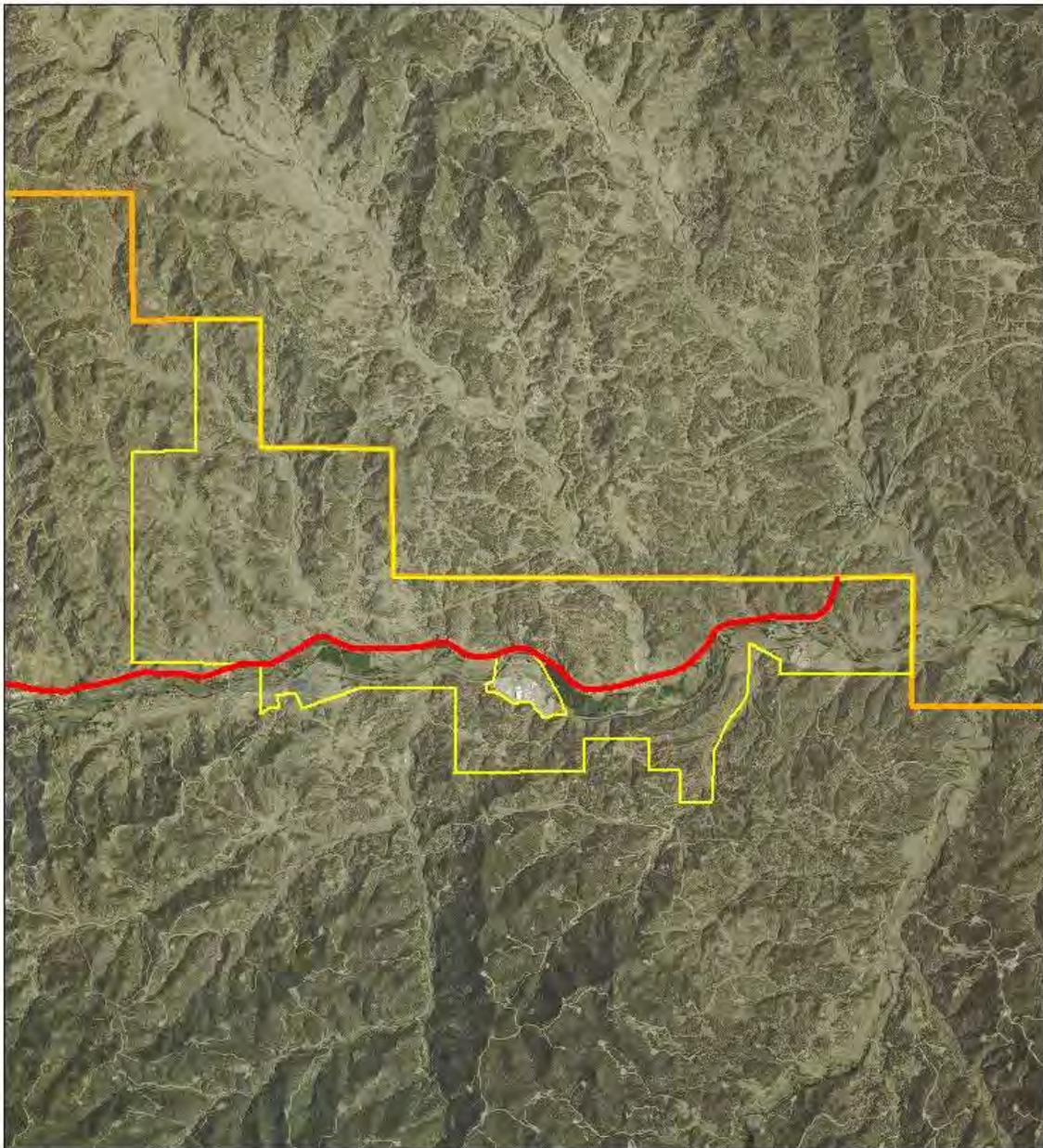
| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See “ <i>Ready, Set, Go! Emergency Preparedness Checklist</i> ” in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See “ <i>FireWise Construction: Site Design &amp; Building Materials</i> ” and “ <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> ” in Appendix |

## East Hwy 12 corridor General Subdivision Wildfire Mitigation Recommendations:

| Category                                       | Priority | Description  |
|--|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b> | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended mitigation activities in coordination with the SFPD, Colorado State Forest Service and others</li> </ul>   |
| <b>Roadside Thinning of internal roads</b>     | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings. This will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing. See <i>"Fuel Break Guidelines for Forested Subdivisions &amp; Communities"</i></li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>       | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>                          | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# East Highway 12 Corridor



# GLEN ASPEN

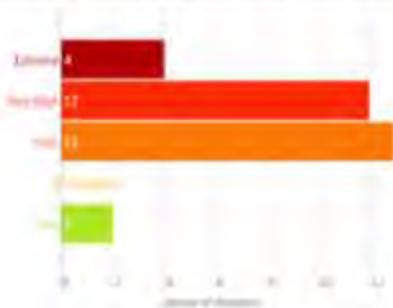


## Overall Hazard and Risk

The Glen Aspen community is located within the northwestern area of the Stonewall Fire Protection District west of Highway 12. Glen Aspen encompasses 623 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the density of vegetation is high. The vegetation in the area is comprised of spruce-fir, ponderosa pine, and aspen.

Located to the west of Highway 12, this community contains pine and mixed conifer forests both of which fit the TU5 Fuel Model, with moderate predicted rates of spread, but under dry windy conditions may be greater than 40 chains per hour. Flame lengths are also moderate, but under dry windy conditions may be greater than 15 feet, making control efforts very difficult. Open areas have both a significant grass and shrub component, mostly of the SH5 Fuel Model. Here, both grass and shrubs can contribute to high rates of spread (greater than 100 chains per hour) and high flame lengths (in excess of 15 feet) contributing to control difficulties.

### Individual Structure Breakdown



### Structure Risk Rating: **Very High**

**Average structure rating: 276**

Glen Aspen is highly developed. There are approximately 11 parcels within Glen Aspen, and the SFPD was able to assess 31 structures. Parcel size is less than 12 acres. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs and structure addresses are minimally posted. Building materials vary widely throughout Glen Aspen. Many structures have

combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within Glen Aspen is poor. The main road is Highway 12 and is paved. There are many one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within Glen Aspen and water storage is minimally available. The nearest fire district substation is Stonewall Station. There are no fire protection capabilities within Glen Aspen, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivision. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Glen Aspen Homeowner Recommendations:

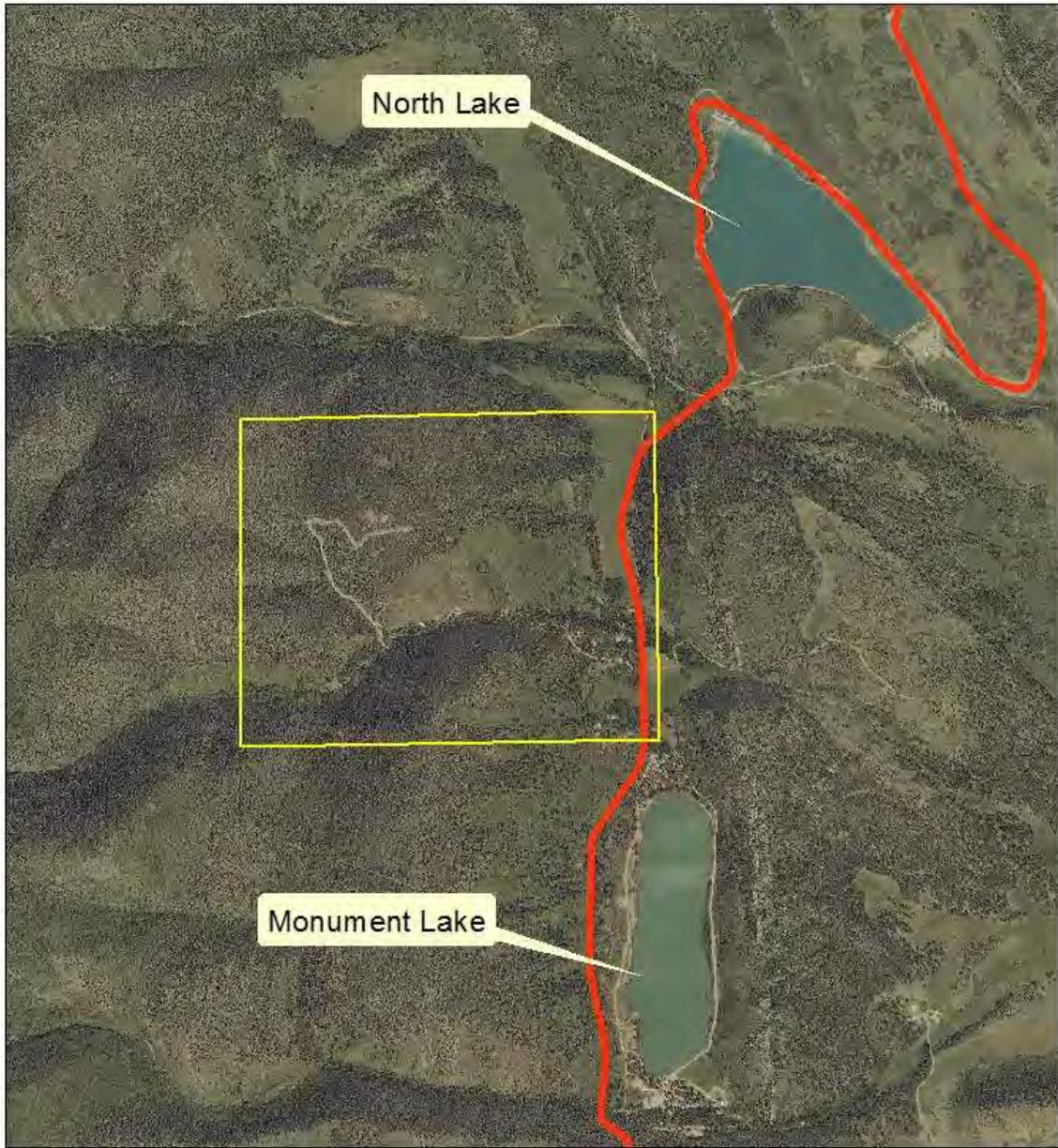
| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See “ <i>Ready, Set, Go! Emergency Preparedness Checklist</i> ” in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See “ <i>FireWise Construction: Site Design &amp; Building Materials</i> ” and “ <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> ” in Appendix |

## Glen Aspen General Subdivision Wildfire Mitigation Recommendations:

| Category  | Priority | Description  |
|---|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>        | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended mitigation activities in coordination with the SFPD, Colorado State Forest Service and others</li> </ul>   |
| <b>Roadside Thinning of HWY 12 and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings. This will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing. See <i>"Fuel Break Guidelines for Forested Subdivisions &amp; Communities"</i></li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>              | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>                                 | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Glen Aspen



# HWY 12 SOUTH DISTRICT

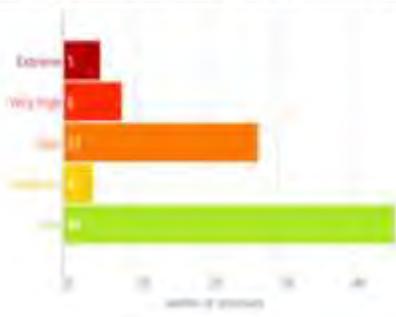


## Overall Hazard and Risk

The Hwy 12 South District community is located within the southern area of the Stonewall Fire Protection District and runs south of Segundo to the state line and west to County Road 13. The Hwy 12 South District encompasses 15,710 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the density of vegetation is moderate to high. The vegetation in the area is comprised of spruce-fir, ponderosa pine, pinon-juniper, oak shrubland, interspersed with grassy meadows, and with aspens in high elevations.

This large area includes substantial landholdings along the southern border of the SFPD and is bounded to the north by areas along the Purgatoire River. For the most part, grasslands and grass-shrub mixtures cover lands at the lowest elevations. In these areas, fire can be expected to spread fairly rapidly under adverse weather conditions, but flame lengths will remain low which make suppression efforts possible. Most forested lands vary from pinon-juniper woodlands in the east, ponderosa pine forests found midway traveling west, and mixed conifer forests at the upper elevations at the western edges. Most of the pine and mixed conifer forests are classified as a TU5 Fuel Model with predicted rates of spread nearing 40 chains per hour and flame lengths exceeding 15 feet under dry windy conditions, which create control problems.

### Individual Structure Breakdown



### Structure Risk Rating: **Moderate**

#### Average structure rating: 174

Hwy 12 South District is minimally developed. There are approximately 46 parcels within Hwy 12 South District, and the SFPD was able to assess 90 structures. Parcels are large ranch holdings. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs and structure addresses are minimally posted. Building materials vary widely throughout Hwy 12 South

District. Many structures have combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within Hwy 12 South District is moderate to low. The main roads are Hill Ranch Road, County Road 13 and are unpaved. There are one-lane roads and turnarounds are infrequent. There is currently one intermittent water source at Highway 12 and Hill Ranch Road available seasonably and water storage is moderately available with seven ponds scattered throughout the community. The nearest fire district substations are Segundo Station and Stonewall Station. There are no fire protection capabilities within Hwy 12 South District, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the area. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Hwy 12 South District Homeowner Recommendations:

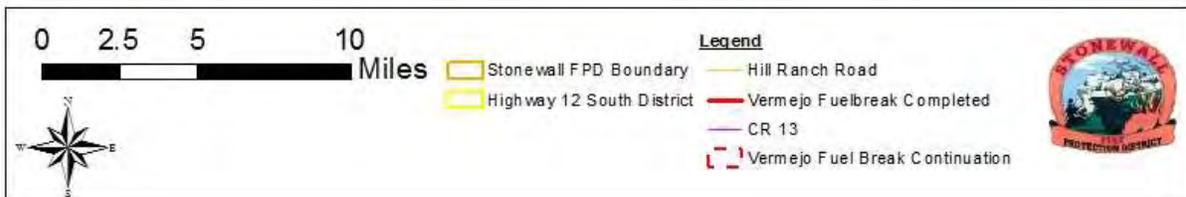
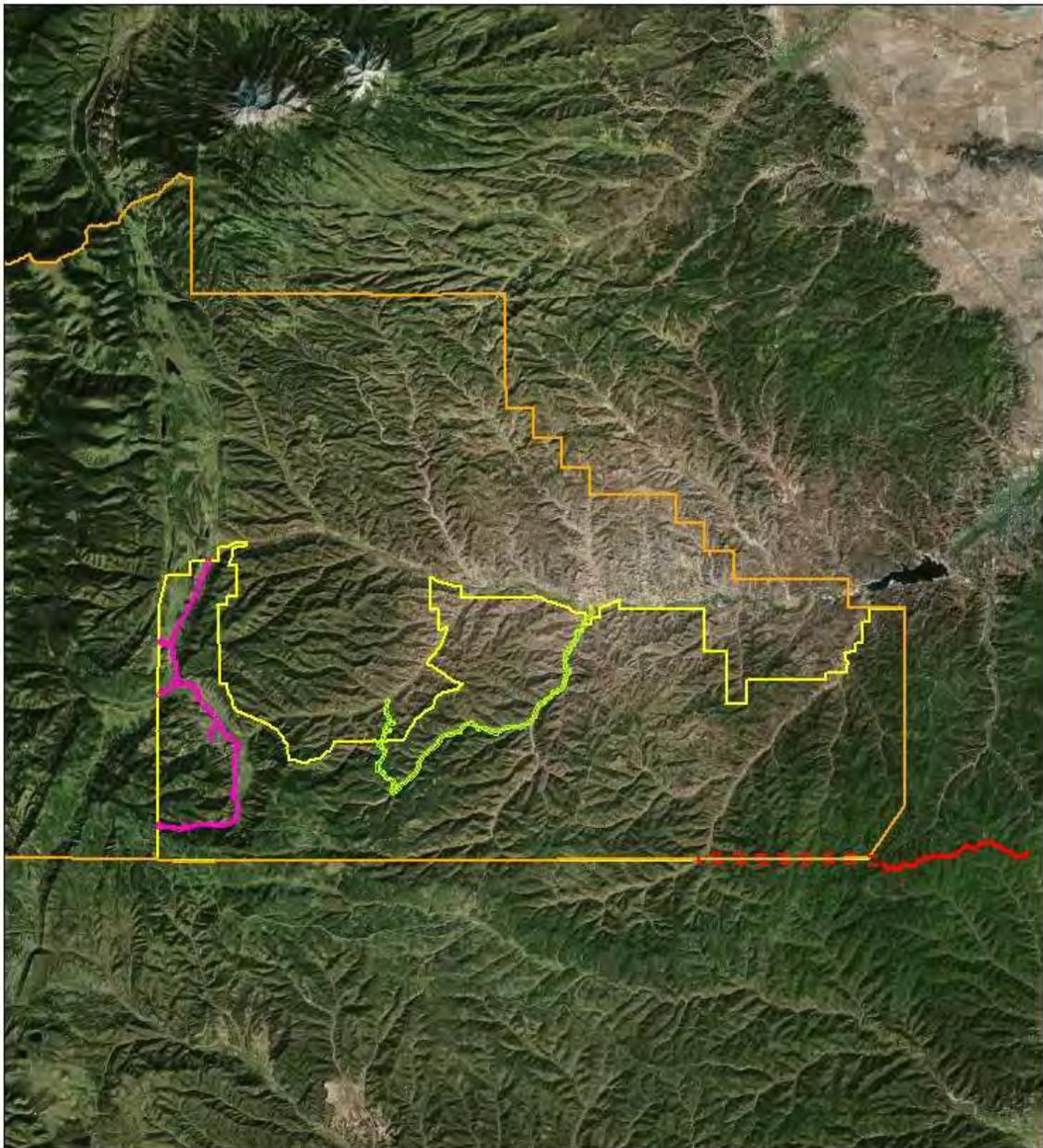
| Name                                  | Priority | Description  | Methods   |
|---------------------------------------|----------|--|---|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See “ <i>Ready, Set, Go! Emergency Preparedness Checklist</i> ” in Appendix   |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix   |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix   |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See “ <i>FireWise Construction: Site Design &amp; Building Materials</i> ” and “ <i>Protect Your Property from Wildfire—Rocky Mountain Edition</i> ” in Appendix |

## Hwy 12 South District General Subdivision Wildfire Mitigation Recommendations:

| Category  | Priority | Description  |
|---|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>                        | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended activities in coordination with the SFPD, State Forest Service, and federal land managers as appropriate.</li> </ul>   |
| <b>Roadside Thinning of Hill Ranch Road, CR 13 and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings this will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing.</li> </ul>  |
| <b>Fuel Breaks</b>  | 3        | <ul style="list-style-type: none"> <li>Create fuel break along western edge of West District (see map) to serve as anchor point for fire suppression activities. See <i>Fuel Break Guidelines for Forested Subdivisions &amp; Communities</i> Appendix F</li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>                              | 4        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>   | 5        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Highway 12 South District



# LONG CANYON RANCH (MADRID CANYON)

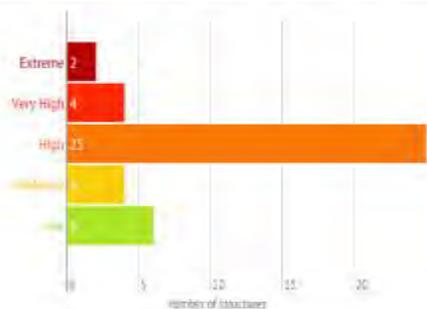


## Overall Hazard and Risk

The Long Canyon Ranch community is located within the eastern area of the Stonewall Fire Protection District south of Highway 12. Long Canyon Ranch encompasses 2473 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the density of vegetation is moderate. The vegetation in the area is comprised of pinon-juniper, scattered ponderosa pine and oak shrubland.

This community is south of Highway 12 and the Purgatoire River, immediately to the east of Widow Woman Canyon in the eastern portion of the district. Lower areas within canyons are covered in grasslands of the GS2 Fuel Type, with fire carried primarily by grass and shrub litter, corresponding predicted rates of spread greater than 100 chains per hour and flame lengths of 6 to 8 feet. The majority of the area is covered by pinon-juniper forests with some ponderosa pine on cooler slopes. Most of these forests are described by the TL3 Model, where fire is carried primarily by dried needles and small branches. Fires here are predicted to spread rather slowly (less than 6 chains per hour) and flame lengths are low (less than 2 feet). Thicker forest cover is better described as the TU1 Fuel Model, with rates of spread predicted to be relatively low (around 10-12 chains per hour) and flame lengths at 4 feet or less. It should be noted that both models, under extreme drought and wind conditions and minimal crown spacing, potential exists for dangerous crown fires to develop and move rapidly across large areas.

## Individual Structure Breakdown



## Structure Risk Rating: **High**

**Average structure rating: 224**

Long Canyon Ranch is moderately developed. There are approximately 54 parcels within Long Canyon Ranch, and the SFPD was able to assess 46 structures. Parcels range from 35-40 acres. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs and structure addresses are minimally posted. Building material varies widely throughout Long Canyon Ranch. Many

structures have combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within Long Canyon Ranch is moderate. The main road is 53.2 and is unpaved. There are many one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within Long Canyon Ranch and water storage is minimally available. The nearest fire district substation is Long Canyon Station. Fire protection capabilities within Long Canyon Ranch are minimal and consist of one Type 6 Bush truck, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivision. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Long Canyon Ranch Homeowner Recommendations:

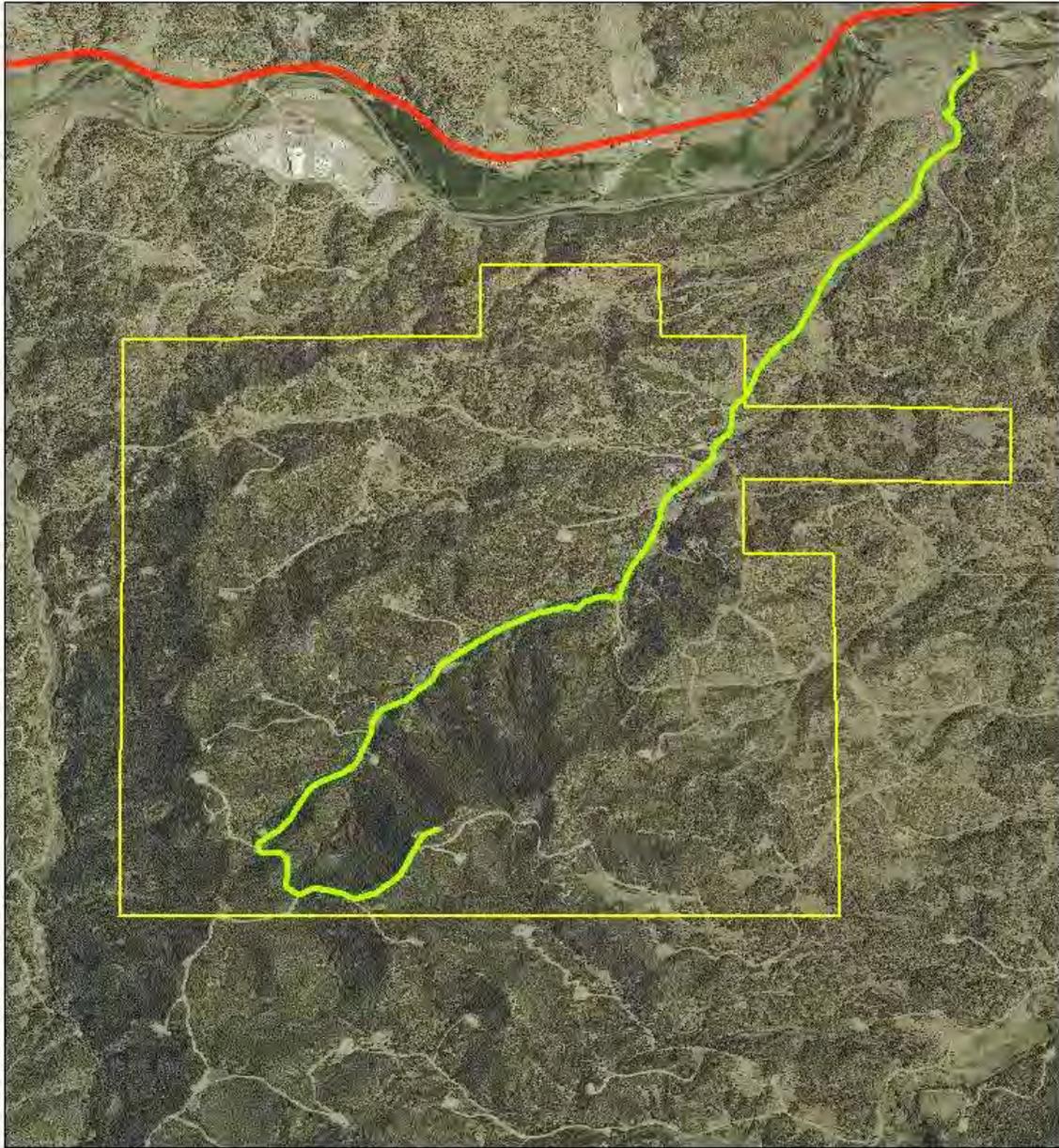
| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See “ <i>Ready, Set, Go! Emergency Preparedness Checklist</i> ” in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See “ <i>FireWise Construction: Site Design &amp; Building Materials</i> ” and “ <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> ” in Appendix |

## Long Ranch Subdivision Wildfire Mitigation Recommendations:

| Category  | Priority | Description  |
|---|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>      | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended mitigation activities in coordination with the SFPD, Colorado State Forest Service and others</li> </ul>   |
| <b>Roadside Thinning of 53.2 and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings. This will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing. See <i>"Fuel Break Guidelines for Forested Subdivisions &amp; Communities"</i></li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>            | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>                               | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Long Canyon Ranch (Madrid Canyon)



# LONG CANYON RANCH PHASE 2 (WIDOW WOMAN)

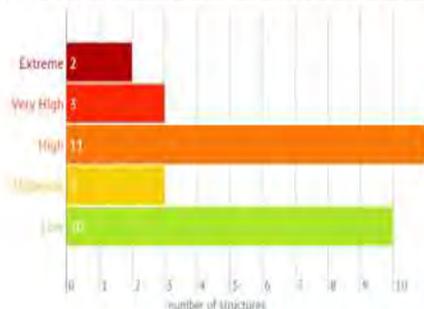


## Overall Hazard and Risk

The Long Canyon Ranch Phase 2 community is located within the eastern area of the SFPD south of Highway 12. Long Canyon Ranch Phase 2 encompasses 2476 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the density of vegetation is moderate. The vegetation in the area is comprised of pinon-juniper, ponderosa pine, and oak shrubland.

This community extends from the Purgatoire River southward from the community of Valdez in the eastern portion of the district. Areas adjacent to the river are covered in grasslands of the GS2 Fuel Type, with fire carried primarily by grass and shrub litter, corresponding predicted rates of spread greater than 100 chains per hour and flame lengths of 6 to 8 feet. The majority of the area is covered by pinon-juniper forests with some ponderosa pine on cooler slopes. Most of these forests are described by the TL3 Model, where fire is carried primarily by dried needles and small branches. Fires here are predicted to spread rather slowly (less than 6 chains per hour) and flame lengths are low (less than 2 feet). Thicker forest cover is better described as the TU1 Fuel Model, with rates of spread predicted to be relatively low (around 10-12 chains per hour) and flame lengths at 4 feet or less. It should be noted that in both models, under extreme drought and wind conditions and minimal crown spacing, potential exists for dangerous crown fires to develop and move rapidly across large areas.

## Individual Structure Breakdown



## Structure Risk Rating: **High**

**Average structure rating: 202**

Long Canyon Ranch Phase 2 is moderately developed. There are approximately 54 parcels within Long Canyon Ranch Phase 2, and the SFPD was able to assess 29 structures. Parcels range from 35-40 acres. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs and structure addresses are posted, but generally are non-reflective and combustible. Building

materials vary widely throughout Long Canyon Ranch Phase 2. Many structures have

combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented.

## Protection and Management

Road accessibility for emergency responders within Long Canyon Ranch Phase 2 is moderate. The main road is Widow Woman Canyon Road and is unpaved. There are many one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within Long Canyon Ranch Phase 2 and water storage is minimally available. The nearest fire district substation is Segundo Station. There are no fire protection capabilities within Long Canyon Ranch Phase 2, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivision. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Long Canyon Ranch Phase 2 Homeowner Recommendations:

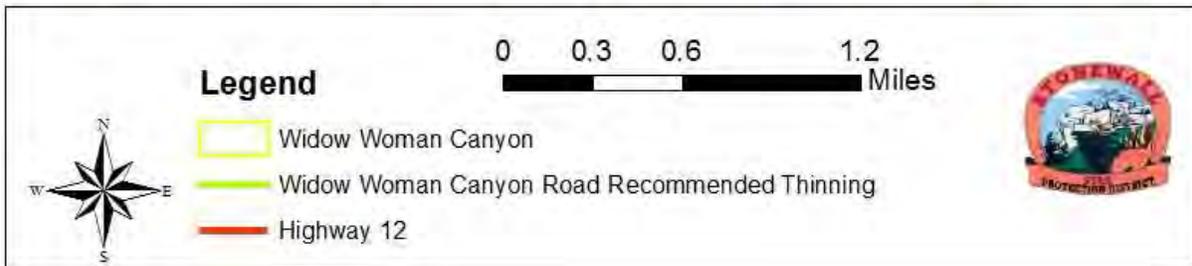
| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See “ <i>Ready, Set, Go! Emergency Preparedness Checklist</i> ” in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See “ <i>FireWise Construction: Site Design &amp; Building Materials</i> ” and “ <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> ” in Appendix D |

## Long Canyon Ranch Phase 2 Subdivision Wildfire Mitigation Recommendations:

| Category   | Priority | Description  |
|--|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>                         | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended mitigation activities in coordination with the SFPD, Colorado State Forest Service and others</li> </ul>   |
| <b>Roadside Thinning of Widow Woman Canyon Road and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings. This will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing. See <i>"Fuel Break Guidelines for Forested Subdivisions &amp; Communities"</i></li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>                               | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>  | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Long Canyon Ranch Phase 2 (Widow Woman)



# NORTH FORK RANCH

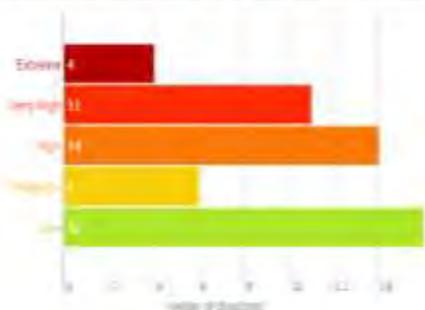


## Overall Hazard and Risk

The North Fork Ranch community is located within the north western area of the Stonewall Fire Protection District north of Highway 12. North Fork Ranch encompasses 3503 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the density of vegetation is moderate. The vegetation in the area is comprised of primarily ponderosa pine, spruce-fir, and oak shrubland, interspersed with pinion-juniper. Grassy meadows and cottonwoods exist along the riparian areas.

This community is located on the hills north of the North Fork Purgatoire River Canyon. It is mostly forested with mixed conifer and ponderosa pine forests, both of which are best described by the TU5 Fuel Model and characterized by Scott and Burgan (2005) as “heavy forest litter with a shrub or small tree understory.” Predicted rates of spread are moderate, but under dry windy conditions may be greater than 40 chains per hour. Flame lengths are also moderate, but under dry windy conditions may be greater than 15 feet, making control efforts difficult. Lower areas within canyons are mostly of the GR2 grassland Fuel Model, with fire carried primarily by grass and shrub litter, and corresponding predicted rates of spread greater than 100 chains per hour and flame lengths of 6 to 8 feet.

### Individual Structure Breakdown



### Structures Risk Rating: **High**

**Average structure rating: 209**

North Fork Ranch is moderately developed. There are approximately 71 parcels within North Fork Ranch, and the SFPD was able to assess 51 structures. Parcels range from 35-40 acres. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs and structure addresses are posted, but generally are non-reflective and combustible. Structure addresses are

inconsistently posted and generally are non-reflective and combustible. Building materials vary widely throughout North Fork Ranch. Many structures have combustible

materials within 10 feet of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within North Fork Ranch is moderate. The main road is Logging Canyon Road and is unpaved. There are many one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within North Fork Ranch and water storage is minimally available. The nearest fire district substation is Stonewall Station. There are no fire protection capabilities within North Fork Ranch, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivision. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### North Fork Ranch Homeowner Recommendations:

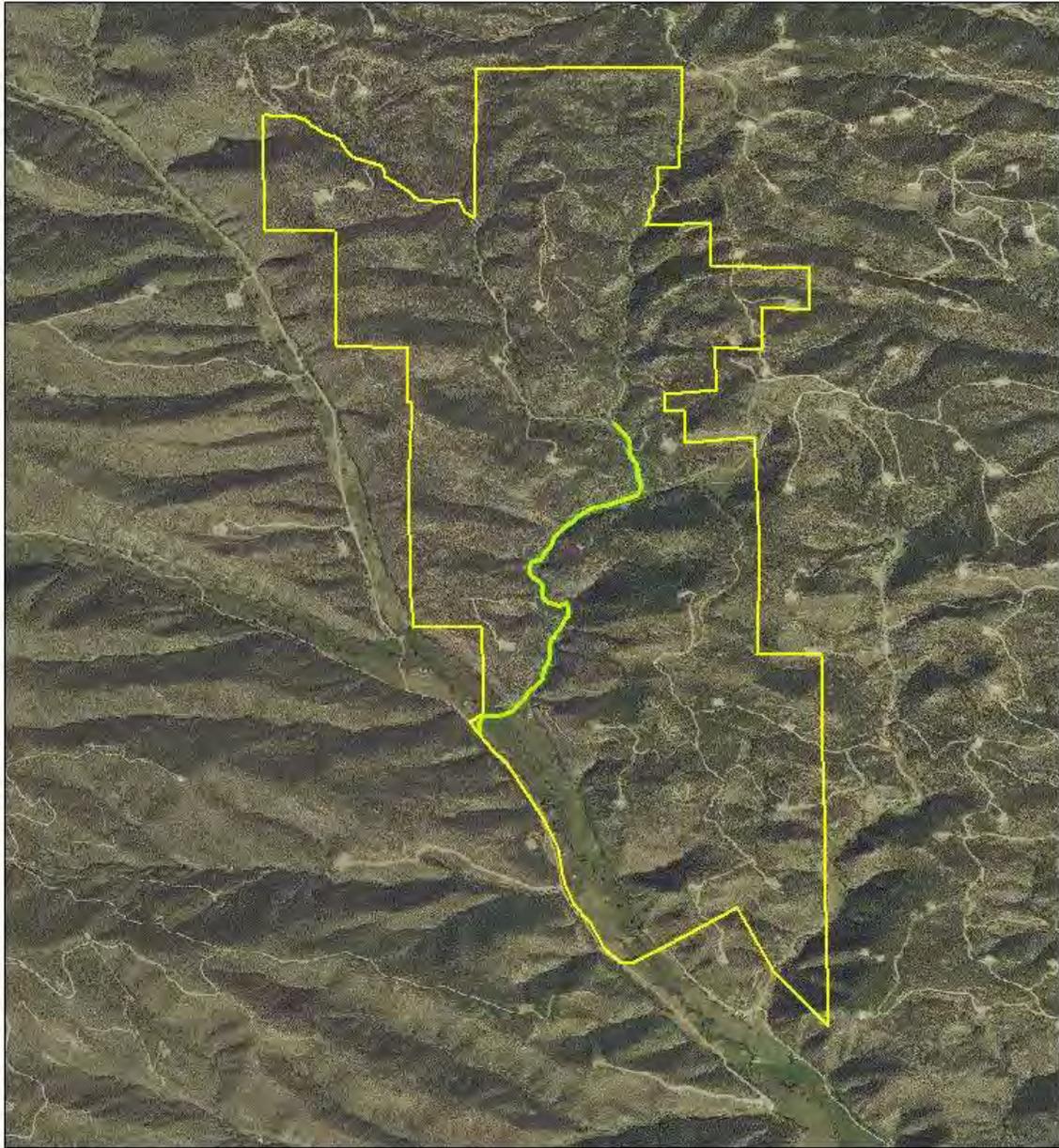
| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See “ <i>Ready, Set, Go! Emergency Preparedness Checklist</i> ” in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See “ <i>FireWise Construction: Site Design &amp; Building Materials</i> ” and “ <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> ” in Appendix |

## North Fork Ranch Subdivision Wildfire Mitigation Recommendations:

| Category   | Priority | Description  |
|--|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>                     | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended mitigation activities in coordination with the SFPD, Colorado State Forest Service and others</li> </ul>   |
| <b>Roadside Thinning of Logging Canyon Road and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings. This will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing. See <i>"Fuel Break Guidelines for Forested Subdivisions &amp; Communities"</i></li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>                           | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>  | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# North Fork Ranch



# NORTH LAKE/CAMP SALVATION

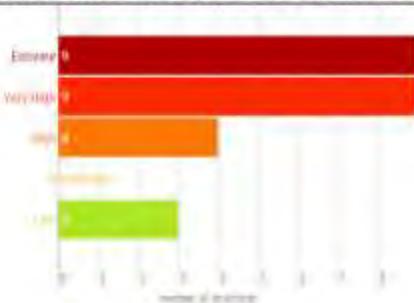


## Overall Hazard and Risk

The North Lake/Camp Salvation community is located within the north western area of the Stonewall Fire Protection District north of Highway 12. North Lake/Camp Salvation encompasses 650 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the density of vegetation is high. The vegetation in the area is comprised of primarily ponderosa pine, spruce-fir, and oak shrubland, and pinion-juniper.

This area is characterized by mostly open areas, with occasional heavy shrub pockets and some ponderosa pine forests. In the grassy areas, the GS2 Fuel Model is present, with predicted rates of spread greater than 100 chains per hour and flame lengths of 6 to 8 feet in adverse conditions. Where dense shrub pockets and occasional grass occur, the SH2 Fuel Model is present with lower rates of spread (30 chains per hour) and similar flame lengths under similarly adverse conditions. The areas of thicker timber are characterized by the TU1 Fuel Model, where fire is carried by a timber understory of grass or small amounts of shrub or litter. In these fuels under even the most adverse conditions, rates of spread are predicted to be relatively low (around 10-12 chains per hour) and flame lengths at 4 feet or less.

## Individual Structure Breakdown



## Structures Risk Rating: **Very High**

**Average structure rating: 281**

North Lake/Camp Salvation is moderately developed. There is one parcel within North Lake/Camp Salvation, and the SFPD was able to assess 25 structures. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs and structure addresses are posted, but generally are non-reflective and combustible. Structure addresses

are inconsistently posted and generally are non-reflective and combustible. Building materials vary widely throughout North Lake/Camp Salvation. Many structures have combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within North Lake/Camp Salvation is moderate. The main road is Highway 12 and is paved. There are many one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within North Fork Ranch and water storage is highly available at the lake. The nearest fire district substation is Stonewall Station. There are no fire protection capabilities within North Lake/Camp Salvation, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the area. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### North Lake/Camp Salvation Homeowner Recommendations:

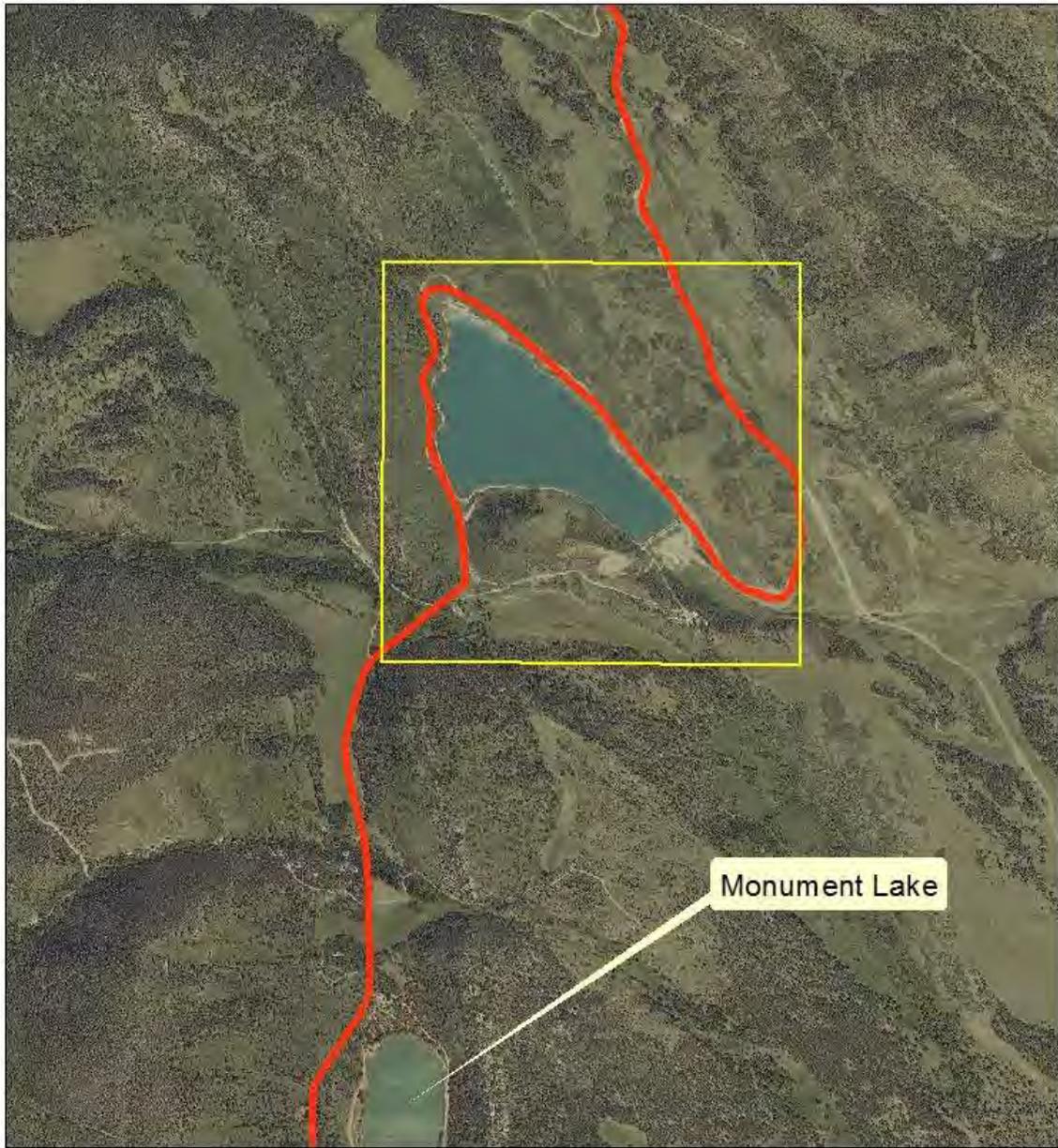
| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See “ <i>Ready, Set, Go! Emergency Preparedness Checklist</i> ” in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See “ <i>FireWise Construction: Site Design &amp; Building Materials</i> ” and “ <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> ” in Appendix |

## North Lake/Camp Salvation Wildfire Mitigation Recommendations:

| Category  | Priority | Description  |
|---|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>        | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended mitigation activities in coordination with the SFPD, Colorado State Forest Service and others</li> </ul>   |
| <b>Roadside Thinning of HWY 12 and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings. This will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing. See <i>"Fuel Break Guidelines for Forested Subdivisions &amp; Communities"</i></li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>              | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>                                 | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# North Lake-Camp Salvation



# PICKETWIRE

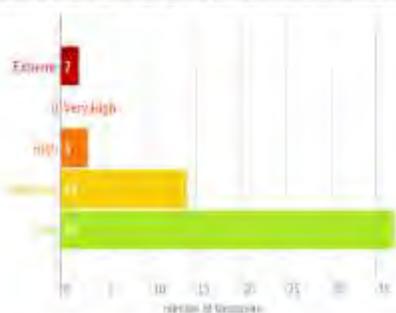


## Overall Hazard and Risk

The Picketwire community is located within the western area of the Stonewall Fire Protection District north and south of Highway 2, and east and west of CR13. Picketwire encompasses 482 acres within the Stonewall Fire Protection District. The overall topography of the land is river bottom and mountainous, and the density of vegetation is low. The vegetation in the area is comprised of landscaping, grassy meadows, cottonwoods in riparian areas, ponderosa pines and pinon-juniper on hillsides.

Most of this community is surrounded by grasslands. Depending on condition and depth of grass at any given time, this could either fall under Fuel Model GS1 or GS2. If cut or under irrigation, flame lengths would be expected to be low, but tall dry grass of the GS2 Model can produce high rates of spread (greater than 100 chains per hour) and flame lengths of 6 to 8 feet. Timbered areas are mostly of the TU1 Model, where fire is carried by a timber understory of grass or small amounts of shrub or litter. In these fuels under even the most adverse conditions, rates of spread are predicted to be relatively low (around 10-12 chains per hour) and flame lengths at 4 feet or less.

## Individual Structure Breakdown



## Structures Risk Rating: **Low**

### Average structure rating: **139**

Picketwire is highly developed. There are approximately 30 parcels within Picketwire, and the SFPD was able to assess 56 structures. Parcel size is private lot size. Roads leading to structures of generally unpaved with some paved roads adjacent Highway 12. Structures generally have one road leading to them. Street signs and structure addresses are minimally posted. Building materials vary widely

throughout Picketwire. Many structures have combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within Picketwire is high. The main road is Highway 12 and is paved. There are one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within Picketwire and water storage is minimally available. The nearest fire district substation is Stonewall Station. There are no fire protection capabilities within Picketwire, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the area. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Picketwire Homeowner Recommendations:

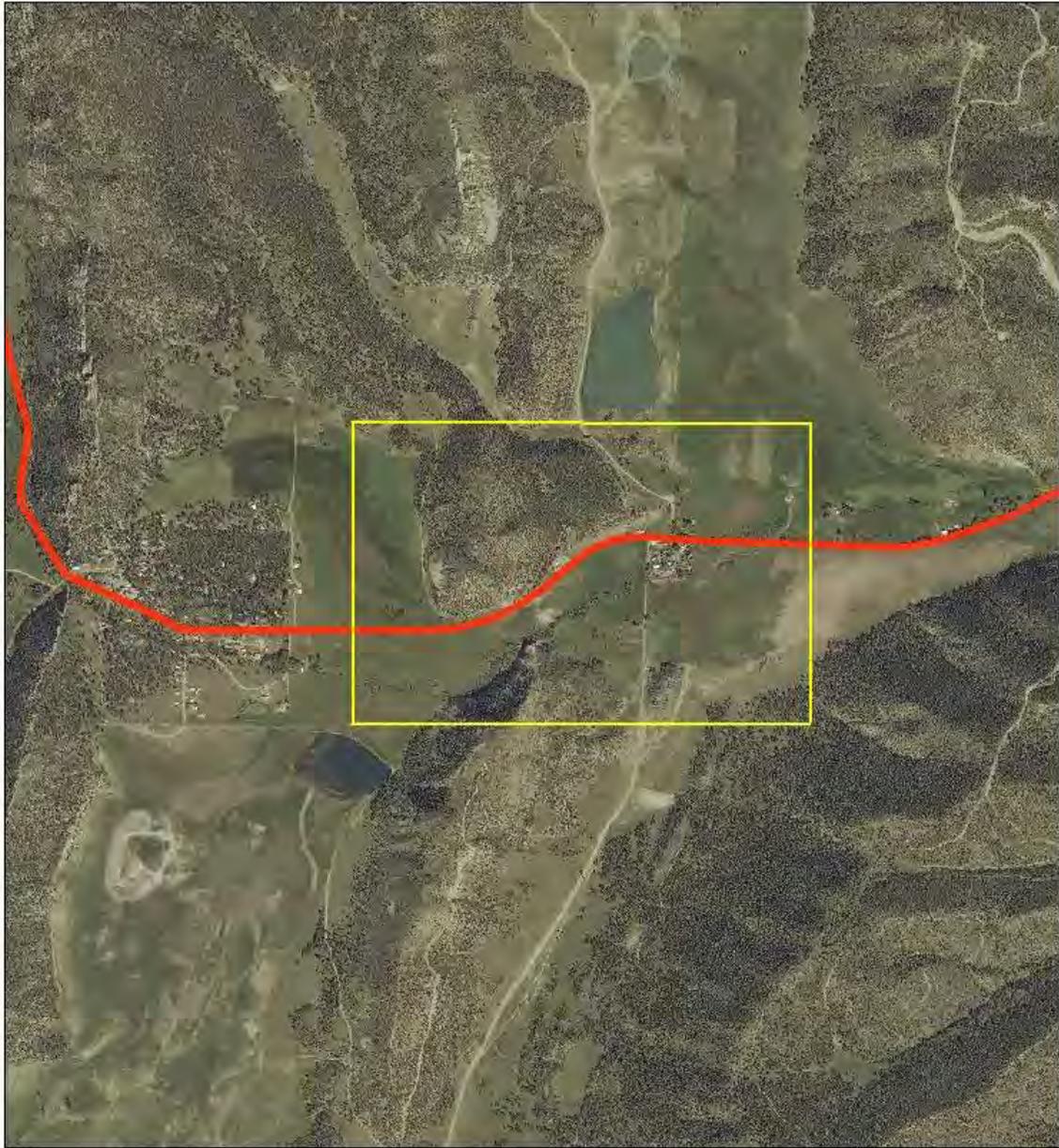
| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See <i>“Ready, Set, Go! Emergency Preparedness Checklist”</i> in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See <i>“FireWise Guide to Landscape and Construction”</i> in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See <i>“FireWise Guide to Landscape and Construction”</i> in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See <i>“FireWise Construction: Site Design &amp; Building Materials”</i> and <i>“Protect Your Property from Wildfire--Rocky Mountain Edition”</i> in Appendix |

## Picketwire General Subdivision Wildfire Mitigation Recommendations:

| Category                                       | Priority | Description  |
|--|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b> | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended activities in coordination with the SFPD, State Forest Service, and federal land managers as appropriate.</li> </ul>   |
| <b>Roadside Thinning of internal roads</b>     | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings this will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing.</li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>       | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>                          | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Picketwire



# PINE RIDGE HIDEAWAY

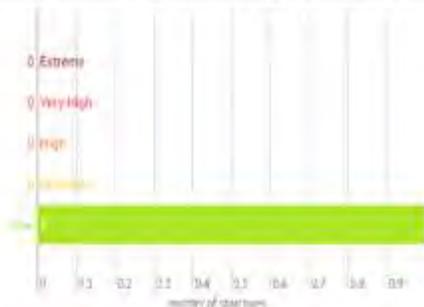


## Overall Hazard and Risk

The Pine Ridge Hideaway community is located within the central area of the Stonewall Fire Protection District north of Highway 12. Pine Ridge Hideaway encompasses 384 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the density of vegetation is moderate. The vegetation in the area is comprised of ponderosa pine, oak shrubland, and scattered spruce-fir.

This community is located east of Big Pine Ranch and Wet Canyon. It contains forests of the TU5 Fuel Model Type, with rates of spread greater than 40 chains per hour and flame lengths greater than 15 feet under adverse conditions. In between forested lands are open grasslands of the GR2 Fuel Type, with fire carried primarily by grass and shrub litter, and corresponding predicted rates of spread greater than 100 chains per hour and flame lengths of 6 to 8 feet.

### Individual Structure Breakdown



### Structures Risk Rating: **Low**

#### Average structure rating: **130**

Pine Ridge Hideaway is minimally developed. There are approximately 11 parcels within Pine Ridge Hideaway, and the SFPD was able to assess 1 structure. Parcels range from 35-40 acres. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs and structure addresses are minimally posted. Building materials vary widely throughout Pine Ridge Hideaway. Many

structures have combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within Pine Ridge Hideaway is moderate. The main road is Big Pine Ridge Road and is unpaved. There are many one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within Pine Ridge Hideaway and water storage is minimally available. The nearest fire district substation is Wet Canyon Station. There are no fire protection capabilities within Pine Ridge Hideaway, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivision. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Pine Ridge Hideaway Homeowner Recommendations:

| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See “ <i>Ready, Set, Go! Emergency Preparedness Checklist</i> ” in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See “ <i>FireWise Construction: Site Design &amp; Building Materials</i> ” and “ <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> ” in Appendix |

## Pine Ridge Hideaway General Subdivision Wildfire Mitigation Recommendations:

| Category   | Priority | Description  |
|--|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>                     | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended mitigation activities in coordination with the SFPD, Colorado State Forest Service and others</li> </ul>   |
| <b>Roadside Thinning of Big Pine Ridge Road and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings. This will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing. See <i>"Fuel Break Guidelines for Forested Subdivisions &amp; Communities"</i></li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>                           | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>  | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Pine Ridge Hideaway



0 0.1 0.2 0.4 Miles

**Legend**

-  Pine Ridge Hideaway
-  Big Pine Ridge Road Recommended Thinning



# PRIMERO

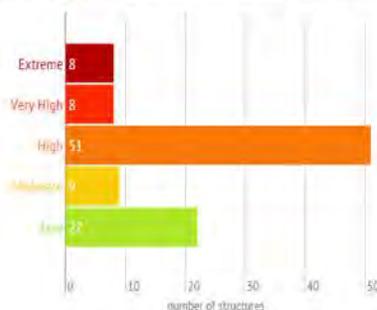


## Overall Hazard and Risk

The Primero community is located within the central area of the Stonewall Fire Protection District along Highway 12. Primero encompasses 1052 acres within the Stonewall Fire Protection District. The overall topography of the land is river bottom and mountainous, and the density of vegetation is moderate to low. The vegetation in the area is comprised of pinon-juniper, oak shrubland, scattered ponderosa pine, and cottonwoods with grassy meadows in riparian areas.

This community is immediately east of Weston along the Purgatoire River and Highway 12. Here, grassland closest to the Purgatoire River is of either the GR1 or GR2 Fuel Types. The GR1 Model represents short, grazed and otherwise discontinuous grass, and predicted rates of spread and flame lengths are low (less than 20 chains per hour, and a maximum of 2 feet, respectively). Greater depths of grass in the GR2 Model mean much greater rates of spread (greater than 100 chains per hour) and flame lengths (6 to 8 feet) can be expected. As the hills rise above the river valley, shrubs and grass mix in the GS1 Fuel Model, where rates of spread can exceed 80 chains per hour and flame lengths can exceed 10 feet when the vegetation is dry and weather conditions adverse. Much of the west side of this area is occupied by the Primero School, which is surrounded by well-irrigated fields, sports facilities and parking areas.

### Individual Structure Breakdown



### Structures Risk Rating: **High**

**Average structure rating: 206**

Primero is highly developed. There are approximately 6 parcels within Primero, and the SFPD was able to assess 98 structures. Roads leading to structures are paved, and structures generally have one road leading to them. Street signs and structure addresses are generally moderately posted. Building materials vary widely throughout Primero. Many structures have combustible materials within 10 feet of the

structure. Defensible space has been inconsistently implemented around current structures. The Primero School is located within this community, and should be considered a high priority in mitigating wildfire and an important community resource.

## Protection and Management

Road accessibility for emergency responders within Primero is high. The main road is Highway 12 and is paved. Parcel size is less than 10 acres. There are many one-lane roads and turnarounds are infrequent. There are currently three fire hydrants available within Primero and water storage is minimally available. The nearest fire district substation is Segundo Station. There are no fire protection capabilities within Primero other than fire hydrants and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the area. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Primero Homeowner Recommendations:

| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See “ <i>Ready, Set, Go! Emergency Preparedness Checklist</i> ” in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See “ <i>FireWise Construction: Site Design &amp; Building Materials</i> ” and “ <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> ” in Appendix |

## Primero General Subdivision Wildfire Mitigation Recommendations:

| Category                                       | Priority | Description  |
|--|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b> | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended activities in coordination with the SFPD, State Forest Service, and federal land managers as appropriate.</li> </ul>   |
| <b>Roadside Thinning of internal roads</b>     | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings this will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing.</li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>       | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>                          | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Primero



# PRIMERO RANCH

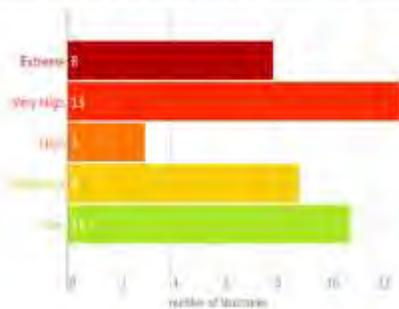


## Overall Hazard and Risk

The Primero Ranch community is located within the central area of the Stonewall Fire Protection District north of Highway 12. Primero Ranch encompasses 7263 acres within the Stonewall Fire Protection District. The overall topography of the land is open grassy meadows and shrub dominated areas with steeper sections of pinon-juniper, and the density of vegetation is light to moderate. The vegetation in the area is comprised of oak shrubland, sagebrush, and scattered pinon-juniper, interspersed with grassy meadows.

This is a community north of Highway 12 and the Purgatoire River directly north of San Juan Plaza. Vegetation coverage alternates between grass and shrub mixtures at the lower elevations to pinon-juniper woodlands of varying density on the upper hillsides. Grasslands with occasional shrubs mixed together is the GR2 Fuel Model with fire carried primarily by grass and shrub litter, and corresponding predicted rates of spread greater than 100 chains per hour and flame lengths of 6 to 8 feet. Where there is a greater shrub component and fire is carried by both grass and shrubs, the GS2 Fuel Model can produce high rates of spread greater than 100 chains per hour and flame lengths of 6 to 8 feet.

## Individual Structure Breakdown



## Structures Risk Rating: **High**

**Average structure rating: 251**

Primero Ranch is moderately developed. There are approximately 28 parcels within Primero Ranch, and the SFPD was able to assess 54 structures. Parcels range from 35-40 acres. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs are posted but are not reflective and are combustible. Structure addresses are minimally posted. Building

materials vary widely throughout Primero Ranch. Many structures have combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within Primero Ranch is moderate. The main road is County Road 43.6 and is unpaved. There are many one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within Primero Ranch and water storage is minimally available. The nearest fire district substation is Segundo Station. There are no fire protection capabilities within Primero Ranch, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivision. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Primero Ranch Homeowner Recommendations:

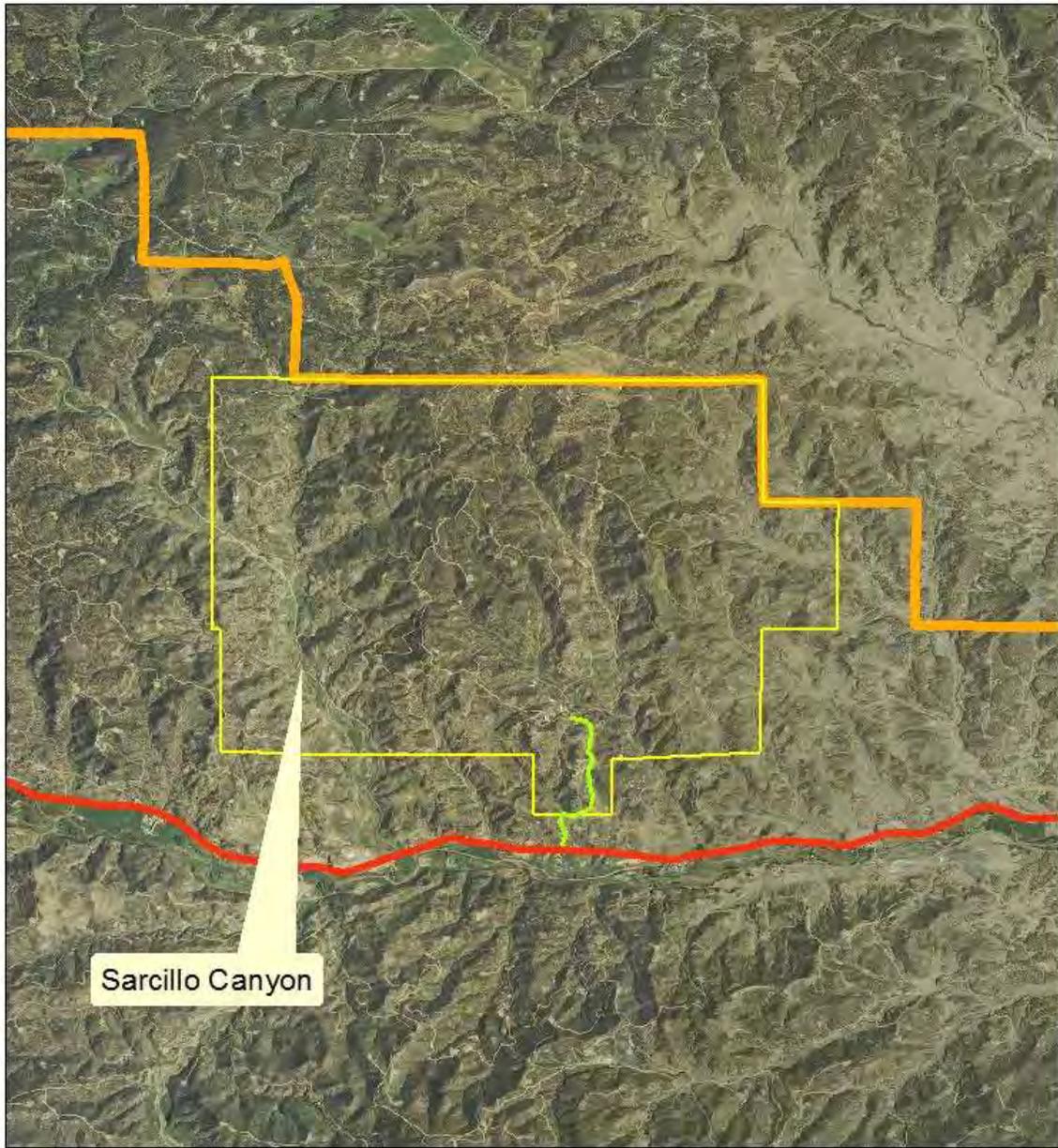
| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See “ <i>Ready, Set, Go! Emergency Preparedness Checklist</i> ” in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See “ <i>FireWise Construction: Site Design &amp; Building Materials</i> ” and “ <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> ” in Appendix |

## Primero Ranch General Subdivision Wildfire Mitigation Recommendations:

| Category   | Priority | Description  |
|--|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>         | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended mitigation activities in coordination with the SFPD, Colorado State Forest Service and others</li> </ul>   |
| <b>Roadside Thinning of CR 43.6 and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings. This will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing. See <i>"Fuel Break Guidelines for Forested Subdivisions &amp; Communities"</i></li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>               | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>                                  | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Primero Ranch



# RAINBOW HEIGHTS

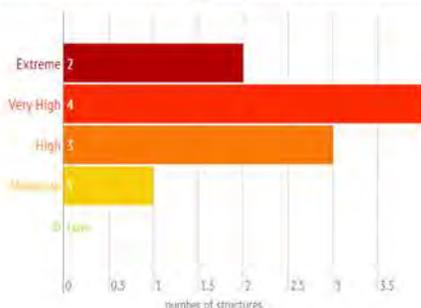


## Overall Hazard and Risk

The Rainbow Heights community is located within the north central area of the Stonewall Fire Protection District. Rainbow Heights encompasses 118 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the density of vegetation is moderate. The vegetation in the area is comprised of ponderosa pine, oak shrubland, and scattered spruce-fir.

This is a small community located in the hills above the upper reaches of Wet Canyon. Mostly forest-covered, the TU1 Fuel Model is present on drier sites, while on cooler and north-facing aspects, the TU5 Model occurs. The difference between the two types is that in the TU1 Model contains less fuel in the understory than in TU5. The TU1 Model has rates of spread predicted to be relatively low (around 10-12 chains per hour) and flame lengths at 4 feet or less, with the TU5 Model having predicted rates of spread greater than 40 chains per hour and flame lengths greater than 15 feet under adverse conditions, making control efforts difficult.

## Individual Structure Breakdown



## Structures Risk Rating: **Very High**

**Average structure rating: 296**

Rainbow Heights is minimally developed. There are approximately 10 parcels within Rainbow Heights, and the SFPD was able to assess 10 structures. Parcel size is less than 12 acres. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs and structure addresses are minimally posted. Building materials vary widely throughout Rainbow Heights. Many structures

have combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within Rainbow Heights is poor. The main road is County Road 31.9 and is unpaved. There are many one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within Rainbow Heights and water storage is minimally available. The nearest fire district substation is Wet Canyon Station. There are no fire protection capabilities within Rainbow Heights, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivision. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Rainbow Heights Homeowner Recommendations:

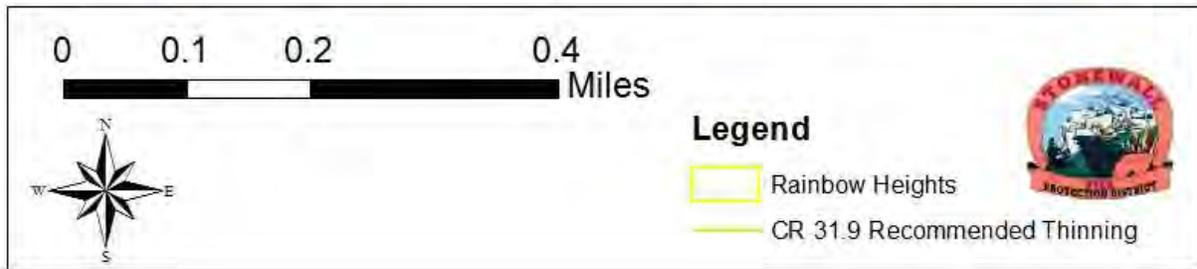
| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See " <i>Ready, Set, Go! Emergency Preparedness Checklist</i> " in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See " <i>FireWise Guide to Landscape and Construction</i> " in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See " <i>FireWise Guide to Landscape and Construction</i> " in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See " <i>FireWise Construction: Site Design &amp; Building Materials</i> " and " <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> " in Appendix |

## Rainbow Heights General Subdivision Wildfire Mitigation Recommendations:

| Category   | Priority | Description  |
|--|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>         | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended mitigation activities in coordination with the SFPD, Colorado State Forest Service and others</li> </ul>   |
| <b>Roadside Thinning of CR 31.9 and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings. This will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing. See <i>"Fuel Break Guidelines for Forested Subdivisions &amp; Communities"</i></li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>               | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>                                  | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Rainbow Heights



# RANCHO ESCONDIDO

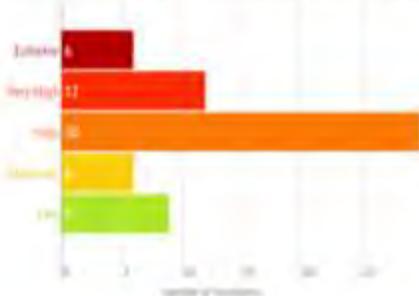


## Overall Hazard and Risk

The Rancho Escondido community is located within the north western area of the Stonewall Fire Protection District north of Highway 12. Rancho Escondido encompasses 2700 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the density of vegetation is moderate. The vegetation in the area is comprised of ponderosa pine, oak shrubland, and scattered spruce-fir, with pinon-juniper in the lower elevations.

This community is located north of Highway 12 along and to the east of Santistevan Canyon. Lower areas within the canyon contain a mixture of grass and shrubs and are mostly of the SH1 Fuel Model, a mixture of shrubs and grass that have predicted rates of spread and flame lengths that are low (less than 3 chains per hour and 2 feet). However, increased amounts of grass will result in higher rates of spread, and thick shrub cover will increase flame lengths and corresponding suppression difficulty. There are several “timber understory” (TU) Fuel Types present at higher elevations, with the predominant and highest density forests falling into the TU5 Model. Here, predicted rates of spread are greater than 40 chains per hour and flame lengths greater than 15 feet under adverse conditions, making control efforts difficult.

### Individual Structure Breakdown



### Structures Risk Rating: **High**

#### Average structure rating: **234**

Rancho Escondido is moderately developed. There are approximately 70 parcels within Rancho Escondido, and the SFPD was able to assess 63 structures. Parcels range from 35-40 acres. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs and structure addresses are posted, but generally are reflective and noncombustible. Structure addresses are

minimally posted. Building materials vary widely throughout Rancho Escondido. Many structures have combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within Rancho Escondido is moderate. The main road is County Road 23.3 and is unpaved. There are many one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within Rancho Escondido and water storage is seasonably available on an adjacent property. The nearest fire district substation is Stonewall Station. There are no fire protection capabilities within Rancho Escondido, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivision. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Rancho Escondido Homeowner Recommendations:

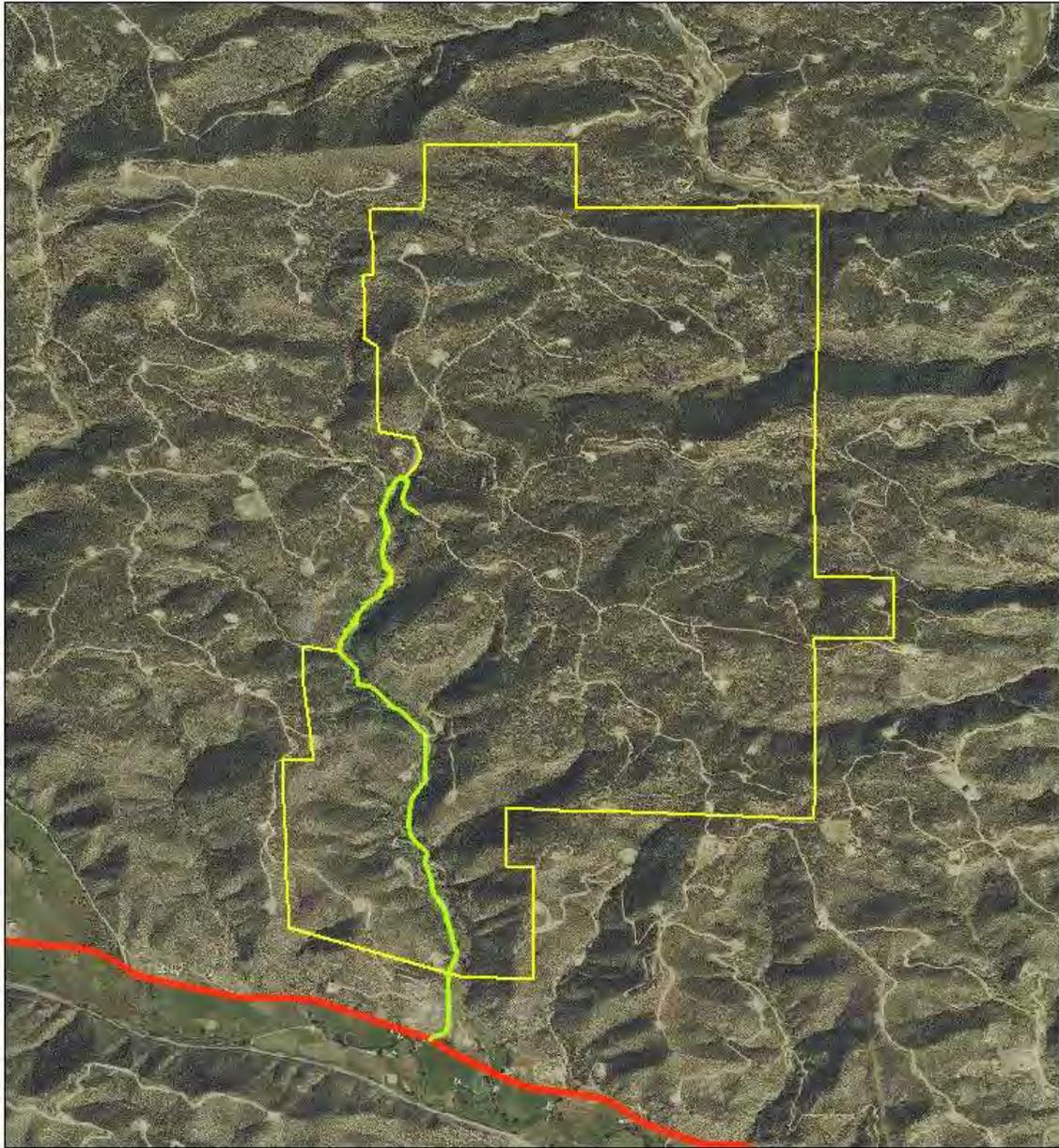
| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See " <i>Ready, Set, Go! Emergency Preparedness Checklist</i> " in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See " <i>FireWise Guide to Landscape and Construction</i> " in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See " <i>FireWise Guide to Landscape and Construction</i> " in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See " <i>FireWise Construction: Site Design &amp; Building Materials</i> " and " <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> " in Appendix |

## Rancho Escondido General Subdivision Wildfire Mitigation Recommendations:

| Category   | Priority | Description  |
|--|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>         | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended mitigation activities in coordination with the SFPD, Colorado State Forest Service and others</li> </ul>   |
| <b>Roadside Thinning of CR 23.3 and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings. This will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing. See <i>"Fuel Break Guidelines for Forested Subdivisions &amp; Communities"</i></li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>               | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>                                  | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Rancho Escondido



# RANCHO LA GARITA

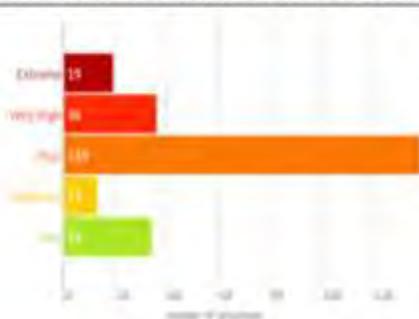


## Overall Hazard and Risk

The Rancho La Garita community is located within the north central area of the Stonewall Fire Protection District north of Highway 12. Rancho La Garita encompasses 6491 acres within the Stonewall Fire Protection District and is divided by CR 41.7 into North and South sections. The overall topography of the land is mountainous, and the density of vegetation is moderate. The vegetation in the area is comprised of ponderosa pine, pinon-juniper, and oak shrubland, interspersed with grassy meadows.

Most of this large area is classified as the TU5 Fuel Model, which is characterized by Scott and Burgan (2005) as “heavy forest litter with a shrub or small tree understory.” Predicted rates of spread are moderate, but under dry windy conditions may be greater than 40 chains per hour. Flame lengths are also moderate, but under dry windy conditions may be greater than 15 feet, making control efforts very difficult. To a lesser extent and on dry aspects, the SH1 Fuel Model is present, with characteristic very low flame lengths and rates of spread. However, as the amounts of grass increase, rates of spread will correspondingly increase.

## Individual Structure Breakdown



## Structures Risk Rating: **High**

**Average structure rating: 233**

Rancho La Garita is highly developed. There are approximately 520 parcels within Rancho La Garita, and the SFPD was able to assess 251 structures. Parcel size is less than 12 acres. Roads leading to structures are unpaved, and structures generally have two roads leading to them in South La Garita and one road leading to them in North La Garita. Street signs are posted and are reflective and noncombustible. Structure

addresses are moderately posted, and may or may not be reflective and noncombustible. Building materials vary widely throughout Rancho La Garita. Many structures have combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within Rancho La Garita is moderate. The main road is CR 41.7 and CR 30.1 and is unpaved. There are many one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within Rancho La Garita and water storage is minimally available. The nearest fire district substation is La Garita Station. There are no fire protection capabilities within Rancho La Garita, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivision. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Rancho La Garita Homeowner Recommendations:

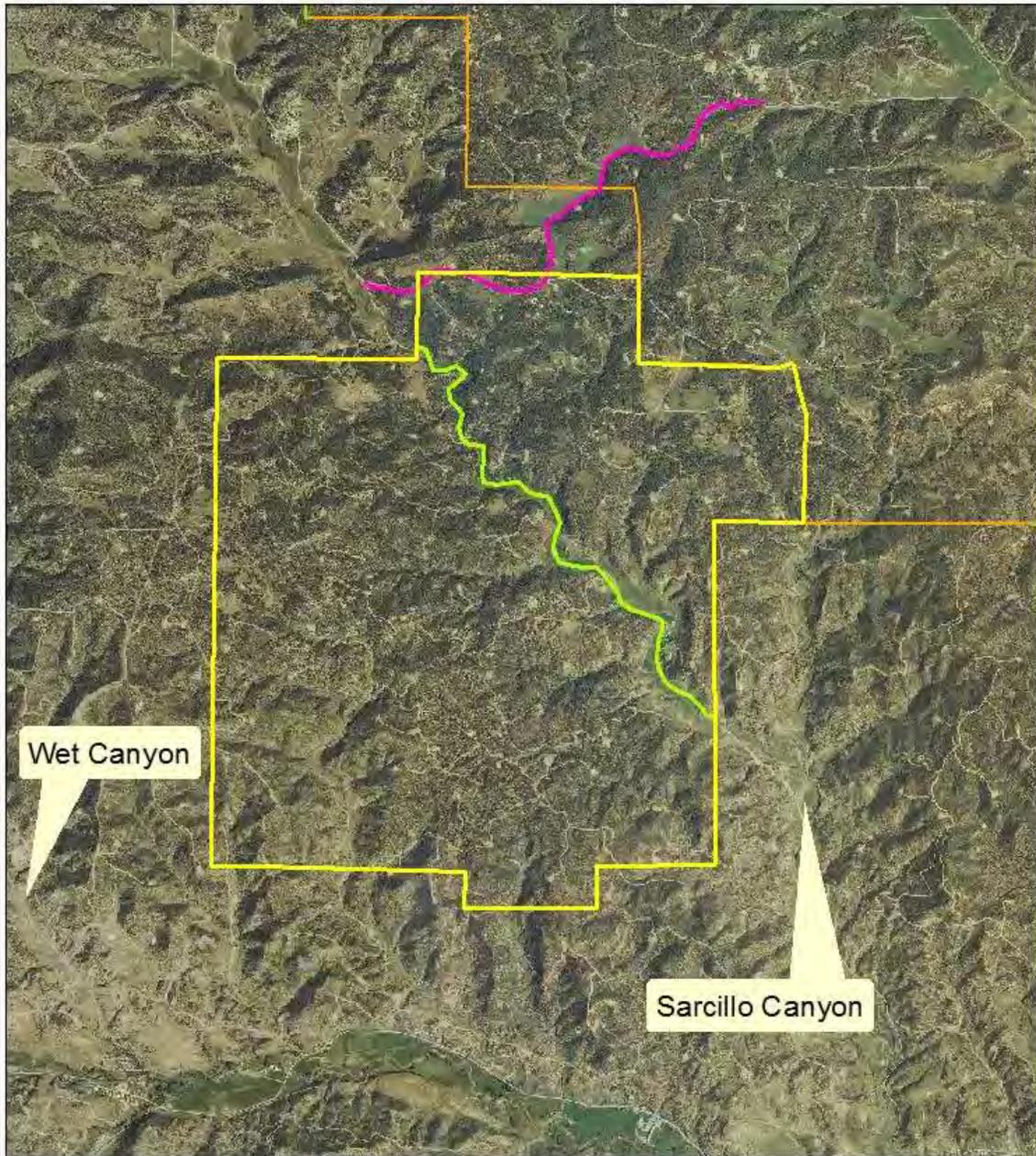
| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See “ <i>Ready, Set, Go! Emergency Preparedness Checklist</i> ” in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See “ <i>FireWise Construction: Site Design &amp; Building Materials</i> ” and “ <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> ” in Appendix |

## Rancho La Garita General Subdivision Wildfire Mitigation Recommendations:

| Category   | Priority | Description  |
|--|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>                     | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended mitigation activities in coordination with the SFPD, Colorado State Forest Service and others</li> </ul>   |
| <b>Roadside Thinning of CR 41.7 and CR 30.1 and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings. This will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing. See <i>"Fuel Break Guidelines for Forested Subdivisions &amp; Communities"</i></li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>                           | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>  | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Rancho La Garita



# RIVER RANCH LONG CANYON

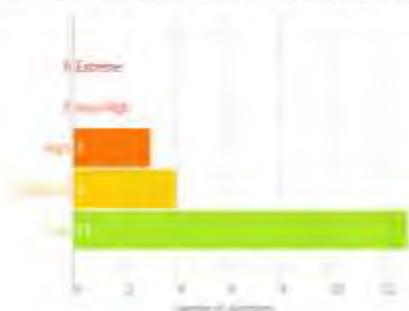


## Overall Hazard and Risk

The River Ranch Long Canyon community is located within the eastern area of the Stonewall Fire Protection District south of Highway 12. River Ranch Long Canyon encompasses 1414 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the density of vegetation is moderate. The vegetation in the area is comprised of pinon-juniper, oak shrubland, scattered ponderosa pine, and cottonwood in riparian areas, interspersed with grassy meadows.

This community is located at the mouth of Long Canyon and rises westward. Lower areas fall into the SH1 Fuel Model, a mixture of shrubs and grass that have predicted rates of spread and flame lengths that are low (less than 3 chains per hour and 2 feet). However, increased amounts of grass will result in higher rates of spread, and thick shrub cover will increase flame lengths and corresponding suppression difficulty. Upper areas contain a mix of TU1 and TL3 Fuel Models within the forests present. The TU1 Model is present on drier aspects, where fire is carried primarily by grass or shrubs in the understory, and rates of spread are predicted to be relatively low (around 10-12 chains per hour) and flame lengths at 4 feet or less. On cooler aspects (north to northeast facing), the forest overstory tends to be thicker, and the Fuel Model here is TL3, where fire is carried primarily by dried needles and small branches. Fires here are predicted to spread slowly (less than 6 chains per hour) and flame lengths are low (less than 2 feet). Because of the denser crown fuels present, a greater potential exists here for dangerous crown fires to develop and persist under extreme weather conditions.

### Individual Structure Breakdown



### Structures Risk Rating: **Low**

#### Average structure rating: **125**

River Ranch Long Canyon is moderately developed. There are approximately 36 parcels within River Ranch Long Canyon, and the SFPD was able to assess 20 structures. Parcels range from 35-40 acres. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs and structure addresses are minimally posted. Building

materials vary widely throughout River Ranch Long Canyon. Many structures have combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented.

## Protection and Management

Road accessibility for emergency responders within River Ranch Long Canyon is moderate. The main road is CR 53.1 and is unpaved. There are many one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available and water storage is minimally available. The nearest fire district substation is Long Canyon Station. There are some individual fire protection capabilities within the community and an evacuation plan was created in 2000 by the Landowner's Association.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivision. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### River Ranch Long Canyon Homeowner Recommendations:

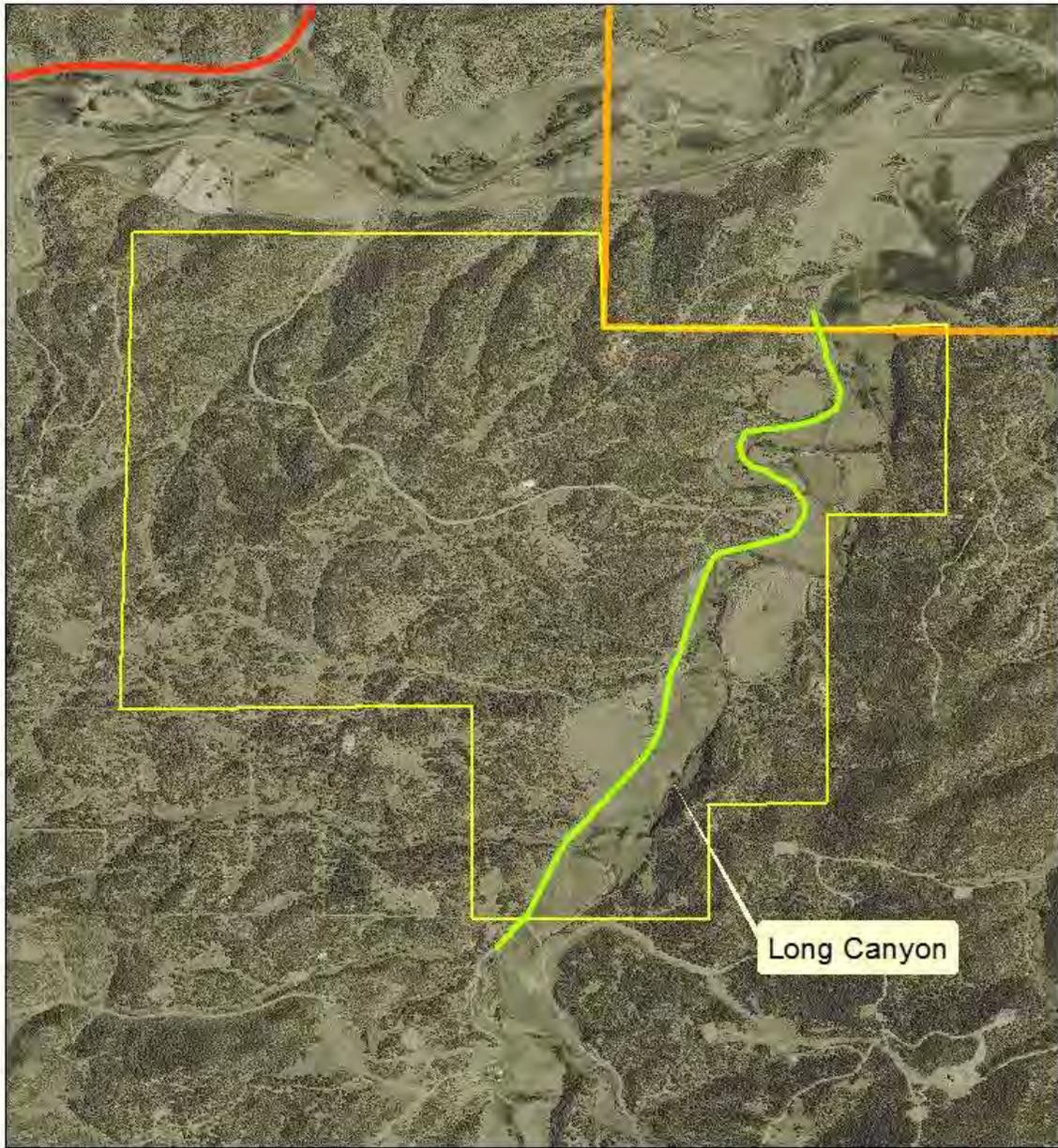
| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See " <i>Ready, Set, Go! Emergency Preparedness Checklist</i> " in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See " <i>FireWise Guide to Landscape and Construction</i> " in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See " <i>FireWise Guide to Landscape and Construction</i> " in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See " <i>FireWise Construction: Site Design &amp; Building Materials</i> " and " <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> " in Appendix |

## River Ranch Long Canyon General Subdivision Wildfire Mitigation Recommendations:

| Category   | Priority | Description  |
|--|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>         | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended mitigation activities in coordination with the SFPD, Colorado State Forest Service and others</li> </ul>   |
| <b>Roadside Thinning of CR 53.1 and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings. This will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing. See <i>"Fuel Break Guidelines for Forested Subdivisions &amp; Communities"</i></li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>               | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Review and or update the evacuation plan created in 2000 and submit the plan to the Stonewall Fire Protection District and Las Animas County for their records.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>                                  | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# River Ranch Long Canyon



# ROBINSON TRACTS

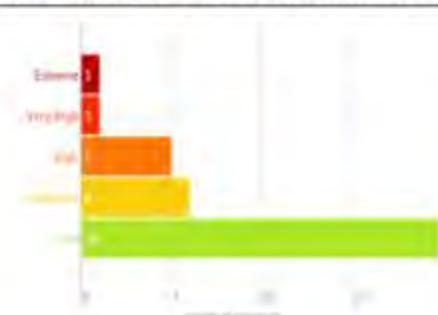


## Overall Hazard and Risk

The Robinson Tracts community is located within the north central area of the Stonewall Fire Protection District north of Highway 12. Robinson Tracts encompasses 606 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the density of vegetation is moderate. The vegetation in the area is comprised of ponderosa pine, oak shrubland, and scattered spruce-fir, interspersed with grassy meadows.

This community is positioned within Wet Canyon and extends to the adjacent hills toward the east. Parcels which reach the canyon lowlands contain grasslands of the GR2 Fuel Model, with predicted rates of spread greater than 100 chains per hour and flame lengths of 6 to 8 feet. The majority of the area is covered in forests best represented by the TU5 Fuel Model, with predicted rates of spread greater than 40 chains per hour and flame lengths greater than 15 feet under adverse conditions, making control efforts difficult.

## Individual Structure Breakdown



## Structures Risk Rating: **Low**

**Average structure rating: 149**

Robinson Tracts is minimally developed. There are approximately 13 parcels within Robinson Tracts, and the SFPD was able to assess 33 structures. Parcels range from 35-40 acres. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs and structure addresses are minimally posted. Building materials vary widely throughout Robinson Tracts. Many structures

have combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within Robinson Tracts is moderate. The main road is County Road 32.5 and CR 31.9 and both are unpaved. There are many one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within Robinson Tracts and water storage is minimally available. The nearest fire district substation is Wet Canyon Station. There are no fire protection capabilities within Robinson Tracts, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivision. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Robinson Tracts Homeowner Recommendations:

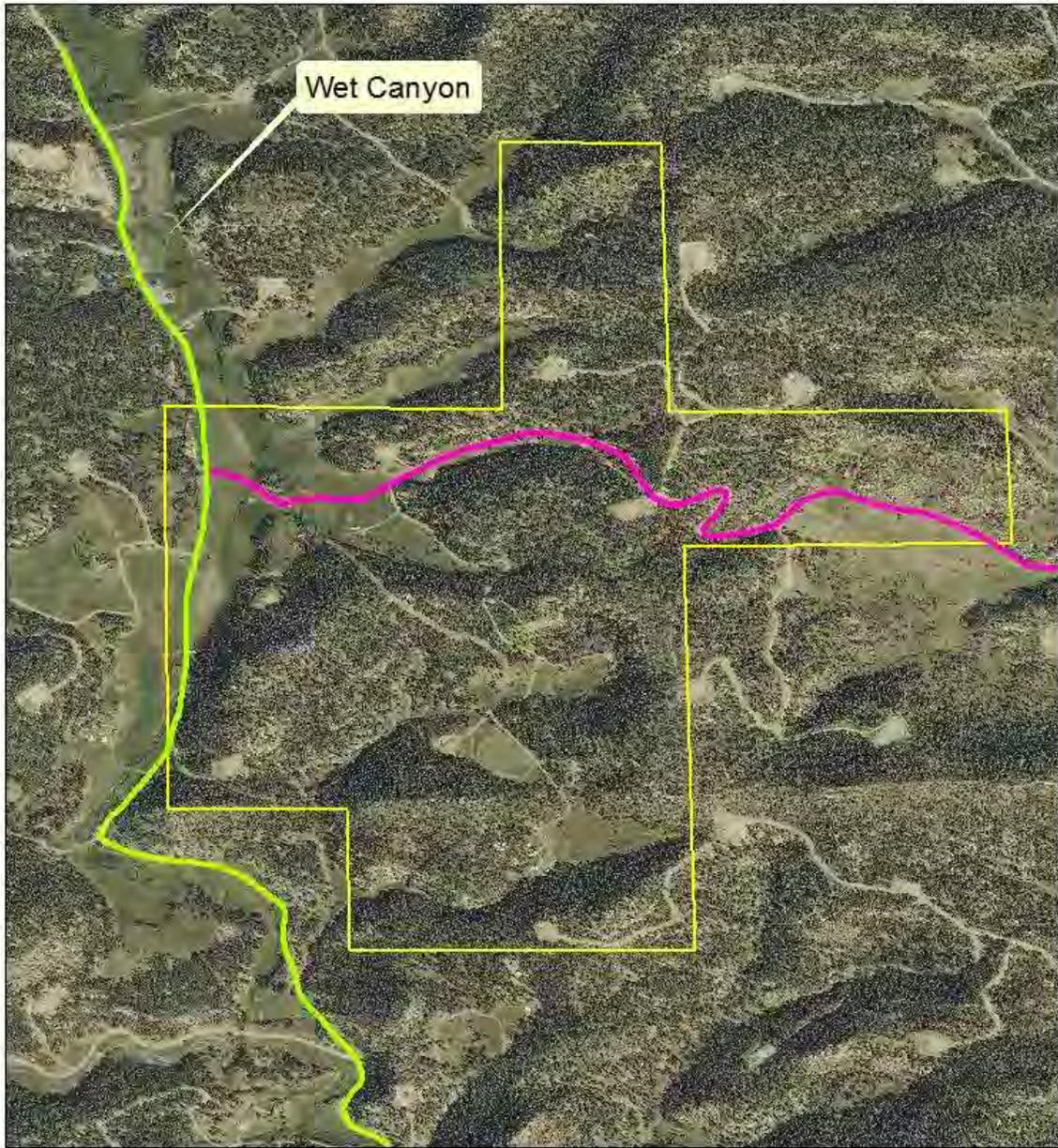
| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See “ <i>Ready, Set, Go! Emergency Preparedness Checklist</i> ” in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See “ <i>FireWise Construction: Site Design &amp; Building Materials</i> ” and “ <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> ” in Appendix |

## Robinson Tracts General Subdivision Wildfire Mitigation Recommendations:

| Category   | Priority | Description  |
|--|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>         | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended mitigation activities in coordination with the SFPD, Colorado State Forest Service and others</li> </ul>   |
| <b>Roadside Thinning of CR 32.5 and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings. This will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing. See <i>"Fuel Break Guidelines for Forested Subdivisions &amp; Communities"</i></li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>               | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>                                  | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Robinson Tracts



# SAN JUAN PLAZA

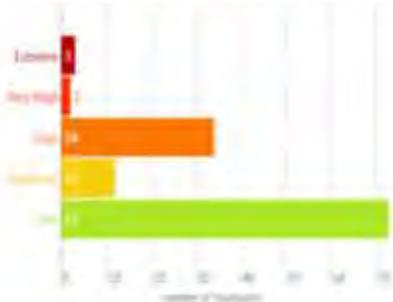


## Overall Hazard and Risk

The San Juan Plaza community is located within the central area of the Stonewall Fire Protection District along Highway 12. The San Juan Plaza encompasses 315 acres within the Stonewall Fire Protection District. The overall topography of the land is river bottom and hills, and the density of vegetation is low. The vegetation in the area is comprised of cottonwoods in riparian areas, grassy meadows, and landscaping.

This community lies along Highway 12, west of Segundo and is mostly confined to the lands adjacent to the Purgatoire River. The grasslands above the river and associated riparian vegetation are classified as either GR1 or GR2, with the difference being the depth and amount of grass present. Since the GR1 Model represents short, grazed and otherwise discontinuous grass, predicted rates of spread and flame lengths are low for grass types (less than 20 chains per hour, and a maximum of 2 feet, respectively). Greater depths and amounts of grass in the GR2 Model mean much greater rates of spread (greater than 100 chains per hour) and flame lengths (6 to 8 feet) can be expected. Further away from the river, the vegetation transitions to a grass-shrub type where both grass and shrubs can be expected to carry fire. In the GS1 Fuel Model found in this community, rates of spread can exceed 80 chains per hour and flame lengths can exceed 10 feet when the vegetation is dry and weather conditions adverse.

## Individual Structure Breakdown



## Structures Risk Rating: **Low**

**Average structure rating: 148**

San Juan Plaza is highly developed. There are approximately 65 parcels within San Juan Plaza, and the SFPD was able to assess 124 structures. Parcel size is mostly private lot size. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs are posted and are reflective and noncombustible. Structure addresses are minimally posted. Building materials vary widely

throughout San Juan Plaza. Many structures have combustible materials within 10 feet

of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within San Juan Plaza is high. The main road is Highway 12 and is paved. There are many one-lane roads and turnarounds are infrequent. There is currently one fire hydrant available within San Juan Plaza and water storage is minimally available. The nearest fire district substation is the Segundo Station. There are no fire protection capabilities within San Juan Plaza, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivision. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### San Juan Plaza Homeowner Recommendations:

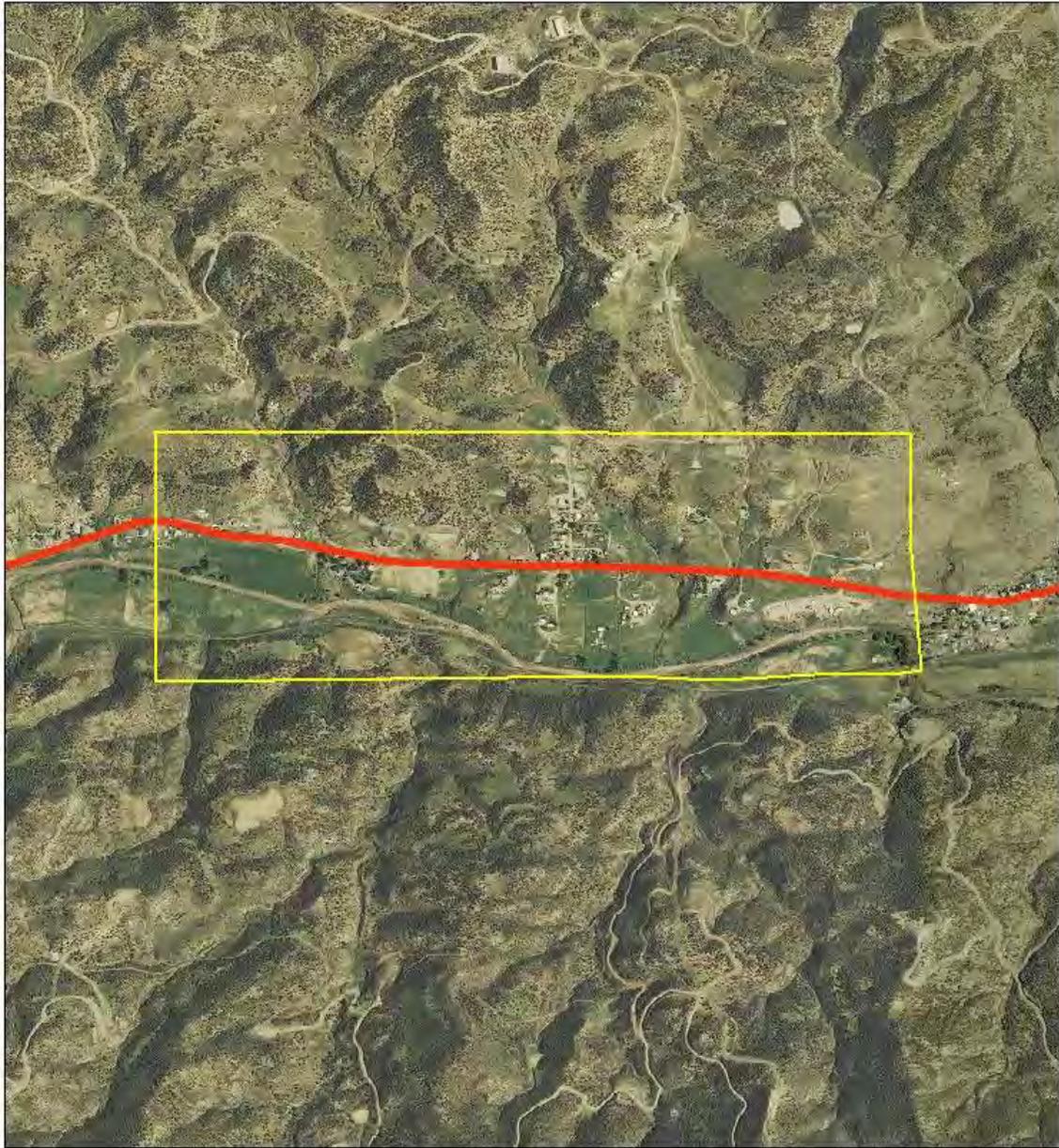
| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See “ <i>Ready, Set, Go! Emergency Preparedness Checklist</i> ” in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See “ <i>FireWise Construction: Site Design &amp; Building Materials</i> ” and “ <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> ” in Appendix |

## San Juan Plaza General Subdivision Wildfire Mitigation Recommendations:

| Category                                       | Priority | Description  |
|--|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b> | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended activities in coordination with the SFPD, State Forest Service, and federal land managers as appropriate.</li> </ul>   |
| <b>Roadside Thinning of internal roads</b>     | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings this will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing.</li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>       | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>                          | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# San Juan Plaza



# SAN PABLO CANYON RANCH

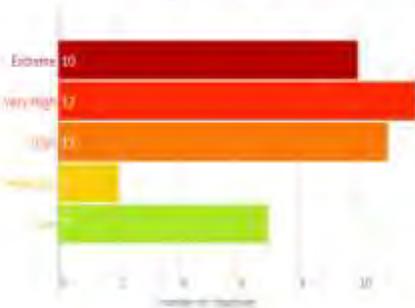


## Overall Hazard and Risk

The San Pablo Canyon Ranch community is located within the north central area of the Stonewall Fire Protection District north of Highway 12. San Pablo Canyon Ranch encompasses 2255 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the density of vegetation is moderate. The vegetation in the area is comprised of ponderosa pine, spruce-fir, and oak shrubland interspersed with grassy meadows.

This community is found in and around San Pablo Canyon, which departs the middle of Wet Canyon and travels upward to the northwest. The lower areas contain a mixture of grass and shrub coverage, most of which falls into the SH1 Fuel Model, comprised mostly of shrubs interspersed with grass. While predicted rates of spread and flame lengths are low (less than 3 chains per hour and 2 feet) in this fuel model, increased amounts of grass will result in higher rates of spread, and thick shrub cover will increase flame lengths and corresponding suppression difficulty. Most upland areas are forested and are of the TU5 Fuel Model, with predicted rates of spread greater than 40 chains per hour and flame lengths greater than 15 feet under adverse conditions, making control efforts difficult.

## Individual Structure Breakdown



## Structures Risk Rating: **High**

**Average structure rating: 267**

San Pablo Canyon Ranch is moderately developed. There are approximately 62 parcels within San Pablo Canyon Ranch, and the SFPD was able to assess 42 structures. Parcels range from 35-40 acres. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs are posted and are reflective but combustible. Structure addresses are generally minimally posted. Building materials

vary widely throughout San Pablo Canyon Ranch. Many structures have combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within San Pablo Canyon Ranch is moderate. The main road is San Pablo Canyon Road and is unpaved. There are many one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within San Pablo Canyon Ranch and water storage is minimally available. The nearest fire district substation is Wet Canyon Station. There are no fire protection capabilities within San Pablo Canyon Ranch, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivision. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### San Pablo Canyon Ranch Homeowner Recommendations:

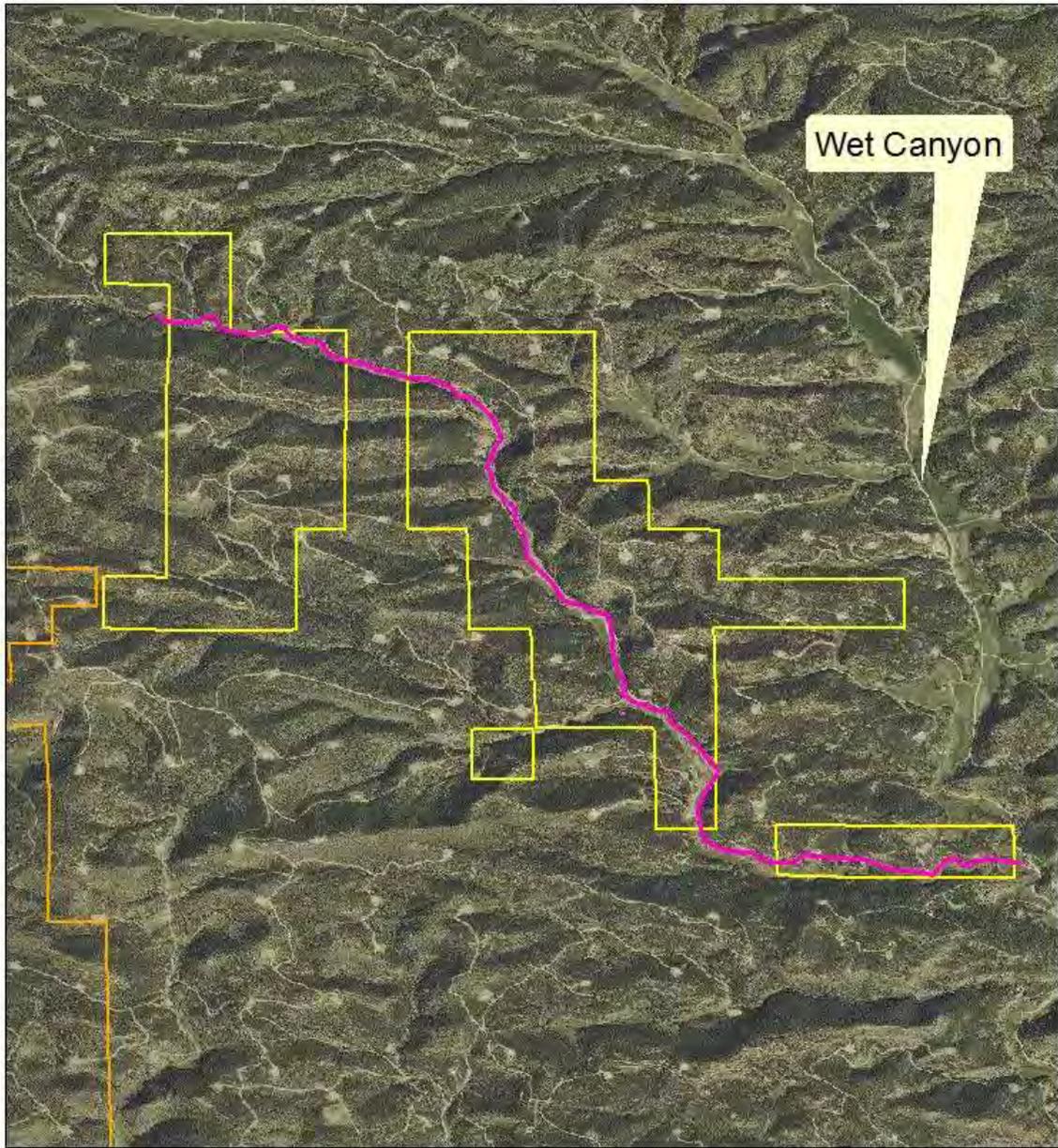
| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See “ <i>Ready, Set, Go! Emergency Preparedness Checklist</i> ” in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See “ <i>FireWise Construction: Site Design &amp; Building Materials</i> ” and “ <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> ” in Appendix |

## San Pablo Canyon Ranch General Subdivision Wildfire Mitigation Recommendations:

| Category   | Priority | Description  |
|--|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>                       | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended mitigation activities in coordination with the SFPD, Colorado State Forest Service and others</li> </ul>   |
| <b>Roadside Thinning of San Pablo Canyon Road and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings. This will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing. See <i>"Fuel Break Guidelines for Forested Subdivisions &amp; Communities"</i></li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>                             | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>  | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# San Pablo Canyon Ranch



# SEGUNDO/VALDEZ

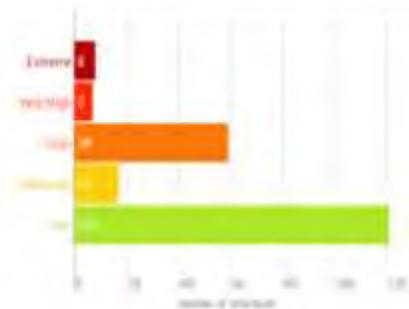


## Overall Hazard and Risk

The Segundo/Valdez community is located within the central area of the Stonewall Fire Protection District along Highway 12. Segundo/Valdez encompasses 326 acres within the Stonewall Fire Protection District. The overall topography of the land is river bottom and hills, and the density of vegetation is low. The vegetation in the area is comprised of landscaping, grassy meadows, and cottonwoods in riparian areas.

Segundo/Valdez is immediately east of San Juan Plaza along Highway 12, and most area is near the Purgatoire River. The grasslands above the river and associated riparian vegetation are classified as either GR1 or GR2, with the difference being the depth and amount of grass present. Since the GR1 Model represents short, grazed and otherwise discontinuous grass, predicted rates of spread and flame lengths are low for grass types (less than 20 chains per hour, and a maximum of 2 feet, respectively). Greater depths and amounts of grass in the GR2 Model mean much greater rates of spread (greater than 100 chains per hour) and flame lengths (6 to 8 feet) can be expected. Further from the river, the vegetation transitions to a grass-shrub type (GS1) where both grass and shrubs can be expected to carry fire. In the GS1 Fuel Model found in this community, rates of spread can exceed 80 chains per hour and flame lengths can exceed 10 feet when the vegetation is dry and weather conditions adverse.

## Individual Structure Breakdown



## Structures Risk Rating: **Moderate**

**Average structure rating: 151**

Segundo/Valdez is highly developed. There are approximately 102 parcels within Segundo/Valdez, and the SFPD was able to assess 212 structures. Parcel size is mostly private lot size. Roads leading to structures are paved, and structures generally have one road leading to them. Street signs are posted and are reflective and noncombustible. Structure addresses are minimally posted. Building

materials vary widely throughout Segundo/Valdez. Many structures have combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within Segundo/Valdez is high. The main road is Highway 12 and is paved. There are one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within Segundo/Valdez and water storage is minimally available. The nearest fire district substation is Segundo/Valdez Station. There are no fire protection capabilities within Segundo/Valdez, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the area. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Segundo/Valdez Homeowner Recommendations:

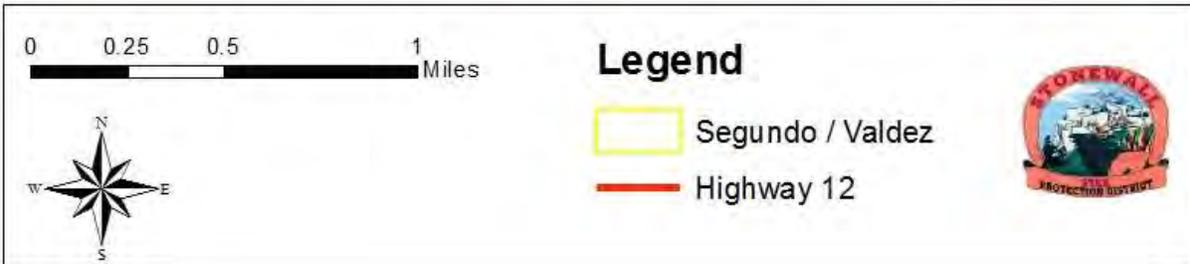
| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See “ <i>Ready, Set, Go! Emergency Preparedness Checklist</i> ” in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See “ <i>FireWise Construction: Site Design &amp; Building Materials</i> ” and “ <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> ” in Appendix |

## Segundo/Veldez General Subdivision Wildfire Mitigation Recommendations:

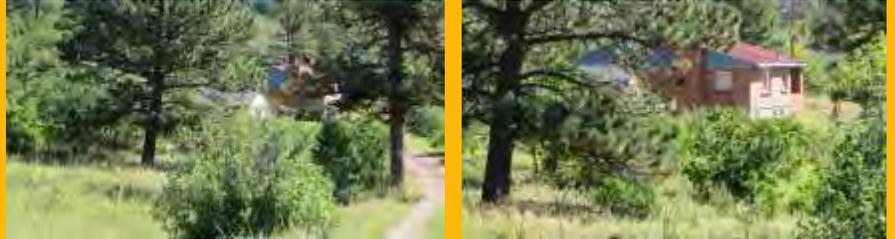
| Category                                       | Priority | Description  |
|--|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b> | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended activities in coordination with the SFPD, State Forest Service, and federal land managers as appropriate.</li> </ul>   |
| <b>Roadside Thinning of internal roads</b>     | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings this will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing.</li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>       | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>                          | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Segundo / Valdez



# SHAFERS ESTATES/WHISKEY CREEK

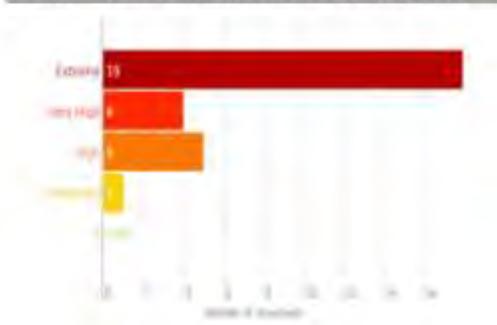


## Overall Hazard and Risk

The Shafers Estates/Whiskey Creek community is located within the north western area of the Stonewall Fire Protection District along Highway 12. Shafers Estates/Whiskey Creek encompasses 1055 within the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the density of vegetation is high. The vegetation in the area is comprised of ponderosa pine, spruce-fir, oak shrubland, and scattered aspen.

Located south of Monument Lake and west of Highway 12, this community contains much forested land characterized as the TU5 Fuel Model, with moderate predicted rates of spread, but under dry windy conditions may be greater than 40 chains per hour. Flame lengths are also moderate, but under dry windy conditions may be greater than 15 feet, making control efforts very difficult. More open areas contain grass and shrub components, with the SH5 Fuel Model predicting high rates of spread (greater than 100 chains per hour) and high flame lengths (in excess of 15 feet) contributing to control difficulties.

### Individual Structure Breakdown



### Structures Risk Rating: **Extreme**

**Average structure rating: 396**

Shafers Estates/Whiskey Creek is moderately developed. There are approximately 20 parcels within Shafers Estates/Whiskey Creek, and the SFPD was able to assess 28 structures. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs and structure addresses are minimally posted. Building materials vary widely throughout Shafers Estates/Whiskey Creek. Many structures

have combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within Shafers Estates/Whiskey Creek is poor. The main road is Highway 12 and is paved. There are many one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within Shafers Estates/Whiskey Creek and water storage is minimally available. The nearest fire district substation is Stonewall Station. There are no fire protection capabilities within Shafers Estates/Whiskey Creek, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivisions. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Shafers Estates/Whiskey Creek Homeowner Recommendations:

| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See “ <i>Ready, Set, Go! Emergency Preparedness Checklist</i> ” in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See “ <i>FireWise Construction: Site Design &amp; Building Materials</i> ” and “ <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> ” in Appendix |

## Shafers Estates/Whiskey Creek General Subdivision Wildfire Mitigation Recommendations:

| Category  | Priority | Description  |
|---|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>            | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended activities in coordination with the SFPD, State Forest Service, and federal land managers as appropriate.</li> </ul>   |
| <b>Roadside Thinning of Highway 12 and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings this will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing.</li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>                  | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>                                     | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Shafers Estates / Whiskey Creek



0 0.2 0.4 0.8 Miles



**Legend**

- Shafers Estates / Whiskey Creek
- Highway 12



# STONEWALL

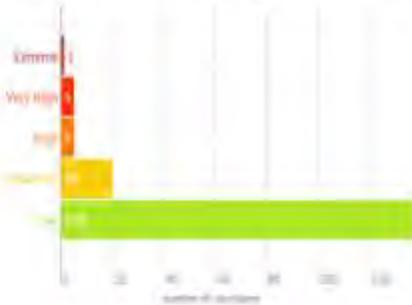


## Overall Hazard and Risk

The Stonewall community is located within the western area of the Stonewall Fire Protection District along Highway 12. Stonewall encompasses 588 acres within the Stonewall Fire Protection District. The overall topography of the land is river bottom and grassy meadows, and the density of vegetation is low to moderate. The vegetation in the area is comprised of ponderosa pine, grassy meadows, with cottonwoods in riparian areas.

Most of the immediate area within and surrounding the community of Stonewall is surrounded by grasslands of the GR1 Fuel Model, with low predicted rates of spread and flame lengths (less than 20 chains per hour, and a maximum of 2 feet, respectively). The forested areas within this community are primarily of the TU5 Fuel Model, with predicted rates of spread which could exceed 40 chains per hour and flame lengths greater than 15 feet under adverse weather conditions.

## Individual Structure Breakdown



## Structures Risk Rating: **Low**

### Average structure rating: 142

Stonewall is highly developed. There are approximately 109 parcels within Stonewall, and the SFPD was able to assess 220 structures. Parcel size is mostly private lot size. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs and structure addresses are minimally posted. Building materials vary widely throughout Stonewall. Many structures have combustible

materials within 10 feet of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within Stonewall is moderate. The main road is Highway 12 and is paved. There are one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within Stonewall and water storage is minimally available. The nearest fire district substation is Stonewall Station. There are no fire protection capabilities within Stonewall, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivisions. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Stonewall Homeowner Recommendations:

| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See “ <i>Ready, Set, Go! Emergency Preparedness Checklist</i> ” in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See “ <i>FireWise Construction: Site Design &amp; Building Materials</i> ” and “ <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> ” in Appendix |

## Stonewall General Subdivision Wildfire Mitigation Recommendations:

| Category  | Priority | Description  |
|---|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>            | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended activities in coordination with the SFPD, State Forest Service, and federal land managers as appropriate.</li> </ul>   |
| <b>Roadside Thinning of Highway 12 and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings this will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing.</li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>                  | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>                                     | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Stonewall Community



# TIMBER RIDGE

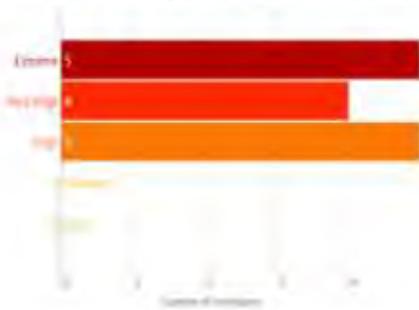


## Overall Hazard and Risk

The Timber Ridge community is located within the north central area of the Stonewall Fire Protection District north of Highway 12. Timber Ridge encompasses 760 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the density of vegetation is moderate. The vegetation in the area is comprised of ponderosa pine, oak shrubland, and scattered spruce-fir.

This community is found on the west side of Wet Canyon, and similar to Cougar Ridge to its immediate north, contains an abundance of ponderosa pine forests and is of the TU5 Fuel Model common in the area, with moderate predicted rates of spread, but under dry windy conditions may be greater than 40 chains per hour. Flame lengths are also moderate, but under dry windy conditions may be greater than 15 feet, making control efforts very difficult. Less common grass-covered areas are of the GR1 Fuel Model, with moderate rates of spread (40-80 chains per hour) but low flame lengths (5-7 feet) under adverse weather conditions.

## Individual Structure Breakdown



## Structures Risk Rating: **Very High** Average structure rating: 292

Timber Ridge is moderately developed. There are approximately 23 parcels within Timber Ridge, and the SFPD was able to assess 14 structures. Parcels range from 35-40 acres. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs and structure addresses are minimally posted. Building materials vary widely throughout Timber Ridge. Many structures have

combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within Timber Ridge is moderate. The main road is Timber Ridge Road and is unpaved. There are one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within Timber Ridge and water storage is minimally available. The nearest fire district substation is Wet Canyon Station. There are no fire protection capabilities within Timber Ridge, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivision. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Timber Ridge Homeowner Recommendations:

| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See “ <i>Ready, Set, Go! Emergency Preparedness Checklist</i> ” in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See “ <i>FireWise Construction: Site Design &amp; Building Materials</i> ” and “ <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> ” in Appendix |

## Timber Ridge General Subdivision Wildfire Mitigation Recommendations:

| Category   | Priority | Description  |
|--|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>                   | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended mitigation activities in coordination with the SFPD, Colorado State Forest Service and others</li> </ul>   |
| <b>Roadside Thinning of Timber Ridge Road and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings. This will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing. See <i>"Fuel Break Guidelines for Forested Subdivisions &amp; Communities"</i></li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>                         | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>  | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Timber Ridge



# TORRES/SAN FRANCISCO PASS

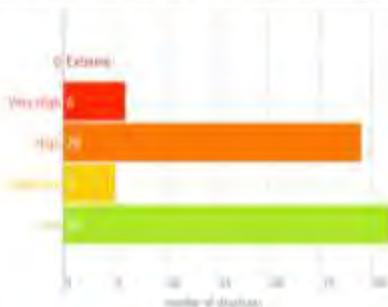


## Overall Hazard and Risk

The Torres/San Francisco Pass community is located within the southwestern area of the Stonewall Fire Protection District south of Highway 12. The Torres/San Francisco Pass encompasses 15376 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the density of vegetation is moderate to high. The vegetation in the area is comprised of ponderosa pine, spruce-fir, and aspen, interspersed with grassy meadows.

This large area encompasses much of the southwest corner of the Stonewall Fire Protection District. Most forests found here are mixed conifer types and on drier sites contain mostly ponderosa pine. Both types fall into the TU5 Fuel Model, with moderate predicted rates of spread, but under dry windy conditions may be greater than 40 chains per hour. Flame lengths are also moderate, but under dry windy conditions may be greater than 15 feet, making control efforts very difficult. Lower lying areas are mostly of the short or sparse grass model GR1, representing short, grazed and otherwise discontinuous grass, with low predicted rates of spread and flame lengths (less than 20 chains per hour, and a maximum of 2 feet, respectively). As grass transitions to forest, some grass-shrub fuel types occur, and both the GS1 and GS2 Fuel Models can have high rates of spread exceeding 60 chains per hour, plus flame lengths exceeding 6 feet under adverse weather conditions.

## Individual Structure Breakdown



## Structures Risk Rating: **Moderate**

### Average structure rating: 172

Torres/San Francisco Pass is minimally developed. There are approximately 30 parcels within Torres/San Francisco Pass, and the SFPD was able to assess 72 structures. Parcel size in Torres is less than 50 acres, while parcel size in San Francisco Pass is mostly large ranch holdings. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs are posted and are

reflective and noncombustible. Structure addresses are minimally posted and building

materials vary widely. Many structures have combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented.

## Protection and Management

Road accessibility for emergency responders within Torres/San Francisco Pass is moderate. The main roads are CR 13, CR 7, and San Francisco Pass Rd (formerly CR 5) and are unpaved. There are many one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within Torres/San Francisco Pass and water storage is minimally available. The nearest fire district substation is Stonewall Station. There are no fire protection capabilities within Torres/San Francisco Pass, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the area. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Torres/San Francisco Pass Homeowner Recommendations:

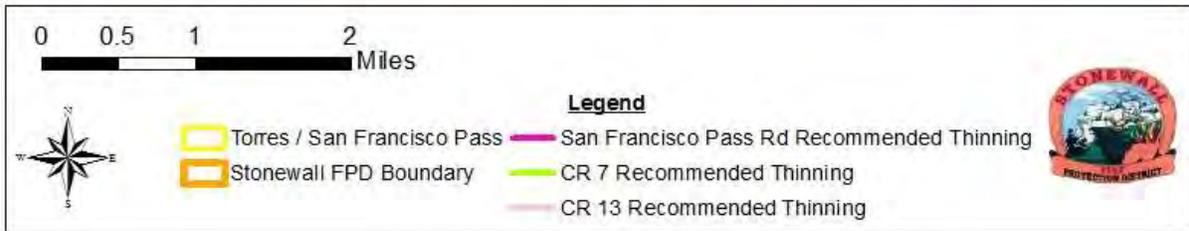
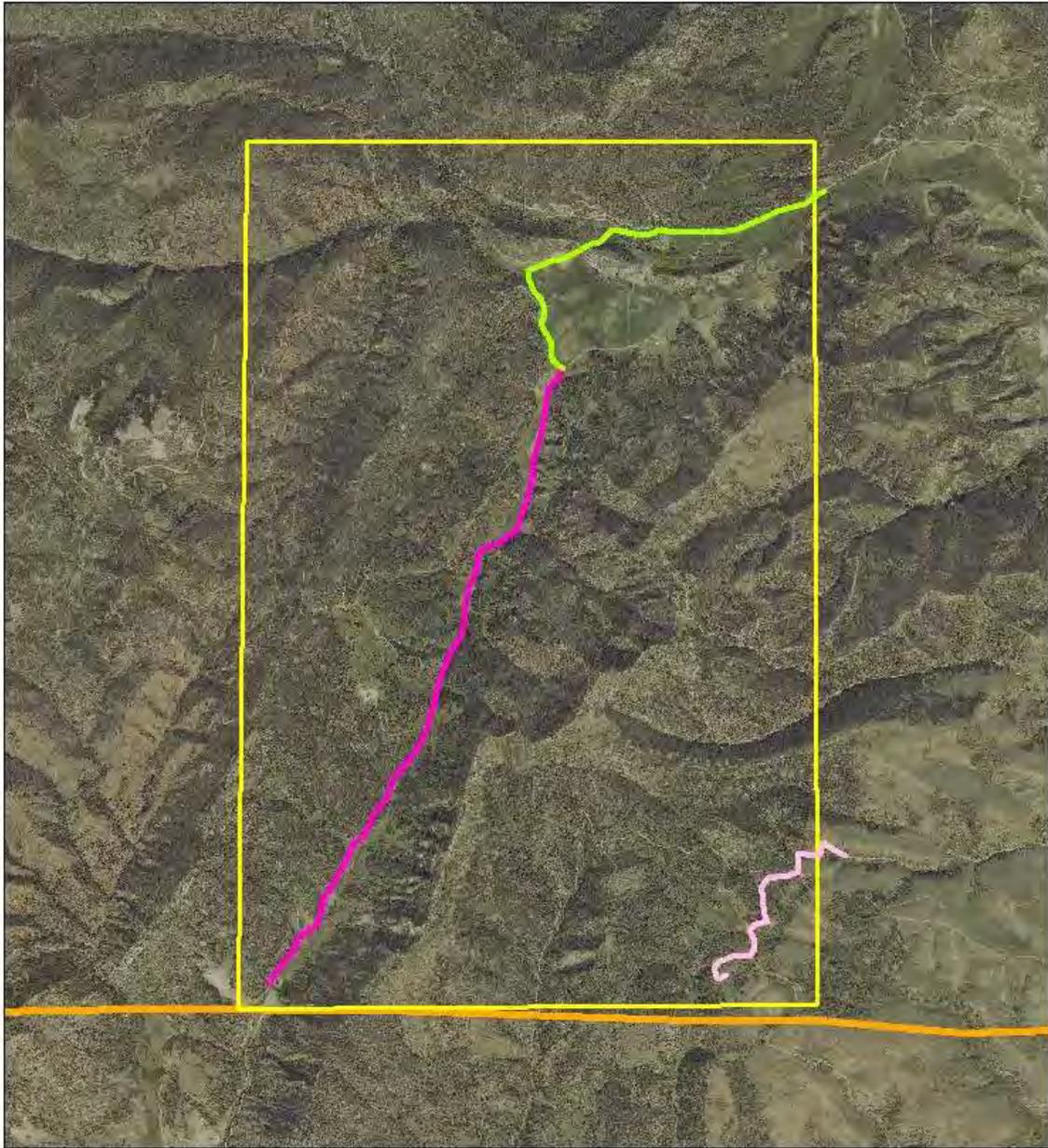
| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See “ <i>Ready, Set, Go! Emergency Preparedness Checklist</i> ” in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See “ <i>FireWise Construction: Site Design &amp; Building Materials</i> ” and “ <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> ” in Appendix |

## Torres/San Francisco Pass General Subdivision Wildfire Mitigation Recommendations:

| Category   | Priority | Description  |
|--|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>   | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended activities in coordination with the SFPD, State Forest Service, and federal land managers as appropriate.</li> </ul>   |
| <b>Roadside Thinning of CR 13, CR 7, San Francisco Pass Rd (formerly CR5) and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings this will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing.</li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>   | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>  | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Torres / San Francisco Pass



# TRINIDAD LAKE ESTATES

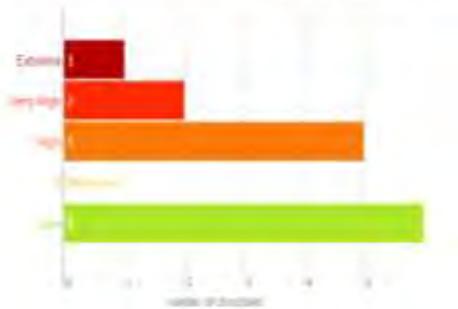


## Overall Hazard and Risk

The Trinidad Lake Estates community is located within the eastern area of the Stonewall Fire Protection District south of Highway 12. The Trinidad Lake Estates encompasses 935 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the density of vegetation is moderate. The vegetation in the area is comprised of pinon-juniper, oak shrubland, and scattered ponderosa pine interspersed with grassy meadows.

This community is located within Long Canyon and westward up the adjacent hills. The upper forests are mostly a TL3 Fuel Model, where fire is most often carried by the materials deposited on the ground, and predicted rates of spread are less than 5 chains per hour and flame lengths of less than 2 feet. However, where litter accumulations are thicker or shrubs and small trees are present in the understory, flame lengths would be expected to be much greater. To a lesser extent, areas with mostly grass cover fit the GR1 Fuel Model, with moderate rates of spread (40-80 chains per hour) but low flame lengths (5-7 feet) under adverse weather conditions. Where hills begin to rise from the canyon, long stretches of the TU1 Model occur, where fire is carried by a timber understory of grass or small amounts of shrub or litter. In these fuels under even the most adverse conditions, rates of spread are predicted to be relatively low (around 10-12 chains per hour) and flame lengths at 4 feet or less.

## Individual Structure Breakdown



## Structures Risk Rating: **High**

**Average structure rating: 193**

Trinidad Lake Estates is moderately developed. There are approximately 20 parcels within Trinidad Lake Estates, and the SFPD was able to assess 14 structures. Parcels range from 35-40 acres. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs and structure addresses are minimally posted. Building materials vary widely throughout Trinidad Lake Estates. Many

structures have combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within Trinidad Lake Estates is moderate. The main road is 53.1 and is unpaved. There are many one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within Trinidad Lake Estates and water storage is minimally available. The nearest fire district substation is Long Canyon Station. There are no fire protection capabilities within Trinidad Lake Estates, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivision. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Trinidad Lake Estates Homeowner Recommendations:

| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See “ <i>Ready, Set, Go! Emergency Preparedness Checklist</i> ” in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See “ <i>FireWise Construction: Site Design &amp; Building Materials</i> ” and “ <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> ” in Appendix |

# Trinidad Lake Estates General Subdivision Wildfire Mitigation Recommendations:

| Category  | Priority | Description  |
|---|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>      | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended mitigation activities in coordination with the SFPD, Colorado State Forest Service and others</li> </ul>   |
| <b>Roadside Thinning of 53.1 and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings. This will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing. See <i>“Fuel Break Guidelines for Forested Subdivisions &amp; Communities”</i></li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>            | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>                               | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Trinidad Lake Estates



# VIGIL PLAZA

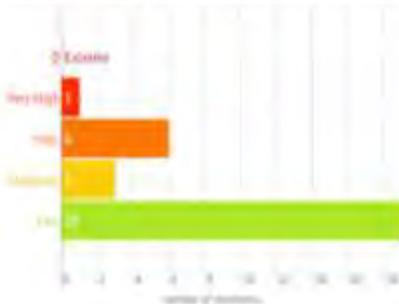


## Overall Hazard and Risk

The Vigil Plaza community is located within the west area of the Stonewall Fire Protection District north of Highway 12. Vigil Plaza encompasses 62 acres within the Stonewall Fire Protection District. The overall topography of the land is rolling hills and mountainous and the density of vegetation is low. The vegetation in the area is comprised of ponderosa pine and grassy meadows with scattered pinon-juniper.

This community is located just east of where the North Fork Purgatoire Canyon joins the Picketwire Valley. Lower levels are covered with short grasses, characterized as the GS1 Fuel Model. Since this model represents short, grazed and otherwise discontinuous grass, predicted rates of spread and flame lengths are low (less than 20 chains per hour, and a maximum of 2 feet, respectively). Higher on the hills, the Fuel Type is mostly GS2, where fire is carried primarily by grass and shrub litter, and predicted rates of spread can exceed 100 chains per hour and flame lengths may reach 6 to 8 feet under adverse conditions.

## Individual Structure Breakdown



## Structures Risk Description: **Low**

### Average structure rating: 128

Vigil Plaza is moderately developed. There are 28 of parcels within Vigil Plaza, and the SFPD was able to assess 29 structures. Parcels are less than 5 acres. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs are posted and are reflective and noncombustible. Structure addresses are minimally posted. Building materials vary widely throughout Vigil Plaza.

Many structures have combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within Vigil Plaza is high. The main road is County Road 23.2 and is unpaved. There are one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within Vigil Plaza and water storage is minimally available. The nearest fire district substation is Stonewall Station. There are no fire protection capabilities within Vigil Plaza, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivision. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Vigil Plaza Homeowner Recommendations:

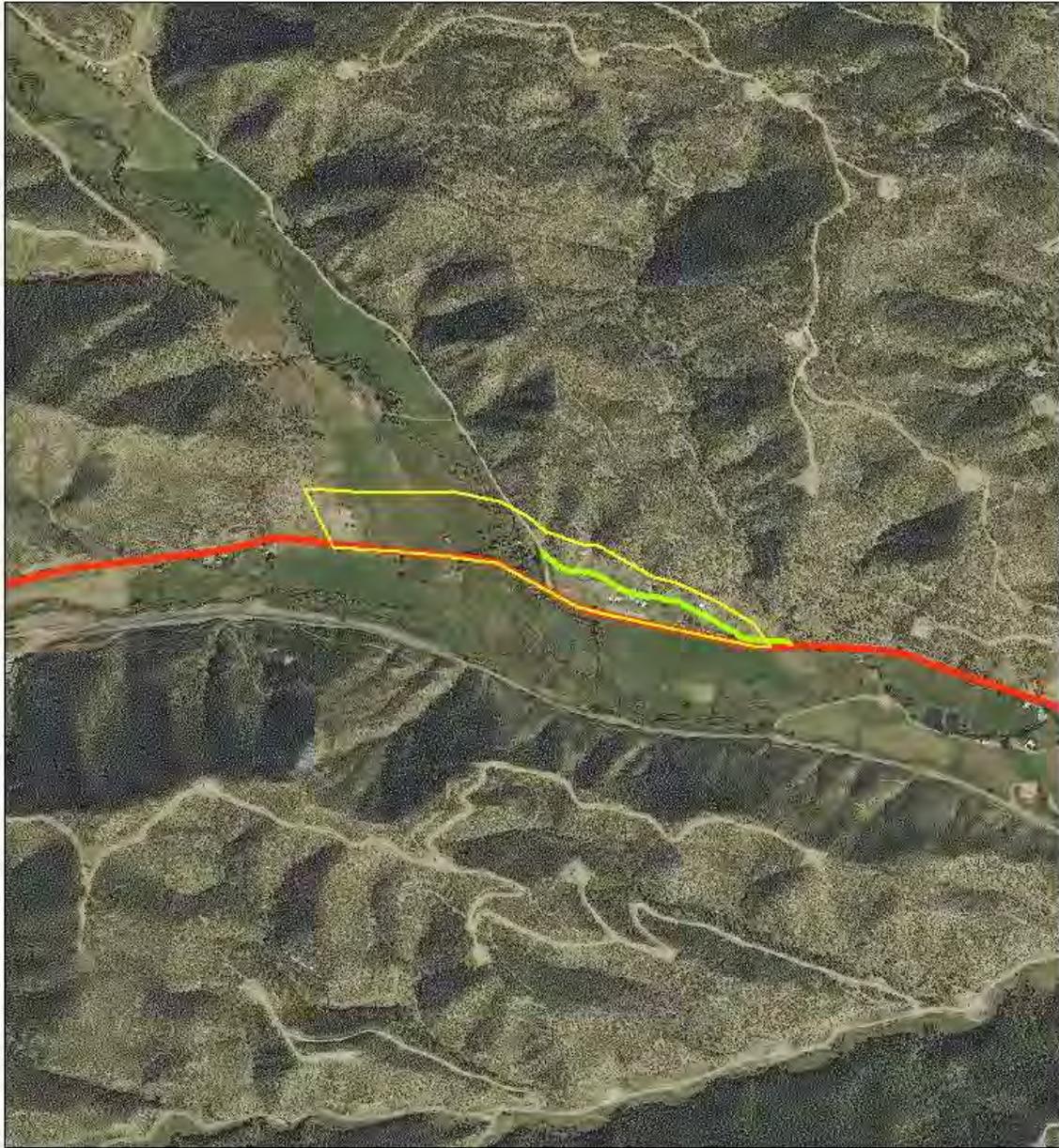
| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See “ <i>Ready, Set, Go! Emergency Preparedness Checklist</i> ” in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See “ <i>FireWise Construction: Site Design &amp; Building Materials</i> ” and “ <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> ” in Appendix |

## Vigil Plaza General Subdivision Wildfire Mitigation Recommendations:

| Category   | Priority | Description  |
|--|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>         | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended activities in coordination with the SFPD, State Forest Service, and federal land managers as appropriate.</li> </ul>   |
| <b>Roadside Thinning of CR 23.2 and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings this will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing.</li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>               | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>                                  | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Vigil Plaza



# WEST DISTRICT

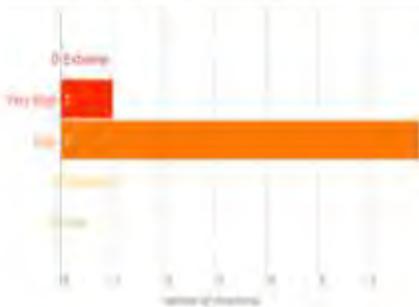


## Overall Hazard and Risk

The West District community is located within the western area of the Stonewall Fire Protection District east and west of Highway 12. The West District encompasses 69673 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the density of vegetation is high. The vegetation in the area is comprised of spruce-fir, ponderosa pine, oak shrubland, and aspen, interspersed with grassy meadows.

Most of this very large area is classified as the TU5 Fuel Model, which is characterized by Scott and Burgan (2005) as “heavy forest litter with a shrub or small tree understory.” Predicted rates of spread are moderate, but under dry windy conditions may be greater than 40 chains per hour. Flame lengths are also moderate, but under dry windy conditions may be greater than 15 feet, making control efforts very difficult. Another common fuel type throughout the district is TL8, which is characterized by “moderate load long-pine litter” with similar rates of spread as the TU5 model, but predicted flame lengths of less than 10 feet even with adverse weather.

## Individual Structure Breakdown



## Structures Risk Rating: **High**

**Average structure rating: 226**

West District is minimally developed. There are approximately 7 parcels within West District, and the SFPD was able to assess 8 structures. Parcel size is mostly large ranch holdings. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs are posted and are reflective and noncombustible. Structure addresses are minimally posted. Building materials vary widely

throughout West District. Many structures have combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within West District is moderate. The main road is Highway 12 and is paved. There are some one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within West District and water storage is minimally available. The nearest fire district substation is Stonewall or Cucharas Pass Station. There are no fire protection capabilities within West District, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the area. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### West District Homeowner Recommendations:

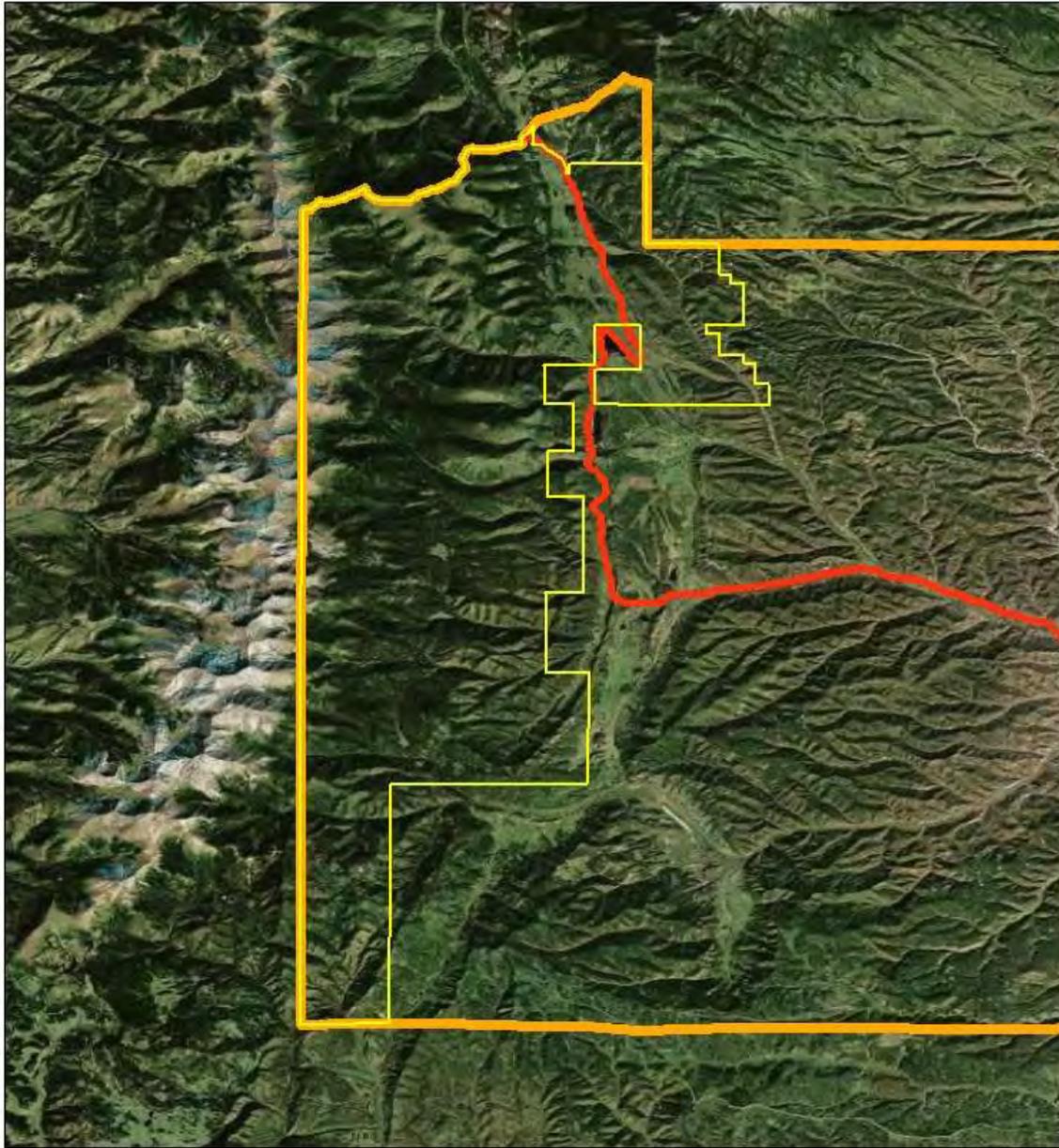
| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See “ <i>Ready, Set, Go! Emergency Preparedness Checklist</i> ” in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See “ <i>FireWise Construction: Site Design &amp; Building Materials</i> ” and “ <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> ” in Appendix |

## West District General Subdivision Wildfire Mitigation Recommendations:

| Category  | Priority | Description  |
|---|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>            | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended activities in coordination with the SFPD, State Forest Service, and federal land managers as appropriate.</li> </ul>   |
| <b>Roadside Thinning of Highway 12 and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings this will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing.</li> </ul>  |
| <b>Fuel Breaks</b>  | 3        | <ul style="list-style-type: none"> <li>Create fuel break along western edge of West District (see map) to serve as anchor point for fire suppression activities. See <i>Fuel Break Guidelines for Forested Subdivisions &amp; Communities</i> in Appendix</li> </ul>   |
| <b>Preparedness Training/ Evacuation</b>                  | 4        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>                                     | 5        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# West District



# WESTON

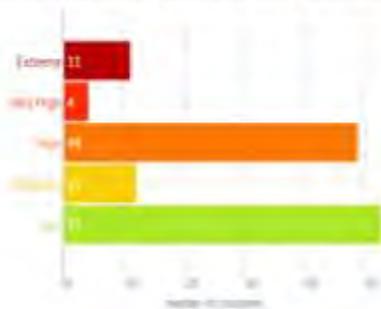


## Overall Hazard and Risk

The Weston community is located within the western area of the Stonewall Fire Protection District along Highway 12. Weston encompasses 946 acres within the Stonewall Fire Protection District. The overall topography of the land is river bottom and hills, and the density of vegetation is low. The vegetation in the area is comprised of pinon-juniper, oak shrubland, scattered ponderosa pine, and cottonwoods with grassy meadows in riparian areas.

Most grassland closest to the Purgatoire River in this community is of either the GR1 or GR2 Fuel Types. The GR1 Model represents short, grazed and otherwise discontinuous grass, and predicted rates of spread and flame lengths are low (less than 20 chains per hour, and a maximum of 2 feet, respectively). Greater depths and amounts of grass in the GR2 Model mean much greater rates of spread (greater than 100 chains per hour) and flame lengths (6 to 8 feet) can be expected. As the hills begin to rise above the river valley, shrubs and grass mix in the GS1 Fuel Model, where rates of spread can exceed 80 chains per hour and flame lengths can exceed 10 feet when the vegetation is dry and weather conditions adverse.

## Individual Structure Breakdown



## Structures Risk Rating: High

### Average structure rating: 177

Weston is highly developed. There are approximately 85 parcels within Weston, and the SFPD was able to assess 129 structures. Parcel size is mostly private lot size. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs are posted and are reflective and noncombustible. Structure addresses are minimally posted. Building materials vary widely throughout

Weston. Many structures have combustible materials within 10 feet of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within Weston is high. The main road is Highway 12 and is paved. There are one-lane roads and turnarounds are infrequent. There are currently no functioning fire hydrants available within Weston and water storage is minimally available. The nearest fire district substation is Wet Canyon Station. There are no fire protection capabilities within Weston, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the area. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Weston Homeowner Recommendations:

| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See <i>“Ready, Set, Go! Emergency Preparedness Checklist”</i> in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See <i>“FireWise Guide to Landscape and Construction”</i> in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See <i>“FireWise Guide to Landscape and Construction”</i> in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See <i>“FireWise Construction: Site Design &amp; Building Materials”</i> and <i>“Protect Your Property from Wildfire--Rocky Mountain Edition”</i> in Appendix |

## Weston General Subdivision Wildfire Mitigation Recommendations:

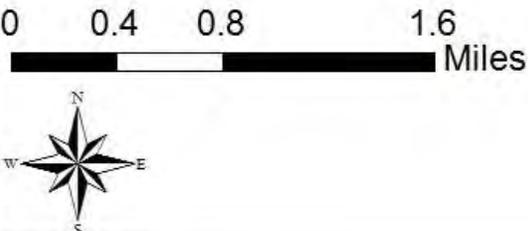
| Category                                       | Priority | Description  |
|--|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b> | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended activities in coordination with the SFPD, State Forest Service, and federal land managers as appropriate.</li> </ul>   |
| <b>Roadside Thinning of internal roads</b>     | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings this will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing.</li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>       | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>                          | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Weston



0 0.4 0.8 1.6 Miles



**Legend**

- Weston
- Highway 12



The legend includes a scale bar with markings at 0, 0.4, 0.8, and 1.6 miles. Below the scale bar is a compass rose with cardinal directions labeled N, S, E, and W. To the right of the legend is the logo for the Stonewall Fire Protection District, which features a circular emblem with a mountain scene and the text 'STONEWALL FIRE PROTECTION DISTRICT' around the perimeter.

# WET CANYON RANCH

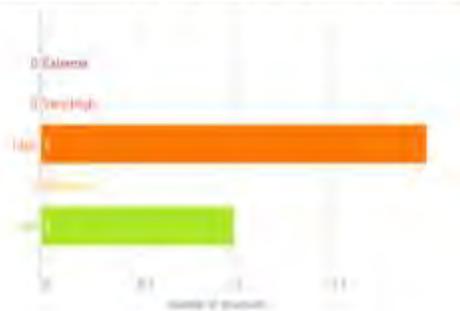


## Overall Hazard and Risk

The Wet Canyon Ranch community is located within the north central area of the Stonewall Fire Protection District north of Highway 12. Wet Canyon Ranch encompasses 222 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous and the density of vegetation is low. The vegetation in the area is comprised of pinon-juniper with grassy meadows.

This community is located directly above and to the north of Weston along the Wet Canyon Road (CR 39.1). The vegetation on the slopes is either a grass-shrub mixture (GS1) or a predominantly shrub fuel type (SH1). In the GS1 Fuel Model, rates of spread can exceed 80 chains per hour and flame lengths can exceed 10 feet when the vegetation is dry and weather conditions adverse. The SH1 Model has fairly sparse shrub cover with grass or low loads of litter in the understory, and correspondingly low rates of spread (2-3 chains per hour) and flame lengths (less than 1 foot) under adverse weather conditions. In areas where shrub densities and the amount of litter in the understory increase, flame lengths and rates of spread will predictably increase.

## Individual Structure Breakdown



## Structures Risk Rating: **Moderate**

### Average structure rating: **157**

Wet Canyon Ranch is minimally developed. There is one parcel within Wet Canyon Ranch, and the SFPD was able to assess 3 structures. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs and structure addresses are minimally posted. Building materials vary widely throughout Wet Canyon Ranch. Many structures have combustible materials within 10 feet of the

structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within Wet Canyon Ranch is low. The main road is 31.9 and is paved. There are one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within Wet Canyon Ranch and water storage is minimally available. The nearest fire district substation is Wet Canyon Station. There are no fire protection capabilities within Wet Canyon Ranch, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivision. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Wet Canyon Ranch Homeowner Recommendations:

| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See “ <i>Ready, Set, Go! Emergency Preparedness Checklist</i> ” in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See “ <i>FireWise Guide to Landscape and Construction</i> ” in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See “ <i>FireWise Construction: Site Design &amp; Building Materials</i> ” and “ <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> ” in Appendix |

## Wet Canyon Ranch General Subdivision Wildfire Mitigation Recommendations:

| Category  | Priority | Description  |
|---|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b>      | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended activities in coordination with the SFPD, State Forest Service, and federal land managers as appropriate.</li> </ul>   |
| <b>Roadside Thinning of 31.9 and internal roads</b> | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings this will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing.</li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>            | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>                               | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Wet Canyon Ranch



# ZAMORA PLAZA

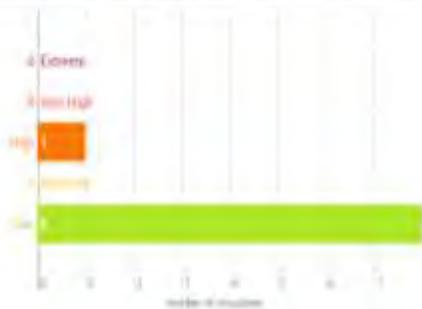


## Overall Hazard and Risk

The Zamora Plaza community is located within the western area of the Stonewall Fire Protection District along Highway 12. The Zamora Plaza encompasses 27 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous and river bottom and the density of vegetation is low. The vegetation in the area is comprised of pinon-juniper, grassy meadows, and irrigated farmlands, with cottonwoods in riparian areas.

This community is on the north side of both Highway 12 and the Purgatoire River and approximately one mile east of where the North Fork of the Purgatoire River joins the Picketwire Valley. Grass-covered land is mostly of the GR2 Fuel Model, with predicted rates of spread greater than 100 chains per hour and flame lengths of 6 to 8 feet. As the amount of shrubs increase at higher elevations, the GS1 Fuel Model is present, rates of spread can exceed 80 chains per hour and flame lengths can exceed 10 feet when the vegetation is dry and weather conditions adverse.

## Individual Structure Breakdown



## Structures Risk Rating: **Low**

### Average structure rating: 90

Zamora Plaza is moderately developed. There is one parcel within Zamora Plaza, and the SFPD was able to assess 9 structures. Parcels range from 35-40 acres. Roads leading to structures are unpaved, and structures generally have one road leading to them. Street signs and structure addresses are minimally posted. Building materials vary widely throughout Zamora Plaza. Many structures have combustible materials

within 10 feet of the structure. Defensible space has been inconsistently implemented around current structures.

## Protection and Management

Road accessibility for emergency responders within Zamora Plaza is high. The main road is Highway 12 and is paved. There are many one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within Zamora Plaza and water storage is minimally available. The nearest fire district substation is Stonewall Station. There are no fire protection capabilities within Zamora Plaza, and there are currently no evacuation plans for this community.

## Recommendations

The following tables of recommendations were created using data collected during risk surveying done by the Stonewall Fire Protection District from May to July of 2014. The first table focuses on homeowner recommendations within the community, while the second table describes general wildfire mitigation recommendations for the community. Together, these recommendations are suggested to minimize the overall wildfire risk within the subdivision. Recommendations are represented in both the tables and a map (where appropriate) that follows.

### Zamora Plaza Homeowner Recommendations:

| Name                                  | Priority | Description  | Methods  |
|---------------------------------------|----------|--|--|
| <b>Evacuation Plan</b>                | 1        | Develop a personal home evacuation plan.   | See " <i>Ready, Set, Go! Emergency Preparedness Checklist</i> " in Appendix  |
| <b>Create Defensible Space</b>        | 2        | Create defensible space around individual homes within 30 feet of home.  | Hand fell and limb near homes; remove ladder fuels; mow; landscape appropriately; remove flammables, etc. See " <i>FireWise Guide to Landscape and Construction</i> " in Appendix  |
| <b>Extend Defensible Space</b>        | 3        | Extend defensible space into Zones 2 (30-100 feet) in moderate and high hazard areas and into Zone 3 (100-200 feet) in high hazard areas.<br><br>Thin and mow fuels along driveways. | Hand fell and limb outward from homes; remove ladder fuels; mow; landscape appropriately; remove flammables; thin or mow fuels along driveways. See " <i>FireWise Guide to Landscape and Construction</i> " in Appendix  |
| <b>Home construction and retrofit</b> | 4        | Site and design home to incorporate additional FireWise/FireAdapted recommendations; retrofit home using FireWise/Fire/Adapted principles.   | Use non-combustible materials for decks, siding and roofs, especially where homes are upslope from heavy vegetation. See " <i>FireWise Construction: Site Design &amp; Building Materials</i> " and " <i>Protect Your Property from Wildfire--Rocky Mountain Edition</i> " in Appendix |

## Zamora Plaza General Subdivision Wildfire Mitigation Recommendations:

| Category                                       | Priority | Description  |
|--|----------|--|
| <b>Identify Wildfire Mitigation Advocate/s</b> | 1        | <ul style="list-style-type: none"> <li>A local Wildfire Mitigation Advocate should be identified for the community that will assist with implementing recommended activities in coordination with the SFPD, State Forest Service, and federal land managers as appropriate.</li> </ul>   |
| <b>Roadside Thinning of internal roads</b>     | 2        | <ul style="list-style-type: none"> <li>Thin along both sides of road in areas of heavy flammable fuel loadings this will aid in the egress of residents by reducing the intensity of fire and smoke. Methodology includes limbing and/or mowing.</li> </ul>  |
| <b>Preparedness Training/ Evacuation</b>       | 3        | <ul style="list-style-type: none"> <li>Create a plan to further refine the risk assessment and mitigation strategies.</li> <li>Encourage individual landowners to reduce fuels near homes and along roadways and fence lines.</li> <li>Add reflective non-combustible addressing to all roadways, driveways and/or homes.</li> <li>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</li> <li>Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> <li>Develop a large-animal evacuation plan, if required.</li> </ul> |
| <b>Infrastructure</b>                          | 4        | <ul style="list-style-type: none"> <li>Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>Develop additional water sources and storage as required.</li> </ul>   |

See map of recommendations on following page.

# Zamora Plaza



# AREAS OF SPECIAL INTEREST

Areas of special interest (ASIs) are places within the CWPP study area that could be threatened from wildfire and have a social or economic value which is not based on residential development. Unlike subdivision communities, ASIs are not given hazard ratings. Candidates for ASIs include recreation areas, defined open space, large energy production sites and critical infrastructure sites. ASIs are identified separately from communities because of a focus on recreation and infrastructure over residences. Sometimes there are specific fuels reduction recommendations that can help mitigate the fire risk to ASIs. Frequently, there are no significant recommendations for the ASIs, but they are still identified, as they are values at risk. Damage to these areas as a result of wildfire could impact the surrounding communities and areas.

# BOSQUE DEL OSO STATE WILDLIFE AREA



The Bosque del Oso State Wildlife Area is located within the central area of the Stonewall Fire Protection District south of Highway 12. The Bosque del Oso encompasses 30,300 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the density of vegetation moderate. The vegetation in the area is comprised of ponderosa pine, pinon-juniper, cottonwood in riparian areas, and grassy meadows. The Bosque del Oso is minimally developed, as it is a State Wildlife Area. Recreational activities include hunting, bird watching, and hiking.

In an effort to maintain and protect the natural habitat and recreational attraction, the threat from wildfire should be taken seriously. Not only is there the concern of protecting visitors and infrastructure in the Bosque del Oso Wildlife Area, there is also the issue of protecting natural resources from human ignitions. Nearly all of the vegetation found within the park is capable of carrying fire. In campground areas set amongst wildland fuels, the potential for human-caused ignitions is higher in this area than in other adjacent communities. Visitors should be well informed of the dangers of wildfire and its potential impacts, and actions should be taken to reduce the risk of human-caused fires.

Road accessibility for emergency responders within Bosque del Oso is moderate. The main road is South Fork of the Purgatoire Road and is unpaved. There are many one-lane roads and turnarounds are infrequent. There are currently no fire hydrants available within Bosque del Oso and water storage is minimally available. The nearest fire district substation is Wet Canyon Station. There are no fire protection capabilities within Bosque del Oso, and there are currently no evacuation plans for this community.

## Bosque del Oso Recommendations:

| Name   | Priority | Description  |
|--|----------|--|
| <b>Evacuation Plan</b>   | 1        | <ul style="list-style-type: none"> <li>• Develop the park's evacuation plan, including clear posting of evacuation routes and procedures.</li> <li>• Post a fire danger sign at the state park entrance. Provide visitors with information on wildfire, especially during times of high fire danger.</li> <li>• Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> </ul> |
| <b>Defensible Space</b>  | 2        | <ul style="list-style-type: none"> <li>• Maintain thinning and mowing around campground sites and fire pits.</li> <li>• Thin vegetation and mow along access roads and trails that might be used for evacuation purposes.</li> </ul>   |
| <b>Roadside Thinning of South Fork of the Purgatoire Road and internal roads</b> | 3        | <ul style="list-style-type: none"> <li>• Thin along both sides of road in areas of heavy flammable fuel loadings. This will aid in the egress of residents by reducing the intensity of fire and smoke.</li> </ul>   |
| <b>Infrastructure</b>  | 4        | <ul style="list-style-type: none"> <li>• Provide adequate turnarounds for fire apparatus throughout the area.</li> <li>• Identify all water sources within the area, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>• Develop additional water sources and storage as required.</li> </ul>   |

# BURRO CANYON ELECTRICAL SUBSTATION



Burro Canyon Electric Substation is located in the eastern area of the Stonewall Fire Protection District north of Highway 12. It is a substation of San Isabel Electric Association. It is located in a mountainous region and the density of vegetation surrounding the substation is moderate. This substation encompasses 5 acres within the Stonewall Fire Protection District. Burro Canyon Electrical Power Substation serves the City of Raton, New Mexico. If this substation were affected by wildfire, residents of Raton could be left without power. Road accessibility for emergency responders is high. The main road is Highway 12 and is paved. The nearest fire district substation is Long Canyon Station. Water storage is minimally available and there are no fire hydrants onsite. The immediate area is mitigated.

## Burro Canyon Electrical Substation Recommendations:

| Name                      | Priority | Description                               |
|---------------------------|----------|---|
| Defensible Space          | 1        | Maintain defensible space around site     |
| Extended Defensible Space | 2        | Extended defensible space is recommended. |

# MONUMENT LAKE



Monument Lake Resort is located within the northwestern area of the Stonewall Fire Protection District east of Highway 12. The Resort consists of a lodge, restaurant and cabins and is a tourist attraction. Monument Lake encompasses 657 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the density of vegetation is moderate. The vegetation in the area is comprised of ponderosa pine, oak shrubland, and spruce-fir. Monument Lake is highly developed with 13 cabins and a large lodge.

Recreational activities at the Resort include fishing, hiking, bird watching, and picnic areas. In an effort to maintain and protect the natural habitat and recreational attraction, the threat from wildfire should be taken seriously. Not only is there the concern of protecting visitors and infrastructure in the Monument Lake Resort, there is also the issue of protecting natural resources from human ignitions. Nearly all of the vegetation found within the Resort is capable of carrying fire. In recreational areas set amongst wildland fuels, the potential for human-caused ignitions is higher in this area than in other adjacent communities. Visitors should be well informed of the dangers of wildfire and its potential impacts, and actions should be taken to reduce the risk of human-caused fires.

Road accessibility for emergency responders within Monument Lake is moderate. The main road is Highway 12 and is paved. There are several one-lane roads and turnarounds are infrequent. There are currently multiple fire hydrants available but they do not have sufficient GPM for fire suppression within Monument Lake. Water storage is highly available. The nearest fire district substation is Stonewall Station. There are no fire protection capabilities within Monument Lake, and there are currently no evacuation plans for this community.

## Monument Lake Resort Recommendations:

| Name  | Priority | Description  |
|---|----------|--|
| <b>Evacuation Plan</b>                                    | 1        | <ul style="list-style-type: none"> <li>• Develop the park's evacuation plan, including posting clear evacuation routes and procedures.</li> <li>• Post a fire danger sign at the park entrance.</li> <li>• Provide visitors with information on wildfire, especially during times of high fire danger.</li> <li>• Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> </ul> |
| <b>Defensible Space</b>                                   | 2        | <ul style="list-style-type: none"> <li>• Maintain thinning and mowing around campground sites and fire pits.</li> <li>• Continue to thin vegetation and mow along access roads and trails which might be used for evacuation purposes.</li> </ul>  |
| <b>Roadside Thinning of Highway 12 and internal roads</b> | 3        | <ul style="list-style-type: none"> <li>• Thin along both sides of road in areas of heavy flammable fuel loadings this will aid in the egress of residents by reducing the intensity of fire and smoke.</li> </ul>  |
| <b>Infrastructure</b>                                     | 4        | <ul style="list-style-type: none"> <li>• Provide adequate turnarounds for fire apparatus throughout the area.</li> <li>• Identify all water sources within the area, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>• Develop additional water sources and storage as required.</li> </ul>   |

# NEW ELK MINE



New Elk Coal Mine is located in the west central area of the Stonewall Fire Protection District north and south of Highway 12. The New Elk Coal Mine encompasses 1754 acres of the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the density of vegetation is moderate. The vegetation in the area is comprised of ponderosa pine, oak shrubland, and scattered spruce-fir. New Elk Mine is a highly developed coal mine. New Elk Coal Mine is currently open and in production, however production is low and inconsistent. Road accessibility for emergency responders is high. The main road is Highway 12 and is paved. The nearest fire district substation is the Stonewall Station.

## New Elk Coal Mine Recommendations

| Name                      | Priority | Description   |
|---------------------------|----------|---|
| Defensible Space          | 1        | Maintain defensible space around facility.                                |
| Extended Defensible Space | 2        | Extended defensible space is recommended. Thin vegetation along roadways. |

# NORTH LAKE STATE WILDLIFE AREA



The North Lake State Wildlife Area is located within the western area of the Stonewall Fire Protection District along and west of Highway 12. The North Lake State Wildlife area encompasses 1,289 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the density of vegetation moderate. The vegetation in the area is comprised of ponderosa pine, aspen, and spruce/fir. North Lake State Wildlife Area is minimally developed, as it is a State Wildlife Area. Recreational activities include fishing, boating, hiking, hunting and picnicking.

In an effort to maintain and protect the natural habitat and recreational attraction, the threat from wildfire should be taken seriously. Not only is there the concern of protecting visitors and infrastructure in the North Lake State Wildlife Area, there is also the issue of protecting natural resources from human ignitions. Nearly all of the vegetation found within the park is capable of carrying fire. In campground areas set amongst wildland fuels, the potential for human-caused ignitions is higher in this area than in other adjacent communities. Visitors should be well informed of the dangers of wildfire and its potential impacts, and actions should be taken to reduce the risk of human-caused fires.

Road accessibility for emergency responders within the North Lake State Wildlife Area is good. The main road is Highway 12. There are currently no fire hydrants available within North Lake State Wildlife Area, but the area provides a ready source of lake water. The nearest fire district substations are Cucharas Pass and Wet Canyon Stations. There are no fire protection capabilities within the North Lake State Wildlife Area, and there are currently no evacuation plans for this community.

## North Lake State Wildlife Area Recommendations:

| Name  | Priority | Description   |
|---|----------|---|
| <b>Evacuation Plan</b>                                | 1        | <ul style="list-style-type: none"> <li>• Develop the park's evacuation plan, including posting clear evacuation routes and procedures.</li> <li>• Post a fire danger sign at the state park entrance. Provide visitors with information on wildfire, especially during times of high fire danger.</li> <li>• Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> </ul> |
| <b>Defensible Space</b>                               | 2        | <ul style="list-style-type: none"> <li>• Maintain thinning and mowing around campground sites and fire pits.</li> <li>• Thin vegetation and mow along access roads and trails that might be used for evacuation purposes.</li> </ul>  |
| <b>Roadside Thinning of highway 12 internal roads</b> | 3        | <ul style="list-style-type: none"> <li>• Thin along both sides of road in areas of heavy flammable fuel loadings this will aid in the egress of residents by reducing the intensity of fire and smoke.</li> </ul>   |
| <b>Infrastructure</b>                                 | 4        | <ul style="list-style-type: none"> <li>• Provide adequate turnarounds for fire apparatus throughout the area.</li> <li>• Identify all water sources within the area, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>• Develop additional water sources and storage as required.</li> </ul>  |

# PIONEER NATURAL RESOURCES, INC. COMPLEX



Pioneer Natural Resources, Inc. is a private natural gas company located in the eastern area of the Stonewall Fire Protection District south of Highway 12. Pioneer Natural Resources, Inc. encompasses 118 acres within the Stonewall Fire Protection District. The overall topography of the land is river bottom and the density of vegetation is low. The vegetation in the area is comprised of pinon-juniper, ponderosa pine, and oak shrubland, interspersed with grassy meadows. Pioneer Natural Resources, Inc. and the infrastructure on site is at risk for wildland fires, but the risk is low as structures are well mitigated. Road accessibility for emergency responders within is high. The main road is Highway 12 and is paved. The nearest fire district substation is the Segundo Station.

## **Pioneer Natural Resources Inc. Recommendations:**

| <b>Name</b>                      | <b>Priority</b> | <b>Description</b>   |
|----------------------------------|-----------------|--|
| <b>Defensible Space</b>          | 1               | Maintain defensible space around the facility              |
| <b>Extended Defensible Space</b> | 2               | Extended defensible space is recommended for the facility. |

# PURGATOIRE CAMPGROUND



The Purgatoire Campground is located in the western area of the Stonewall Fire Protection District west of Highway 12. Located within the Pike-San Isabel National Forest, the Purgatoire Campground offers year-round recreational opportunities including camping, hiking, snowshoeing, and fishing. There are 23 campsites within 37 acres of the central campground area. The Park has miles of trails including several peaks.

Vegetation density in the Purgatoire Campground is high. Types of vegetation include ponderosa pines, spruce/fir and aspens, and a number of important wetland areas along the Purgatoire River. The Purgatoire Campground protects habitat for plants, as well as many species of mammals, birds, amphibians, and fishes. In an effort to maintain and protect the natural habitat and recreational attraction, the threat from wildfire should be taken seriously. Not only is there the concern of protecting visitors and infrastructure in the Purgatoire Campground, there is also the issue of protecting natural resources from human ignitions. Nearly all of the vegetation found within the park is capable of carrying fire. In campground areas set amongst wildland fuels, the potential for human-caused ignitions is higher in this area than in other adjacent communities. Visitors should be well informed of the dangers of wildfire and its potential impacts, and actions should be taken to reduce the risk of human-caused fires.

The main road is Highway 12 and is paved. There are currently no fire hydrants available within the Purgatoire Campground, and water storage is minimally available. The nearest fire district substations are Stonewall and Cucharas Pass Stations.

## Purgatoire Campground Recommendations:

| Name  | Priority | Description   |
|---|----------|---|
| <b>Evacuation Plan</b>                                    | 1        | <ul style="list-style-type: none"> <li>• Develop the park's evacuation plan, including making clear posted evacuation routes and procedures.</li> <li>• Post a fire danger sign at the park entrance. Provide visitors with information on wildfire, especially during times of high fire danger.</li> <li>• Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> </ul> |
| <b>Defensible Space</b>                                   | 2        | <ul style="list-style-type: none"> <li>• Maintain thinning and mowing around campground sites and fire pits.</li> <li>• Continue to thin vegetation and mow along access roads and trails which might be used for evacuation purposes.</li> </ul>   |
| <b>Roadside Thinning of Highway 12 and internal roads</b> | 3        | <ul style="list-style-type: none"> <li>• Thin along both sides of road in areas of heavy flammable fuel loadings this will aid in the egress of residents by reducing the intensity of fire and smoke.</li> </ul>   |
| <b>Infrastructure</b>                                     | 4        | <ul style="list-style-type: none"> <li>• Provide adequate turnarounds for fire apparatus throughout the community.</li> <li>• Identify all water sources within the community, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>• Develop additional water sources and storage as required.</li> </ul>  |

# ROBINSON SAWMILL



The Robinson Sawmill is located in the western area of the Stonewall Fire Protection District north of Highway 12. The Robinson Sawmill is owned by Robinson Sons and Construction and encompasses 40 acres in a river bottom area surrounded by hills. Vegetation surrounding Robinson Sawmill is moderate. The vegetation surrounding Robinson Sawmill includes ponderosa pine, pinon-juniper, and oak shrubland. The Robinson Sawmill is a concern for the Stonewall Fire Protection District because of the amount of fuel located onsite and the potential for a human caused fire, as well as from machines on site. Spontaneous combustion of sawdust, wood chips and other wood products is of special concern. Special precautions must be implemented to minimize wildland fire risk at Robinson Sawmill and in surrounding areas. Road accessibility for emergency responders is high. The main road is County Road 31.9 and is unpaved. The nearest fire district substation is Wet Canyon Station.

## Robinson Sawmill Wildfire Mitigation Recommendations:

| Name                        | Priority | Description   |
|-----------------------------|----------|---|
| Chip and Wood Product Piles | 1        | Monitor heat temperatures of composting wood products   |
| Defensible Space            | 2        | Create and maintain defensible space around individual facility and homes.                        |
| Extended Defensible Space   | 3        | Extended defensible space is recommended for facility and homes. Thin vegetation along driveways. |

# SPANISH PEAKS STATE WILDLIFE AREA



The Spanish Peaks State Wildlife Area community is located within the north central area of the Stonewall Fire Protection District north of Highway 12. The Spanish Peaks State Wildlife Area encompasses 6,410 acres within the Stonewall Fire Protection District. The overall topography of the land is mountainous, and the density of vegetation is moderate. The vegetation in the area is comprised of ponderosa pine, pinon-juniper, and oak shrubland, interspersed with grassy meadows. Spanish Peaks State Wildlife Area is minimally developed and is used for recreation. Recreational activities include hunting, bird watching, hiking, and camping.

In an effort to maintain and protect the natural habitat and recreational attraction, the threat from wildfire should be taken seriously. Not only is there the concern of protecting visitors and infrastructure in the Spanish Peaks State Wildlife Area, there is also the issue of protecting natural resources from human ignitions. Nearly all of the vegetation found within the park is capable of carrying fire. In recreational areas set amongst wildland fuels, the potential for human-caused ignitions is higher in this area than in other adjacent communities. Visitors should be well informed of the dangers of wildfire and its potential impacts, and actions should be taken to reduce the risk of human-caused fires.

Road accessibility for emergency responders within Spanish Peaks State Wildlife Area is moderate. The main road is County Road 41.7 and is unpaved. There are currently no fire hydrants available within Spanish Peaks State Wildlife Area and water storage is minimally available. The nearest fire district substations are La Garita and Wet Canyon Stations.

## Spanish Peaks State Wildlife Area Recommendations:

| Name                                       | Priority | Description  |
|--|----------|--|
| <b>Evacuation Plan</b>                     | 1        | <ul style="list-style-type: none"> <li>• Develop the park's evacuation plan, including clear posting of evacuation routes and procedures.</li> <li>• Post a fire danger sign at the entrance.</li> <li>• Provide visitors with information on wildfire, especially during times of high fire danger.</li> <li>• Determine the viability of additional egress route, and if viable, develop the route and include it in evacuation planning.</li> </ul> |
| <b>Defensible Space</b>                    | 2        | <ul style="list-style-type: none"> <li>• Maintain thinning and mowing around campground sites and fire pits.</li> <li>• Thin vegetation and mow along access roads and trails that might be used for evacuation purposes.</li> </ul>   |
| <b>Roadside Thinning of internal roads</b> | 3        | <ul style="list-style-type: none"> <li>• Thin along both sides of road in areas of heavy flammable fuel loadings. This will aid in the egress of residents by reducing the intensity of fire and smoke.</li> </ul>   |
| <b>Infrastructure</b>                      | 4        | <ul style="list-style-type: none"> <li>• Provide adequate turnarounds for fire apparatus throughout the area.</li> <li>• Identify all water sources within the area, including hydrants, cisterns and ponds, and make sure that they are visible, maintained and operable.</li> <li>• Develop additional water sources and storage as required.</li> </ul>   |

# TRINIDAD WATER TREATMENT PLANT



The Trinidad Water Treatment Plant is located along North Lake in the western area of the Stonewall Fire Protection District east of Highway 12 at the intersection of CR 21.6 and CR 13. The Water Treatment Plant encompasses 5 acres of the Stonewall Fire Protection District. Vegetation density in the surrounding area is moderate. Vegetation includes pinon-juniper, ponderosa pine, and oak shrubland, interspersed with grassy meadows. The Trinidad Water Treatment Plant is at risk from wildfire. A wildfire in the area could impact the amount and quality of water available to the residents in Trinidad and the surrounding communities, The cost of replacing the equipment associated with water treatment could also be high. Road accessibility for emergency responders is high. The main road is County Road 21.6 and is unpaved. The nearest fire district substation is Stonewall Station.

## Trinidad Water Treatment Plant Recommendations:

| Name                      | Priority | Description   |
|---------------------------|----------|---|
| Evacuation Plan           | 1        | Develop an evacuation plan that incorporates containment of hazardous materials and provides for life safety. |
| Fire Hydrant              | 2        | Continue to secure fire hydrant at site.  |
| Defensible Space          | 3        | Maintain defensible space around facility.  |
| Extended Defensible Space | 2        | Extended defensible space   |

# XTO ENERGY, INC.



XTO Energy, Inc. is a private natural gas development company located in the central area of the Stonewall Fire Protection District north of Highway 12. XTO Energy headquarters encompasses 46 acres within the Stonewall Fire Protection District. The overall topography of the land is river bottom and the density of vegetation is low. The vegetation in the area is comprised of grasses and shrubs. XTO Energy, Inc. and the infrastructure on site are at risk for wildland fires, but that risk is low as structures are well mitigated. Road accessibility for emergency responders is high. The main road is Highway 12 and is paved. The nearest fire district substation is Segundo Station.

## **XTO Energy, Inc. Recommendations:**

| <b>Name</b>                      | <b>Priority</b> | <b>Description</b>                                     |
|----------------------------------|-----------------|--|
| <b>Defensible Space</b>          | 1               | Maintain defensible space around facility              |
| <b>Extended Defensible Space</b> | 2               | Extended defensible space is recommended the facility. |

# COUNTYWIDE FIRE MITIGATION RECOMMENDATIONS

Las Animas County does not currently have any planning or zoning ordinances directed to wildfire risk reduction. The county is currently updating the Annual Operating Plan and the Emergency Operating/Evacuation plan is under development.

It is the recommendation of this CWPP that Las Animas County consider the following:

- Complete a county-wide Community Wildfire Protection Plan
- Identify and pre-plan primary escape routes for the county
- Develop evacuation centers and staging areas for fire resources
- Educate citizens on the proper escape routes and evacuation centers
- Plan for evacuation of large animals
- Perform response drills to determine the timing and effectiveness of escape routes and fire resource staging areas
- Consider implementing building and land use codes that address wildfire hazard mitigation
- Consider implementing road standards that facilitate fire apparatus access
- Consider sponsoring community chipper operations and designated burn areas

# CONCLUSION AND NEXT STEPS

The Stonewall Fire Protection District Community Wildfire Protection Plan (CWPP) is a comprehensive review of wildfire-related hazards and risks in the Wildland Urban Interface (WUI) areas. This plan and its accompanying assessment of values at risk demonstrate that SFPD has variable, but considerable, risk to wildfires across much of the district. Much can be done to reduce this risk before the next wildfire occurs.

The success of the plan depends upon **strong leadership** at the community, district and county level. **Educating citizens and organizations** about the risk of wildfires and mitigation to reduce that risk is paramount. The plan also relies on the **efforts of individuals, landowners associations, the SFPD and Las Animas County** to reduce the risks of wildland fires.

No matter how good a plan is, it holds little value if it is not implemented. Defensible space is THE MOST IMPORTANT action an individual can take to protect his home. It is imperative that individual homeowners respond and begin efforts to mitigate the fire risk around their homes. It is also critical that communities organize to accomplish subdivision or community-wide mitigation and fuels reduction.

Tables are included in each community write-up that define and prioritize community action. The priority level should be used to assist in determining which fuels projects should be focused on and in what order they should be implemented. CWPP activities may be eligible for funding through state and federal grant programs.

Stakeholders, including representatives of the community that may include homeowner's association board members or citizens, must support recommendations in this plan. A concerted effort to identify Wildfire Mitigation Advocates within each community may be one of the most important recommendations of this CWPP. A

Wildfire Mitigation Advocate can assist the SFPD in strengthening public understanding, acceptance and participation in the plan.

The projects detailed in the CWPP are not the only projects that are required within the planning area; they are the most achievable for the communities at this point in time. Landscape scale projects are excellent options as well, but often require the collaboration of multiple communities working with federal, state and county government. As support and community involvement grow through the completion of recommended smaller projects, the larger treatments become more obtainable. The core stakeholder group should consider additional projects at all scales, especially as Stonewall Fire Protection District begins to complete the initial projects identified in the CWPP.

The following table summarizes actions required of the Stonewall Fire Protection District. It details a suggested completion date and estimated cost for each project.

### Stonewall Fire Protection District Action Plan

| Priority | Action   | Target date                  | Assigned to                          | Estimated cost |
|----------|--|------------------------------|--------------------------------------|----------------|
| 1        | In partnership with the City of Trinidad obtain nine additional fire hydrants. In order of priority these are:<br>1. Hwy 12 and CR 31.9 (Weston)<br>2. Hwy 12 at Segundo<br>3. Hwy 12 at Valdez<br>4. Hwy 12 at CR 41.7 (Sarcillo Canyon)<br>5. CR 13 and CR21.6 (Trinidad Water Treatment Plant)<br>6. Hwy 12 at Lower North Fork<br>7. Hwy 12 at Rancho Escondido<br>8. Hwy 12 at Madrid Canyon<br>9. Hwy 12 at Pioneer Resources, Inc. facility | 2014/<br>Until<br>Completion | SFPD, City of Trinidad               | \$15,000 each  |
| 2        | Secure required equipment (chippers, chain saws, dump apparatus) to conduct FireWise wildfire risk mitigation  | 2015                         | SFPD, Mitigation Project Coordinator | \$180,000      |
| 3        | Develop a trained mitigation crew capable of providing low-cost fuel reduction services within the district  | 2015                         | SFPD, other agencies                 | \$250          |

|    |  |           |  |  |
|----|--|-----------|--|--|
| 4  | Hire part-time Mitigation Project Coordinator for first two years of CWPP implementation   | 2015/2016 | SFPD   | \$40,000                                   |
| 5  | Develop a large scale shaded fuel break to enhance protection of the City of Trinidad Watershed above Monument and North Lake.   | 2015      | City of Trinidad, SFPD, NRCS, CPW, and area landowners.                          | \$1,500-\$2,000/per acre.                  |
| 6  | Identify and complete five two-to-five acre demonstration projects within the district in strategic locations as examples of mitigation for wildland fire risk reduction | 2015/2016 | SFPD, CSFS, SFPD mitigation crews, Communities                                   | \$15,000-\$40,000                          |
| 7  | Offer comprehensive WFAP Risk Assessments to area homeowners at no or low cost depending on funding  | Ongoing   | SFPD, Wildland Mitigation Advocates, Mitigation Project Coordinator, Communities | \$0-\$60 each and Staff time to coordinate |
| 8  | Work with Las Animas County to establish building, road and land use codes that address wildfire hazard mitigation issues  | Ongoing   | SFPD, Las Animas County  | Staff costs                                |
| 9  | Identify Wildfire Mitigation Advocates to serve as primary contact resource for each WUI/community   | 2015/2016 | SFPD, Mitigation Project Coordinator, Communities                                | \$2,500                                    |
| 10 | Assist in developing a system of cisterns or other water storage in collaboration with communities within the district   | Ongoing   | SFPD, Wildland Mitigation Advocates, Communities                                 | Unknown                                    |
| 11 | Work with Las Animas County to implement evacuation planning, training and response drills   | Ongoing   | SFPD, Las Animas County  | Staff costs                                |
| 12 | Encourage evacuation planning in every WUI community   | Ongoing   | SFPD, Wildland Mitigation Advocates, Mitigation Project Coordinator, Communities | Staff costs                                |

|    |  |               |   |                              |
|----|--|---------------|---|------------------------------|
| 13 | Research and develop slash disposal areas and resources for disposal of mitigation by-products | 2015/<br>2016 | SFPD,<br>Communities  | Unknown                      |
| 14 | Conduct at least four educational workshops throughout the district                            | 2015/<br>2016 | SFPD,<br>Wildland<br>Mitigation<br>Advocates,<br>Mitigation<br>Project<br>Coordinator,<br>Communities | \$400                        |
| 15 | Assist at least two communities in achieving FireWise Community status                         | 2016/<br>2017 | SFPD,<br>Wildland<br>Mitigation<br>Advocates,<br>Mitigation<br>Project<br>Coordinator,<br>Communities | \$500                        |
| 16 | Conduct one or more community chipping projects  | 2016/<br>2017 | SFPD,<br>Communities  | \$2,000                      |
| 17 | Continue to offer S-130 and S-190 training to new firefighters and as refresher courses        | Ongoing       | SFPD  | \$2,500<br>annually          |
| 18 | Continue to offer RT-130 Annual Wildland Safety refresher course                               | Ongoing       | SFPD  | \$200                        |
| 19 | Offer additional training courses to upgrade existing skill levels for all firefighters        | Ongoing       | SFPD  | Varies;<br>\$200-<br>\$2,500 |
| 20 | Upgrade SCBA equipment- 20 units   | 2016/<br>2017 | SFPD and<br>Mitigation<br>Project<br>Coordinator  | \$60-75K                     |
| 21 | Obtain 20 additional VHF radios  | 2016          | SFPD and<br>Mitigation<br>Project<br>Coordinator  | \$18K                        |
| 22 | Obtain 10 wildland fire Nomex shirt/pant sets  | 2016          | SFPD and<br>Mitigation<br>Project<br>Coordinator  | \$4K                         |
| 23 | Obtain 10 additional laptop computers for full computer mapping program use                    | 2016/<br>2017 | SFPD,<br>Mitigation<br>Project<br>Coordinator   | \$6,000                      |

## Funding Sources

The following list is meant to serve as a starting point for securing funding. Available funds and funding priorities change rapidly. Some funding programs have decreased significantly in the last five years, and competition for the remaining limited funds can be intense.

Additional funding opportunities may be available in the future. Please check the Stonewall Fire Protection District's website at : [www.stonewallfire.us](http://www.stonewallfire.us) for more information.

### **Colorado Department of Revenue Income 65**

#### **Wildfire Mitigation Measures Subtraction**

Individuals, estates and trusts may subtract up to \$2500 of costs incurred while performing wildfire mitigation measures on their property from their federal taxable income. Qualifying wildfire mitigation efforts includes

- Creating and maintaining a defensible space around structures;
- Establishing fuel breaks;
- Thinning of woody vegetation for the primary purpose of reducing risk to structures from wildland fire;
- Secondary treatment of woody fuels by lopping and scattering, piling, chipping, removing from the site or prescribed burning.

See <http://www.colorado.gov/cms/forms/dor-tax/Income65.pdf>

### **Natural Resources Conservation Service**

Program: Environmental Quality Incentives Program (EQIP)

Eligible applicants: landowners

Funding Categories: conservation; environmental, sustainability issues; forest health, restoration, rehabilitation; riparian forest health, restoration; watershed protection, restoration, water quality

Deadline: ongoing

Website:

<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/>

Contact: 3590 East Main Street; Trinidad CO 81082; 719 846-3681

### **Colorado Cattleman's Agricultural Land Trust**

Eligible applicants: farmers and ranchers

Funding categories: agroforestry; community assistance, rural development; conservation; environmental, sustainability issues; fish and wildlife habitat improvement; forest health, restoration, rehabilitation; riparian forest health, restoration; watershed protection, restoration, water quality

Deadline: 1/31/2015

website: <http://www.ccalt.org/Home.aspx>

**Colorado State Forest Service  
LANDOWNER & COMMUNITY ASSISTANCE PROGRAMS FOR  
FORESTRY/AGROFORESTRY IN COLORADO UPDATED APRIL 2014**

Contact your local [CSFS District](#) for additional information.

| PROGRAM   | ELIGIBLE LAND  | SIGN-UP PERIOD  | EASEMENT | COST* SHARE | POTENTIAL PRACTICES SUPPORTED  |
|---|--|---|----------|-------------|--|
| Front Range Fuels Treatment Partnership (FRFTP)       | Non-federal lands  | Annually; based on available funding  | No       | 50%         | Forest stand improvement for hazardous fuels reduction, including defensible space, thinning, slash disposal, fuelbreaks, assessments, planning, and monitoring.                                     |
| Stevens Hazardous Fuels Grant (CAFA)                  | Non-federal lands  | Annually; based on available funding  | No       | N.A         | Treatments on adjacent non-federal lands to protect communities when hazard reduction activities are planned on National Forest lands.   |
| Forest Agriculture for Tax Status Program (Forest Ag) | Private forestland producing tangible wood products (40 acres or more) | Annually; application materials due by Oct. 1 (requires a CSFS approved forest stewardship management plan) | No       | N.A         | “Forest Ag” tax classification does not preclude participation in other programs. Supports all management practices, especially those that result in revenue from harvesting tangible wood products. |
| Forest Legacy Program (FLP)                           | Non-industrial private forestland                                      | As announced  | Yes      | 25%         | Protection from development. Conserve working forested lands.  |

|   |                                   |   |    |     |  |
|---|-----------------------------------|---|----|-----|--|
| Forest Stewardship Program (FSP)                              | Non-industrial private forestland | Continuous  | No | N.A | Provides technical and planning assistance for forest management activities.   |
| State & Private Forestry Competitive                          | Non-federal lands                 | Annually; based on available funding  | No | 50% | Forest management and fuels reduction.   |
| Restoring Colorado's Forests Fund                             | State or private                  | Annually; based on available funding  | No | N.A | Restoration of areas impacted by natural disasters.  |
| 1SFA Wildland - Urban Interface Competitive Grants (SFA-NFP2) | Non-federal lands                 | Ongoing; based on funding approval (projects with an approved CWPP3 receive priority) | No | 50% | Forest stand improvement for hazardous fuels reduction, including defensible space, thinning, slash disposal, fuelbreaks, assessments, planning, and monitoring. |
| FEMA - Pre-Disaster Mitigation                                | Non-federal lands                 | Annually; based on available funding  | No | 25% | Pre-disaster mitigation and fuels management.  |
| Colorado Forest Restoration Grant                             | All forestlands                   | Based on available funding (requires an approved CWPP)                                | No | 40% | Watershed protection, forest management, ecological restoration, and fuels mitigation.   |

\*Cost share rates indicated represent the recipient's share of total project cost.

<sup>1</sup> SFA (State Fire Assistance) grants are provided to state forestry organizations to maintain and improve protection efficiency and effectiveness on non-federal lands; funds are provided under authority of the Cooperative Forestry Assistance Act and the National Fire Plan.

<sup>2</sup> NFP (National Fire Plan) was developed in August 2000, following a landmark wildland fire season, and addresses five key points: firefighting, rehabilitation,

hazardous fuels reduction, community assistance and accountability. NFP uses the authorities of the Cooperative Forestry Assistance Act.

3 CWPP (Community Wildfire Protection Plans) are authorized and defined in Title I of the Healthy Forests Restoration Act (HFRA) passed by Congress on Nov. 21, 2003, and signed into law by President Bush on Dec. 3, 2003. The Healthy Forests Restoration Act places renewed emphasis on community planning by extending a variety of benefits to communities with a wildfire protection plan in place. Funding comes through the SFA/NFP. Senate Bill 09-001, Community Wildfire Protection Plans, was initiated on Aug. 4, 2009 and updates the CWPP criteria. The bill states that counties, with the assistance of the state forester, must identify fire hazard areas in unincorporated portion of the county by January 1, 2011.

### **Pre-Disaster Mitigation (PDM) Grant Program**

The Department of Homeland Security/FEMA administers the Pre-Disaster Mitigation (PDM) Grant Program. The PDM program provides funding to states, territories, Indian tribal governments, communities and universities for hazard mitigation planning and the implementation of **mitigation projects prior to a disaster event**. Eligible applicants and subapplicants include:

- State and Local government
- Indian tribes or other tribal organizations

Individual homeowners and businesses may not apply directly to the program; however an eligible application or subapplicant may apply on their behalf.

### **Program 15.228: Wildland Urban Interface Community and Rural Fire Assistance**

This program is designed to implement the National Fire Plan and assist communities at risk from catastrophic wildland fires. The program provides grants, technical assistance, and training for community programs that develop local capability, including:

- Assessment and planning, mitigation activities, and community and homeowner education and action;
- Hazardous fuels reduction activities, including the training, monitoring or maintenance associated with such hazardous fuels reduction activities, on federal land, or on adjacent nonfederal land for activities that mitigate the threat of catastrophic fire to communities and natural resources in high risk areas;
- Enhancement of knowledge and fire protection capability of rural fire districts through assistance in education and training, protective clothing and equipment purchase, and mitigation methods on a cost share basis.

### **Pre-Disaster Mitigation Grant Program**

The Department of Homeland Security, which includes the Federal Emergency Management Agency (FEMA) and the U.S. Fire Administration (USFA), administers Pre-Disaster Mitigation Planning and Project Grants. This competitive grant program, known as PDM, provides funds and technical assistance to state entities, tribes and local governments to help develop multi-hazard mitigation plans and to implement projects identified in those plans. Individual communities can apply for PDM grants, but they are advised to work with their state contacts in emergency management or mitigation as they are developing their plans and projects.

### **BLM Wildland Urban Interface Community Assistance grant program**

The application is open for two weeks of June through August and is posted on grants.gov. The program can fund a wide variety of wildland fire related projects and activities including wildfire related education, preparedness, prevention, risk assessment and hazard mitigation. It operates under a 90:10 cost share with the contributed 10% coming from either direct funding or in-kind services. The cost share might be increased to an 80:20 ratio in 2015.

### **Colorado Department of Natural Resources Wildfire Risk Reduction Grant (WRRG)**

This grant was created under Colorado Senate Bill 269 awarded \$9.3 million to communities, special districts and local and state governments in 2014. It is unclear if additional funding will be available.

website: <http://dnr.state.co.us/Media/Pages/WRRGProgram.aspx>

### **Regional Conservation Partnership Program**

NRCS Programs Used in RCPP - Conservation program contracts and easement agreements are implemented through the Agricultural Conservation Easement Program (ACEP), Environmental Quality Incentives Program (EQIP), Conservation Stewardship Program (CSP) or the Healthy Forests Reserve Program (HFRP). NRCS may also utilize the authorities under the Watershed and Flood Prevention Program, other than the Watershed Rehabilitation Program, in the designated critical conservation areas.

## **Plan Maintenance and Monitoring**

The Stonewall CWPP is a planning tool. As such, it will help to identify and guide mitigation efforts within the district. Its overall value, however, is directly related to the ongoing evaluation and improvement of the plan in the future. Future plans will re-evaluate risks as conditions change and as mitigation efforts are completed. The plan should be revisited on an annual basis by the Core Group Committee, and should be formally updated every five years. As a living document, the plan relies on the input of all stakeholders. Particular attention should be paid to developing a district-wide infrastructure of volunteer advocates where existing and/or improved communication

# APPENDIXES

## **Appendix A General Recommendations**

### **Home Mitigation**

In the end, every homeowner and every community must assume responsibility for protection from wildfire. Although the Stonewall Fire Protection District is dedicated to protect and defend, in the event of a catastrophic fire, or even a much smaller fire under the right conditions, the SFPD may or may not be able to intervene. The more steps each homeowner and each community takes to mitigate wildfire risk, the more likely it is a home will survive without intervention and the more likely it is that lives will be protected.

All of the communities in the SFPD, especially those with extreme, very high and high hazard ratings, should consider implementing a parcel-level analysis. Even homes that are outside of a defined CWPP community will most likely have hazard levels similar to homes within near-by evaluated communities. Communities may undertake large-scale projects that may benefit multiple homes, but the most effective steps landowners can take to protect their property from wildfire is to mitigate around homes.

### **Home Construction**

All new construction within the SFPD area should consider incorporating wildfire construction principles. Changes to existing structures should be done with the assistance of a fire department representative, who will know which guidelines are appropriate for new or remodeled structures. Recommended alterations to a home may include simple tasks such as cleaning gutters, moving firewood from around buildings, raking pine needles and flammable ground cover away from the home. Other recommendations might include replacing flammable roofing materials and siding,

screening beneath decks and vents, double pane windows, and more. Please see Appendix for more details.

### **Road Signs and Home Addresses**

The majority of the streets within the county are not adequately labeled, signs are not always reflective and are frequently combustible. There are still many places where signs are missing or made of combustible materials or it is unclear which road is which. Proper reflective signage is a critical operational need. Knowing at a glance the difference between a road and a driveway (and which houses are on the driveway) cuts down response time by reducing navigation errors. This is especially true for out-of-district responders who are not familiar with our area. The value of the time saved, especially at night and in difficult conditions, cannot be overstated: it can make the difference between lives saved and lost.

#### **Recommendations**

- Ensure that every intersection and street name change has adequate, reflective signage.
- Develop a program of replacing worn or difficult to read street signs. Include specifications and input from developers, HOAs, and the fire protection districts.
- Lot markers should be replaced with address markers as soon as a home has a certificate of occupancy.
- Where dead end and private road markers occur, the addresses of homes beyond the marker should be clearly posted. This can be done with a group address marker.

### **Preparedness Planning**

Many CWPP communities in the SFPD have only one way in and out of the community. In order to reduce potential conflicts between evacuating citizens and incoming responders, it is desirable to have evacuation plans in place.

#### **Recommendations:**

- Identify and pre-plan primary escape routes for all CWPP communities. Emergency management personnel should be included in the development of pre-plans for citizen evacuation. Re-evaluate and update these plans as necessary.
- Educate citizens on the proper escape routes and evacuation centers to use in the event of an evacuation. This also applies to animal rescue.
- Ensure the existing reverse 911 system includes wildfire notifications.
- Perform response drills to determine the timing and effectiveness of escape routes and fire resource staging areas.

### **Public Education**

There is likely to be a varied understanding among property owners of the hazards associated with the threat of a wildfire. An approach to wildfire education that emphasizes safety and hazard mitigation on an individual property level should be undertaken, in addition to fire department efforts at risk reduction.

### **Recommendations:**

- Provide communities and homeowners fire prevention educational materials through personal contact.
- Fire prevention and wildfire hazard mitigation education should be an ongoing effort.
- Implement fire prevention, fire preparedness, defensible space, and hazard reduction recommendations for each community.
- Create an evacuation plan that is presented and distributed to residents.
- Hold multiple meetings per year to educate residents on wildfire risk, defensible space, and evacuation.
- Provide citizens with the findings of this study including:
  1. Levels of risk and hazard.
  2. Values of fuels reduction programs.
  3. Consequences of inaction for the entire community.
- Create a community level Mitigation Advocates or Firewise Council or similar WUI citizen advisory committee to promote the message of shared responsibility. The Mitigation Advocates or Firewise Council should consist of local citizens and members of the local FPD and the Mitigation Coordinator and its primary goals should be:
  1. Bringing the concerns of the residents to the prioritization of mitigation actions.
  2. Selecting demonstration sites.
  3. Assisting with grant applications and awards.
  4. Make use of regional and local media to promote wildfire public education messages in the fire district.
  5. Maintain a current wildfire educational presentation explaining the concepts of defensible space and wildfire hazard mitigation. The information in this CWPP should be incorporated into that presentation for the education of homeowners in the SFPD. This could be promoted through informational gatherings sponsored by the fire department, homeowners associations or neighborhood gatherings such as local festivals, and school events. It should also be presented during times of extreme fire danger and other times of heightened awareness concerning wildfire.

### **Water Supply**

Water is a critical fire suppression issue in the District, as it is in many communities in Colorado. Very little of the area is served with water hydrants. All new developments within the District should consider developing year-round water sources.

### **Recommendations:**

- Areas with no water or inadequate water supply should be evaluated to establish a stored water supply, or use preplanned firefighting resources.
- Map existing water sources and their volume. Make this information available for emergency personnel in and out of the district.
- Make sure cisterns are well marked with their capacity and are kept clear of vegetation.

## **Appendix B: Additional Resources**

### **FireWise**

[www.firewise.org](http://www.firewise.org)

Click on “Wildfire Preparedness” tab

Firewise landscaping and plant lists, the basics of defensible space, checklists, information about becoming a Firewise Community[p

### **Colorado State Forest Service:**

<http://csfs.colostate.edu/pages/home-land-owners.html>

Links to information about protecting your home, Community Wildfire Protection Plans, numerous publications and links to other websites and information (click on “Links for Homeowners and Landowners”)

Colorado State University Extension Small Acreage Management Resource Center

<http://www.colostate.edu/Depts/CoopExt/LARIMER/disa/disa.shtml>

Scroll down to “Wildfires”. Information about caring for animals during a wildfire, emergency water supplies, Firewise plant materials for your yard and more.

<http://www.ext.colostate.edu/sam/webinar.html> click on 2013 “Firewise Landscaping Webinar Series: Defensible Space is Not Moonscape!” for a video presentation about how fires start when embers are blowing and easy and inexpensive steps you can take to reduce your risk.

### **Fire Adapted Communities**

<http://www.fireadapted.org/>

Click on Info and Resources. Information about becoming a Fire Adapted Community. Videos, retrofit guides to protect your property from wildfire and more.

### **CSU Fact Sheets:**

A series of short (3-5 pages) fact sheets

#6.303: Fire Resistant Landscaping

<http://www.ext.colostate.edu/pubs/natres/06303.html>

CSU Fact Sheet# 6.304 Forest Home Fire Safety

<http://www.ext.colostate.edu/pubs/natres/06304.html>

6.302 Creating Wildfire Defensible Zones

6.305 FireWise Plant Materials  
<http://www.ext.colostate.edu/pubs/natres/06305.html>

### **Data Graphics**

Graphics for displaying information for individual structure breakdown were created by using:

<https://infogr.am>

**For specific details regarding mitigation, please refer to the following documents:**

|                   |   |
|-------------------|---|
| <b>Appendix C</b> | <b>Protecting Your Home From Wildfire: Creating Wildfire-Defensible Zones</b>                                   |
| <b>Appendix D</b> | <b>FireWise Construction: Site Design &amp; Building Materials</b>  |
| <b>Appendix E</b> | <b>Protect Your Property from Wildfire: Rocky Mountain Edition</b>  |
| <b>Appendix F</b> | <b>Is Your Home Protected From Wildfire Disaster? A Homeowner's Guide to Wildfire Retrofit</b>                  |
| <b>Appendix G</b> | <b>Fuel Break Guidelines for Forested Subdivisions &amp; Communities</b>  |
| <b>Appendix H</b> | <b>Ready, Set, Go! Emergency Preparedness Checklist*</b><br><b>*Courtesy of El Paso County Sheriff's Office</b> |



## QUICK GUIDE SERIES

FIRE 2012-1

# Protecting Your Home from Wildfire: Creating Wildfire-Defensible Zones

Formerly CSU Extension Factsheet 6.302

If your home is located in the natural vegetation of Colorado's grasslands, shrublands, foothills or mountains, you live in the **wildland-urban interface** (WUI) and are inherently at risk from a wildfire. The WUI is any area where structures and other human developments meet or intermingle with wildland vegetative fuels. In many vegetation types, it is not a matter of *if* a wildfire will impact your home, but *when*.

Wildfires are a natural part of Colorado's varied forest ecosystems. Many rural communities are located in areas historically prone to frequent natural wildfires. Living in the wildland requires more self-reliance than living in urban areas. It may take longer for a fire engine to reach your area, and a small fire department can easily become overwhelmed during an escalating wildfire. Planning ahead and taking actions to reduce fire hazards can increase your safety and help protect your property. As more people choose to live in areas prone to wildfire, additional homes and lives are potentially threatened every year. Firefighters always do their best to protect rural residents, but ultimately, **it is YOUR responsibility to protect your life, family, animals and property from wildfire.**

The information contained in this document is for use by individual landowners to help reduce wildfire risk on their property. In order to effectively protect subdivisions and communities, all landowners must work together

to reduce fire hazards within and adjacent to communities. This includes treating individual home sites and common areas within communities, and creating fuelbreaks within and adjoining the community where feasible. This document will focus on actions individual landowners can take to reduce wildfire hazards on their property. For additional information on broader community protection, go to [www.csfs.colostate.edu](http://www.csfs.colostate.edu).



**Figure 2:** Colorado's grasslands, shrublands, foothills and mountains all have areas in the wildland-urban interface where human development meets wildland vegetative fuels. Photo: CSFS

In this guide, you'll read about steps you can take to protect your property from wildfire. These steps focus on beginning work closest to your house and moving outward. Also, remember that keeping your home safe is not a one-time effort – it requires ongoing maintenance. It may be necessary to perform some actions, such as removing pine needles from gutters and mowing grasses and weeds several times a year, while other actions may only need to be addressed once a year. While



**Figure 1:** Firefighters will do their best to protect homes, but ultimately it is the homeowner's responsibility to plan ahead and take actions to reduce fire hazards around structures. Photo: National Interagency Fire Center

This quick guide was produced by the Colorado State Forest Service to promote knowledge transfer.

October 2012  
[www.csfs.colostate.edu](http://www.csfs.colostate.edu)

you may not be able to accomplish ALL of the actions described in this document to prepare your home for wildfire, each completed activity will increase the safety of your home, and possibly your family, during a wildfire.

*(Note: These guidelines are adapted for ponderosa pine, Douglas-fir and mixed-conifer ecosystems below 9,500 feet. See page 9 for guidelines adapted to other forest ecosystems.)*

This guide primarily will help design your defensible space. **Defensible space** is the natural and landscaped area around a home or other structure that has been modified to reduce fire hazard. Defensible space gives your home a fighting chance against an approaching wildfire. Creating defensible space also reduces the chance of a structure fire spreading to the surrounding forest and other homes.

Three factors determine wildfire behavior: **fuels, weather and topography**. We cannot alter weather or topography, so we must concentrate on altering fuels. Fuels include vegetation, such as trees, brush and grass; near homes, fuels also include

such things as propane tanks, wood piles, sheds and even homes themselves. Some plant species are more flammable than others, and the flammability of vegetative fuels changes depending on the season, recent weather events, and other factors such as drought. Fuel continuity and density also play an important role in wildfire.

Wildfire often creates its own weather conditions. Hot rising air and associated winds can carry embers and other burning materials into the atmosphere for long distances, where they can ignite vegetation and structures up to several miles away. Embers have caused the loss of many homes during wildfires.

As you think about protecting your home and property from wildfire, consider how you can manage fuels on your property to prevent fire from spreading to your home and other structures.

For more information on wildfire behavior, please see [FireWise Construction: Site Design and Building Materials](http://www.csfs.colostate.edu) at [www.csfs.colostate.edu](http://www.csfs.colostate.edu).

## Fuel Arrangement and Types

When fuels are abundant, a fire can be uncontrollable and destructive. But when fuels are scarce, a fire cannot build momentum and intensity, which makes it much easier to control and is more likely to be beneficial to the land.

The more dense and continuous the fuels, the bigger the threat they pose to your home. The measure of fuel hazard refers to its continuity, both horizontal and vertical. Horizontal continuity refers to fuels across the ground, while vertical continuity refers to fuels extending from the ground up into the crowns of trees and shrubs. Fuels with a high degree of both vertical and horizontal continuity are the most hazardous, particularly when they occur on slopes. Mitigation of wildfire hazards focuses on breaking up the continuity of horizontal and vertical fuels.

Heavier fuels, such as brush and trees, produce a more intense fire than light fuels, such as grass. However, grass-fueled fires travel much faster than heavy-fueled fires. Some heavier surface fuels, such as logs and wood chips, are potentially hazardous heavy fuels and also should be addressed.



Figure 3: Burning embers can be carried long distances by wind. Embers ignite structures when they land in gaps, crevices and other combustible places around the home. Photo: CSFS

### Remember...

- **Reducing fuels around a home will increase the chances for survival in a wildfire, but there is no guarantee.**
- **This quick guide provides minimum guidelines. The more fuels you remove, the greater the chance your home will survive.**
- **Working with your neighbors and community will increase the effectiveness of your home's defensible space.**

## Vertical/Ladder Fuels

Ladder fuels are defined as smaller trees and brush that provide vertical continuity, which allows a fire to burn from the ground level up into the branches and crowns of larger trees. Lower branches on large trees also can act as ladder fuels. These fuels are potentially very hazardous, but are easy to mitigate. The hazards from ladder fuels near homes are especially important to address. Prune all tree branches from ground level up to a height of 10 feet above ground or up to  $\frac{1}{3}$  the height of the tree, whichever is less. Do not prune further up because it could jeopardize the health of the tree. Shrubs should be pruned based on specifications recommended for the species. Dead branches should be removed whenever possible.

## Surface Fuels

### Logs/Branches/Slash/Wood Chips

Naturally occurring woody material on the ground and debris from cutting down trees (also known as slash) may increase the intensity of fires. Increased fire intensity makes a fire harder to control and increases the likelihood of surface fires transitioning to crown fires. Dispose of any heavy accumulation of logs, branches and slash by chipping, hauling to a disposal site or piling for burning later. Always contact your county sheriff's office or local fire department first for information about burning slash piles. Another alternative is to lop and scatter slash by cutting it into very small pieces and distributing it widely over the ground. If chipping logs and/or slash, it's essential to avoid creating continuous areas of wood chips on the ground. Break up the layer of wood chips by adding nonflammable material, or allow for wide gaps (at least 3 feet) between chip accumulations. Also, avoid heavy accumulation of slash by spreading it closer to the ground to speed decomposition. If desired, two or three small, widely spaced brush piles may be left for wildlife habitat. Locate these well away from your home (NOT in Zones 1 or 2; see page 5-8 for zone descriptions).

### Pine Needles/Duff Layers

Due to decades of fire suppression, decomposing layers of pine needles, twigs and other organic debris—called duff—is deeper under many large trees today than it would have been a century ago. This is especially true in ponderosa pine forests where frequent and naturally occurring fires have been absent. These large trees often are lost when fires occur, because flames burning in the duff layer can pre-heat live vegetation and ignite the trees, or the tree's roots can be damaged from the intense heat of the smoldering duff, killing the tree. It is important to rake needle or duff layers deeper than 2 inches at least 3 feet away from the base of large trees. This should be done annually, and the additional duff also should be removed from the area.

### Grasses

Grasses are perhaps the most pervasive and abundant surface fuel in Colorado. Mow grasses and weeds as often as needed throughout the growing season to keep them shorter than 6 inches. This applies to irrigated lawns and wild or native grasses. This is critical in the fall, when grasses dry out, and in the spring, after the snow is gone but before plants green-up.

Be especially careful when mowing in areas with rocks. Mower blades can hit rocks and create sparks, causing fires in dry grass. Consider mowing only on days with high humidity or after recent moisture to reduce the risk of starting an unwanted fire.

When mowing around trees, be sure to avoid damaging the root system and tree trunk by using a higher blade setting on the mower and trimming grass that grows against the trunk only by hand.

## Crown Fuels

An intense fire burning in surface fuels can transition into the upper portion of the tree canopies and become a crown fire. Crown fires are dangerous because they are very intense and can burn large areas. Crown fire hazard can be reduced by thinning trees to decrease crown fuels, reducing surface fuels under the remaining trees, and eliminating vertical fuel continuity from the surface into the crowns. Specific recommendations are provided in the Defensible Space Management Zones, pages 5-8.



**Figure 4:** Ladder fuels are shrubs and low branches that allow a wildfire to climb from the ground into the tree canopy. Photo: CSFS



**Figure 5:** Surface fuels include logs, branches, wood chips, pine needles, duff and grasses. Photo: CSFS



**Figure 6:** Tree canopies offer fuel for intense crown fires. Photo: Paul Mintier

## The Home Ignition Zone



Figure 7: Addressing both components of the Home Ignition Zone will provide the best protection for your home. Credit: CSFS

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

### Structural Ignitability

The ideal time to address home ignition risk is when the structure is in the design phase. However, you can still take steps to reduce ignitability to an existing home.

The **roof** has a significant impact on a structure's ignitability because of its extensive surface area. When your roof needs significant repairs or replacement, use only fire-resistant roofing materials. Also, check with your county building department – some counties now have restrictions against using wood shingles for roof replacement or require specific classifications of roofing material. Wood and shake-shingle roofs are discouraged because they are highly flammable, and are prohibited in some areas of the state. Asphalt shingles, metal sheets and shingles, tile, clay tile, concrete and slate shingles are all recommended roofing materials.

The extension of the roof beyond the exterior structure wall is the eave. This architectural feature is particularly prone to ignition. As fire approaches the building, the exterior wall deflects hot air and gasses up into the eave. If the exterior wall isn't ignition-resistant, this effect is amplified.

Most **decks** are highly combustible. Their shape traps hot gasses, making them the ultimate heat traps. Conventional wooden decks are so combustible that when a wildfire approaches, the deck often ignites before the fire reaches the house.

The **exterior walls** of a home or other structure are affected most by radiant heat from the fire and, if defensible space is not adequate, by direct contact with flames from the fire.

**Windows** are one of the weakest parts of a building with regard to wildfire. They usually fail before the building ignites, providing a direct path for flames and airborne embers to reach the building's interior.

Burning embers are produced when trees and structures are consumed by wildfire. These embers sometimes can travel more than a mile. Flammable horizontal or nearly horizontal surfaces, such as wooden decks or shake-shingle roofs, are especially at risk for ignition from burning embers. Since airborne embers have caused the loss of many homes in the WUI, addressing structural ignitability is critical, even if the area surrounding a home is not conducive to fire spread.

This guide provides only basic information about structural ignitability. For more information on fire-resistant building designs and materials, refer to the CSFS *FireWise Construction: Site Design and Building Materials* publication at [www.csfs.colostate.edu](http://www.csfs.colostate.edu).



Figure 8: (above) Wood shingle roofs are highly flammable and not recommended. Photo: CSFS

Figure 9: (above right) Class A roofing materials including tile, clay, concrete, slate and asphalt shingles are fire-resistant options. Photo: CSFS



Figure 10: Decks, exterior walls and windows are important areas to examine when addressing structure ignitability. Photo: CSFS

# Defensible Space

Defensible space is the area around a home or other structure that has been modified to reduce fire hazard. In this area, natural and manmade fuels are treated, cleared or reduced to slow the spread of wildfire. Creating defensible space also works in the reverse, and reduces the chance of a structure fire spreading to neighboring homes or the surrounding forest. Defensible space gives your home a fighting chance against an approaching wildfire.

Creating an effective defensible space involves a series of management zones in which different treatment techniques are used. Develop these zones around each building on your property, including detached garages, storage buildings, barns and other structures.

The actual design and development of your defensible space depends on several factors: size and shape of building(s), construction materials, slope of the ground, surrounding topography, and sizes and types of vegetation on your property. You may want to request additional guidance from your local Colorado State Forest Service forester, fire department or a consulting forester as you plan a defensible space for your property.

Defensible space provides another important advantage during a fire: increased firefighter safety. Firefighters are trained to protect structures only when the situation is relatively safe for them to do so. They use a process called “structural triage” to determine if it is safe to defend a home from an approaching wildfire. The presence or absence of defensible space around a structure is a significant determining factor used in the structural triage process, as defensible space gives firefighters an opportunity to do their job more safely. In turn, this increases their ability to protect your home.

If firefighters are unable to directly protect your home during a wildfire, having an effective defensible space will still increase your home’s chance of survival. It is important to remember that with wildfire, there are no guarantees. Creating a proper defensible space does not mean that your home is guaranteed to survive a wildfire, but it does significantly improve the odds.

## Defensible Space Management Zones

Three zones need to be addressed when creating defensible space:

**Zone 1** is the area nearest the home and other structures. This zone requires maximum hazard reduction.

**Zone 2** is a transitional area of fuels reduction between Zones 1 and 3.

**Zone 3** is the area farthest from the home. It extends from the edge of Zone 2 to your property boundaries.



Figure 11: Homesite before defensible space. Photo: CSFS



Figure 12: Homesite after creating a defensible space. Photo: CSFS

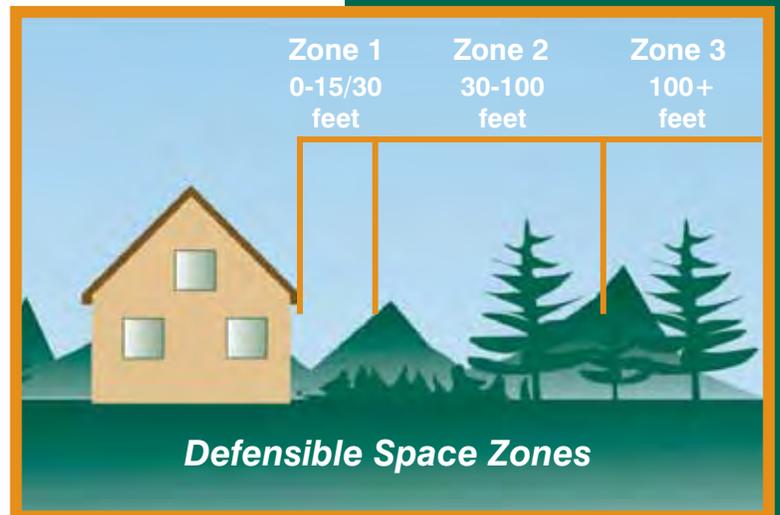


Figure 13: Defensible space management zones. Credit: CSFS

## Zone 1

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

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

- Install nonflammable ground cover and plant nothing within the first 5 feet of the house and deck. This critical step will help prevent flames from coming into direct contact with the structure. This is particularly important if a building is sided with wood, logs or other flammable materials. Decorative rock creates an attractive, easily maintained, nonflammable ground cover.
- If a structure has noncombustible siding (i.e., stucco, synthetic stucco, concrete, stone or brick), widely spaced foundation plantings of low-growing shrubs or other fire-resistant plant materials are acceptable. However, do not plant directly under windows or next to foundation vents, and be sure areas of continuous grass are not adjacent to plantings. Information on fire-resistant plants is available on the CSFS website at [www.csfs.colostate.edu](http://www.csfs.colostate.edu).
- Prune and maintain any plants in Zone 1 to prevent excessive growth. Also, remove all dead branches, stems and leaves within and below the plant.
- Irrigate grass and other vegetation during the growing season. Also, keep wild grasses mowed to a height of 6 inches or less.
- Do not store firewood or other combustible materials anywhere in this zone. Keep firewood at least 30 feet away from structures, and uphill if possible.
- Enclose or screen decks with 1/8-inch or smaller metal mesh screening (1/16-inch mesh is preferable). Do not use areas under decks for storage.
- Ideally, remove all trees from Zone 1 to reduce fire hazards. The more trees you remove, the safer your home will be.
- If you do keep any trees in this zone, consider them part of the structure and extend the distance of the entire defensible space accordingly.
- Remove any branches that overhang or touch the roof, and remove all fuels within 10 feet of the chimney.
- Remove all pine needles and other debris from the roof, deck and gutters.
- Rake pine needles and other organic debris at least 10 feet away from all decks and structures.
- Remove slash, wood chips and other woody debris from Zone 1.

## Zone 2

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



**Figure 14:** *This homeowner worked hard to create a defensible space around the home. Notice that all fuel has been removed within the first 5 feet of the home, which survived the Waldo Canyon Fire in the summer of 2012. Photo: Christina Randall, Colorado Springs Fire Department*



**Figure 15:** *Clearing pine needles and other debris from the roof and gutters is an easy task that should be done at least once a year. Photo: CSFS*



**Figure 16:** *Enclosing decks with metal screens can prevent embers from igniting a house. Photo: Marilyn Brown, La Plata County*

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

## Tree Thinning and Pruning

- Remove stressed, diseased, dead or dying trees and shrubs. This reduces the amount of vegetation available to burn, and makes the forest healthier.
- Remove enough trees and large shrubs to create at least 10 feet between crowns. Crown separation is measured from the outermost branch of one tree to the nearest branch on the next tree. On steep slopes, increase the distance between tree crowns even more.
- Remove all ladder fuels from under remaining trees. Prune tree branches off the trunk to a height of 10 feet from the ground or  $\frac{1}{3}$  the height of the tree, whichever is less.
- If your driveway extends more than 100 feet from your home, thin out trees within a 30 foot buffer along both sides of your driveway, all the way to the main access road. Again, thin all trees to create 10-foot spacing between tree crowns.
- Small groups of two or three trees may be left in some areas of Zone 2, but leave a minimum of 30 feet between the crowns of these clumps and surrounding trees.
- Because Zone 2 forms an aesthetic buffer and provides a transition between zones, it is necessary to blend the requirements for Zones 1 and 3. For example, if you have a tree in Zone 2 with branches extending into Zone 1, the tree can be retained if there is proper crown spacing.
- Limit the number of dead trees (snags) to one or two per acre. Be sure snags cannot fall onto the house, power lines, roads or driveways.
- As in Zone 1, the more trees and shrubs removed, the more likely your house will survive a wildfire.



**Figure 17:** In Zone 2, make sure there is at least a 10-foot spacing between tree crowns. Credit: CSFS

## Shrub Thinning/Pruning and Surface Fuels

- Isolated shrubs may be retained in Zone 2, provided they are not growing under trees.
- Keep shrubs at least 10 feet away from the edge of tree branches. This will prevent the shrubs from becoming ladder fuels.
- Minimum spacing recommendations between clumps of shrubs is  $2\frac{1}{2}$  times the mature height of the vegetation. The maximum diameter of the clumps themselves should be twice the mature height of the vegetation. As with tree-crown spacing, all measurements are made from the edge of vegetation crowns.
- Example – For shrubs 6 feet high, spacing between shrub clumps should be 15 feet or more (measured from the edge of the crowns of vegetation clumps). The diameter of these shrub clumps should not exceed 12 feet.
- Periodically prune and maintain shrubs to prevent excessive growth, and remove dead stems from shrubs annually. Common ground junipers should be removed whenever possible because they are highly flammable and tend to hold a layer of duff beneath them.
- Mow or trim wild grasses to a maximum height of 6 inches. This is especially critical in the fall, when grasses dry out.
- Avoid accumulations of surface fuels, such as logs, branches, slash and wood chips greater than 4 inches deep.



**Figure 18:** Pruning trees will help prevent a wildfire from climbing from the ground to the tree crowns. Credit: CSFS

## Firewood

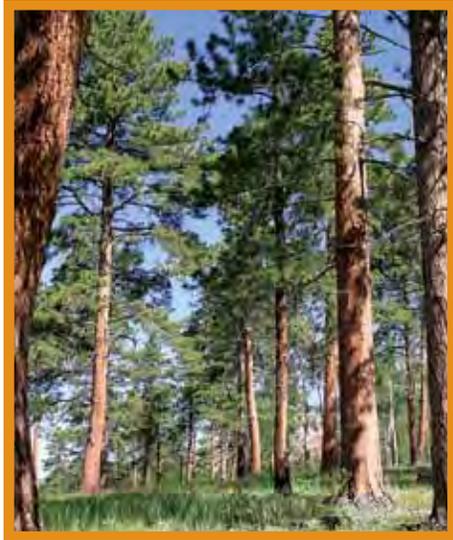
- Stack firewood uphill from or on the same elevation as any structures, and at least 30 feet away.
- Clear all flammable vegetation within 10 feet of woodpiles.
- Do not stack wood against your home or on/under your deck, even in the winter. Many homes have burned as a result of a woodpile that ignited first.

## Propane Tanks and Natural Gas Meters

- Locate propane tanks and natural gas meters at least 30 feet from any structures, preferably on the same elevation as the house.
- The tank should not be located below your house because if it ignites, the fire would tend to burn uphill. Conversely, if the tank or meter is located above your house and it develops a leak, gas will flow downhill into your home.
- Clear all flammable vegetation within 10 feet of all tanks and meters.
- Do not visibly screen propane tanks or natural gas meters with shrubs, vegetation or flammable fencing. Instead, install 5 feet of nonflammable ground cover around the tank or meter.



**Figure 19:** Keep firewood, propane tanks and natural gas meters at least 30 feet away from structures. Photo: CSFS



**Figure 20:** This ponderosa pine forest has been thinned, which will not only help reduce the wildfire hazard, but also increase tree health and vigor. Photo: CSFS

## Zone 3

Zone 3 has no specified width. It should provide a gradual transition from Zone 2 to areas farther from the home that have other forest management objectives. Your local Colorado State Forest Service forester can help you with this zone.

This zone provides an opportunity for you to improve the health of the forest through proper management. With an assortment of stewardship options, you can proactively manage your forest to reduce wildfire intensity, protect water quality, improve wildlife habitat, boost the health and growth rate of your trees, and increase tree survivability during a wildfire.

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

Consider the following when deciding forest management objectives in Zone 3:

- The healthiest forest is one that includes trees of multiple ages, sizes and species, and where adequate growing room is maintained over time.
- Remember to consider the hazards associated with ladder fuels. A forest with a higher canopy reduces the chance of a surface fire climbing into the tops of the trees, and might be a priority if this zone has steep slopes.
- A greater number of snags – two or three per acre, standing or fallen – can be retained in Zone 3 to provide wildlife habitat. These trees should have a minimum diameter of 8 inches. Make sure that snags pose no threat to power lines or firefighter access roads.
- While tree pruning generally is not necessary in Zone 3, it may be a good idea from the standpoint of personal safety to prune trees along trails and firefighter access roads. Or, if you prefer the aesthetics of a well-manicured forest, you might prune the entire area. In any case, pruning helps reduce ladder fuels within tree stands, thus reducing the risk of crown fire.
- Mowing grasses is not necessary in Zone 3.
- Any approved method of slash treatment is acceptable, including piling and burning, chipping or lop-and-scatter.

## Other Recommendations

### Windthrow

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

### Water Supply

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

## Recommendations for Specific Forest Types

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

### Aspen

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

### Lodgepole Pine

Lodgepole pine management in the WUI is much different than that for lodgepole pine forests located away from homes, communities and other developments. Normally, it is best to develop fuels management and wildfire mitigation strategies that are informed and guided by the ecology of the tree species. This is not the case with lodgepole pine.

Older lodgepole pine stands generally do not respond well to selective thinning, but instead respond better to the removal of all trees over a defined area to allow healthy forest regeneration. Selectively thinning lodgepole can open the stand to severe windthrow and stem breakage. However, if your home is located within a lodgepole pine forest, you may prefer selective thinning to the removal of all standing trees.

To ensure a positive response to thinning throughout the life of a lodgepole pine stand, trees must be thinned early in their lives – no later than 20 to 30 years after germination. Thinning lodgepole pine forests to achieve low densities can best be



*Figure 21: During high winds, these lodgepole pine trees fell onto the house. Lodgepole pine is highly susceptible to windthrow. Photo: CSFS*



*Figure 22: Mature aspen stands can contain many young conifers, dead trees and other organic debris. This can become a fire hazard. Photo: CSFS*



*Figure 23: A young lodgepole pine stand. Thinning lodgepole pines early on in their lives will help reduce the wildfire hazard in the future. Photo: CSFS*

**The defensible space guidelines in this quick guide are predominantly for ponderosa pine and mixed-conifer forests. These guidelines will vary with other forest types.**

accomplished by beginning when trees are small saplings, and maintaining those densities through time as the trees mature.

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

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

### **Piñon-Juniper**

Many piñon-juniper (PJ) forests are composed of continuous fuel that is highly flammable. Fire in PJ forests tend to burn intensely in the crowns of trees. Try to create a mosaic pattern when you thin these trees, with a mixture of individual trees and clumps of three to five trees. The size of each clump will depend on the size, health and location of the trees. The minimum spacing between individual trees should be 10 feet between tree crowns, with increasing space for larger trees, clumps, and stands on steeper slopes.

Tree pruning for defensible space is not as critical in PJ forests as in pine or fir forests. Instead, it is more important to space the trees so that it is difficult for the fire to move from one tree clump to the next. Trees should only be pruned to remove dead branches or branches that are touching the ground. However, if desired, live branches can be pruned to a height of 3 feet above the ground. Removing shrubs that are growing beneath PJ canopies is recommended to reduce the overall fuel load that is available to a fire.

It is NOT recommended to prune live branches or remove PJ trees between April and October, when the piñon ips beetle is active in western Colorado. Any thinning activity that creates the flow of sap in the summer months can attract these beetles to healthy trees on your property. However, it is acceptable to remove dead trees and dead branches during the summer months.

For more information, please refer to the CSFS [Piñon-Juniper Management Quick Guide](http://www.csfs.colostate.edu) at [www.csfs.colostate.edu](http://www.csfs.colostate.edu).

### **Gambel Oak**

Maintaining Gambel oak forests that remain resistant to the spread of wildfire can be a challenge because of their vigorous growing habits. Gambel oak trees grow in clumps or groves, and the stems in each clump originate from the same root system. Most reproduction occurs through vegetative sprouts from this deep, extensive root system. You may need to treat Gambel oak near your home every five to seven years. Sprouts also should be mowed at least once every year in Zones 1 and 2. Herbicides can be used to supplement mowing efforts for controlling regrowth.

For more information, please refer to the CSFS [Gambel Oak Management](http://www.csfs.colostate.edu) publication at [www.csfs.colostate.edu](http://www.csfs.colostate.edu).

*Note: This publication does not address high-elevation spruce-fir forests. For information on this forest type, please contact your local CSFS district office.*



**Figure 24:** Piñon-juniper forests are often composed of continuous fuels. Creating clumps of trees with large spaces in between clumps will break up the continuity. Photo: CSFS



**Figure 25:** Gambel oak needs to be treated in a defensible space at least every 5-7 years because of its vigorous growing habits. Photo: CSFS

## Maintaining Your Defensible Space

Your home is located in a dynamic environment that is always changing. Trees, grasses and shrubs continue to grow, die or are damaged, and drop their leaves and needles each season. Just like your home, the defensible space around it requires regular, ongoing maintenance to be effective. Use the following checklists to build and maintain your defensible space.

### Defensible Space: Initial Projects

- Properly thin and prune trees and shrubs within Zones 1 and 2.
- Dispose of slash from tree/shrub thinning.
- Screen attic, roof, eaves and foundation vents, and periodically check them to ensure that they are in good condition.
- Screen or wall-in stilt foundations and decks; screens should be 1/8-inch or smaller metal mesh (1/16-inch mesh is best).
- Post signs at the end of the driveway with your last name and house number that are noncombustible, reflective and easily visible to emergency responders.
- Make sure that the driveway is wide enough for fire trucks to enter and exit, and that trees and branches are adequately cleared for access by fire and emergency equipment. Contact your local fire department or check the CSFS website for information specific to access.
- Take pictures of your completed defensible space for comparison of forest growth over time.



**Figure 26:** Keeping the forest properly thinned and pruned in a defensible space will reduce the chances of a home burning during a wildfire. Photo: CSFS

### Defensible Space Tasks: Annual Requirements

- Clear roof, deck and gutters of pine needles and other debris. \*
- Mow grass and weeds to a height of 6 inches or less. \*
- Rake all pine needles and other flammable debris away from the foundation of your home and deck. \*
- Remove trash and debris accumulations from the defensible space.\*
- Check fire extinguishers to ensure that they have not expired and are in good working condition.
- Check chimney screens to make sure they are in place and in good condition.
- Remove branches that overhang the roof and chimney.
- Check regrowth of trees and shrubs by reviewing photos of your original defensible space; properly thin and prune trees and shrubs within Zones 1 and 2.
- Dispose of slash from tree/shrub thinning. \*

\*Address more than once per year, as needed.

### Be Prepared

- Complete a checklist of fire safety needs inside your home (these should be available at your local fire department). Examples include having an evacuation plan and maintaining smoke detectors and fire extinguishers.
- Develop your fire evacuation plan and practice family fire drills. Ensure that all family members are aware of and understand escape routes, meeting points and other emergency details.
- Contact your county sheriff's office and ensure that your home telephone number and any other important phone numbers appear in the county's Reverse 911 or other emergency notification database.
- Prepare a "grab and go" disaster supply kit that will last at least three days, containing your family's and pets' necessary items, such as cash, water, clothing, food, first aid and prescription medicines.
- Ensure that an outdoor water supply is available. If it is safe to do so, make a hose and nozzle available for responding firefighters. The hose should be long enough to reach all parts of the house.



**Figure 27:** Sharing information and working with your neighbors and community will give your home and surrounding areas a better chance of surviving a wildfire. Photo: CSFS

Preparing your home and property from wildfire is a necessity if you live in the wildland-urban interface. It is important to adequately modify the fuels in your home ignition zone. Remember, every task you complete around your home and property will make your home more defensible during a wildfire.

Always remember that creating and maintaining an effective defensible space in the home ignition zone is not a one-time endeavor – it requires an ongoing, long-term commitment.

If you have questions, please contact your local CSFS district office. Contact information can be found at [www.csfs.colostate.edu](http://www.csfs.colostate.edu).

## List of Additional Resources

- The Colorado State Forest Service, <http://www.csfs.colostate.edu>
- CSFS wildfire-related publications, <http://csfs.colostate.edu/pages/wf-publications.html>
- Community Wildfire Protection Planning, <http://csfs.colostate.edu/pages/community-wf-protection-planning.html>
- Colorado's "Are You FireWise?" information, <http://csfs.colostate.edu/pages/wf-protection.html>
- National Fire Protection Association's Firewise Communities USA, <http://www.firewise.org>
- Fire Adapted Communities, <http://fireadapted.org/>
- Ready, Set, Go!, <http://wildlandfirersg.org/>



**Figure 28:** *This house has a high risk of burning during an approaching wildfire. Modifying the fuels around a home is critical to reduce the risk of losing structures during a wildfire. Photo: CSFS*



**Figure 29:** *This house survived the Fourmile Canyon Fire in 2010. Photo: CSFS*



**Figure 30:** *Firefighters were able to save this house during the 2012 Weber Fire because the homeowners had a good defensible space. Photo: Dan Bender, La Plata County*

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# **FireWise Construction:** *Site Design & Building Materials*

*Based on the 2009 International Wildland-Urban Interface Code*



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David developed sections 4 and 5 of this publication based on the 2009 International Wildland-Urban Interface Code.

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Tim was the main author of the first three sections of this publication.

## Dedication

**Peter Slack** of Boulder, Colo., was a practicing architect for 26 years, until his untimely death in June 2000. Peter designed many homes and other buildings in the wildland-urban interface (WUI). His designs emphasized the integration of fire-resistive elements with other important design principles, such as proper site development for limited impact, low energy and water consumption, and the use of appropriate, resource-conserving materials.

Peter developed the first iteration of this publication in 1999.

## Acknowledgements

Our thanks to the following for reviewing publication drafts:

Steve Quarles, Insurance Institute for Business and Home Safety

Chris Jennings, APA - The Engineered Wood Association

## Special thanks to:

Judy Serby, Conservation Education Program Manager, and Katherine Timm, Outreach Division Supervisor, Colorado State Forest Service, for providing leadership in the production of this report.

*December 2012*

## Introduction

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

This publication addresses both defensible space and structural ignitability.

Sections 1 – 3 are based on a recent publication developed by the Colorado State Forest Service, *Protecting Your Home from Wildfire: Creating Wildfire-Defensible Space*.

Sections 4 and 5 are based on the *2009 International Wildland-Urban Interface Code*.

In 2003, a growing awareness of wildfire risk led the International Code Council (ICC) to publish the first edition of the International Wildland-Urban Interface Code (IWUIC). This was the culmination of an effort initiated in 2001 by the ICC and the three statutory members of the International Code Council: Building Officials and Code Administrators International, Inc. (BOCA), International Conference of Building Officials (ICBO) and Southern Building Code Congress International (SBCCI). The intent was to draft a comprehensive set of regulations for mitigating hazards to life and property from the intrusion of fire resulting from wildland exposures and adjacent structures, and preventing structure fires from spreading to wildland fuels. Technical content of the 2000 Wildland-Urban Interface Code, published by the International Fire Code Institute, was used as the basis for development of the initial draft, followed by the publication of the 2001 final draft.

This updated publication is based on the 2009 IWUIC. It provides criteria for establishing an area's fire hazard severity as moderate, high or extreme, and spells out prescriptive measures for building within those zones. Local jurisdictions often use the IWUIC or adopt something similar for their communities. It is hoped that the information presented will help homeowners, designers and builders understand the unique issues associated with structure construction in the wildland-urban interface and encourage consistency in the application of provisions.



# Table of Contents

## 1. Wildfire in Colorado. . . . . 1

- What is the Wildland-Urban Interface?
- Fire suppression and increased fuels
- How can we protect our homes?
- Fire intensity and duration related to the fire resistance of a structure
- Evaluating fire hazard

## 2. Fire Behavior: Fuels, Topography and Weather. . . . . 4

- Wildfires and burning structures
- Vegetation is the fuel for wildfires
- Fire duration and fuel
- Fire behavior and slope
- Fire behavior, ignition of fuels: mechanisms of heat transfer
- Convective lifting
- Indirect: convective heating
- Radiant heating
- Direct contact or impingement
- Weather

## 3. Building-site Location and Landscaping . . . . . 9

- Topography and vegetation: fire behavior and intensity
- Aspect
- Dangerous topographic features: areas of more intense fire behavior
- Natural barriers and buffer zones
- Effects on structure location and design decisions
- Site design and modifications to the forest: developing a defensible space

## 4. Building Design . . . . . 13

- Simple vs. complex forms
- Aspect ratio
- Vents, eaves, soffits, gutters, downspouts and decks
- Ignition-resistant construction class

## 5. Building Materials and Components . . . . . 21

- Ratings
- Roofing
- Siding
- Windows and glass
- Doors

## 6. Summary . . . . . 31

## References and Additional Resources . . . . . 32



# 1. Wildfire in Colorado

This publication was developed to provide homeowners, building designers/builders and landscape architects with design, building and landscaping techniques for additional protection from wildfires in the wildland-urban interface (WUI).

It is not always possible to control a wildfire. Under extreme conditions, wildfires can threaten homes and other structures, infrastructure and evacuation routes. Planning and preparation can make the difference in personal safety and home protection.

## What is the wildland-urban interface?

The wildland-urban interface (WUI) is any area where structures and other human development meets or intermingles with wildland vegetative fuels.

Population growth in the WUI has increased, especially in the Western U.S. The expansion of subdivisions and other high-density developments has created conditions under which local fire departments cannot possibly protect all structures during a wildfire.



## Fire suppression and increased fuels

Past fire suppression and limited forest management have produced dangerous accumulations of fuels, causing hotter and more intense fires when they burn. The arrangement of these fuels causes fire to travel to the top of the forest, rather than staying close to the ground. These crown fires are extremely threatening to soils, habitat, property and people.

In some of Colorado's forests, naturally occurring low-intensity wildfires periodically burned through stands of trees, removing fuels and thinning out excess vegetation.

As population in the WUI has increased, so too has the difficulty of protecting that population. When fires occur in the WUI, they are suppressed to prevent the destruction of homes and other values at risk. This creates a problem because historically, some forests have depended on fire to maintain good health. Fire can thin trees and brush, and eliminate dead material. By fighting wildfires to protect homes and people, this natural process has been altered and vegetation density has increased, which provides more fuel for fires. When fires occur, the dense vegetation can burn more intensely, making it more destructive and dangerous.

## How can we protect our homes?

Construction in virtually every jurisdiction in the United States is regulated by building codes for the purpose of providing minimum public health and safety standards. Non-governmental model building code organizations, such as the International Code Council (ICC) and the National Fire Protection Association (NFPA), develop and maintain model building codes for use by state and local jurisdictions. A model building code is not enforceable until it is adopted by a state or local jurisdiction, with or without amendments, and becomes law. Several states, including Colorado, are "home-rule states." Under home rule, local governments have the ability to establish their own sets of codes and standards specific to their community. Because Colorado is a home-rule state and no statewide building code has been enacted as law, local jurisdictions adopt and/or adapt their own codes.

Typically, model codes allow the use of given building materials, while creating the parameters under which the material can be used. The concepts presented in this publication are based on the 2009 International Wildland-Urban Interface Code (IWUIC), the most widely adopted code addressing the WUI in the United States.

This comprehensive WUI code establishes minimum regulations for land use and the built environment in designated WUI areas, using prescriptive and performance-related provisions. It is founded on data collected through tests and fire incidents, technical reports and mitigation strategies from around the world. The IWUIC references the International Building Code (IBC), rather than the International Residential Code (IRC), the code most often adhered to by builders for home construction. This is because the IRC does not address several of the fire-resistive construction concepts that are necessary to meet the Ignition-Resistance Construction Classification. (*Ignition-resistant building materials are those that sufficiently resist ignition or sustained flaming combustion to reduce losses from WUI conflagrations under worst-case weather and fuel conditions with wildfire exposure to burning embers and small flames.*)

### **This publication offers a two-part approach to the problem:**

1. Build more ignition-resistant structures, and
2. Reduce hazardous forest fuels.

A combination of site/landscape management techniques and appropriate construction materials are necessary to build more ignition-resistant structures in the WUI. The goal is to create structures that can either resist fire on their own, or at least make it easier for firefighters to safely protect structures. Building a noncombustible structure, as often is done in urban settings, can be prohibitively expensive; this publication discusses a combination of cost-effective strategies that increase the probability a structure will survive a wildfire.

Solutions to problems in the WUI involve a two-part approach: Make structures more ignition-resistant and reduce surrounding wildland fuels. Choosing the best combination of these two strategies for a particular site requires a basic understanding of wildfire behavior.

- If we leave the surrounding wildland in its current state, we need to build structures that are resistant to fire. Noncombustible structures are very expensive to build.
- Trying to provide a defensible space large enough for a typical wood-frame structure may not be practical or desirable.

Another goal of this publication is to give homeowners, designers and builders a better understanding of how buildings in the WUI ignite during a wildfire. With this information, it is possible to make better choices when selecting building techniques and materials. However, fire is only one of many factors to consider during construction. There is no single approach, and using alternative materials or landscape management techniques is always possible.

Awareness of the unique issues landowners face when building in the WUI will help direct them toward a more comprehensive solution during the design process. Some design elements and materials may help mitigate fire hazards; some may not. It is possible, however, to compensate for less desirable fire protection choices and still meet design goals.

## Fire intensity and duration related to the fire resistance of structures

How ignition-resistant should a structure be? The answer to this question depends on fire intensity (how hot the fire burns) and fire duration (how long the fire will last at your site). If the fire hazard is low to moderate, only a few precautions may be necessary. If the fire hazard is high or extreme, most, or all, of the strategies described may be necessary.

In Colorado, almost any area surrounded by natural vegetation faces some hazard due to wildfire. In mountainous regions between elevations of 5,000 and 10,000 feet, fire hazard increases due to topography and increased vegetation density.

## Ember propagation potential in relation to structures

Burning embers, have caused the loss of many homes in the WUI. Embers in wildfires are produced when conifer trees are consumed by the fire. In WUI fires, burning structures also can be sources of burning embers. Flammable horizontal surfaces, such as wooden decks or shake roofs, are especially at risk for ignition from burning embers.

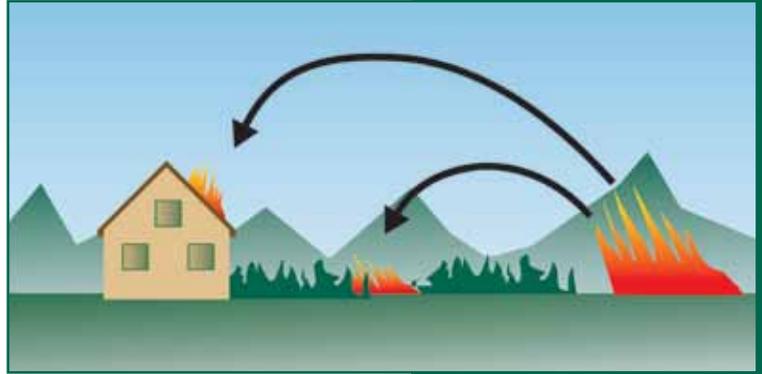


Figure 1-1: Fire brands, transported by convective lifting, create spot fires

## Evaluating fire hazards

An effective way to determine the specific fire hazard severity in an area is to look at a fire hazard map or study located in the county building or land use department. Your local fire protection district also may have information. The code officially establishes the fire hazard severity of your site based on section 502.1 (Appendix C) of the IWUIC. If this information is not immediately available, use Figure 1-2 to determine the hazard level of your site.

*This short evaluation is based on the Wildland Home Fire Risk Meter developed by the National Wildfire Coordinating Group.*

*Note: The term fire hazard severity in this publication refers to material elements used in building design and the actual design itself.*

| Slope   | Score                |
|---|----------------------|
| Level   | 0                    |
| 0° - 10°  | 1                    |
| 10° - 20°   | 2                    |
| 20° - 30°   | 3                    |
| 30°+  | 4                    |
| Vegetation  |                      |
| water, rock or bare ground  | 0                    |
| grass, shrub, less than 2 feet with no trees  | 1                    |
| grass, shrub, less than 4 feet, widely scattered trees  | 2                    |
| dense young shrubs, no dead wood or trees   | 2                    |
| many trees, touching, some grass and brush  | 3                    |
| dense shrubs with some trees  | 3                    |
| thick, tall grass   | 3                    |
| dense evergreen trees with grass and shrubs   | 4                    |
| dense mature shrub with dead branches   | 4                    |
| After selecting the appropriate slope and vegetation scores, add them together to determine the fire hazard severity. |                      |
| Scores  | Fire Hazard Severity |
| 0 - 2   | low                  |
| 3 - 4   | moderate             |
| 5 - 6   | high                 |
| 7 - 8   | extreme              |

Figure 1-2: Fire hazard severity ratings

## 2. Fire Behavior: Fuels, Weather and Topography

### Wildfires and the nature of burning structures

#### Wildfires can ignite structures in two ways:

1. Direct flame contact with a moving fire. The fire behavior factors that influence a structure's potential for ignition are fire intensity and duration of flame contact.
2. An ignition started by a burning ember landing on a flammable surface, such as a shake roof or wooden deck.

Understanding the potential fire behavior, especially intensity, duration and ember deposition at a building site, will help homeowners, designers and builders determine how ignition-resistant a structure needs to be.

Wildfires have been studied in great detail to help predict fire behavior. Predicting fire intensity, rate of spread, duration, direction and spot-fire production is important for firefighter safety and is the basis for tactical decisions made during the suppression of a fire.

#### Three factors affect wildfire behavior in the WUI:

1. **Fuels:** The type, continuity and density of surrounding vegetation and, sometimes, flammable structures, provide fuel to keep the fire burning.
2. **Weather:** Wind, relative humidity and atmospheric stability all affect potential fire behavior.
3. **Topography:** The steepness and direction of slopes, and building-site location in relation to topography are features that affect fire behavior.

### Fuels are anything that burns in a fire

#### Wildland fuels are divided into four categories:

1. Grass
2. Brush or shrubs
3. Timber
4. Woody debris

All plants can burn under extreme conditions, such as drought; however, plants burn at different intensities and rates of consumption. The type and density of a specific plant determines how it will burn. Some vegetation rarely burns, while other vegetation burns at different times of the year; and some can burn almost anytime. The amount of moisture in the fuels is the biggest factor affecting flammability.

**Grasses:** Grass primarily exists in two conditions – green and cured. When grass is green, moisture content is high enough to prevent or decrease fire spread. Firefighters sometimes use green meadows and lawns as safety zones. As the year progresses, plants enter a dormant state and the residual surface vegetation dies. Cured grass has the potential to promote extreme fire rates of spread (ROS); grass fuels have the highest potential ROS of any fuels. Another hazard associated with cured grass is the potential for a rapid decrease in fuel moisture; the ability of air to circulate through standing grass allows the grass to dry rapidly and can result in sudden changes in fire behavior.

**Brush:** Brush fires spread slower than grass fires, but burn at a higher intensity. The most common flammable brush species in Colorado are oak brush and sagebrush. Brush is least flammable in late spring when new growth occurs.

**Timber:** Timber burns in two manners – as surface fires and crown fires. Surface fires consume fuels on the forest floor without burning trees, although trees may burn individually, which is called torching. Crown fires occur when entire stands of trees are totally consumed. These fires are the most intense, but tend to move less rapidly than other types of fire. Coniferous trees are more susceptible to crown fire than deciduous trees. Torching and crown fires are the major source of ember production, which can start new fires (spot-fires) in vegetation and structures downwind.

**Woody debris:** Dead logs, branches and sticks on the ground surface are referred to as woody debris. Debris can result from human activity, such as thinning, or from natural processes, such as wind-throw or beetle-killed trees that have fallen to the ground. Wildfires in these fuels vary greatly, but can produce high-intensity, slow-moving fires that are very difficult to control. Colorado's mountain pine beetle epidemic will result in a major increase in woody debris over large areas.

**Complexes:** More than one fuel component is present in most wildland areas. Areas containing these fuel complexes are more common than those represented by a single fuel component.

**Structures:** The effect of a burning structure can significantly impact wildfire behavior. Structures burn with extreme intensity, often launching large burning embers over long distances.

**Fuels and fire duration:** Fire duration refers to the length of time a wildfire will burn under certain conditions. Fuel type, quantity, temperature and moisture content determine the duration of a fire. Building structures that will resist fires for any length of time is dependent on a good understanding of local conditions that contribute to the duration of fire in a particular area. Different building materials can resist fire for different time periods.

## Climate and Weather

**Climate:** Fire seasons in Colorado's high country and on the Western Slope tend to last from late spring until mid-autumn. Fire seasons on the Front Range and Eastern Plains tend to be split, with most large fires occurring in the spring or fall. It's important to keep in mind that these are generalizations and that large fires can occur anytime conditions are right. The most likely fire season depends on the geographical location of the building site.

Weather is a major factor that affects fire behavior and is highly variable in terms of time, intensity and location. Weather can change dramatically in a short period of time, resulting in rapid changes in fire behavior.

**Wind:** Surface winds are the most important element in determining fire direction and rate of spread. Wind pushes flames into adjacent fuels, facilitating rapid ignition, and tends to be the common theme in large fire events. High-velocity, warm, dry, down-slope winds, such as a Chinook, can cause fuels to dry rapidly, resulting in extreme fire behavior.

**Relative Humidity (RH):** RH is a measure of how much moisture is in the air compared to the maximum amount of moisture the atmosphere can hold at that temperature. RH has a major influence on the moisture content of dead fuels. The smaller the dead fuel, the faster it will react to a change in the RH. Cured grass can dry out in less than 15 minutes when a dry air mass moves into an area. Firefighters generally monitor RH on an hourly basis when fighting a fire.

**Temperature:** Before combustion can occur, fuels must reach ignition temperature (approximately 450° F); fuels heat up and reach ignition temperature more quickly on hot days. In addition, when fuels are preheated, fire expends less energy and will burn at a higher intensity.

## Topography and Fire Behavior

Topography is the shape of the land's surface. It influences fire behavior by the effects it has on wind, temperature, moisture and the preheating of fuels.

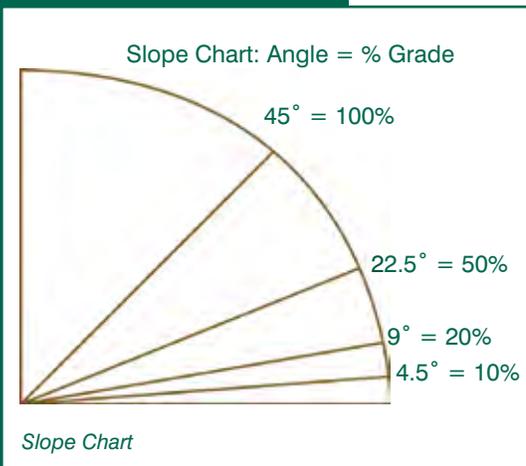


Figure 2-1: Slope chart

**Slope:** Defined as the angle of the ground relative to the horizon, slope commonly is measured in degrees or as a percent. On calm days, heated air, including flames, rises and preheats the fuels upslope, which causes an increase in fire spread. On gentle slopes, preheating has little effect on fire behavior, but on steep slopes, the effect can be significant. During summer months, preheating generally causes winds to blow upslope. The combined effect of slope and wind results in rapid fire spread.

**Aspect:** Aspect is the direction the slope faces. South and southwest aspects are warmer and drier than north and northeast aspects.

**Saddles and Chimneys:** A saddle is a low spot on a ridge. A chimney is a gully or drainage that goes up a slope. Both saddles and chimneys funnel winds and increase fire spread and intensity.

Structures located on steep slopes or in saddles or chimneys require more ignition-resistant components and/or larger defensible space.

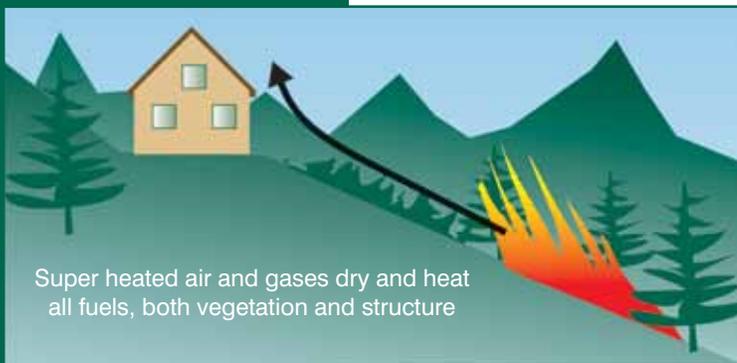


Figure 2-2: Super heated air and gases rise and heat fuels

### Fire behavior and ignition of fuels: heat transfer mechanisms

As fuels burn, they release hot gas in the form of flames and smoke. These gases rise and move with the wind. Sometimes embers are carried aloft by this convective lifting. These hot gasses also heat fuels in which they come in contact, bringing those fuels closer to their ignition point. Fires also produce large amounts of radiant energy (like the sun), which heats surrounding fuels. Ignition occurs more easily once flames make contact with the vegetation. This, in turn, accelerates the rate at which the fire moves and increases in intensity.

Several heat-transfer mechanisms from a wildfire are involved in the ignition of a structure:

- Radiant heating that results in an ignition or heats a flammable surface makes structures more susceptible to ignition from another source.
- Direct flame contact with a flammable portion of the structure can cause ignition.
- Convective lifting resulting in ember deposition on a flammable surface can cause ignition.

Understanding these processes will help design structures and landscapes that reduce wildfire risk.

## Indirect: radiant heating

The transfer of heat by radiant energy from fire can preheat or even ignite structures. This is the same process that occurs when sunlight heats an object. Radiant heat transfer occurs on a straight line of sight and is not affected by wind.

Vertical surfaces, such as siding, can ignite as a result of this process before fire actually reaches the structure. Curtains can ignite from radiant heat transferred through windows. Torching trees and crown fires nearby can cause high levels of radiant heat for short to moderate durations. Adjacent burning structures create intense radiant heat for long durations. And once ignited, large, heavy fuels burn at high temperatures that amplify radiant energy, creating more potential for ignition through heat transfer.

Radiant energy decreases with distance. It follows the inverse square rule shown in Figure 2-4. Doubling the distance from the heat source will reduce radiant heat by significantly more than half. A torching tree 10 feet from a structure will produce four times more radiant heat than the same tree torching 20 feet from a structure. Radiant heat energy decreases dramatically with increased distance.



Figure 2-3: Radiant heating

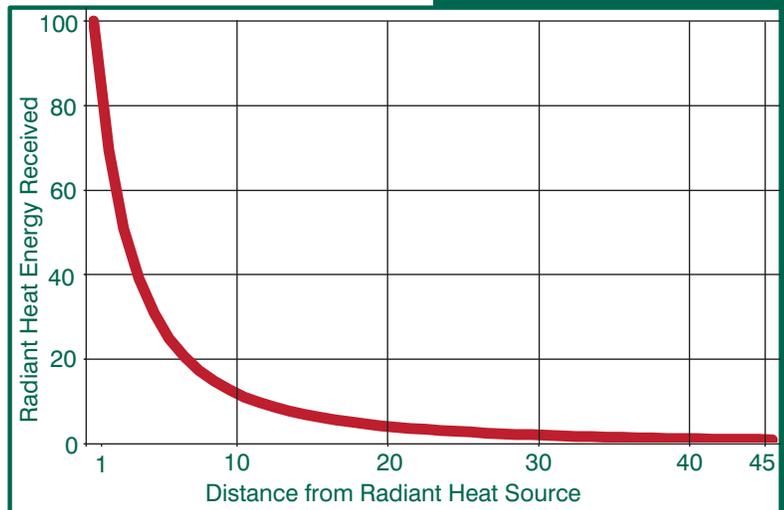


Figure 2-4: Radiant energy decreases with increased distance

## Direct contact or impingement

Unmanaged vegetation adjacent to a structure provides continuous and abundant fuels, which can ignite flammable building surfaces. Creating defensible space and fuelbreaks around a structure is specifically intended to reduce this effect.



Figure 2-5: Fire directly impinging on a house

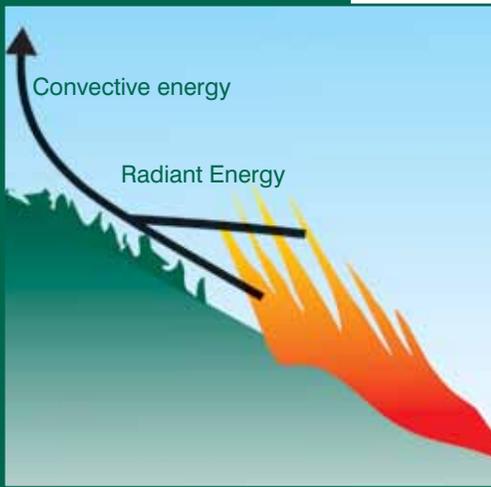


Figure 2-6: Convective and radiant energy from a fire

### Convective lifting

Fire produces hot gases that rise into the atmosphere. During a wildfire, this atmospheric effect can be very strong, even causing its own wind as cooler air rushes in to replace the rising hot air.

Convective air currents also lift burning materials or embers. Winds can carry embers horizontally for long distances from the fire.

Embers can fall onto horizontal surfaces, such as combustible roofs, decks and dry vegetation around structures. When this results in a new ignition, it is called spotting and can be very widespread. Embers often travel hundreds or even thousands of feet ahead of the actual fire.

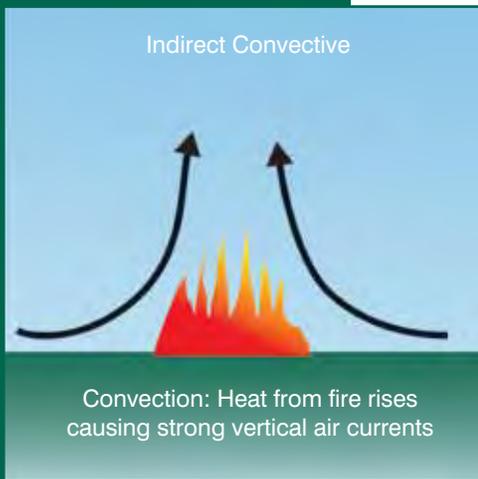


Figure 2-7: Convective lifting

### Indirect: convective heating

The same hot air and gasses that dry and preheat vegetation have the same effect on structures, predisposing combustible materials to ignition as the fire gets closer.

### 3. Building-site Location and Landscaping

#### Topography and vegetation: fire behavior and intensity

Structure location influences the potential fire intensity and duration to which that structure may be exposed. The information in the fire behavior section (Section 2) discussed how to estimate fire intensity and duration. This information can be used to determine the building site that will allow the highest probability of survival in the event of a wildfire. When choosing a site or determining the level of ignition resistance a structure requires, homeowners, designers and builders should be aware of how local vegetation and topographic variations affect fire behavior.

#### Aspect

Aspect is the direction that the slope faces. Vegetation varies widely between the extremes of south-facing and north-facing slopes.

South and west slopes tend to have the least vegetation because they quickly dry out and have less available moisture for plants. Southwest slopes tend to have the fastest moving fires.

East aspects generally have more vegetation than southwest slopes and tend to dry out in later in the summer.

North slopes typically have the densest vegetation because there is more water available for plants. Because the moisture content of the vegetation on north slopes is higher, fires tend to burn with less intensity. However, when fires occur during times of drought, they can burn with greater intensity because of the increased amount of fuels.

#### Dangerous topographic features: areas of more intense fire behavior

Variations in topographic features such as valleys, ridges, canyons and saddles present hazards that further intensify or attract fires. A **valley**, as a concave form, tends to collect and concentrate winds. This means that the intensity of a wildfire can increase as it moves through a valley. In **canyons**, this effect is even more pronounced. **Ridges** experience more wind primarily because they are elevated above the surrounding land. When a fire moves up a slope toward a ridge, it gathers speed and intensity. A low point between the higher parts of a ridge is called a saddle. Like a valley, saddles will channel, intensify and increase the fire's rate of spread. These areas often are popular building sites because they offer some shelter and tend to be flat. **Saddles** are natural pathways for fire; fire often travels first and with increased intensity in saddles. As wind crosses a ridge, a leeward eddy can occur, where the wind rolls around and comes up the leeward side, exposing both sides of a structure to wind and fire. Ridges usually offer no protection from fire.

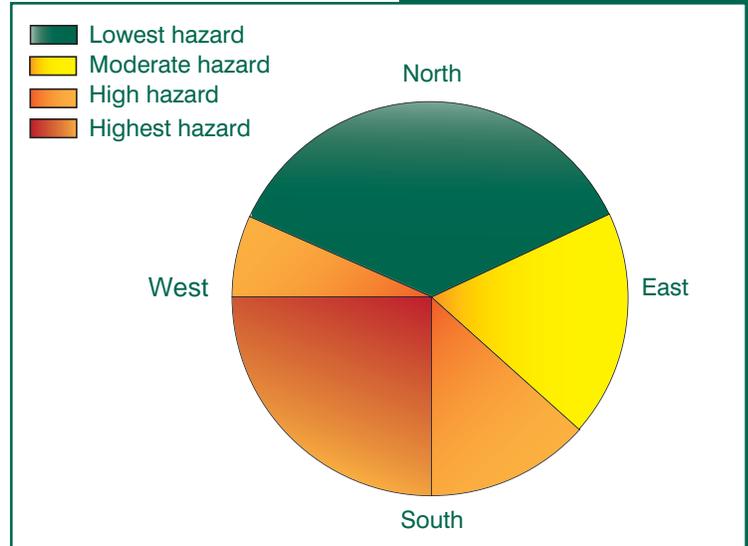


Figure 3-1: Fire hazard varies widely from aspect to aspect

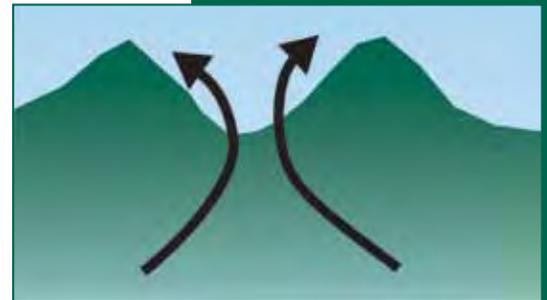


Figure 3-2: Saddle, or low area, on a ridge



Figure 3-3: Ridge with wind exposure

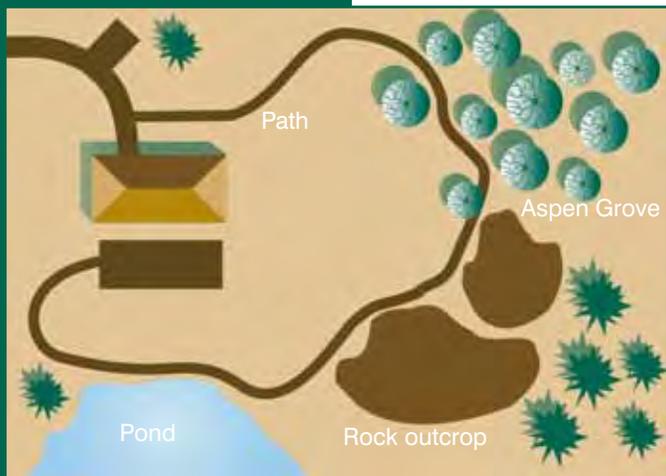


Figure 3-4 Site: House located relative to natural features that buffer against fire

## Natural barriers and buffer zones

Some physical features reduce fire behavior and can be used to slow, reduce or deflect a fire. Examples include natural rock outcroppings, wetlands, streams, lakes and deciduous tree stands, (aspen, cottonwood, etc). It is advantageous to locate the structure between the natural barrier and the anticipated path of a fire. Some areas, such as meadows or lawns, can be barriers at certain times of the year, but serve as fuels after they cure.

## How this affects building location and design decisions

On large parcels of land, consider the physical features previously discussed when choosing the final location of a structure. Many factors will affect decisions regarding building-site location, such as privacy, views, access and aesthetic values; fire is just one of these factors. Determining whether fire is the primary consideration will depend on the severity of the fire hazard in the area.

On smaller parcels, only one suitable building location may exist. The physical features of the site will determine the probable fire intensity and dictate what combination of site modifications and fire protection is necessary to prevent the structure from igniting.

## Site Evaluation, Design, and Modifications to the Vegetation

When selecting a building site, several questions should be answered:

1. Is there adequate ingress and egress in the event of a fire?
2. Can fire engines and other emergency equipment safely access the property?
3. Can close-in fuels be modified to reduce fire potential (defensible space)?
4. What is the potential fire behavior and ember production in the fuels further out?

After evaluating the fire hazard severity of a site, develop a plan to manage the surrounding vegetation and defensible space. This is the first part of the two-part strategy to build an ignition-resistant structure. Defensible space is defined as an area where material capable of allowing a fire to spread is modified to slow the rate and intensity of an advancing wildfire, and create an area for firefighters to safely work. It also can work in reverse by helping to prevent a structure fire from spreading to surrounding vegetation.

In diagramming the features of a building site, it is apparent that the features gradually shift from man-made to natural, as the distance increases from the structure into the wildland; this area should be divided into zones. Developing a defensible space plan requires an inventory of the existing site features and their hazards. Man-made elements include landscaping features, such as masonry walls, patios, footpaths and driveways. These features create fire barriers and buffer zones. Three zones need to be addressed when creating defensible space:

**Zone 1** is the area nearest the home and requires maximum hazard reduction.

**Zone 2** is a transitional area of fuels reduction between Zones 1 and 3.

**Zone 3** is the area farthest from the home, where traditional forest management techniques should be used. It extends from the edge of Zone 2 to the property boundaries.

**Zone 1** – The width of Zone 1 extends a distance of 15 - 30 feet minimum from a structure depending on property size. Increasing the distance of Zone 1 will increase structural survivability. This distance should be increased five or more feet for fuels downhill from a structure. Remove most flammable vegetation, with the possible exception of a few low-growing shrubs or FireWise plants (plants that are comparatively fire resistant). Avoid landscaping with common ground junipers. The distance should be measured from the outside edge of the home's eaves and any attached structures, such as decks. Several specific treatments are recommended within this zone:

- Install nonflammable ground cover and plant nothing within the first 5 feet of the structure and deck.
- If a structure has noncombustible siding (i.e. stucco, synthetic stucco, concrete, stone or brick), widely spaced foundation plantings of low-growing shrubs or other FireWise plant materials are acceptable. Do not plant directly under windows or next to foundation vents.
- Prune and maintain plants and remove all dead branches, stems and leaves within and below the plant.
- Irrigate grass and other vegetation during the growing season if possible. Keep grasses mowed to a height of 6 inches or less.
- Do not store firewood or other combustible materials in this zone. Keep firewood at least 30 feet away from structures, uphill if possible.
- Enclose or screen decks with at least 1/8-inch metal screening (1/16-inch is preferable). Do not use areas under decks for storage.
- Ideally, remove all trees from Zone 1 to reduce fire hazards. The more trees you remove, the safer the home will be. If you do retain any trees, consider them part of the structure and extend the distance of the entire defensible space accordingly.
- Remove any branches that overhang or touch the roof, and remove all fuels within 10 feet of the chimney.
- Remove all needles and other debris from the roof, deck and all gutters.
- Rake needles and other debris at least 10 feet away from all decks and structures.
- Remove slash, chips other woody debris from Zone 1.

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

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

- Remove stressed, diseased, dead or dying trees and shrubs.
- Remove enough trees and large shrubs to create at least 10 feet between crowns. Crown separation is measured from the farthest branch of one tree to the nearest branch on the next tree. On steep slopes, increase the distance between tree crowns.

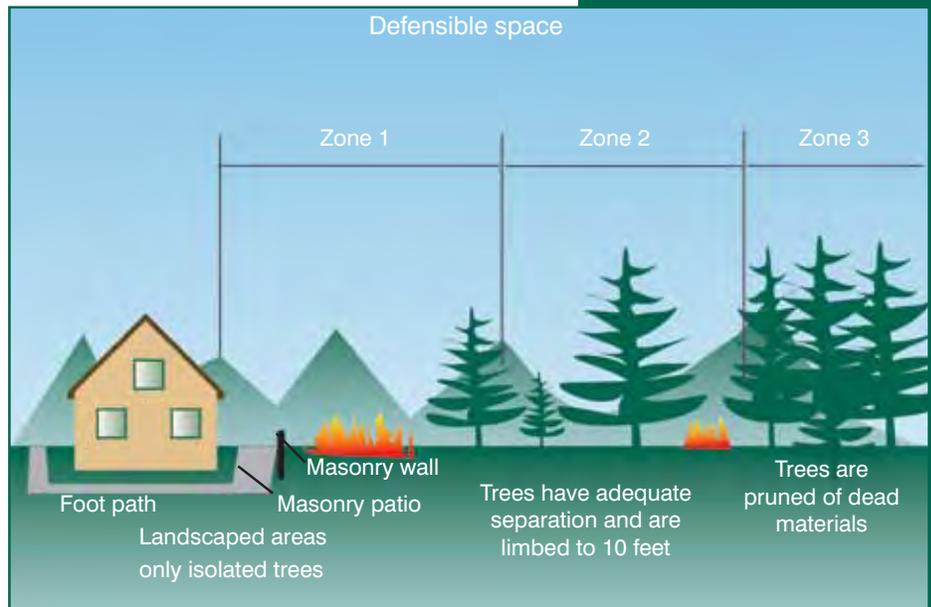


Figure 3-5: Defensible space

- Remove all ladder fuels from under remaining trees. Prune tree branches to a height of 10 feet from the ground or 1/3 the height of the tree crown, whichever is less.
- Extend tree thinning out 30-feet along both sides of your driveway all the way to the main access road, even if it is over 100 feet from your home. Thin all trees to create 10-foot spacing between tree crowns.
- Small groups of two to three trees may be left in some areas of Zone 2, but leave a minimum of 30 feet between the crowns of these clumps and surrounding trees.
- As noted in Zone 1, the more trees and shrubs removed, the more likely the structure will be spared in a wildfire.
- Isolated shrubs may remain, provided they are not under trees.
- Keep shrubs at least 10 feet away from the edge of tree branches. This will prevent the shrubs from becoming ladder fuels.
- Minimum spacing recommendations between clumps of shrubs is 2 1/2 times the mature height of the vegetation. The maximum diameter of the clumps themselves should be twice the mature height of the vegetation. As with tree-crown spacing, all measurements are made from the edge of vegetation crowns.
- Periodically prune and maintain shrubs to prevent excessive growth; remove dead stems from shrubs annually.
- Mow or trim grasses to a maximum height of 6 inches. This is critical in the fall when grasses dry out.
- Avoid accumulations greater than 4 inches deep of surface fuels such as logs, branches, slash and chips.
- Stack firewood and woodpiles uphill from or on the same elevation as any structures, and at least 30 feet away.
- Clear, mow and remove all flammable vegetation within 10 feet of woodpiles.
- Do not stack wood against your home or on/under your deck, even in winter.
- Locate propane tanks and natural gas meters at least 30 feet from any structures, preferably on the same elevation as the structure. The containers should not be located below your home because if it ignites, the fire would tend to burn uphill. Conversely, if the tank or meter is located above your structure and it develops a leak, gas will flow downhill into your home.
- Clear and remove flammable vegetation within 10 feet of all tanks and meters.
- Do not visibly screen propane tanks or natural gas meters with shrubs, vegetation or flammable fencing. Instead, install 5 feet of nonflammable ground cover around the tank or meter.

**Zone 3** – Zone 3 has no specified size. It should provide a gradual transition from Zone 2 to areas farther from the home that have other forest management objectives. Your local Colorado State Forest Service forester can help you with this zone.

Forest management in Zone 3 provides an opportunity to improve the health of the forest. With an assortment of tools and alternatives, it is possible to proactively manage forest land to reduce wildfire intensity and protect water quality, increase habitat diversity for wildlife, increase the health and growth rate of trees and increase the survivability of trees in a wildfire.

For additional information about defensible space, see [Protecting Your Home from Wildfire: Creating Wildfire-Defensible Space](#) or visit <http://csfs.colostate.edu/pages/wf-publications.html>.

## 4. Building Design

So far, we have discussed elementary fire behavior and how to manage the wildlands surrounding a home in the interface. The second part of our approach to building ignition-resistant structures is learning about appropriate design and material choices.

### Simple vs. complex forms

Simple building forms have less surface area relative to the volume of the structure. Complex building forms have much more surface area relative to volume. Simple building forms are less expensive to build, more energy efficient and easier to protect from wildfires. There is simply less exterior surface to protect.

Complex forms not only increase the surface area of the structure, but also create shapes that trap the fire's heat; these areas are called heat traps. Transitions between vertical surfaces and horizontal surfaces, inside corners between two walls or abrupt intersections of different solid planes form pockets where wind velocity drops and eddy currents form.

Parapet walls, solar collectors, intersecting roofs and walls, roof valleys and decks are examples of heat traps. These forms cannot be avoided, therefore their locations require much more attention to ignition-resistant materials. Burning embers most often fall in these locations when wind velocity decreases.

Roofs are very susceptible to embers in a wind-driven fire. A simple roof form such as a hip or straight gable is best. Complicated roofs with intersecting planes and valleys form dead air pockets and areas where currents eddy. The use of complicated forms further highlights the importance of a truly ignition-resistant roof.

Some roof coverings have gaps that allow ember intrusion under the covering and can result in ember intrusion and ignition of the structure under the roof covering. The worst types of roof coverings allow combustible debris to blow or rodents and birds to build nests under the roof covering. This can occur in clay (Spanish or straight-barrel mission) tile roof covering unless eave closures or "bird stops" are used to close the convex opening created by the shape of the tile at the eave. If you can see wood through gaps in the roof covering, embers can penetrate and ignite the structure.

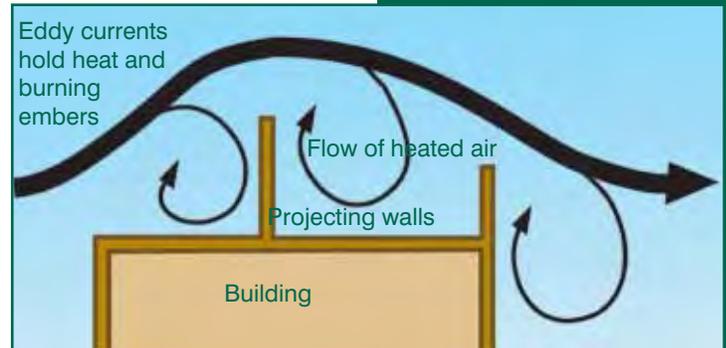


Figure 4-1: Heat traps around walls

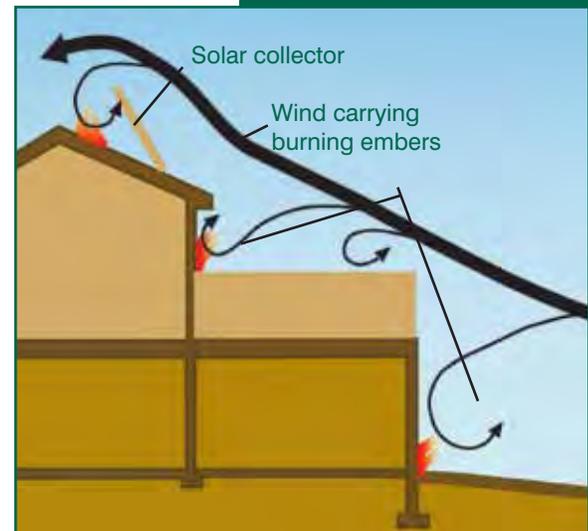


Figure 4-2: Heat traps around roofs

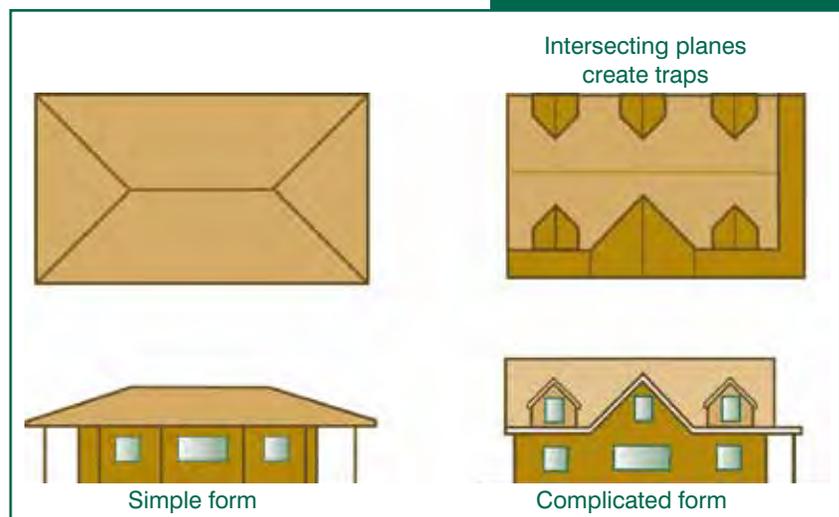


Figure 4-3: Roof forms

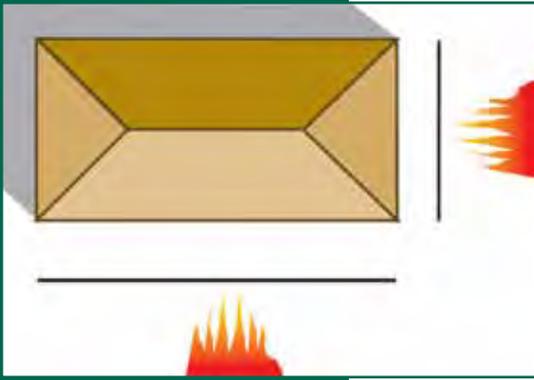


Figure 4-4: Aspect ratio is the ratio between the east-west axis and the north-south axis.

## Aspect ratio

Aspect ratio is the ratio between the east-west axis and the north-south axis. In Colorado's climate, it generally is better to build a structure that is longer on the east-west axis than the north-south axis. Such a structure has a more favorable energy relationship with the climate and can benefit from passive solar heat.

With regard to wildfire, if the widest exterior of the structure faces the direction from which a fire is likely to come, it will be more vulnerable. More fire-resistant materials and components are needed on the side that faces oncoming fire. On a flat site, the direction of a fire is somewhat unpredictable, but it generally is determined by predominant winds and fuel.

The probable fire path is more easily predicted on sloping sites. Fire can be expected to approach up the slope. On east- and west-facing slopes, it is best to locate the structure on the longer east-west axis in terms of energy efficiency and fire risk, as the widest side of the structure faces the winter sun and the narrowest side faces the fire path.

When simple forms and optimum aspect ratios cannot be used, the structure will require more ignition-resistant building materials.

## Vents, eaves, soffits, gutters, downspouts and decks

Building an ignition-resistant structure can be compared to building a watertight roof. One little hole in the roof allows water to leak in, and it doesn't matter how well the job was done on the rest of the roof, it failed and damage occurred. Small building elements like soffits and vents can be the weak link in a fire. An otherwise ignition-resistant structure can be damaged or destroyed because fire found a way in through these areas.

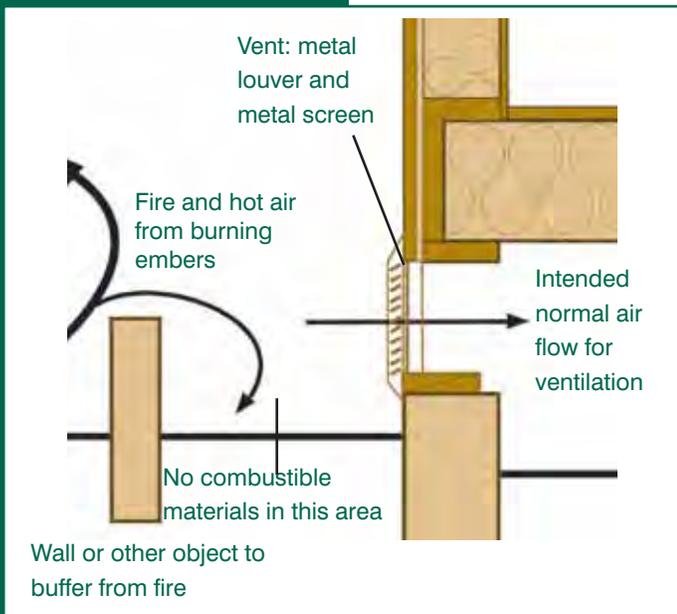


Figure 4-5: Crawl-space ventilation

## Vents

The International Building Code (IBC) requires vents to prevent accumulation of water vapor in the structure. All crawl spaces under wood floors are required to have ventilation. One square foot of vent is required for every 150 square feet of floor area. Because these vents typically are located near the ground, combustible vegetation should not be located next to them.

Vents located on the downhill side of the structure should be protected by landscaping elements, such as stone patios or walls, that block the direct path of the fire. Mechanical ventilation with intakes and exhaust located away from the ground also can be used.

All attic spaces and roof cavities are required to have ventilation. One square foot of vent is required for every 300 square feet of horizontal projected roof area (see eaves and soffits). In both cases, the vents should be covered with noncombustible, corrosion-resistant mesh with openings that do not exceed ¼-inch, or be designed and approved to prevent flame or ember penetration into the structure. Roof turbine vents also should be screened to prevent embers from entering attic spaces.

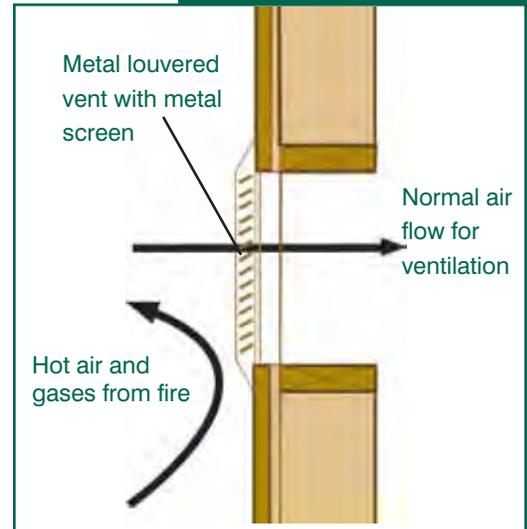


Figure 4-6: Attic vent

### Eaves and soffits

The extension of the roof beyond the exterior wall is the eave. This architectural feature is particularly prone to ignition. As fire approaches the structure, the exterior wall deflects the hot air and gasses up into the eave. If the exterior wall isn't ignition resistant, this effect is amplified.

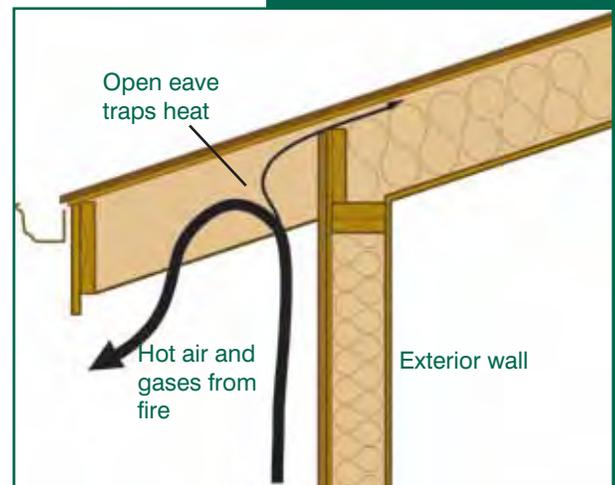


Figure 4-7: Open eave with no soffit

The eave should be covered with a soffit. If the soffit is applied directly to the rafter eave, it forms a sloping soffit, which creates a pocket that can trap fire.

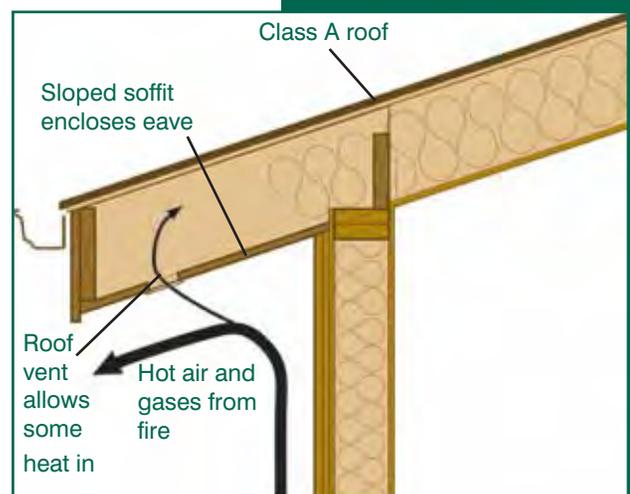


Figure 4-8: Open eave with soffit

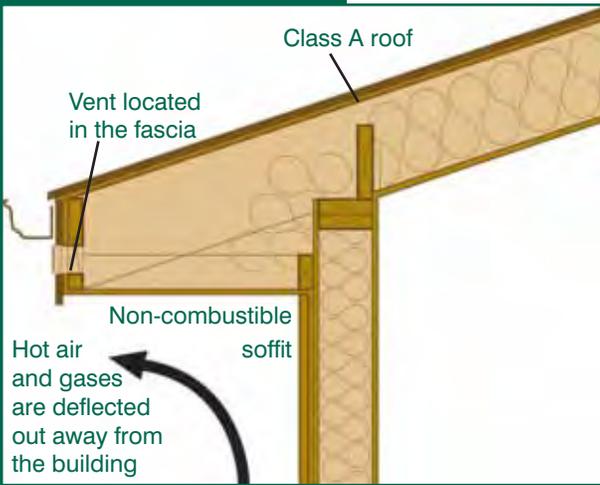


Figure 4-9: Fully enclosed soffit with isolated vent

A flat soffit allows the structure to more readily deflect fire outward. Vents for roof ventilation often are found in the soffit. Placing vents in these locations creates a path for fire to enter the roof structure. If the vent must be placed in this location, it is better to place it farther from the wall and closer to the fascia. The vent also can be placed in the fascia or near the lower edge of the roof.

### Gutters and downspouts

Gutters and downspouts collect leaves and pine needles. Gutters and eave troughs made from combustible materials (e.g., wood, vinyl) are as vulnerable to ember collection as the roof and other parts of the structure. If leaf litter is allowed to gather in gutters, embers can ignite the leaf litter, which in turn could ignite combustible eave materials or overhangs. If gutters are attached to combustible fascia boards, the fascia board should be considered a possible fuel that can be ignited by fine fuels burning in the gutters.



Figure 4-10: Conventional deck in a fire

### Decks

Decks are a popular and well-used feature of the structure, especially in the mountains. Because they are elevated above the terrain and surrounding vegetation, they offer a better view and provide flat areas for walking on otherwise sloping terrain.

Most decks are highly combustible structures. Their shape traps hot gasses, making them the ultimate heat traps. And because they often face downhill – they allow easy access to an approaching fire, which most likely is moving up a slope.

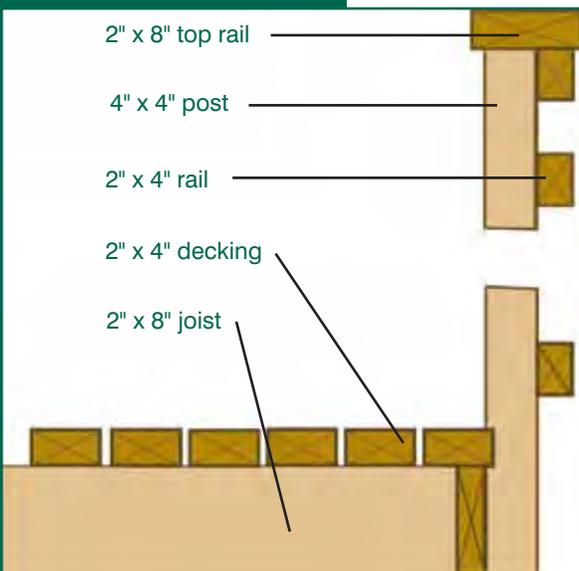


Figure 4-11: Conventional deck construction detail

Decks are built to burn almost as easily as wood stacked in a fireplace. All the components of a deck – joists, decking and railings – generally are made of wood, plastic or wood-plastic composites generally no more than 2 inches thick with high surface-to-volume ratios.

When fire approaches, deck material quickly heats up. Ignition can easily occur when the radiant energy from the fire gets hot enough or a burning ember lands on it.

## Ignition of decks

Conventional decks are so combustible that when a wildfire approaches, the deck often ignites before the fire gets to the structure.

Normally, decks ignite in one of two ways. A burning brand landing on the surface of the deck is all that's required, particularly if the decking is dry or has wide gaps between the boards, which allows airflow and harbors embers. Similarly, space between the first deck board and the structure can provide airflow and catch embers, increasing the risk that the siding will ignite.

The other common cause of deck fires is direct flame from unmaintained vegetation igniting the deck from below, or a burning brand igniting debris under the deck. Again, dry or widely spaced deck boards speeds the spread of fire.

Once the deck ignites, it may set the structure on fire. Heat from the deck fire, for example, may cause the glass in a sliding door to break, permitting flames to enter the interior of the structure. Or, combustible siding or soffits can ignite, carrying fire to the structure. The end result is the same. Even if the structure itself doesn't ignite, the structural integrity of the deck can be compromised and can become too hazardous to use.



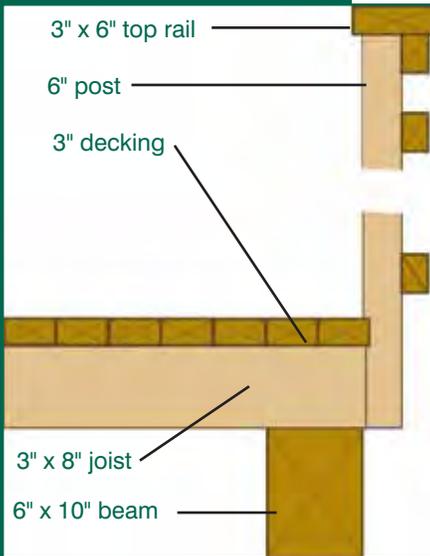
Figure 4-12: Conventional decks can easily ignite during a wildfire

## Isolate the deck from wildfire with a patio and a wall

In low and moderate fire areas, it may be sufficient to isolate the deck from the fuels and fire by building a noncombustible patio and wall below it. The patio will ensure that no combustible materials are below the deck. The wall will act as a shield, deflecting both the radiant and convective energy of the fire.



Figure 4-13: Deck with a patio and a wall below

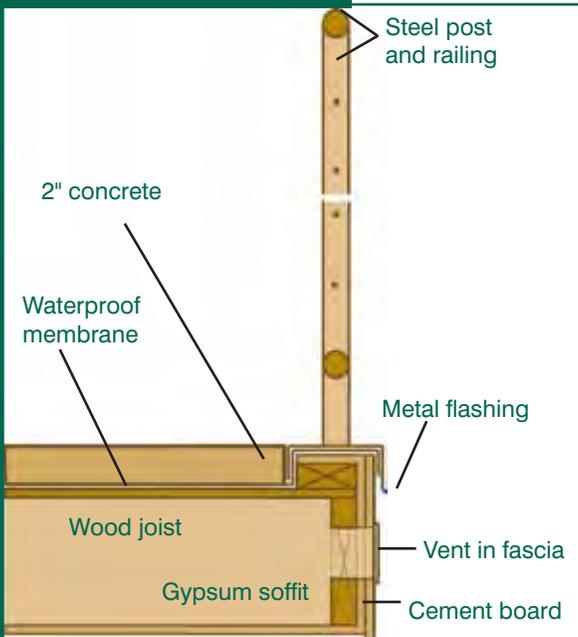


### Heavy timber construction

Like log construction, heavy timber is combustible but so thick that it burns very slowly.

Minimum thickness for a heavy timber deck is 6 inches for the posts and structural members and 3 inches for the decking and rails. This type of construction can be used with a patio below for additional protection.

Figure 4-14: Heavy timber deck



### Fire-resistive deck construction

In the highest fire hazard areas, consider noncombustible surfaces, fire-retardant-treated wood and fire-resistive building materials for a deck. Wood frame construction is permitted, but the surface should be composed of noncombustible, fire-retardant-treated or one-hour fire-resistive materials.

To build this type of surface, place a waterproof membrane over the top of the deck. This allows the use of fire-resistive soffit materials, which cannot tolerate moisture. The most common materials are cement fiber or metal panels (noncombustible), fire-retardant-treated plywood (ignition resistant) and gypsum sheathing (noncombustible).

Cover the membrane with fire-retardant-treated lumber decking, or use 1 to 2 inches of concrete or stone. This surface is ignition resistant and protects the deck from air-borne embers, but will require that the structure be strengthened to support the additional weight.

Posts and railings can be economically built from steel. Wood posts near the ground can have stone, brick or noncombustible coverings, or be of fire-retardant-treated wood. A popular, but expensive, baluster design is steel wire. Steel pipe, usually 1 to 2 inches in diameter, is economical and easy to work with. Square steel shapes can look like traditional wood railings.

Figure 4-15: Fire-resistive deck construction detail

## Fully enclosed decks

The best design is to convert the deck to a solid form by fully enclosing it, completely eliminating the heat trap. This form also complies with the 2009 *International Wildland-Urban Interface Code*.

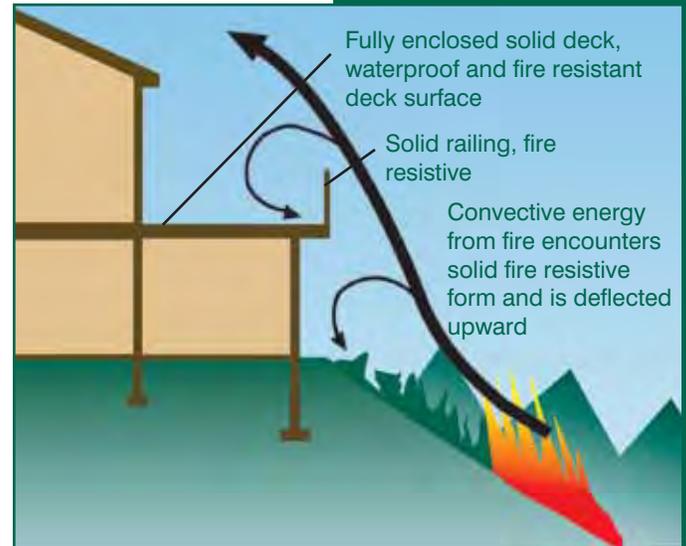


Figure 4-16: Fully enclosed solid deck

## Ignition-resistant construction class

The IWUIC requires that structures constructed, modified or relocated into or within WUI areas meet the requirements of Class 1, Class 2 or Class 3 ignition-resistant construction. The requirements of these ignition-resistant construction classes are based on the fire hazard severity of the site. The greater the fire severity, the greater the fire protection provided by the class. Class 1 provides the most protection in areas of extreme fire hazard; Class 2 provides protection in areas of high fire hazard; and, Class 3 provides additional protection over the traditional construction requirement in areas of moderate fire hazard. The following table is an extract of IWUIC Sections 504, 505 and 506, which define the Class 1, Class 2 and Class 3 requirement, respectively.



## 5. Building Materials and Components

When discussing building materials and components, we make frequent references to types of construction, noncombustible materials and various classes and ratings. Flame-spread classes, roofing classes and hourly ratings are confusing terms and sometimes are misused. The first is based on the Society for Testing and Materials' ASTM E-84/UL 723 "Test for Surface Burning Characteristics of Building Materials," the second is based on ASTM E-108/UL 790, "Test for Fire Performance of Roofing Materials," and the third is based on ASTM E-119, "Fire Tests of Building Materials."

### Noncombustible

As applied to building materials, noncombustible means a material that, in the form in which it is used, is one of the following:

1. Material of which no part will ignite and burn when subjected to fire. Any material conforming to ASTM E-136 "Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C" is considered noncombustible. Materials such as concrete, steel and brick masonry generally are considered noncombustible.
2. Material that has a structural base of noncombustible material, as defined in Item 1 above, with a surfacing material not over 1/8-inch (3.2 mm) thick, and a flame spread index of 50 or less. The paper face on most gypsum wallboard has a flame-spread index of 15 and is considered noncombustible.

If a building material does not fall into either of the above categories, it is assumed to be combustible.

### Flame-spread classification of building materials

The Uniform Building Code UBC uses the I-II-III designation, and the International Building Code (IBC) uses A-B-C. The flame-spread categories are as follows, per ASTM E-84/UL 723:

**Class A or I:** Flame-spread index of 25 or less (Fire-Retardant-Treated Wood or FRTW)

**Class B or II:** Flame spread index of 26 to 75 (some untreated lumber)

**Class C or III:** Flame spread index of 76 to 200 (most untreated lumber and plywood)

### Class A-B-C roof coverings

Class A, B or C roofing systems sometimes are confused with the Class A-B-C/I-II-III flame-spread categories as referenced above. The tendency is to assume that Class A roof systems have a Class A flame spread, and so on, but there is no correlation.

The ASTM E-108/UL 790 roof-coverings test does not produce a flame-spread rating. It is a pass-fail test under which a product either passes the criteria as a Class A, B or C roof covering system or it doesn't. It is an entirely different test from ASTM E-84/UL 723, and it includes weathering per the ASTM D-2898 "Standard Rain Test." The highest fire classification is Class A. Note that a Class C roof system is considered fire resistant, while a Class C (or III) building material (as above) is not. Non-classified roof systems have no fire rating.

## Hourly fire-resistance ratings

Hourly ratings are a function of the assembly being used (wall, floor, door, ceiling, roof, etc.) and generally require use of a noncombustible membrane (e.g. gypsum, masonry). ASTM E-119 “Fire Tests of Building Construction Materials,” is the test used to determine the hourly rating of an assembly. It exposes an assembly to heat and flame on one side and tests for heat transmission, burn-through, structural integrity and ability to withstand a hose stream from a fire hose.

Because of the potential for radiant heat exposure from one structure to another, either on adjoining sites or on the same site, the IBC regulates the construction of exterior walls for fire resistance. Where exterior walls have a fire-separation distance of more than 5 feet, IBC Section 705.5 allows the fire-resistance rating to be determined based only on interior fire exposure. This recognizes the reduced risk that is due to the setback from the lot line. For fire separation distances greater than 5 feet, the hazard is considered to be predominately from inside the structure. Thus, fire-resistance-rated construction whose tests are limited to interior fire exposure is considered sufficient evidence of fire resistance under these circumstances. However, at a distance of 5 feet or less, there is additional hazard of direct fire exposure from a structure on the adjacent lot and the possibility that it may lead to self-ignition at the exterior face of the exposed structure. Therefore, exterior walls located very close to any lot line must be rated for exposure to fire from both sides. The listings of various fire-resistance-rated exterior walls will indicate if they were only tested for exposure from the inside, usually by a designation of “FIRE SIDE” or similar terminology. Where so listed, their use is limited to those applications where the wall need only be rated from the interior side. For application in the WUI, the “FIRE SIDE” of the wall system must be the exterior wall surface.

The difference between a non-combustible material and a rated material or assembly is the surface resistance to ignition versus the protection afforded the structure behind it. A good example of a non-combustible material is metal roofing and siding. Metal is non-combustible, but an excellent conductor of heat. If the fire remains present long enough, the heat will be conducted through the metal and ignite the material behind it. An example of a fire-rated assembly is wood siding applied over 5/8 inch gypsum sheathing. This assembly is rated as one hour. The surface can ignite, but the structure is protected from the fire for one hour. **The importance is the difference between intensity of fire and duration of fire, as described in the fire behavior section (Section 2).**

Most ratings are for commercial structures in urban settings. That is why the IWUIC references the IBC, which is used to build both commercial and residential structures, rather than the IRC, which is used for single family and multi-family homes with up to four units.

The IBC allows both prescriptive and performance-based fire-resistant designs, although its current emphasis is clearly on the former. Section 720 of the code explicitly lists several detailed, prescriptive fire-resistant designs. However, Section 703.3 also allows the designer to choose from other alternative methods for design as long as they meet the fire exposure and criteria specified in the American Society for Testing and Materials (ASTM) fire test standard ASTM E-119.

### **IBC 703.3 Alternative methods for determining fire resistance:**

1. Fire-resistant designs documented in recognized sources.
2. Prescriptive designs of fire resistance-rated building elements, components or assemblies, as prescribed in Section 720.
3. Calculations in accordance with Section 721.
4. Engineering analysis based on a comparison of building element, component or assemblies designs having fire-resistance ratings, as determined by the test procedures set forth in ASTM E119 or UL 263.
5. Alternative protection methods, as allowed by Section 104.11.

Fire-resistant construction assemblies (walls, floors, roofs) and elements (beams, columns), that perform satisfactorily in standard fire-resistance tests, are documented in building codes, standards, test reports and special directories of testing laboratories. Over the years, a considerable amount of accumulated test data allowed the standardization of many fire-resistant designs involving generic (non-proprietary) materials, such as wood, steel, concrete, masonry, clay tile, “Type X” gypsum wallboard and various plasters. These generalized designs and methods are documented in IBC sections 720 and 721, with detailed explanatory figures, tables, formulas and charts. Fire-resistant designs that incorporate proprietary (pertaining to specific manufacturers and/or patented) materials are documented by test laboratories in reports and special directories of both test laboratories and trade associations. The major sources of documented construction designs rated for fire resistance are described below.

Underwriters Laboratories Inc. (UL) conducts tests of various building components and fire protection materials. The assemblies are tested under recognized testing procedures, including ASTM E119 and ANSI/UL 263, all of which are essentially the same. When the assembly complies with the acceptance criteria of the fire-test standard, a detailed report is provided, including its description and performance in the test, pertinent details and specifications of materials used. A summary of the important features is produced and given a UL designation, which is then added to the UL directory.

To facilitate the design process, numerous associations publish wall-design configurations that meet various fire criteria. Examples of these publications are Fire Rated Wood Floor and Wall Assemblies (DCA-3), published by the American Wood Council; Fire Rated Systems Design/Construction Guide (W305), published by APA-The Engineered Wood Association; and Fire Resistance Design Manual (GA-600), published by the Gypsum Association.

## **Heavy timber and log wall construction**

Heavy timber is another type of wood construction. Experience and fire tests have shown that the tendency of a wood member to ignite in a fire is affected by its cross-sectional dimensions. During a fire, large-size wood members form a protective coating of char that insulates the inner portion of the member from the fire. This type of wood construction often is referred to as slow burning.

Different minimum dimensions apply to different types of wood members, and the minimum cross-sectional dimension required in order to qualify for the heavy-timber fire rating is set forth in IBC Section 602.4. The following is a condensed version of building code sections, which is provided as a guide. Consult the IBC or your local building or fire departments to determine complete requirements.

**602.4.1 Columns.** Wood columns shall be not be less than 8 inches nominal in any dimension where supporting floor loads and not less than 6 inches nominal in width and not less than 8 inches nominal in depth where supporting roof and ceiling loads only.

**602.4.2 Floor framing.** Wood beams and girders shall be not less than 6 inches nominal in width and not less than 10 inches nominal in depth.

**602.4.3 Roof framing.** Framed or glued-laminated arches for roof construction, framed timber trusses and other roof framing, which do not support floor loads, shall have members not less than 4 inches nominal in width and not less than 6 inches nominal in depth.

**602.4.4 Floors.** Floors shall be without concealed spaces. Wood floors shall be of sawn or glued-laminated planks, splined or tongue-and-groove, of not less than 3 inches nominal in thickness. Floors shall not extend closer than 0.5 inch to walls. This space shall be covered by a molding fastened to the wall and so arranged that it will not obstruct the swelling or shrinkage movements of the floor.

**602.4.5 Roofs.** Roofs shall be without concealed spaces and wood roof decks shall be of sawn or glued-laminated, splined or tongue-and-groove plank, not less than 2 inches nominal in thickness, 1 1/8 inch thick plywood, or of planks not less than 3 inches nominal in width, set on edge close together and laid as required for floors. Other types of decking shall be permitted to be used if providing equivalent fire resistance and structural properties.

## Fire-retardant-treated wood

Certain ingredients, when added to the wood, can insulate its surfaces so that its temperature remains below the kindling temperature for an extended period of time, no matter how hot the heat source might become. Among the ingredients used for this purpose are the acid salts of sulfates and phosphates, borates and boric acid.

All fire-retardant treatments are water-soluble, so water is used as the vehicle for carrying the treatments into the wood. The only effective method of application is the pressure treatment process. After pressure impregnation, most of the moisture is removed until the treated wood has a moisture content of no more than 19 percent for lumber and 15 percent for plywood.

Fire-retardant treatments do not necessarily prevent wood from being destroyed by fire, but they are the necessary ingredient that, when added to wood, slow decomposition to such an extent that the wood structurally outperforms most other building materials during actual fire conditions.

When temperatures reach a point slightly below the kindling point, the chemicals react with each other. Nonflammable gases and water vapor are formed and released at a slow, persistent rate that envelops the wood fibers, insulating them from temperatures that cause the wood to decompose. The inflammable gases and tars are reduced and an insulating char forms on the surface of the wood, further slowing the process of decomposition. Structural integrity of the wood is preserved for a longer time with the reduced rate of decomposition, and smoke and toxic fumes are greatly reduced. When the heat source is removed, the treated wood ceases to decompose and fire spread is eliminated.

In Section 2303.2, the IBC defines fire-retardant-treated wood as

*“any wood product that, when impregnated with chemicals by a pressure process or other means during manufacture, shall have, when tested in accordance with ASTM E 84 or UL 723, a listed flame spread index of 25 or less and show no evidence of significant*

*progressive combustion when the test is continued for an additional 20-minute period. In addition, the flame front shall not progress more than 10.5 feet (3200 mm) beyond the centerline of the burners at any time during the test.”*

This is far more severe than the 10-minute ASTM E-84 test used for the flame-spread classification of building materials.

Flame-spread classification per ASTM E-84, 30-minute duration, has no relation to a 30-minute rating or any other hourly rating (which must be determined by ASTM E-119). ASTM E-119 is not a required test for FRTW, therefore FRTW has no different hourly rating than untreated wood. The advantage of FRTW over untreated wood and other combustible materials is the fact that it doesn't ignite or contribute to flame spread.

The IWUIC and IBC require FRTW to be properly labeled. Code-compliant stamps must contain the information in Figure 5-1. Product coloration is not a substitute for a building-code approved, third-party inspection agency label.



Figure 5-1: Courtesy of Western Wood Preservers Institute

## Ignition-resistant building material

Ignition-resistant building materials are those that sufficiently resist ignition or sustained flaming combustion under worst-case weather and fuel conditions and with exposure to burning embers and small flames. Ignition-resistant building materials shall comply with any one of the following:

1. Extended ASTM E 84 testing. Materials that, when tested in accordance with the procedures set forth in ASTM E 84 or UL 723, for a test period of 30 minutes, comply with the following:
  - 1.1 Flame spread. Material shall exhibit a flame-spread index not exceeding 25 and shall show no evidence of progressive combustion following the extended 30-minute test.
  - 1.2 Flame front. Material shall exhibit a flame front that does not progress more than 10 1/2 feet (3200 mm) beyond the centerline of the burner at any time during the extended 30-minute test.
  - 1.3 Weathering. Ignition-resistant building materials shall maintain their performance in accordance with this section under conditions of use. Materials shall meet the performance requirements for weathering (including exposure to temperature, moisture and ultraviolet radiation) contained in the following standards, as applicable to the materials and conditions of use:

- 1.3.1 Method A “Test Method for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing” in ASTM D 2898, for fire-retardant-treated wood, wood-plastic composite and plastic lumber materials.
- 1.3.2 ASTM D 7032 for wood-plastic composite materials.
- 1.3.3 ASTM D 6662 for plastic lumber materials.

Identification. All materials shall bear identification showing the fire-test results.

2. Noncombustible material.
3. Fire-retardant-treated wood identified for exterior use.
4. Fire-retardant-treated wood roof coverings. Roof assemblies containing fire-retardant-treated wood shingles and shakes that comply with the requirements of Section 1505.6 of the *International Building Code* and classified as Class A roof assemblies, as required in Section 1505.2 of the *International Building Code*.

## Roofing

### Noncombustible roof coverings

The following are noncombustible roof coverings:

- cement shingles or sheets
- exposed concrete slab roof
- ferrous or copper shingles or sheets
- slate shingles
- clay or concrete roofing tile
- approved roof covering of noncombustible material

Roofing is one of the most important ways to protect a structure from wildfire. As shown earlier, when wildfires become more intense, the lofted embers become a significant cause of the fire spread. Because most roofing has a rough surface and numerous cracks, it can trap wind-blown embers. In many major WUI fires, burning roofs have been observed on structures thousands of feet from the fire.



Figure 5-2: Wood shakes

### Wood shakes and shingles

Simply put, untreated wood shakes and shingles are almost like kindling. They are thin, 1/2- to 1-inch thick, with a very rough surface and many cracks. When an untreated wood roof burns, it also lofts burning embers, contributing to fire spread.

Cedar shakes and shingles can be modified by pressure impregnation with fire-retardants, which changes their classification to either B or C. Fire-retardant-treated cedar shakes and shingles installed over a gypsum underlayment have a Class A assembly rating.



Figure 5-2: Reinforced asphalt shingles

### Asphalt shingles

Conventional mineral reinforced asphalt shingles usually have a Class C rating.

Mineral-reinforced shingles gradually have been replaced by fiberglass-reinforced asphalt shingles. These have a Class A rating. They are available in many colors and textures and can even imitate wood or slate shingles.

## Metal

Metal roofing in many colors is available in sheet form, and usually has standing seams or ribs. The most common metal roof is galvanized steel with factory-applied paint.

Metal roofing also is available in patterns that imitate wood and slate shingles. This product is made by stamping a texture and shape on the metal and then applying the appropriate color. This imitation is so good that at a distance of 100 feet or more it is difficult to tell the difference between it and the material it is imitating.

While metal roofing is noncombustible, it requires a gypsum underlayment in order to have a Class A assembly rating.

In addition to galvanized steel with paint, metal roofing also is available in aluminum with paint, stainless steel and copper. These tend to be more expensive, but may last longer.



Figure 5-4: Metal roofing

## Fiber-cement shingles

These shingles are made of cement and fiberglass, or cement and wood. Like the metal shingle, they are made to imitate a wood shingle's texture, shape and color. The cement in these products is altered with polymers to make it less brittle. These products may be noncombustible and may require an underlayment for a Class A assembly rating.

## Membrane roofs

These materials include both rubber and hot-applied, bituminous-saturated mineral felt for flat roofs. They are marginally combustible, but most often are used with other covering systems such as concrete. They can be applied over a gypsum underlayment for a Class A assembly rating.

## Concrete shingles and tile, slate shingles and clay tile

These products are noncombustible. They are 1-inch thick, heavy (10 pounds per square foot or more) and Class A rated. Concrete shingles often are manufactured to look like wood shingles.



Figure 5-5: Concrete tiles

## Exterior walls: siding

The exterior walls of a structure are most affected by radiant energy from the fire and, if defensible space is not adequate, by direct impingement of the fire.

## Wood panels and boards

Wood panels and boards are the most common and economical forms of siding, but they are readily combustible. This siding usually is not very thick (1/2-inch to 3/4-inch) and will burn through to the structure behind it in less than 10 minutes. A one-hour fire-resistance rating can be achieved by adding 5/8-inch Type X gypsum sheathing behind the siding.

Fire-retardant-treated lumber and plywood siding is another option. These products are traditional wood-siding materials that have been pressure impregnated with fire retardants and meet the definition of ignition-resistant materials. They can be used in all fire hazard severity zones.



Figure 5-6: Wood siding

## Fiber cement panels, boards and shingles

While these products may be noncombustible, they may not have a fire-resistance rating and may need gypsum sheathing to achieve a one-hour rating. These materials are virtually permanent on a vertical surface and may need to be painted; stain can even be used on some with satisfactory results. These products are available with textures molded to imitate wood grain.

## Metal

Like their counterparts in roofing, metal siding is available in either flat sheets with seams or in stamped patterns intended to imitate wood boards or shingles. They are noncombustible, but like other metal products, they need gypsum sheathing to achieve a one-hour rating.

## Stucco

Real stucco, as base material, is  $\frac{3}{4}$ -inch to 1-inch thick cement and gypsum. The stucco is applied in two or three coats with metal mesh reinforcement. It is both a non-combustible and one-hour rated material, which makes it a very good material for high-hazard areas.

## Synthetic stucco

Synthetic stucco also is referred to as EIFS (exterior insulating finish system). It consists of a  $\frac{1}{8}$ -inch thick acrylic cement finish on fiberglass mesh. This is applied to the top 1 to 2 inches of expanded polystyrene insulation. The surface may be noncombustible and has no rating by itself. During a fire, it can delay ignition of the structure because it melts and falls away. It can, like other products, obtain a one-hour rating with gypsum sheathing.



Figure 5-7: Log wall construction

## Log wall construction

Log wall construction has exterior walls constructed of solid wood members where the smallest horizontal dimension of each member is at least 6 inches. Although the logs are combustible, the low surface-to-volume ratio of the logs causes them to burn very slowly.

Log siding is not an acceptable substitute for log wall construction, as it is not as thick as actual log wall construction. However, log siding can achieve a one-hour fire resistance rating by adding  $\frac{5}{8}$ -inch Type X gypsum sheathing behind the siding.

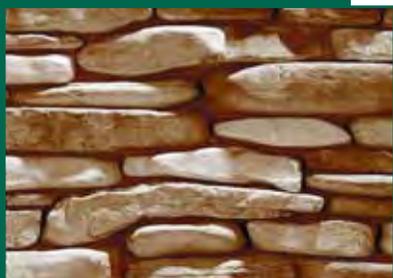


Figure 5-8: Concrete synthetic stone

## Concrete synthetic stone

Concrete synthetic stone is cast concrete with integral color forming the texture and shape of the stone being imitated. The stones are modular in shape with consistent dimensions and flat backs. This synthetic stone is noncombustible and can have a fire resistance rating.

## Brick, stone and block

These materials are inherently noncombustible and can have a fire-resistance rating.



Figure 5-9: Brick wall

## Windows and Glass

Windows are one of the weakest parts of a structure with regard to fire. They usually fail before the structure ignites, providing a direct path for the fire to reach the structure interior.

### Glass failure

Glass provides only a partial barrier to fire and only for a short time as it fractures in the presence of heat. In the case of a wildfire, this will happen in about five minutes. Glass deflects most of the convective energy, but not the radiant energy of the fire.

Convective energy contains hot air and gasses. Approximately 70 percent of the heat is deflected by window glass; roughly 20 percent is absorbed; and 10 percent is transmitted to the interior of the structure.

Radiant energy from a fire is infrared light energy, like the energy we experience from the sun. Sixty percent of the radiant energy from a fire is transmitted through the glass to the interior of the structure; approximately 20 percent is reflected; and the other 20 percent is absorbed by the window glass.

Both radiant and convective energy heats the glass, but the perimeter of the glass is covered and protected by a sash. As a result, differential heating and stressing of the glass occurs, which causes it to crack.

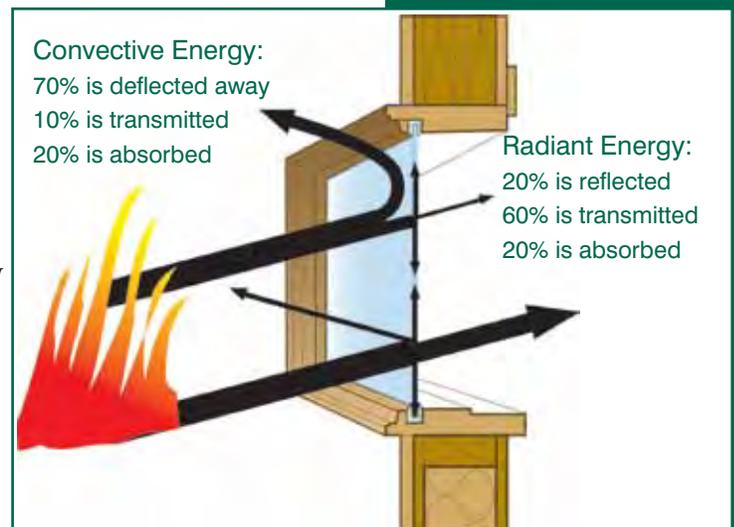


Figure 5-10: Energy transmission, conventional glass

### Large and small windows

Even if the glass does fracture, the hot gasses (convective energy) from the fire and the fire itself cannot enter the structure if the glass stays in place. Only the radiant energy heat can pass through the glass. Eventually, even with the glass in place, combustible materials behind the window may ignite. (See Low E glass).

Small windows, less than 2 feet wide or tall on a side, will keep fractured glass in place. The size of glass held in place by the sash is relatively small and light weight.

Large windows (more than 2 feet wide or tall on a side) cannot keep the fractured glass in place. The size and weight of glass in relationship to the length of sash is too great.

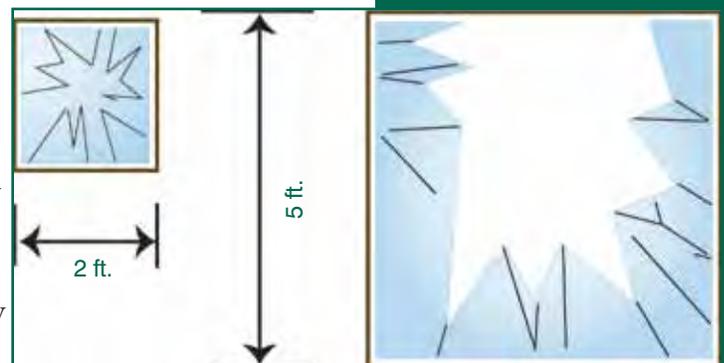


Figure 5-11: Small and large windows



Figure 5-12: Thermopane window

## Thermopane or double-glazed windows

Most of today's energy codes require glass to be double-glazed or Thermopane. During a fire event, double-glazed windows last approximately twice as long as a single pane, or about 10 minutes.

The same processes of convective and radiant energy affect the front pane of glass. As long as the front pane is in place, the second pane is partially protected. When the front pane fails and falls away, the process continues until the second pane fails and falls away.

As shown earlier in the fire behavior section (Section 2), the duration of a fire in an area is dependent on slope and fuels; which, in the case of a grass fire, can be as short as 5 minutes.

If the duration of the fire is any longer than 10 minutes due to preheating or significant fuel around the structure, additional protection is necessary to prevent glass failure and fire from entering the structure.

## Tempered glass

Tempered glass is resistant to high impact and high heat, which means it will remain in place and intact throughout a wildfire event. Building codes require tempered glass to be used in patio doors and all areas subject to human impact. Tempered glass also is used in front of fireplaces.

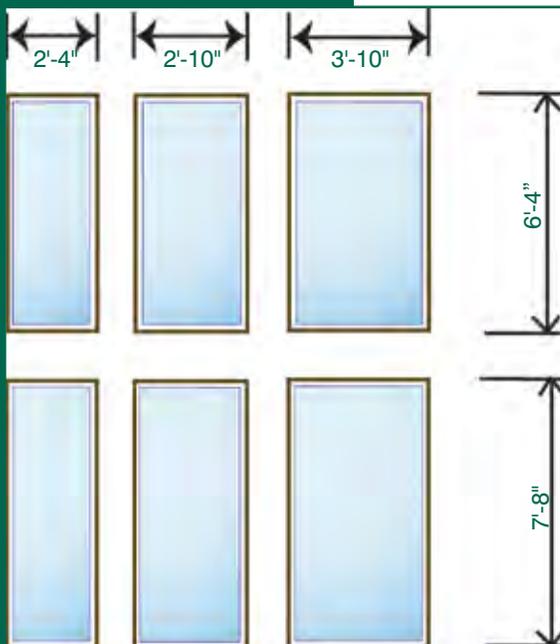


Figure 5-12: Patio door replacement unit sizes

Tempered glass typically costs 50-percent more than regular glass. However, patio door replacement units are mass-produced and stocked by virtually every glass business. As a result, they are economical and less expensive than conventional glass. They come in six sizes, as shown in Figure 5-12, and typically can be used as a picture window unit, or combined to make a window wall or solar structure.

Using patio door replacement units provides tempered glass at a very economical price.

A few brands of windows are marketed as replacement windows in existing mid-rise urban structures where the use of tempered glass is required. As a result, the additional cost for these brands of tempered glass is only 25 percent more than standard glass. Your local window supplier can suggest appropriate manufacturers.

## Glass block

Glass block is the most fire-resistive glass available. It has the highest available rating of 90 minutes.

Glass block may be a good choice when only daytime lighting is needed, a view is not a factor and the window is oriented toward a very high fire hazard.



Figure 5-14: Glass block

## Doors

### Wood doors

Residential structures typically use wood doors with glass inserts. The same fire issues related to window glass apply to glass in doors. An unrated wood door typically is 1 1/2 to 2 inches thick, and can readily ignite and burn through in only 10 minutes, which is much faster than the rest of the structure.

Wood doors are available with a 20-minute rating. Solid-core wood doors a minimum of 1 1/2-inches thick also are acceptable.

### Metal doors, steel and aluminum

Metal doors are non-combustible and available with 20-minute, 45-minute and 90-minute ratings. Glass sizes are restricted in these doors. The surfaces are available with embossing to simulate wood grain and raised panel designs.

Just as with energy conservation, a good fire-resistant door requires adequate weather stripping to prevent hot gasses or burning embers from entering the structure.

## 6. Summary

A major wildfire can be an overwhelming event to experience. It can be huge, blotting out the sun and creating its own winds. It can throw flames and burning embers everywhere. Wildfire is a natural part of our environment that we can either respect or fear. When we modify our homes and the surrounding environment, we can adapt to living in fire-prone areas. Every WUI resident must understand the basic characteristics of wildfire and the risks it presents to their lives and property. The actions we take by building appropriate structures and properly caring for the surrounding environment can significantly reduce wildfire hazards.

A comparison often is made between fire and water. Fire, like water, tries to find a way into our homes. It does not matter how fire-resistant some parts of a structure are if weak points allow a fire to enter. An awareness of how each building component is affected by fire will allow the owner, architect or builder to eliminate those weak points.

## References and Additional Resources

*2009 International Wildland-Urban Interface Code*

International Code Council, Inc.

[www.iccsafe.org/Store/Pages/Product.aspx?id=3850X09](http://www.iccsafe.org/Store/Pages/Product.aspx?id=3850X09)

*NFPA 1144 Standard for Reducing Structure Ignition Hazards from Wildfire*

National Fire Protection Association, (NFPA)

[www.nfpa.org/catalog/product.asp?pid=114413](http://www.nfpa.org/catalog/product.asp?pid=114413)

*2009 International Building Code*

International Code Council, Inc.

[www.iccsafe.org/Pages/default.aspx](http://www.iccsafe.org/Pages/default.aspx)

Fire-Retardant-Treated Lumber and Plywood

Hoover Treated Wood Products

[www.FRTW.com](http://www.FRTW.com)

*The following is a partial list of organizations that can provide more information on the subjects covered in this document.*

### **Colorado State Forest Service**

<http://csfs.colostate.edu/>

<http://csfs.colostate.edu/pages/wildfire.html>

<http://csfs.colostate.edu/pages/wf-publications.html>

### **Fire Adapted Communities**

<http://fireadapted.org/>

**Firewise Communities USA** (National Fire Protection Association)

<http://www.firewise.org/>

**eXtension Wildfire Information Network (eWIN)**

[http://www.extension.org/surviving\\_wildfire](http://www.extension.org/surviving_wildfire)

**Southern Rockies Fire Science Network**

<http://www.frames.gov/partner-sites/srfsn/home/>

**Federal Emergency Management Agency-Wildfire**

<http://www.ready.gov/wildfires>

**Insurance Institute for Business and Home Safety**

<http://www.disastersafety.org/Wildfire>

**USDA Forest Service, Southern Research Station,**

**Centers for Urban and Interface Forestry**

<http://www.humanandnaturalsystems.org/technology/cuif>

**University of Nevada Cooperative Extension, Living with Fire**

<http://www.livingwithfire.info/who-we-are>

## Acronyms

|       |  |
|-------|--|
| APA   | American Plywood Association (now APA-The Engineered Wood Association) |
| ANSI  | American National Standards Institute                                  |
| ASTM  | American Society for Testing and Materials                             |
| BOCA  | Building Officials and Code Administrators International, Inc          |
| FEMA  | Federal Emergency Management Agency                                    |
| FRTW  | Fire-retardant-treated wood  |
| ICBO  | International Conference of Building Officials                         |
| ICC   | International Code Council   |
| IRC   | International Residential Code   |
| IWUIC | International Wildland-Urban Interface Code                            |
| NFPA  | National Fire Protection Association                                   |
| SBCCI | Southern Building Code Congress International                          |
| UBC   | Uniform Building Code  |
| UL    | Underwriter's Laboratory   |
| WHIMS | Wildfire Hazard Identification and Mitigation System                   |
| WUI   | Wildland-Urban Interface   |





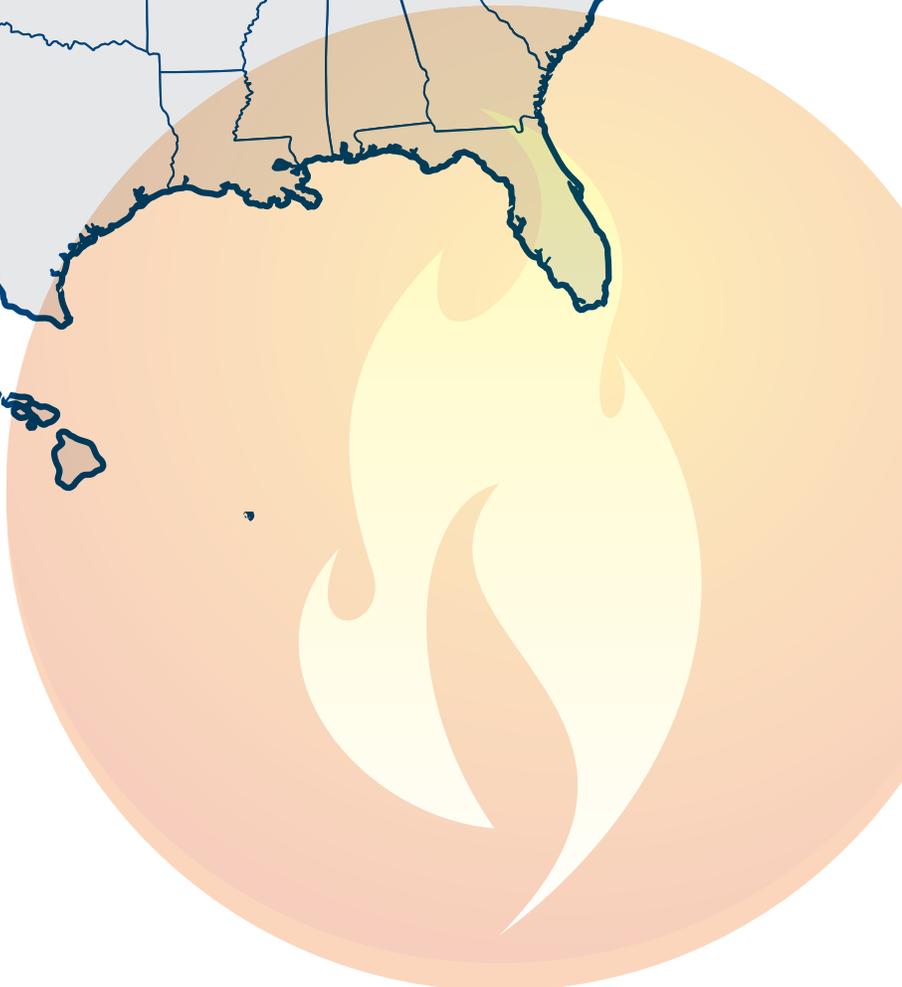
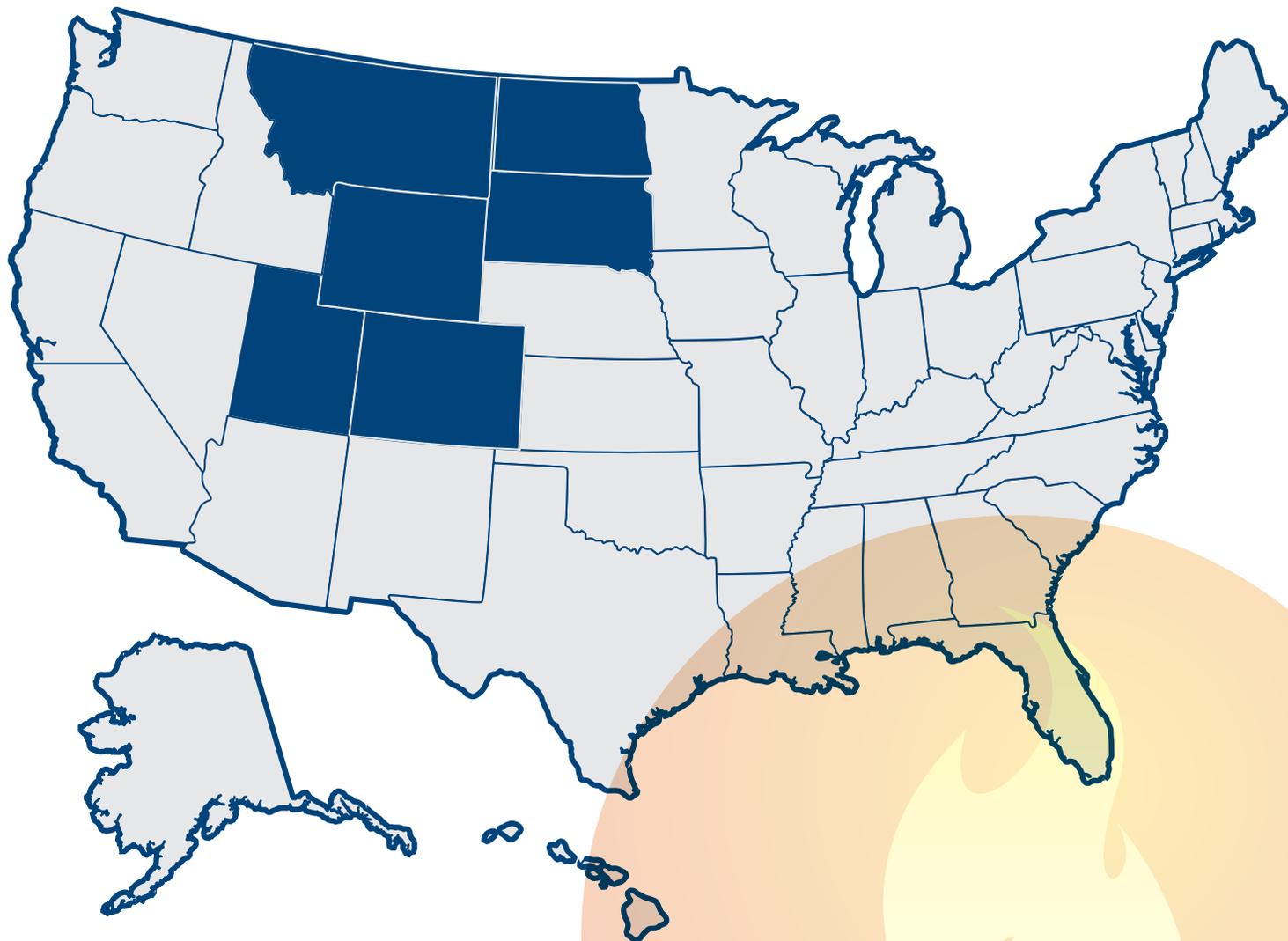
# Protect Your Property from Wildfire





# Table of contents

|    |                               |
|----|-------------------------------|
| 3  | Introduction                  |
| 4  | Rocky Mountain Retrofit Guide |
| 15 | Property Assessment Checklist |





## YOU CAN MAKE A DIFFERENCE

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Heavily forested areas, inconsistent rainfall and the infestation of the mountain pine beetle, which has killed nearly 4 million acres of lodgepole pine trees across the Rocky Mountain Region since 2007, have contributed to the growing wildfire threat facing properties in this region. As these areas are threatened by larger and more destructive fires, property owners are looking for solutions to reduce the risk of damage to homes and businesses. This guide was created for the states of Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming, and takes into account regional building styles and construction materials, common topographical characteristics and other risk factors identified by fire science research. While wildfire protection begins with the individual, this research proves that a community-wide approach to fire protection is the most effective, so please share this guide with neighbors and friends. If something combustible is located within a 100-foot perimeter of your home or business (including your neighbor's house, business, surroundings or landscaping), it could potentially increase your risk of wildfire damage. Everyone benefits from a wildfire-adaptive community.

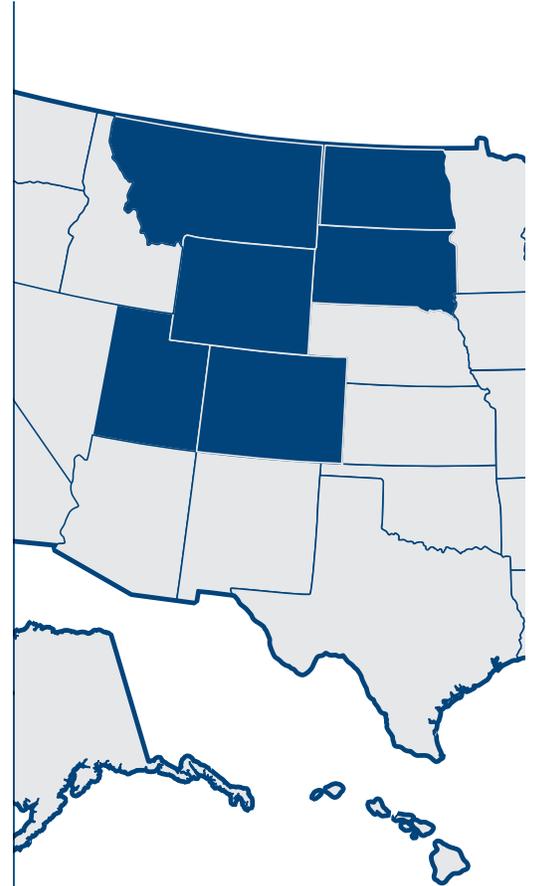
Wildfire research has shown that individuals and families can protect their properties against wildfires by addressing three clear zones of vulnerability: the structure of the home or business itself; the landscaping nearby; and the general vegetation in the area surrounding the structure. Each of these zones can be dealt with through maintenance, material and design improvements, and vegetation control. Many of these projects are affordable and can be done in a weekend. Some of the projects have an additional financial benefit – they can help improve energy efficiency.

### UNDERSTANDING EFFECTIVE WILDFIRE PROTECTION

Wildfires are called wild for a reason - they are often uncontrollable. What is controllable, however, is the preparation you can undertake to protect your home or business from damage and losses when a wildfire threatens. Ultimately, the difference between survival and destruction is whether some part of the structure catches on fire. A number of features, materials and design details can make your home or business vulnerable to a wildfire. Additionally, the surrounding forested areas and vegetation near your home or business can provide a pathway for fire and heat to get close enough to ignite the structure. There also is a chance that embers from a fire a mile or more away may fall onto the house or business, nearby vegetation or secondary buildings, and cause them to ignite.

### MANAGING YOUR HOME OR BUSINESS

The most vulnerable part of your home or business is the roof. If you have a flammable roof, almost anything else you do will be of little consequence in reducing the chances it will ignite and burn the rest of the building when a wildfire approaches. Other key risk factors include entry of attic or crawlspace vents, debris that collects in gutters and, on complex roofs, in various locations along the roof line and adjacent to exterior walls. Embers can enter enclosed spaces through vents, potentially igniting fine fuels, and ignite debris that has collected in gutters or at roof-to-wall intersections. Single-pane windows also are vulnerable to glass breakage, allowing embers and flames inside. Decks and





fences that ignite can bring a fire right up to the building. This guide provides ideas for how you can reduce ignition risks by making improvements to your home or business.

## DEFENSIBLE SPACE: MANAGING VEGETATION AND FUEL SOURCES AROUND YOUR HOME OR BUSINESS

Fire officials recommend a vegetation management zone around your home or business of at least 100 feet, depending on the type of vegetation in the adjacent wildland areas and the slope of the land. The actions you take to modify the vegetation in this area are intended to reduce the severity of a wildfire. This also reduces the chances that flames will come into direct contact with any part of the house or business and prevents high-intensity flames from bringing heat strong enough to break windows or cause other surfaces to ignite. Regardless of the size of the land surrounding a house or business, the goal is the same -- to reduce the amount of fuel that can bring a wildfire dangerously close. This zone is widely referred to as defensible space. It can help stop wildfire flames from reaching your home or business and also creates a safer area for firefighters to defend the structure.

## IMPROVING YOUR STRUCTURE'S WILDFIRE RESISTANCE

You probably already have a list of improvement and maintenance projects, both large and small. Maybe you need a new roof, want to replace old windows or doors with energy-efficient models or need to rebuild a deck or porch. Review your list to see if it includes projects in any of the following building-related sections. If so, by slightly modifying your project plans, you may be able to simultaneously improve the condition of the structure, add to its value and reduce your risk of wildfire damage. You also may decide to add new projects to that list, which can provide vital protection against wildfire and, in some cases, save money on energy bills.

# ROOF

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## WHAT YOU SHOULD KNOW

Replacing a roof is a major project, but it also yields major benefits. The roof should be your first priority. Research has shown that combustible roof coverings are the greatest threat to a house or business during a wildfire. Roof combustibility is described by a UL (Underwriters Laboratory) rating system – with Class “A” being the least combustible and most resistant to wildfire. Roof shape and design also play an important role. Take a careful look at your roof. If you have a lot of ridges and valleys, or roof segments that intersect with the vertical walls of the building, you have a complex roof. This makes your home or business more vulnerable to wildfires, even if you have a Class “A” roof, because vegetative debris can readily accumulate at the intersections and





so can burning embers. Also consider whether the siding provides protection comparable to a Class “A” roof. If the roof is adjacent to combustible siding, the resulting fire can burn into the stud cavity and enter the entire building.

## WHAT YOU SHOULD DO

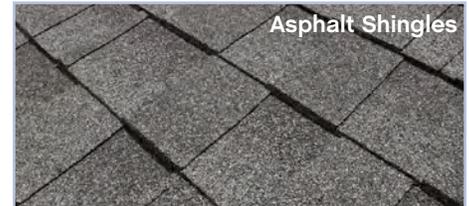
Always keep your roof clean of debris.

It can be difficult to tell whether you have a Class “A” fire-rated roof, unless it is made of an obviously noncombustible material, such as tile. If you are not sure about your roof, schedule a professional roof inspection. If you replace your roof, choose a Class “A” fire-rated roof, and completely remove the old covering.

Regardless of the specific Class “A” or noncombustible roofing material that you choose, inspect it regularly, maintain it when necessary, and replace it when needed.

Here are some things to keep in mind when choosing a Class “A” roof covering:

- Many roof coverings have a Class “A” rating based only on the top/external covering (i.e., the part of the roof that you can see). Some common examples include asphalt composition fiberglass shingles, steel, and clay or concrete tiles. Asphalt composition shingles also can use organic fibers instead of fiberglass, which would result in a Class “C” fire rating.
- Other roof coverings obtain their Class “A” rating because additional materials that enhance the fire resistance are used in the roof assembly. The assembly is composed of the roof covering that you see and the additional underlying materials that you cannot see. These coverings are considered Class ‘A’ by assembly. Examples include aluminum, and some of the newer composite roofs made from recycled plastic and rubber materials, which require an additional layer of fire-resistant material to achieve a Class “A” rating. Wood shakes also are now available with pressure-impregnated, exterior-rated, fire-retardant chemicals that provide a stand-alone Class “B” fire rating, and a “Class ‘A’ rating by assembly.”
- It is important to note that the fire rating of most roof coverings and assemblies are evaluated using new materials. One exception is wood shakes, which are subjected to a natural weathering protocol prior to roof fire testing. Another important thing to note is that over time as the products weather, both wood shake and shingle roofs may become more vulnerable to fire.



Wood shake roofs are now available with chemical treatments that provide a Class “B” fire rating.

Asphalt shingles are available with Class “A” fire ratings, but also may use organic fibers that can result in a Class “C” rating with less fire resistance.

## EAVES, SOFFITS, ATTIC AND CRAWLSPACE OPENINGS

### WHAT YOU SHOULD KNOW

Researchers have learned from post-fire surveys of buildings damaged and destroyed by wildfires that attic/roof and foundation vents are entry points for embers and flames. These findings have also been confirmed during other post-fire evaluations. Depending on topography, and the location of the building on the slope, vents in the eave and soffit areas, and gable end vents can be very vulnerable to the entry of embers. Embers entering vents can ignite other materials that are located in these spaces. There also is a risk associated with the most common type of eave, known as open (or exposed) eave construction, which does not have vents. You have this type of construction if you can see the rafter tails from your roof framing on the exterior underside of your roof. If not properly installed, there can be gaps where the blocking and rafter tails intersect; as a result, wind-blown embers could become lodged here, igniting the wood members there with the fire spreading to the rest of the house or business or business.

### WHAT YOU SHOULD DO

If you have vent openings into your attic or crawlspace, check for screening. At a minimum, these vents should be covered with 1/8-inch metal mesh screens (usually the finest mesh allowed by the building code). Until very recently, 1/4-inch mesh screen was the minimum allowed by building codes, so the vents on most homes or businesses will have this size screening. Post-fire surveys have shown that embers large enough to cause ignitions can pass through 1/4- and even 1/8-inch mesh screening, so while screening will help reduce the risk of ember entry, it is not a perfect solution. Also, keep in mind that a finer mesh screen will require more maintenance to be kept free of debris. It is important to keep air flowing freely to help manage the moisture in your attic.

Property owners in every area vulnerable to wildfire can benefit from new vents being designed as a result of stricter building codes in California. Although these vents may not be required in your state, they are designed to offer enhanced protection by reducing the chance embers will enter your structure. These products are currently in the testing and acceptance phase while test standards are being finalized. These vents typically incorporate a finer mesh secondary screen (i.e., one that is set back in the vent device), and other design features on the exterior side. Find a list of accepted vents at: <http://osfm.fire.ca.gov/> Scroll down to the section titled Building Code Chapter 7A Wildfire Protection Information & CBC Chapter 7A Task Force.

Depending on the ease of accessing your vents, you could prepare vent covers using 1/2-inch plywood or a thin metal plate and include their installation as part of your wildfire pre-evacuation preparedness plan. These covers should be removed upon your return.

If you have open eaves (i.e., you can see the exposed rafters in the eave of your house or business), you can inject a sealant (such as caulking) in any gaps that you observe, or enclose the underside of the roof overhang to help keep embers from lodging there. To do this, fasten sheathing made from noncombustible or ignition-resistant material to the underside of the rafter tails. This enclosure can follow the slope of the roof, and is sometimes referred to as



Boxed eave with vent



Open eave



boxing-in the eave. This also can be accomplished by extending the material from the roof edge horizontally to the exterior wall, thereby making a soffit eave. If you have a vented attic, don't forget to add soffit vents as part of your project – position the vents close to the roof edge, not the exterior wall.

## TILE AND OTHER NONCOMBUSTIBLE ROOF COVERINGS WITH GAPS ALONG THE EDGES

### WHAT YOU SHOULD KNOW

Tile roofs are growing in popularity among builders in the Rocky Mountain region, but are not commonly found in older construction. If you have never had a tile roof before, keep in mind that some roofing materials have a gap at the ridge and edge of the roof. The most common example is a clay barrel tile roof covering, but it also occurs in some metal roofs (mainly shingle style) and other flat tile or cement roof coverings. Even with flat profiles, gaps will occur at the ridge of the roof. The gaps can allow birds and rodents to get into the opening and build nests. The small bits of vegetation used for nesting material are highly combustible, and easily ignited by wind-blown embers. The flames can then quickly spread to the structural members that support your roof and bypass any protection offered by Class "A" fire-rated roof covering materials.

### WHAT YOU SHOULD DO

Use a form of protection called a bird stop to seal the open edges of the roof covering. Bird stops are a manufactured shield that can be purchased from roofing supply stores and are typically provided by the manufacturer of the roof covering. The bird stop is inserted into the opening at the edge of the roof. You can also use a mortar mix to plug the ends. The mortar mix would be the best option for openings at the ridge of the roof. Remember, the idea is to keep fuel sources, such as nesting materials wind-blown debris and embers from getting under the roof covering.

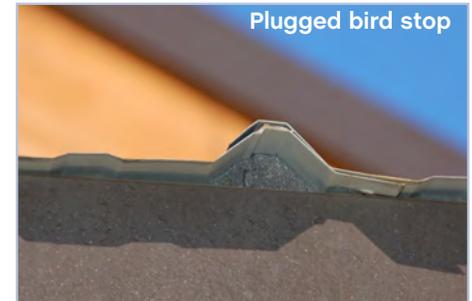
Do not forget to inspect the ridge (peak) of your roof. A flat tile roof may not have a gap at the roof edge, but it could have openings at the ridge. These openings also need to be closed.

## GUTTERS

### WHAT YOU SHOULD KNOW

Wind-blown vegetative debris and overhanging trees can lead to the accumulation of leaves and needles on your roof and in your gutters. Once dry, this debris can be readily ignited by embers from a wildfire. Debris accumulated in gutters and at roof-to-wall intersections is particularly vulnerable to ignition by wind-blown embers. Even if you have a Class "A" ignition-resistant roof covering, such as tile, concrete or asphalt composition shingles, the roof edge and, in the case of a multi-story home or business or a building with dormers, the exterior siding adjacent to the roof will be exposed to flames from the ignited vegetative debris.

Many checklists suggest replacing vinyl gutters with metal gutters. Debris in any gutter will be readily ignited by embers. Depending on the amount of accumulated debris, a vinyl gutter will quickly detach from the fascia due to deformation from the heat or flames and fall to the ground. The debris will burn



In this case, a bird stop piece is missing. If you have bird stops, inspect them regularly to make sure they are all still in place and functional.

Smaller gaps can occur in standing seam metal roofs. As shown here, material is also available to plug the ends of these roof coverings.



out on the ground, potentially igniting any other vegetation or combustible siding. The metal gutter will remain attached to the fascia, and the ignited debris will burn out there, continuing to expose the edge of the roof to flames. The most fire-safe solution is to minimize the build-up of debris in the gutter.

### WHAT YOU SHOULD DO

Remove tree branches that overhang the roof and remove any dead vegetation, including branches, within your defensible space, the zone where you are actively managing your vegetation. This should be part of your routine defensible space maintenance. Do this at least once each year, at a time best suited for the health of the tree or plant.

Clean gutters and roof areas where debris collects. Inspect these areas at least twice a year. Remove accumulated leaves, pine needles and any other combustible debris. Covering your gutters with screens or other cover devices can minimize the build-up of debris in the gutter. Remember that even gutters with screens should be inspected to make sure covers are in place and performing properly. Some screens and cover devices will keep debris out of the gutter, but allow it to accumulate on the roof, behind the device. If ignited, this amount of debris won't be a problem for a Class "A" roof, but can increase your vulnerability if you don't have a Class "A" roof. Even if you have a Class "A" roof, debris should still be removed on a regular basis to reduce ember generation and exposure to other building components.

## WINDOWS AND DOORS

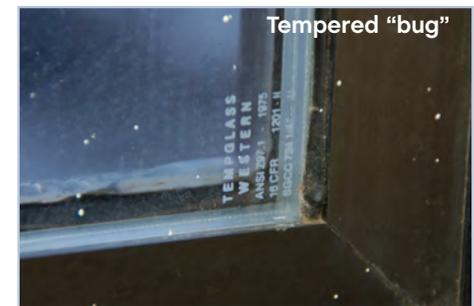
### WHAT YOU SHOULD KNOW

The doors and windows of your home or business should be able to resist wind-blown embers and protect against radiant heat and flame exposure. Depending on the type of glass, a window that is exposed to flames may break after only 1 to 3 minutes of exposure to intense heat or flames. When windows break from exposure to heat and/or flames, embers and flames can get inside your building. Testing has shown that single-pane windows are highly vulnerable to breaking when exposed to wildfire conditions. Fortunately, dual-pane windows provide better protection; this protection is even greater when tempered glass is used. Remember, even dual-pane, tempered glass windows will not protect your home or business if they are left open. Close all windows before you evacuate during a wildfire.

Studies have shown that glass is the most vulnerable part of the window. Glass in windows breaks because of extreme temperature differences, which develop between the exposed glass and the glass protected by the window framing material, when exposed to the heat from a wildfire (or the heat from your neighbor's burning home or business). Cracks develop and propagate inward, which makes larger windows more vulnerable to breaking because they tend to have more edge than smaller windows.

### WHAT YOU SHOULD DO

Determine what kind of windows are in your home or business. Single-pane windows are more common in older structures. Dual-pane windows have two sheets of glass that are separated by airspace. Regardless of which types of



The outer pane of this dual-pane window broke during a 2007 wildfire. Having the dual-pane window was one reason why this home survived.

Tempered glass in a window will have a marking etched on one of the corners, similar to that shown here.



windows are in place, the key is the use of tempered glass. To find out if your windows contain tempered glass, look for an etching (called a bug) in the corner.

You should replace your windows with ones that have tempered glass, preferably dual-pane windows that have at least one pane of tempered glass on the outside. Remember, dual-pane windows without tempered glass don't protect as well in wildfire conditions. Current energy code requirements usually require dual-pane windows, so upgrading will increase both fire resistance and energy efficiency.

Metal window screens have been shown to improve the performance of windows subjected to radiant heat exposure in wildfire conditions. Fine mesh screens of at least 1/16-inch will also help to resist the entry of embers, but will not keep flames out. If you cannot afford to replace your windows, it is important to manage the fuels close to your home or business, including maintaining the surrounding vegetation and using noncombustible mulch and ignition-resistant materials for yard and garden structures. Once you have done this, and provided your windows are accessible, a less expensive alternative would be to make shutters out of 1/2-inch plywood. Cut them to size and label them for each window so they can be installed quickly when wildfire threatens. Take the time to pre-install the anchorage hardware and prepare your shutter materials in advance. The 1/2-inch plywood will provide an extra measure of protection from radiant heat or the impact of wind-blown embers.

## DECKS, PORCHES AND PATIOS

### WHAT YOU SHOULD KNOW

Decks, patios and porches are important because they often are attached to the house or business and are next to windows, sliding glass doors, and possibly combustible siding. Consider the construction material used to build the deck, patio or porch, along with the types of items that are on and beneath it. This includes vegetation leading up to the structure, which can act as a wick and move the fire through to the building materials, igniting it and other items stored underneath or nearby. This is particularly important for decks when the house or business is sited on a sloped lot. Depending on the type and condition of the vegetation, flame lengths on a slope can reach more than 30 feet, so even an elevated deck can be vulnerable.

It is common knowledge that wood deck boards are combustible. There is sometimes a misunderstanding regarding the combustibility of wood-plastic composite decking products. These products also are combustible; some manufacturers are now incorporating fire retardant chemicals into their products, and fire performance information for many decking products is now available online at the manufacturer Web site. Wood decking that has been treated with an exterior fire retardant also is available.

Some checklists and guides suggest attaching a metal flashing strip, approximately 18 inches tall, between the top of the deck, patio or porch and the exterior (combustible) siding. The purpose of the flashing strip is to provide protection from ember exposure, both the embers themselves and the flaming exposure that could occur if accumulated debris at the point where the house or business intersects with the deck, patio or porch were ignited by the embers.



Use noncombustible materials when building a deck. Never store flammable materials on top of or beneath the deck.



This is a good idea, as long as the flashing is tucked in behind the siding where the top of flashing terminates so water cannot seep between the flashing and the siding.

## WHAT YOU SHOULD DO

Enclosing your elevated deck, patio or porch can help reduce the risk of damage from wildfire. These can be enclosed vertically by applying an exterior siding product around the edge of the deck, patio or porch or horizontally by applying an exterior panelized product to the bottom of the support joists.

To determine if enclosing your deck, patio or porch would be beneficial, consider whether you store combustible materials underneath it, or if your vegetation management plan is inadequate, particularly in the 0- to 30-foot zone. If you can avoid storing combustible materials underneath and if you create and maintain your vegetation management plan, enclosure will not significantly increase the protection of your house or business from wildfire.

If you choose to enclose your deck, patio or porch make sure you provide sufficient ventilation or other means for water to drain out. The building code requirement for a crawlspace is one square foot of venting for each 150 square feet of floor area. You should have at least this much ventilation and maybe more if you are in a particularly wet area. If you do not allow the structural support members and boards to dry out, fungal decay will become the biggest threat to your deck, patio or porch.

Enclosing your deck, patio or porch will not reduce the risk of the top being exposed to embers. For that, the best protection is to keep the surface clear of leaves, pine needles and other vegetative debris. If your house or business is supported by a column and beam system, and it doesn't have skirting around the perimeter, add a skirting of an ignition-resistant material. Remember to provide vents on all sides to ensure proper ventilation.

Learn more about how to choose wildfire-resistant decking materials at:  
[http://www.fire.ca.gov/fire\\_prevention/fire\\_prevention\\_wildland.php](http://www.fire.ca.gov/fire_prevention/fire_prevention_wildland.php).

## SIDING

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### WHAT YOU SHOULD KNOW

Siding can be vulnerable for two reasons. First, if ignited, combustible siding can provide a path for flames to reach other vulnerable components of your building, such as windows and the eave area. Second, if penetrated, a horizontal or vertical lap joint can provide access for flames to enter the home or business. Penetration at lap joints is more likely with combustible siding products.

Log buildings will resist ignition better than smaller members typically used for wood siding products. The most vulnerable part of a log wall is between log joints, but this risk is minimized if the joint is chinked with a resistant material that provides protection from flame penetration. Wood siding with a more complicated lap joint, such as tongue-and-groove or shiplap, offers better



resistance than other bevel-type joints from flame penetration into the stud cavity. Incorporating an underlying sheathing material in the wall assembly will improve the ability of any siding material to resist lap-joint penetration.

Vinyl siding will deform and fall off the wall at relatively low radiant energy or flame exposure during a fire. In these cases, protection of your home or business will depend on the performance of the underlying sheathing material.

Noncombustible siding, including fiber cement, traditional three-coat stucco, and brick will provide the best protection. Wood siding that has been treated with an exterior-rated fire retardant chemical will also improve the performance of siding against both radiant and flaming wildfire exposures.

## WHAT YOU SHOULD DO

If you have combustible siding, consider incorporating a noncombustible zone next to your home or business. In order to best resist fire penetration at lap joints, plain bevel lap joints should be avoided, or exterior-type fire retardant treated siding should be used. If you have a chinked-style log structure, inspect the chinking for cracks and/or missing pieces, and repair and replace with ignition-resistant chinking.

Replacing siding is expensive. There are other, less expensive items already discussed in this guide that will provide more protection for your home or business.



## FENCES

### WHAT YOU SHOULD KNOW

Fences can be a wildfire hazard, particularly if they connect directly to the home or business. The bottom of fences collect debris that, when combined with combustible materials, can become a fuel source that can act as a wick to carry fire directly to the structure.

Some checklists recommend inserting a metal shield where the fence connects to the exterior (combustible) siding. How effective this is will depend on the size of the metal. Also, depending on how it is attached, over time it could result in other moisture-related problems with the siding. Find more effective solutions in the following section.

Solid noncombustible fencing (i.e., steel, stucco) that is more than six feet tall can serve as a barrier for the house or business from the radiant heat exposure from a passing fire front.

### WHAT YOU SHOULD DO

New fences should be entirely constructed of noncombustible or other ignition-resistant materials. A wood frame with steel mesh infill is another option that will provide adequate protection. Existing wood fences that are attached to the house or business should be retrofitted so the fence ends with a noncombustible material like masonry or metal, or with a larger wood member



Use metal gates and noncombustible materials when installing or replacing a fence.

(i.e., heavy timber) to keep fire from spreading to the house or business. A common technique is to use a metal gate that is attached to the fence on one side and to the exterior siding on the other side.

It is important not to store firewood or other combustible materials against the fence, and to regularly remove debris and dead vegetation at the bottom of the fence.

## CHIMNEYS

### WHAT YOU SHOULD KNOW

Spark arrestors are required to prevent large embers from escaping through your chimney. Think of it as a community-wide approach to wildfire protection – you protect your neighbors and they protect you by having a chimney spark arrestor.

### WHAT YOU SHOULD DO

Install a spark arrestor that has ½-inch mesh. These are available at lumber yards, hardware stores or fireplace specialty stores.

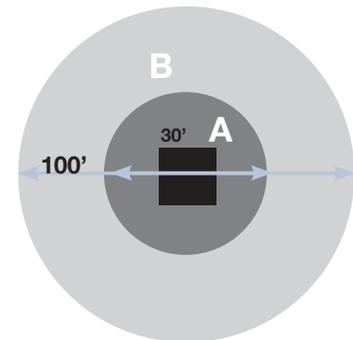
## CREATING DEFENSIBLE SPACE

### IDENTIFYING FUEL MANAGEMENT ZONES

The first zone is the one closest to your home or business, which extends outward at least 30 feet or to the property line. This zone will require the most thinning and horizontal separation of trees and other vegetation, and removal of items that could cause a very intense fire close by. The objective of the thinning and separation is to reduce the chances that vegetation will provide a wildfire a direct path to your home or business. Items that also should be removed include wood structures, boats, RVs, trailers and anything else containing combustible materials.

The next zone extends from 30 feet to approximately 100 feet or to the property line. If your home or business is located on a steeper slope (more than 20 percent) then this zone should be increased. [See the Topography Section for how to determine slope.] Trees and other vegetation here should be maintained and dead plant materials and tree branches should be removed. The objective of the work in this zone is to slow down and reduce the energy of the wildfire.

If you are in a forested area, there is a risk that a wildfire could spread to the tops of the trees. By making modifications in the 30- to 100-foot zone, such as increasing the separation between trees and vegetation and eliminating tree branches located close to the ground, you can help drive the wildfire back to



Defensible space involves two zones extending out from a home or business.



the ground before it reaches your home or business. These improvements also will help to reduce the chance that a fire will climb back up into the crown of the tree. Once created, it is critical to maintain these improvements.

Colorado, South Dakota, North Dakota and Wyoming have 80 percent of the nation's National Grassland. Fast moving grassland fires can generate embers that can ignite vegetation near your home or business, or other combustibles that are located near the building or stored under a deck.

Because of the importance of the area closest to your home or business, some experts suggest an additional zone that extends from 10 to 15 feet from your structure. In high risk areas such as chaparral, this extra attention needs to be extended throughout the full 30-foot zone. Pay particular attention to the types of vegetation and mulch you select for this area. Whatever types of plant materials are chosen, they must be carefully maintained. There are products on the market such as noncombustible mulches, including rock, gravel, and noncombustible hardscape features such as brick and concrete walkways and surfacing that will reduce your wildfire exposure. Choosing low-growing, irrigated herbaceous plant materials is another good option.

## THE AREA CLOSEST TO YOUR HOME OR BUSINESS (ZERO TO 30 FEET)

Take stock of what is in your yard and/or the common areas outside your business. Consider the plants but look beyond them to other items that could increase the risk that your structure will catch on fire.

## PLANTS

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### WHAT YOU SHOULD KNOW

Close to a building, plants can become a major fire hazard. Plants adjacent to combustible siding, as well as plants under or next to windows or the interior corners of a house or business present the greatest hazard. Embers from a wildfire can reach your home or business from a mile or more away, and can become trapped in corners, igniting nearby plants and exposing siding and the roof overhang to flames.

### WHAT YOU SHOULD DO

Remove dead vegetation close to the house or business, paying attention to material on and underneath plants. Mulch can help keep the ground moist and reduce the need for watering, but it also can become a fire hazard. Avoid using wood, bark and rubber mulch products, particularly small pieces of bark or those with hairy components such as "gorilla hair" mulch. Consider rock mulch or other noncombustible materials. For plants, shorten the height, remove branches that are close to the ground, prune to reduce the amount of material in the plant, and remove dead material.



Vegetation too close to windows.



## BETTER VEGETATION CHOICES FOR YOUR AREA

Choose fire-resistant plants. Learn more about choosing plants by visiting the links at [www.DisasterSafety.org/megafires](http://www.DisasterSafety.org/megafires) or directly at:

### Colorado

<http://www.ext.colostate.edu/pubs/natres/06305.html>

### Montana

<http://www.mt.nrcs.usda.gov/technical/fires/reveg.html>

<http://msuextension.org/publications/outdoorsenvironmentandwildlife/4480.pdf>

<http://msuextension.org/publications/outdoorsenvironmentandwildlife/4455.pdf>

<http://msuextension.org/publications/yardandgarden/mt200101ag.pdf>

### North Dakota and South Dakota

<http://agbiopubs.sdstate.edu/articles/ExEx2057.pdf>

[http://www.ndsu.nodak.edu/forests-service/fire/wildfire\\_prevention.htm](http://www.ndsu.nodak.edu/forests-service/fire/wildfire_prevention.htm)

[http://www.firewise.org/usa/files/south\\_dakota.pdf](http://www.firewise.org/usa/files/south_dakota.pdf)

### Utah

[http://extension.usu.edu/forestry/hometown/ho\\_firewise.htm](http://extension.usu.edu/forestry/hometown/ho_firewise.htm)

[http://extension.usu.edu/forestry/reading/assets/pdfdocs/nr\\_ff/nrff002.pdf](http://extension.usu.edu/forestry/reading/assets/pdfdocs/nr_ff/nrff002.pdf)

## YARD AND GARDEN STRUCTURES

### WHAT YOU SHOULD KNOW

Arbors, pergolas or trellises, combustible fencing, playground equipment, gazebos and other structures located close to your home or business will increase its vulnerability to wildfire. Wind-blown embers can accumulate in or on such structures and ignite them. Depending on how close the items are to a building, they might act as a fuel source driving the fire to your home or business. Trellises and pergolas are especially susceptible because they are often made of wood, are covered with vegetation, and are attached or adjacent to the structure.

### WHAT YOU SHOULD DO

Consider removing arbors or pergolas made from combustible materials. Structures made from metal and other noncombustible materials would be acceptable choices. Wood arbors and pergolas can be more resistant to fire if they are made with exterior-rated, fire retardant lumber, or larger dimension material. If you go this route, you should also use the heartwood of a naturally durable species (such as cypress or cedar). Unfortunately, there is no treatment for lumber that functions as both a fire retardant and a preservative against wood-destroying organisms. Regarding use of larger dimension material, remember that wood members with smaller cross-sections ignite and burn more easily. You could also consider mixing materials - the supporting structural members could be large timbers, and the smaller members could be noncombustible. Remember to remove dead vegetation on these structures.



Wooden playground equipment can be a fire risk if located too close to a home or business.



Keep all yard and garden structures free of accumulated debris. Any structures, such as a child's play set or gazebo built from combustible materials, should be relocated at least 30 feet away from the home or business.

## OUTBUILDINGS, FUEL TANKS AND FLAMMABLE PERSONAL PROPERTY

---

### WHAT YOU SHOULD KNOW

All buildings on the property face the same types of risks when it comes to wildfire. Once ignited, these buildings would act just like a large plant, bringing flames closer to the home or business, potentially resulting in ignition. If ignited, outbuildings will burn much longer than a typical plant, resulting in longer fire exposure for any other buildings on the property. They will also generate their own embers.

Boats and recreational vehicles (RVs) also are easily ignited during wildfires. If these are located near your home or business, they can help spread flames and radiant heat exposure. They should be protected inside a building or parked at least 30 feet from the home or business.

If fire comes too close to exterior liquefied petroleum (LP) tanks, a leak can develop at the pressure relief valve, resulting in a column of flame. Flame impinging on the upper surface of the tank can result in an explosion, particularly when the fuel level is lower. It is important to follow your local building code requirements regarding tank placement. It is also important to locate propane tanks at least 30 feet away from your home or business and create 10 to 15 foot defensible space around your tank.

### WHAT YOU SHOULD DO

Relocate combustible outbuildings at least 30 feet away from your home or business. Other options would be to create defensible space around the outbuilding or to incorporate noncombustible or ignition-resistant materials into the building.

If possible, store your boat or RV in a garage. Otherwise store it away from your home or business and/or move it when a wildfire threatens.

If necessary, relocate your propane tanks to at least 30 feet from your home or business. Create a noncombustible zone within 10 feet of the tank. Another option is to enclose the tank. If enclosure is used, it should be made of noncombustible materials (i.e., fiber cement siding, stucco, or metal.)



Locate propane tanks at least 30 feet from a home or business and create defensible space around the tank.

## **FIREWOOD, LEFTOVER BUILDING/CONSTRUCTION MATERIALS AND COMBUSTIBLE MULCH**

---

### **WHAT YOU SHOULD KNOW**

It may seem obvious, but firewood, combustible mulch, or other combustible materials located too close to a home or business can spread the wildfire. Mulch offers several beneficial attributes to the soil, including weed and erosion control and water retention. Balancing the benefits of mulch with the potential risk from spreading fire to the house or business must be carefully considered.

The ease with which combustible mulches ignite, and the speed with which fire will spread, will depend on the characteristics of the particular mulch, but they will all burn. Smaller mulches or ones that have fine fuel components (for example, the hairy bark or needle mulches) will ignite and spread fire more quickly. Studies have shown that composted mulches perform better than other combustible mulches, but even this material exhibits smoldering combustion. Learn more by watching the mulch burning demonstration video at [www.livingwithfire.info](http://www.livingwithfire.info).

### **WHAT YOU SHOULD DO**

Move firewood and leftover building materials, and items such as wheelbarrows containing these materials, as far away as possible from your home or business. Firewood piles should be located at least 30 feet from any building on the property. Consider using noncombustible mulches in the area immediately adjacent to your home or business.

## **ASSESSING AND MANAGING SURROUNDINGS BEYOND 30 FEET VEGETATION MANAGEMENT**

---

### **WHAT YOU SHOULD KNOW**

If your home or business faces a wildland and you own or can get access and permission to modify the vegetation in the area between 30 feet and 100 feet from your building, you should manage the vegetation to reduce the intensity of the fire in this area and make sure that it does not progress beyond a surface fire.

### **WHAT YOU SHOULD DO**

You should regularly remove any dead brush from this extended fuel modification area and thin out trees, including removing branches close to the ground so that a crown fire cannot be supported and a fire on the ground will not climb up into the tree canopy.





## IMPORTANCE OF TOPOGRAPHY

---

### WHAT YOU SHOULD KNOW

The topography around your home or business, which includes the slope of the land and the direction the structure faces, is a major consideration in assessing the risk exposure to wildfire. Wildfires burn up a slope faster and more intensely than along flat ground. A steeper slope will result in a faster moving fire, with longer flame lengths.

### WHAT YOU SHOULD DO

Determine the steepness of the slope. Select a mark on the slope and walk ten paces downhill, if your head is below the mark you have a steep slope.

If your home or business is mid-slope, or at the top of a steep slope but set back less than 15 feet for a single-story and 30 feet for a two-story building, fire science research indicates a need to take additional precautions. These include being more aggressive with your vegetation modification and maintenance plan and more aware of the materials used to build the house or business, deck or any outbuildings. You will also want to push the fuel modification area beyond the 100-foot length, if at all possible. A target for the extended fuel modification area would be between 150 feet and 200 feet.

Consider increasing the protection of your home or business by constructing a noncombustible retaining wall to help increase the set-back. When making future improvements, incorporate ignition-resistant features and materials into the home or business and surrounding landscape.

## IMPORTANCE OF ENVIRONMENTAL CONDITIONS

---

### WHAT YOU SHOULD KNOW

Higher wind speeds are frequently associated with fast moving wildfires and some areas in this region are prone to strong, hot, dry winds that tend to blow from certain directions (e.g., Chinook winds). Strong winds blowing a fire toward your home or business will have the same effect as being located on a slope and the fire will move faster, burn more intensely, blowing embers in front of the fire. The flame lengths also will be longer.

### WHAT YOU SHOULD DO

If your home or business is located on the side of a development that faces into the prevailing strong wind direction or on a side that is parallel to the prevailing strong wind direction, consider pushing the fuel modification area beyond the 100-foot length if at all possible. A target for the extended fuel modification area would be between 150 feet and 200 feet.





## DEFENSIVE ACTIONS

---

### WHAT YOU SHOULD KNOW

Some states have been given grants from the Federal Emergency Management Agency (FEMA) for the installation of exterior roof-mounted fire sprinklers. The use of exterior sprinklers is considered a defensive action and a primary use is to help limit the spread of the fire to the home or business. The sprinklers should be turned on prior to evacuation.

Using exterior sprinklers can help to reduce the chances of a home or business being damaged by a wildfire, but like all other actions that can be taken, it requires planning and the system must be properly maintained. It also must be treated as one component of a fire safety plan and it does not eliminate the need for other actions recommended in this guide.

### WHAT YOU SHOULD DO

If you are considering an external sprinkler system, check with your local fire department. They may have installation plans, and other suggestions. In order to maximize the effectiveness of exterior sprinklers, they should be operated by a stand-alone, independent water system (i.e., tank, pool, or lake) and must be attached to a pressurized delivery system or use a generator for needed pumps.

Separate water and power supplies will reduce the reliance on municipal power sources, which could be affected by the wildfire, and water sources that could be needed by firefighters to protect other properties.


**YOUR HOME  
OR BUSINESS**
**REQUIRED ACTION  
OR RETROFIT**
**RELATIVE  
COST**

**ROOF COVERING** - Your roof, both in terms of its covering and design, is the most vulnerable part of your home or business when considering exposure to wildfire.

|  |   |               |
|--|---|---------------|
| 1. Do you have a non-combustible or Class "A" roof?  | A professional roof inspection can help determine this. If not, replace your roof covering with a Class "A" fire-rated covering. Many styles are available.   | \$\$\$\$      |
| 2. Do you have a tile or metal roof? If yes, are the gaps between covering and roof sheathing, which can occur at the edge and ridge, filled with either a bird stop or other material to seal the openings?<br><br>Are there other roof openings? | Install bird stops.<br><br>Plug any roof openings that are not functioning as vents.  | \$-\$-\$      |
| 3. Do you have combustible siding where a lower level roof meets and on the upper level roof or wall?  | Replace siding with a more fire-resistant material.   | \$\$-\$\$\$\$ |
| 4. Has vegetative debris accumulated on your roof?   | Ember accumulation at the roof-wall intersection increases the risk of fire exposure, particularly if combustible siding is present. The problem is exacerbated with a buildup of debris. Routinely remove debris from the roof. Consider hiring a professional to help with this task. | FREE          |

**VENTS** are vulnerable to wind-blown embers and flames from nearby vegetation, combustible siding that has ignited or if combustible materials are stored nearby that could potentially catch on fire. Maintaining appropriate defensible space will help minimize wildfire risks.

|   |  |    |
|---|--|----|
| 1. Are your vents covered with 1/8-inch mesh metal screens?   | There are many types of new vents on the market that are designed to reduce the risks of wind-blown embers getting inside. Consider installing new vents; availability and styles will vary by region. A less expensive alternative is to attach a minimum of 1/8-inch mesh metal screens over existing vents.   | \$ |
| 2. If your vents are not covered with metal screens, have you attached 1/8-inch mesh metal screens and have you prepared vent covers that can be easily installed when a wildfire is approaching? | Attach screens and/or prepare covers. Attaching a solid cover would provide additional assurance that large embers would be kept out of the attic or crawlspace. Since the primary purpose is to prevent embers from getting inside your vents, 1/2-inch plywood could be used. Keep the areas around the vents clear of vegetation and other combustible materials. Install covers before evacuation and remove them upon your return. Use caution when installing and removing covers over vents on higher floors. | \$ |

















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Web site: [DisasterSafety.org](http://DisasterSafety.org)



# Is Your Home Protected From Wildfire Disaster?

**A Homeowner's Guide to Wildfire Retrofit**



**INSTITUTE FOR  
Business &  
Home Safety**

# acknowledgments

The staff of the Institute for Business & Home Safety (IBHS) wishes to acknowledge the valuable input of all those involved in the preparation of this booklet. In particular, we extend our thanks to:

**The IBHS Wildfire Committee Members**  
**National Fire Protection Association**  
**State Farm Fire and Casualty Company**  
**National Institute of Standards & Technology**  
**US Geological Survey**  
**Insurance Services Office, Inc.**  
**The Hartford Financial Services Group**  
**California FAIR Plan Association**  
**Allstate Insurance Company**

Architectural Illustrations:  
W. Spaulding, AIA

Photography:

Page 1: Bitterroot National Forest, Montana  
Courtesy National Interagency Fire Center, Boise, Idaho

Page 2: Pine Barrens  
© J Smalley, NJ

Opposite Table of Contents: Florida Wildfire  
© AP/Wide World Photos

## **Disclaimer**

*The purpose of this document is to provide homeowners with guidance on ways to retrofit and build homes to reduce losses from wildfire damage. It contains suggestions and recommendations based on professional judgment, experience and research and is intended to serve only as a guide. The authors, contributors and publisher disclaim all warranties and guarantees with respect to the information in the document and assume no liability or responsibility with respect to the information.*

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***“Nature...she pardons no mistakes.”***

*Ralph Waldo Emerson*



© AP/Wide World Photos

*An April 2001 Florida wildfire caused Olga Gutierrez to desperately fight a fire behind her Port Charlotte, FL home with water from her pool.*

In 1993, a wildfire in a dry canyon north of Laguna Beach, California, raced toward hundreds of nearby homes, giving residents little advance warning of its awesome destruction. More than 14,000 acres and 440 homes went up in flames.

In the nearby Mystic Hills neighborhood, 286 homes were totally destroyed. Yet, there was one white house left standing in the midst of hundreds of piles of smoking ash that remained of its neighboring homes. This sole surviving house was built with fire prevention in mind. It stood as an example of how homes can, with a little extra attention, better withstand nature's perils. The practical methods used in and around that house can help reduce the chances of future wildfires from reducing communities to ashes. This guide is designed to make that one rare exception of survival a more common occurrence in the future.

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# table of contents

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|  |    |
|--|----|
| <b>Introduction</b> .....                              | 1  |
| <b>Wildfires and Your Home</b> .....                   | 2  |
| The Wildland/Urban Interface Problem .....             | 2  |
| You and Your Local Fire Department .....               | 2  |
| Just the Right Conditions .....                        | 3  |
| How Your Home Catches Fire .....                       | 4  |
| Taking Inventory - Is your property at risk? .....     | 4  |
| What's Your Risk Level? .....                          | 5  |
| What You Can Do to Reduce Your Risk .....              | 5  |
| <b>Your Home's Landscape</b> .....                     | 7  |
| Creating a Survivable Space .....                      | 7  |
| The Importance of Maintenance .....                    | 7  |
| <b>Your Home's Building Materials and Design</b> ..... | 8  |
| The Ideal Fire-Resistant Home .....                    | 8  |
| Taking Inventory .....                                 | 8  |
| Taking Action .....                                    | 9  |
| <b>Helping Your Local Fire Department</b> .....        | 12 |
| <b>Wildfire Safety Project List</b> .....              | 13 |
| <b>Wildfire Protection Checklist</b> .....             | 14 |
| <b>References</b> .....                                | 19 |
| <b>Additional Sources of Information</b> .....         | 20 |

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# Large Fire Locations

## January 1 to October 3, 2000



*Courtesy National Interagency Fire Center  
Boise, Idaho*

# introduction

**N**early every state has been devastated by wildfires in the last century. More than 140,000 wildfires occur on average each year. Since 1990, more than 900 homes have been destroyed each year by wildfires.

So, what can you do to protect yourself, your home and property from wildfires? This guide will help you understand

- why your home is at risk, and
- how you can reduce the risk to your home and property.



*Bitterroot National Forest, Montana  
John McColgan  
FairBanks, AK • August 6, 2000*

# wildfires and your home

## The Wildland/Urban Interface Problem

**W**ildfires occur regularly. Whether started by humans or by lightning, they are part of a natural cycle that helps to maintain the health of our forests. Today, more than ever, people are moving into remote areas, with the desire to "get back to nature," without addressing the dangers that exist around them.

A tremendous wildfire danger exists where homes blend together with the wildland, creating the wildland/urban interface. The addition of homes there interrupts the natural cycle of wildfires. Ultimately,

this contributes to a dangerous build-up of old vegetation, leading to an uncontrollable wildfire.

## You and Your Local Fire Department

In a wildfire, your local fire department has two priorities – to remove you and your family from harm's way and to stop the progression of the wildfire. If your home happens to be in the wildfire's path, they may or may not be able to protect it – there are simply no guarantees.

Consequently, you must take action before a fire starts.

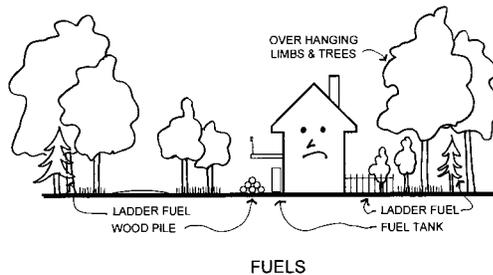


© J Smalley, NJ • Pine Barrens

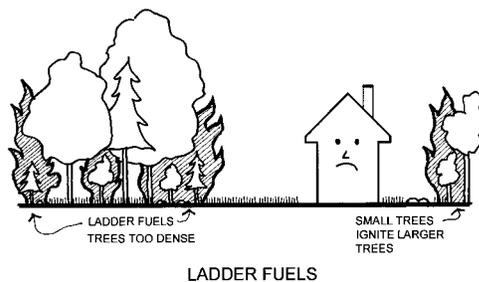
## Just the Right Conditions

Conditions must be just right for a wildfire to start and spread. Specifically, fuel, weather and topography work together to determine how quickly a wildfire travels and at what intensity.

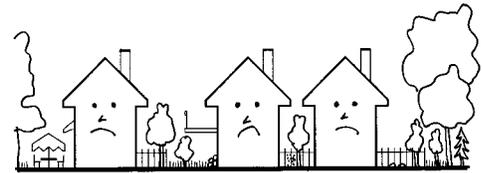
**Fuels:** The two basic fuel types in the wildland/urban interface are vegetation and structures.



**Vegetation:** Fuel in its natural form consists of living and dead trees, bushes and grasses. Typically, grasses burn more quickly and with less intensity than trees. Any branches or shrubs between 18 inches and 6 feet are considered to be ladder fuels. Ladder fuels help convert a ground fire to a crown fire (tree tops) which moves much more quickly.



**Structural Density:** The closer the homes are together, the easier it is for the flames to spread from one structure to another.

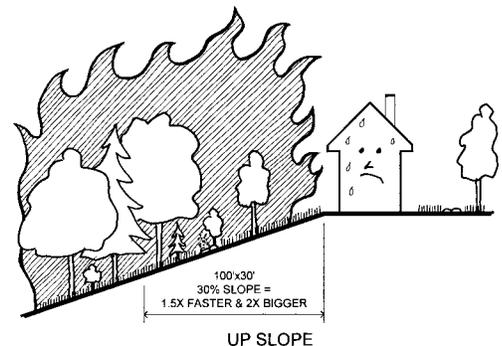


STRUCTURAL DENSITY

**Weather:** High temperatures, low humidity, and swift winds increase the probability of ignitions and difficulty of control. Short and long-term drought further exacerbates the problem.

**Slope:** Slope is the upward or downward incline or slant of terrain. For example, a completely flat plain represents a 0% slope and a hillside that rises 30 feet for every 100 feet horizontal distance represents a 30% slope.

Hot gases rise in front of the fire along the slope face, pre-heating the up-slope vegetation, moving a grass fire up to four times faster with flames twice as long as a fire on level ground.



## How Your Home Catches Fire

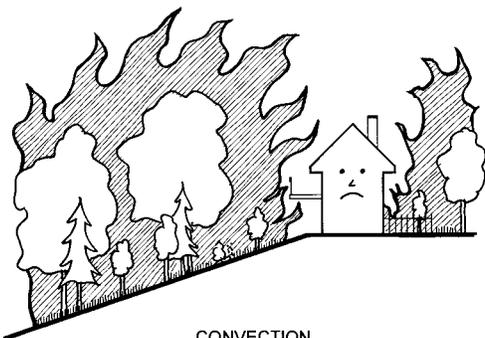
There are three ways that the wildfire can transfer itself from the natural vegetation or other burning homes to your home – through radiation, convection or firebrands.

**Radiation:** Wildfires can spread to your home by radiating heat in the same way a radiator heats your rooms in the wintertime. Radiated heat is capable of igniting combustible materials from distances of 100 feet or more.



RADIATION

**Convection:** Contact with the convection column (flames) may also cause the wildfire to ignite your house. Typically, the convec-



CONVECTION

tive heat column rises vertically, within the smoke plume.

**Firebrands:** Firebrands are burning materials that detach from a fire during strong convection drafts in the burning zone. Firebrands can be carried long distances – more than a mile – by the winds associated with the wildfire.



FIREBRANDS

In all cases, your home's building materials and design play a significant role in establishing the level of exposure that can be endured before ignition from radiation, convection, firebrands or any combination of these three.

## Taking Inventory – Is Your Property at Risk?

The first step in establishing your risk is to assess your property. The table on page 5 lists numerous factors and issues that you should consider.

This assessment will give you a good sense of your property's wildfire risk.

## Assessing Your Property

- |  |  |
|--|--|
| <input type="checkbox"/> Have wildfires occurred in your area? If so, under what conditions?       | <input type="checkbox"/> Is there a substantial amount of tall vegetation crowded in around your home? |
| <input type="checkbox"/> Do you have seasons when wildfires are more likely to occur?              | <input type="checkbox"/> Do tree limbs extend over your home?  |
| <input type="checkbox"/> Do you live in hilly or flat country?                                     | <input type="checkbox"/> Are the trees in good condition or are they dying?                            |
| <input type="checkbox"/> Are there areas around your home that are more susceptible to a wildfire? | <input type="checkbox"/> Do you have a woodpile in close proximity to your home?                       |
| <input type="checkbox"/> Do you border wildland?   | <input type="checkbox"/> Do you have any fuel tanks nearby?  |
| <input type="checkbox"/> Have you used native vegetation in your landscaping?                      | <input type="checkbox"/> Is a wood fence attached to your home?  |

### What's Your Risk Level?

The rough categories that follow on page 6 are not meant to give you an absolute score, but are to help guide you when deciding how to best protect your home.

### What You Can Do To Reduce Your Risk

Homes in a wildland/urban interface area can be designed and maintained to increase the chances of surviving a wildfire without the intervention of the fire department.

This guide will help you protect your home on two different fronts:

- Your Home's Landscape
- Your Home's Building Materials and Design

### Low Risk Areas:

- Little or no history of nearby wildfires
- Humid climate, short dry season
- Flat terrain (no grades greater than 9%)
- Limited wildland
- Home not crowded by trees
- Landscape includes native vegetation
- Manmade fuels at least 50 feet from your home.
- Fire hydrant within 300 feet
- Easy access for fire trucks

### Moderate Risk Areas:

- History of wildfires
- Climate includes a dry season less than 3 months
- Hilly terrain (grades average between 10% and 20%)
- Bordering a wildland with light brush, small trees or grass
- Trees are located in close proximity to your home
- Native vegetation has or has not been incorporated into your landscape
- Manmade fuels are within 50 feet of your home
- Fire hydrant within 500 feet
- Access for fire trucks

### High Risk Areas:

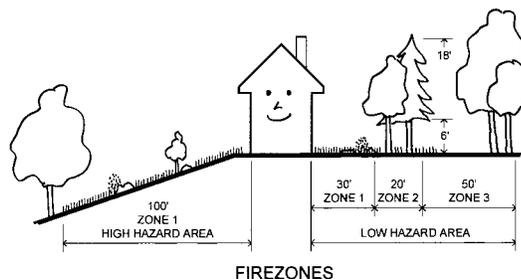
- History of nearby wildfires
- Dry climate with a dry season more than 3 months
- Steep terrain (grades average over 20%)
- Forested wildland within 100 feet of your home
- Native vegetation has not been incorporated into your landscape
- Trees are crowded within 30 feet of your home
- Manmade fuels within 30 feet of your home
- No fire hydrants
- Limited access for fire trucks

# your home's landscape

## Creating a Survivable Space For Your Home

A survivable space is an area of reduced fuels between your home and the untouched wildland. This provides enough distance between the home and a wildfire to ensure that the home can survive without extensive effort from either you or the fire department.

One of the easiest ways to establish a survivable space is to use the zone concept. Zone 1 is the closest to your home and Zones 2 and 3 move progressively further away.



**Zone 1:** Establish a well-irrigated area around your home. In a low hazard area, it should extend a minimum of 30 feet from your home on all sides. As your hazard risk increases, a clearance of between 50 and 100 feet or more may be necessary, especially on any downhill sides of the lot. Plantings should be limited to carefully spaced indigenous species.

**Zone 2** Place low-growing plants, shrubs and carefully spaced trees in this area. Maintain a reduced amount of vegetation. Your irrigation system

should also extend into this area.

Trees should be at least 10 feet apart, and all dead or dying limbs should be trimmed. For trees taller than 18 feet, prune lower branches within six feet of the ground. No tree limbs should come within 10 feet of your home.

**Zone 3:** This furthest zone from your home is a slightly modified natural area. Thin selected trees and remove highly flammable vegetation such as dead or dying trees and shrubs.

So how far should Zones 2 and 3 extend? Well, that depends upon your risk and your property's boundaries.

In a low hazard area, these two zones should extend another 20 feet or so beyond the 30 feet in Zone 1. This creates a modified landscape of over 50 feet total.

In a moderate hazard area, these two zones should extend at least another 50 feet beyond the 50 feet in Zone 1. This would create a modified landscape of over 100 feet total.

In a high hazard area, these two zones should extend at least another 100 feet beyond the 100 feet in Zone 1. This would create a modified landscape of over 200 feet total.

## The Importance of Maintenance

Once you have created your home's survivable space, you must maintain it or risk losing the benefit of its protection.

# your home's building materials and design

**C**reating and maintaining a survivable space is a necessary first step. The next step is to use fire resistant building materials and construction techniques in retrofitting your home.

## The Ideal Fire-Resistant Home

Keep in mind that a wildfire sees your home as just another fuel

source. The survivable space you construct around your home will keep all but the most ferocious wildfires at bay. However, if the wildfire does break through your first line of defense, an ignition might occur on your home's exterior. The ideal situation is for your home's exterior materials to prevent or retard the flames from burning into your interior walls, soffits, attic area, and rooms.

### Taking Inventory

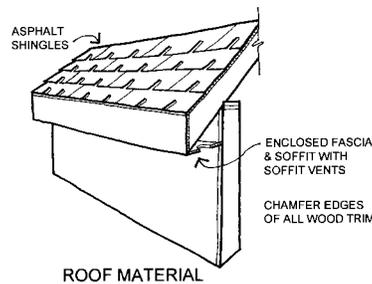
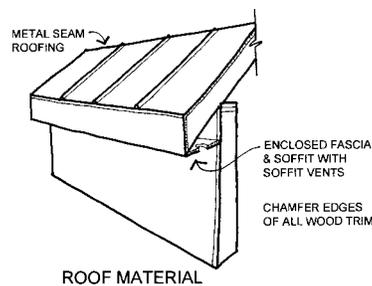
Examine your home's construction and materials. Use the following as a checklist.

- What type of roof covering do you have? Asphalt, wood, concrete, tile or metal?
- How are your eaves, fascias and soffits constructed? Are they made from vinyl, wood or metal?
- What are your home's exterior walls covered with? Are they wood, aluminum or vinyl siding, stucco, brick or concrete masonry?
- Do you have large windows or sliding glass doors that border or face the wildland? Are they single pane, double pane or tempered glass?
- How are your home's attic and sub-floor vents protected? Are their covers metal or vinyl?
- Are spark arresters installed on all your home's chimneys?
- Does your home have a deck or balcony that overhangs a slope?
- Is there a porch, garage or wood fence that attaches directly to your home?

## Taking Action

Now you will need to decide on the best modifications for your home, given your risk.

**Roof:** The roof is the most vulnerable part of your home to wildfires. During a wildfire, firebrands can fall on your roof, landing in your roof's nooks and crannies where a fire can easily start. Once your roof covering does ignite, chances are very good that the rest of your home will follow.



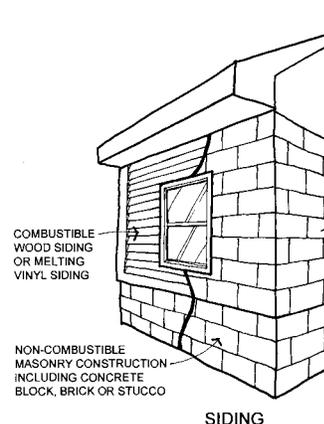
The best way to avoid this situation is to make sure your roof is fire-resistant. The two main fire resistance tests used today include: ASTM E108 and UL 790. There are three levels of classification awarded under the test protocol, A, B, and C, with A being the most

fire resistant. Some treated wood shake shingle products have ratings of Class C or better. Over time, the effectiveness of this chemical is reduced by weathering before the end of the product's useful life and may leave your roof unprotected.

If your roof needs to be re-covered, consider installing a Class A roof covering.

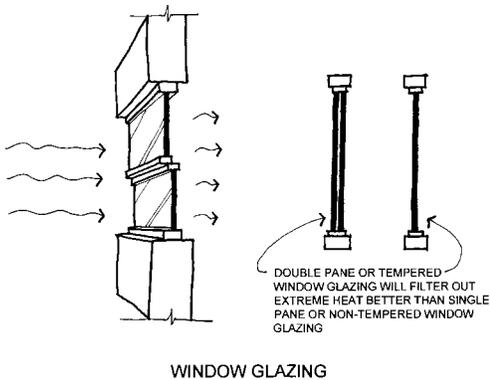
**Exterior Walls:** Exterior walls are susceptible to a wildfire's radiant and convective heat. Although a fire on an exterior wall may not penetrate inside your home, the fire can 'bridge' to more vulnerable areas such as eaves, soffits, vents and windows.

Wall materials that resist heat and flames include cement, plaster, stucco and concrete masonry such as stone, brick or block. Though some materials will not burn, such as vinyl, they may lose their integrity when exposed to high temperature and fall away or melt, providing the fire with a direct path inside the home.



**Exterior Windows, Glass Doors and Skylights:** Exposure to the heat of the wildfire can cause glass to fracture and collapse, leaving an opening for flames and firebrands to enter your home. This applies to both double pane and single pane glass, since double pane glass is only slightly more resistant to heat than single pane glass.

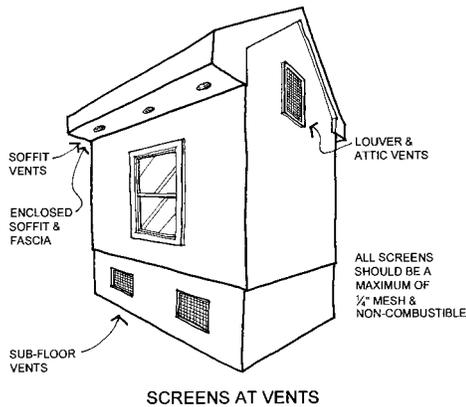
On the other hand, single or double pane tempered glass windows, doors and skylights typically fracture at higher exposures, well above the radiant heat exposures capable of igniting the surrounding wood.



**Eaves, Fascias, Soffits:** Eaves, fascias and soffits are vulnerable to both firebrands and convective exposures.

Eaves, fascias and soffits should be ‘boxed’ or enclosed with noncombustible materials to reduce the size of the vents. Materials that melt or

burn in relatively low temperatures, such as PVC and vinyl siding, should not be used, since they do not provide adequate protection and can melt in the heat of the wildfire. Non-combustible screening should be used in the vents.

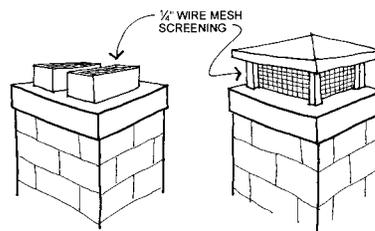


**Attic, Subfloor or Foundation Vents:** Wind and/or direct contact with a fire’s convective heat can push firebrands through the vents into your home’s basement or crawl space.

Your vent openings should be screened to prevent firebrands or other objects larger than 1/4 inch from entering your home. Both your vents and screens should be constructed of materials that will not burn or melt when exposed to radiate or convective heat or firebrands. Also, these vents should be corrosion-resistant to help minimize required maintenance.

**Fireplace Chimneys:** Windblown embers can access your home through your fireplace's chimney flue. Once inside, these firebrands then collect on flammable objects, greatly increasing the chance of combustion. The situation can also be reversed: embers from your own fire can fly out the chimney and start a wildfire, right in your own neighborhood.

The best way to avoid this situation is to install a spark arrestor made from welded wire or woven wire mesh with openings less than 1/4" wide.

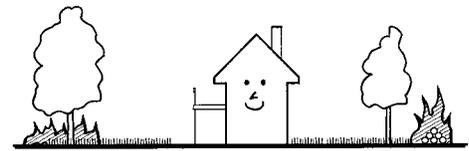


CHIMNEY SCREENS

**Overhangs and Other Attachments:** Overhangs and other attachments include any additional structures attached to a residence such as room pushouts, bay windows, decks, porches, carports and fences. These features are often very vulnerable to convective exposures.

When assessing your home and property, if the feature in question is attached to your home, it should be considered part of your home.

There are a number of ways you can reduce the vulnerability of your home's overhangs and attachments. First and foremost, remove all fuels around these areas. Next, box in the undersides of the overhangs, decks and balconies with noncombustible or fire-resistant materials to reduce the possibility of ignition. For fences, make sure that they don't attach directly to your home.



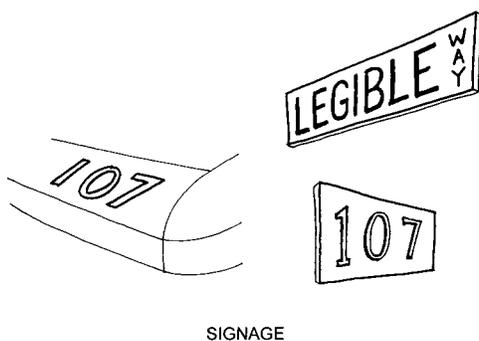
WOOD PILES, DECKS, FENCES, ETC.

# helping your local fire department

**E**ven if you modify your home's landscape to incorporate the most fire-resistant materials and design into your home's construction, there is no guarantee that a wildfire will not threaten your home. It is important that your local fire department be able to find and defend your home.

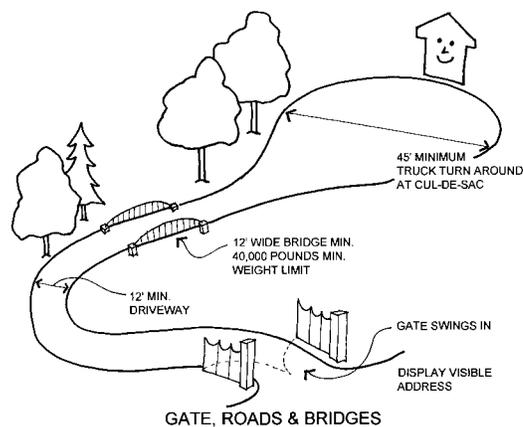
Here are some suggestions on how to modify your property to accommodate your local fire department.

**Street Signs and Numbers:** If made from combustible materials, your street signs and numbers can ignite or melt, leaving the fire department with no ability to locate your home. It is critical that signs and numbers be noncombustible and visible from the road.



**Driveways:** Fire trucks and equipment are quite large and often have difficulty in tight spots. Consequently, your home's driveway must be large enough to accommodate the typical sized trucks. Fire experts recommend a driveway at least 12 feet wide and 13 feet of vertical clearance.

**Gates:** If your home is gated, it is very important that the gate opens inward and be wide enough to accommodate the fire fighting equipment. Experts also recommend that the gate be at least 30 feet off of the main road, so that the equipment can pull off the road to open the gate. If the gate is locked, the lock should not be so strong that firefighters cannot break it in an emergency.



# wildfire safety project list

This list of home improvements is divided into cost categories. You can tackle these projects one at a time, but remember, the more you do, the better protected your home will be against wildfires.

## Category \$ (<\$300)

- Creating a survivable space;
- Maintaining your survivable space;
- Installing fire-resistant signs and address numbers;
- Modifying your attic, sub-floor, and basement vents;
- Installing a spark arrestor on your chimney.

## Category \$\$ (\$300 – \$1000)

- Boxing in overhangs and modifying other attachments;
- Boxing in your eaves, facias, and soffits.

## Category \$\$\$ (>\$1000)

- Re-covering your exterior walls with a more fire-resistant material;
- Replacing single-pane glass windows, doors, or skylights with tempered glass;
- Modifying your driveway, bridges, and gates to accommodate fire trucks.
- Re-roofing your home with a Class A roof covering.

# WILDFIRE PROTECTION CHECKLIST

## Before, During and After: Be Completely Prepared

You will give yourself and your family a better chance of escaping harm during a wildfire by taking as many of the precautions outlined in this brochure as possible. But, these steps are only the beginning. To protect yourself as completely as possible, here are some added suggestions:

### before a wildfire strikes:

|   |  |
|---|--|
|    | Know where your gas, electric and water main shut-off controls are and how to turn them off if there is a leak or electrical short. Also, know how to use a fire extinguisher. Make sure all adult and teenage members of your family know how to shut off each utility and to use the extinguisher.   |
|  | Become familiar with your community's disaster-preparedness plans and create a family plan. Know where the closest police, fire and emergency medical facilities are located.  |
|  | Plan several different escape routes from your home and neighborhood and designate an emergency meeting place for the family to reunite. Establish a contact point to communicate with concerned relatives.  |
|  | Put together an emergency kit that includes at least a three-day supply of drinking water and food that needs no refrigeration and, generally, no cooking; emergency cooking equipment, if required; a portable NOAA weather radio; first aid supplies and medications; basic tools, such as a wrench, a flashlight and gloves; portable lanterns and batteries; credit cards and cash; and important documents, including insurance policies. |
|  | Talk to your neighbors about wildfire safety. Plan how the neighborhood could work together before, during and after a wildfire. Make a list of your neighbors' skills such as medical or technical. Consider how you would help neighbors who have special needs such as elderly or disabled persons. Make plans to take care of children who may be on their own if parents can't get home.  |
|  | Periodically review your homeowner's insurance policy with your insurance agent or company to make sure that, if you are the victim of a disaster, you have enough coverage to rebuild your home and life.   |

## during a wildfire:

|   |  |
|---|--|
|    | If you are warned that a wildfire is threatening your area, listen to your portable radio for reports and evacuation information. Follow the instructions of local officials.                                  |
|    | Back your car into the garage or park it in an open space facing the direction of escape. Shut car doors and roll up windows. Leave the key in the ignition or in another easily accessible location.          |
|    | Close garage windows and doors, but leave them unlocked. Disconnect automatic garage door openers.   |
|    | Confine pets to one room. Make plans to care for your pets in case you must evacuate.  |
|  | Arrange temporary housing outside the threatened area.   |
|  | When advised to evacuate, do so immediately.   |
|  | Wear protective clothing – sturdy shoes, cotton or woolen clothing, long pants, a long-sleeved shirt, gloves and a handkerchief to protect your face.  |
|  | Take your emergency kit.   |
|  | Lock your home.  |
|  | Notify your relatives and the local officials that you have left and where you can be reached.   |
|  | Follow the evacuation route that your local officials have identified. If no official route exists, choose a route away from fire hazards. Watch for changes in the speed and direction of the fire and smoke. |



If you are SURE you have the time, take additional steps to protect your home:

|   |   |
|---|---|
|    | Close windows, vents, doors, venetian blinds and heavy drapes. Remove lightweight curtains.     |
|    | Shut off gas at the meter. Turn off pilot lights.   |
|    | Move flammable furniture into the center of the home away from windows and sliding-glass doors. |
|    | Turn on a light in each room to increase the visibility of your home in heavy smoke.            |
|  | Seal attic and ground vents.  |
|  | Turn off propane tanks.   |
|  | Place combustible patio furniture inside.   |
|  | Connect the garden hose to outside taps.  |
|  | Place lawn sprinklers on the roof and near aboveground fuel tanks. Wet the roof.                |
|  | Wet or remove shrubs within 15 feet of the home.  |
|  | Gather fire tools, including a rake, axe, hand/chainsaw, bucket and shovel.                     |





## after a wildfire strikes:

|   |  |
|---|--|
|  | Listen to and follow the advice and recommendations of the local aid organizations, including the emergency management office, the fire department and the utility companies.                                |
|  | Check for hazards, such as gas or water leaks and electrical shorts. Turn off damaged utilities. Have the fire department or gas and electric companies turn the utilities back on when the area is secured. |
|  | Check for injuries and administer first aid as needed.   |
|  | Check your food and water supplies. Do not eat anything from open containers near shattered glass.   |



# references

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American Society for Testing and Materials. Standard Test Methods for Fire Testing of Roof Coverings ASTM E108. West Conshohocken, PA: ASTM, 2000.

Insurance Services Office, Inc. The Wildland/Urban Fire Hazard. New York, NY: ISO, 1997

International Fire Code Institute Urban–Wildland Interface Code. Whittier, CA: IFCI, 2000

National Fire Protection Association Firewise Landscaping Videotapes (3) and Checklist. Firewise Construction Videotapes and Checklist. Quincy, MA: NFPA, 1994

- Protecting Your Home from Wildfire. Quincy, MA: NFPA, 1987

- Standard for Protection of Life and Property from Wildfire NFPA 299. 1997 Edition. Quincy, MA: NFPA, 1997.

NFPA Journal Wildland/Urban Interface Fires. Quincy, MA: NFPA, March/April.

National Wildland/Urban Interface Fire Protection Program. Wildland/Urban Interface Fire Hazard Assessment Methodology. Washington, DC: 1997

Underwriters Laboratories Tests for Fire Resistance of Roof Covering Materials. UL 790. Northbrook, IL: 1997

Alberta Environment Land and Forest Service FireSmart: Protecting Your Community from Wildfire. Partners in Protection. Edmonton, Alberta: May 1999.

# appendix I: additional sources of information

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California Department of Forestry and Fire Protection (CDF)

<http://www.fire.ca.gov/>

Colorado State University/Colorado Forestry Service

<http://lamar.colostate.edu/~firewise/>

Firewise

<http://www.firewise.org/>

National Interagency Fire Center (NIFC)

<http://www.nifc.gov/>

U.S. Forest Service

<http://www.fs.fed.us/fire/>

Wildfire News

<http://www.wildfirenews.com/>

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# Fuelbreak Guidelines for Forested Subdivisions & Communities

By

Frank C. Dennis



*Knowledge to Go Places*

This publication was developed for use by foresters, planners, developers, homeowners' associations and others. Implementation of these measures cannot *guarantee* safety from all wildfires, but will greatly increase the probability of containing them at more manageable levels.



*Inadequate fire planning can result in loss of life or property and costly suppression activities.*



Colorado's forested lands are experiencing severe impacts from continuing population increases and peoples' desire to escape urban pressures. Subdivisions and developments are opening new areas for homesite construction at an alarming rate, especially along the Front Range and around recreational areas such as Dillon, Vail, and Steamboat Springs.

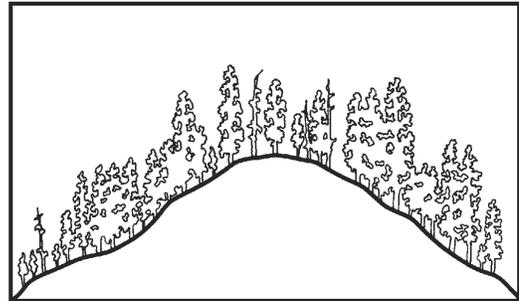
But with development inevitably comes a higher risk of wildfire as well as an ever-increasing potential for loss of life and property. Methods of fire suppression, pre-suppression needs, and homeowner and fire crew safety must all be considered in the planning and review of new developments as well as for the "retrofitting" of existing, older subdivisions.

Fuelbreaks should be considered in fire management planning for subdivisions and developments; however, the following are guidelines **only**. They should be customized to local areas by professional foresters experienced in Rocky Mountain wildfire behavior and suppression tactics.

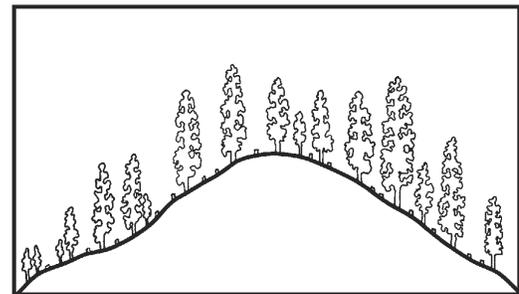
## Fuelbreak vs Firebreak

Although the term fuelbreak is widely used in Colorado, it is often confused with firebreak. The two are entirely separate, and aesthetically different, forms of forest fuel modification and treatment.

- A firebreak is strip of land, 20 to 30 feet wide (or more), in which all vegetation is removed down to bare, mineral soil each year prior to fire season.



*Above, cross section of mixed conifer stand before fuelbreak modification. Below, after modification.*



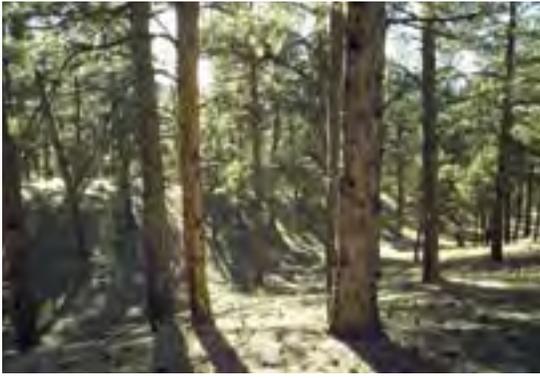
- A fuelbreak (or shaded fuelbreak) is an easily accessible strip of land of varying width (depending on fuel and terrain), in which fuel density is reduced, thus improving fire control opportunities. The stand is thinned, and remaining trees are pruned to remove ladder fuels. Brush, heavy ground fuels, snags, and dead trees are disposed of and an open, park-like appearance is established.

The following is a discussion of the uses, limitations, and specifications of fuelbreaks in wildfire control and fuels management.

## Fuelbreak Limitations

Fuelbreaks provide quick access for wildfire suppression. Control activities can be conducted more safely due to low fuel volumes. Strategically located, they break up large, continuous tracts of dense timber, thus limiting uncontrolled spread of wildfire.

Fuelbreaks can aid firefighters greatly by slowing fire spread under normal burning conditions. However, under extreme conditions, even the best fuelbreaks stand little chance of arresting a large



Before and after photos of a forest stand thinned to reduce fuel loads.

fire, regardless of firefighting efforts. Such fires, in a phenomenon called “spotting,” can drop firebrands 1/8-mile or more ahead of the main fire, causing very rapid fire spread. These types of large fires may continue until there is a major change in weather conditions, topography, or fuel type.

**It is critical to understand: A fuelbreak is the line of defense. The area (including any homes and developments) between it and the fire may remain vulnerable.**

In spite of these somewhat gloomy limitations, fuelbreaks have proven themselves effective in Colorado. During the 1980 Crystal Lakes Subdivision Fire near Fort Collins, crown fires were stopped in areas with fuelbreak thinnings, while other areas of dense lodgepole pine burned completely. A fire at O’Fallon Park in Jefferson County was successfully stopped and controlled at a fuelbreak. The Buffalo Creek Fire in Jefferson County (1996) and the High Meadow Fire in Park and Jefferson Counties (2000) slowed dramatically wherever intense forest thinnings had been completed. During the 2002 Hayman Fire, Denver Water’s entire complex of offices, shops and caretakers’ homes at Cheesman Reservoir were saved by a fuelbreak with no firefighting intervention by a fuelbreak.



Burned area near Cheesman Reservoir as a result of the Hayman Fire. Note the unburned green trees in the middle right of the photo, a treated fuelbreak.

### The Need For A Fuelbreak

Several factors determine the need for fuelbreaks in forested subdivisions, including: (1) potential problem indicators; (2) wildfire hazard areas; (3) slope; (4) topography; (5) crowning potential; and (6) ignition sources.

### Potential Problem Indicator

The table below explains potential problem indicators for various hazards and characteristics common to Colorado’s forest types. All major forest types, except aspen, indicate a high potential for wildfire hazard.

| Fuel Type               | Characteristics |          |      | Hazards  |           |       |         |
|-------------------------|-----------------|----------|------|----------|-----------|-------|---------|
|                         | Aesthetics      | Wildlife | Soil | Wildfire | Avalanche | Flood | Climate |
| Aspen                   | 2               | 3        | 3    | 2        | 4         | 3     | 2       |
| Douglas-fir             | 2               | 2        | 3    | 5        | 2         | 2     | 3       |
| Greasewood-Saltbrush    | 4               | 2        | 2    | 2        | 1         | 3     | 3       |
| Limber-Bristlecone Pine | 3               | 2        | 4    | 3        | 4         | 2     | 5       |
| Lodgepole Pine          | 2               | 2        | 3    | 5        | 4         | 2     | 4       |
| Meadow                  | 5               | 4        | 4    | 2        | 3         | 4     | 3       |
| Mixed Conifer           | 2               | 1        | 1    | 5        | 3         | 1     | 3       |
| Mountain Grassland      | 5               | 3        | 4    | 3        | 3         | 2     | 4       |
| Mountain Shrub          | 3               | 5        | 4    | 4        | 2         | 2     | 3       |
| Piñon-Juniper           | 2               | 3        | 4    | 4        | 2         | 3     | 2       |
| Ponderosa Pine          | 2               | 3        | 1    | 5        | 2         | 2     | 3       |
| Sagebrush               | 4               | 4        | 3    | 3        | 3         | 2     | 3       |
| Spruce-Fir              | 2               | 3        | 3    | 4        | 5         | 3     | 4       |

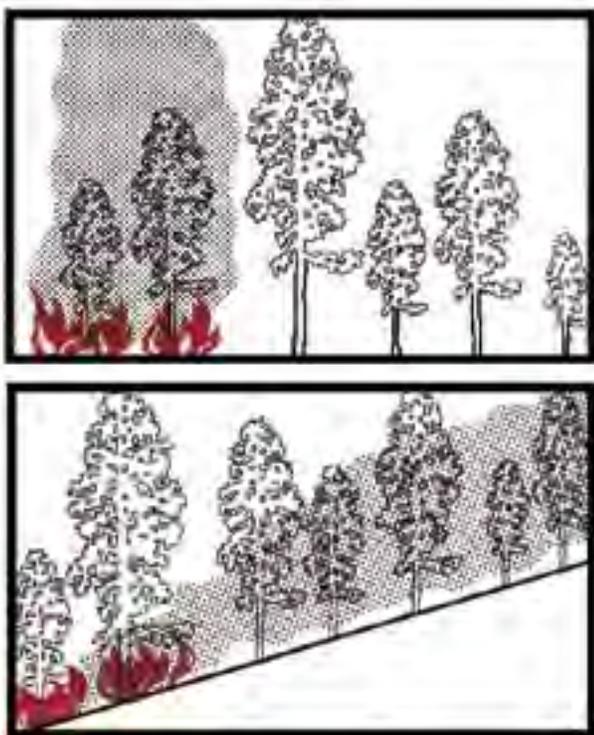
Legend: 5 – Problem may be crucial; 4 – Problem very likely; 3 – Exercise caution; 2 – Problem usually limited; 1 – No rating possible

## Wildfire Hazard Maps

The Colorado State Forest Service (CSFS), numerous counties and some National Forests have completed wildfire hazard mapping for many areas within Colorado, particularly along the Front Range. These maps typically consider areas with 30 percent or greater slope; hazardous fuel types; and hazardous topographic features such as fire chimneys. Wildfire Hazard Ratings may be depicted in several ways. Whatever system is used, areas rated moderate or higher should be considered for fuel modification work.

### Slope

Rate of fire spread increases as the slope of the land increases. Fuels are preheated by the rising smoke column or they may even come into contact with the flames themselves.



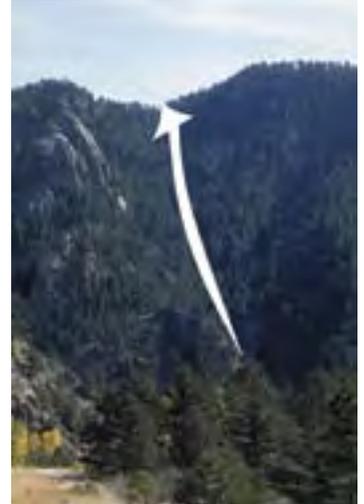
*Fire effects, flat vs steep terrain. Note preheating of fuels on steep ground from passage of smoke column.*

At 30 percent slope, rate of fire spread doubles compared to rates at level ground, drastically reducing firefighting effectiveness. **Areas near 30 percent or greater slopes are critical and must be reviewed carefully.**

### Topography

Certain topographic features influence fire spread and should be evaluated. Included are fire chimneys, saddles, and V-shaped canyons. They are usually recognized by reviewing standard U.S.G.S. quad maps.

- Chimneys are densely vegetated drainages on slopes greater than 30 percent. Wind, as well as air pre-heated by a fire, tends to funnel up these drainages, rapidly spreading fire upslope.



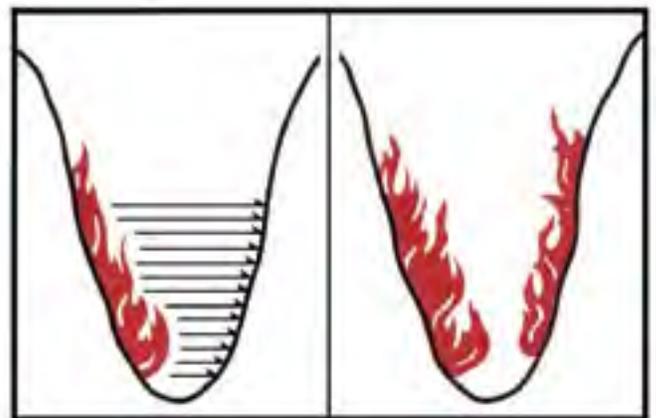
*Chimney.*

- Saddles are low points along a main ridge or between two high points. Like chimneys, they also funnel winds to create a natural fire path during a fire's uphill run. Saddles act as corridors to spread fire into adjacent valleys or drainages.



*Saddle.*

- Narrow, V-shaped valleys or canyons can ignite easily due to heat radiating from one side to the other. For example, a fire burning on one side of a narrow valley dries and preheats fuels on the opposite side until the fire "flashes over." The natural effect of slope on fire then takes over and fire spreads rapidly up drainage and uphill along both sides of the valley.



*Flashover in V-shaped valley.*

## Crowning Potential

An on-site visit is required to accurately assess crowning potential. A key, below, helps determine this rating. Fuel modification is usually unnecessary if an area has a rating of 3 or less.

### Crowning Potential Key

|   | Rating |
|---|--------|
| A. Foliage present, trees living or dead — B  |        |
| B. Foliage living — C   |        |
| C. Leaves deciduous or, if evergreen, usually soft, pliant, and moist; never oily, waxy, or resinous. | 0      |
| CC. Leaves evergreen, not as above — D  |        |
| D. Foliage resinous, waxy, or oily — E  |        |
| E. Foliage dense — F  |        |
| F. Ladder fuels plentiful — G   |        |
| G. Crown closure > 75 percent   | 9      |
| GG. Crown closure < 75 percent  | 7      |
| FF. Ladder fuels sparse or absent — H   |        |
| H. Crown closure > 75 percent   | 7      |
| HH. Crown closure < 75 percent  | 5      |
| EE. Foliage open — I  |        |
| I. Ladder fuel plentiful  | 4      |
| II. Ladder fuel sparse or absent  | 2      |
| DD. Foliage not resinous, waxy, or oily — J   |        |
| J. Foliage dense — K  |        |
| K. Ladder fuels plentiful — L   |        |
| L. Crown closure > 75 percent   | 7      |
| LL. Crown closure < 75 percent  | 4      |
| KK. Ladder fuels sparse or absent — M   |        |
| M. Crown closure > 75 percent   | 5      |
| MM. Crown closure < 75 percent  | 3      |
| JJ. Foliage open — N  |        |
| N. Ladder fuels plentiful   | 3      |
| NN. Ladder fuels sparse or absent   | 1      |
| BB. Foliage dead  | 0      |

The majority of dead trees within the fuelbreak should be removed. Occasionally, large, dead trees (14 inches or larger in diameter at 4 1/2 feet above ground level) may be retained as wildlife trees. If retained, all ladder fuels must be cleared from around the tree's trunk.

### Ignition Sources

Possible ignition sources, which may threaten planned or existing developments, must be investigated thoroughly. Included are other developments and homes, major roads, recreation sites, railroads, and other possible sources. These might be distant from the proposed development,

yet still able to channel fire into the area due to slope, continuous fuels, or other topographic features.

### Fuelbreak Locations

In fire suppression, an effective fire line is connected, or "anchored," to natural or artificial fire barriers. Such anchor points might be rivers, creeks, large rock outcrops, wet meadows, or a less flammable timber type such as aspen. Similarly, properly designed and constructed fuelbreaks take advantage of these same barriers to eliminate "fuel bridges." (Fire often escapes control because of fuel bridges that carry the fire across control lines.)

Since fuelbreaks should normally provide quick, safer access to defensive positions, they are necessarily linked with road systems. Connected with county-specified roads within subdivisions, they provide good access and defensive positions for firefighting equipment and support vehicles. Cut-and fill slopes of roads are an integral part of a fuelbreak as they add to the effective width of modified fuels.

Fuelbreaks without an associated road system, such as those located along strategic ridge lines, are still useful in fire suppression. Here, they are often strengthened and held using aerial retardant drops until fire crews can walk in or be ferried in by helicopter.

Preferably, fuelbreaks are located along ridge tops to help arrest fires at the end of their runs. However, due to homesite locations and resource values, they can also be effective when established at the base of slopes. Mid-slope fuelbreaks are least desirable, but under certain circumstances and with modifications, these too, may be valuable.

Fuelbreaks are located so that the area under management is broken into small, manageable units. Thus, when a wildfire reaches modified fuels, defensive action is more easily taken, helping to keep the fire small. For example, a plan for a subdivision might recommend that fuelbreaks break up continuous forest fuels into units of 10 acres or less. This is an excellent plan, especially if defensible space thinning is completed around homes and structures, and thinning for forest management and forest health are combined with the fuelbreak.

When located along ridge tops, continuous length as well as width are critical elements. Extensive long-range planning is essential in positioning these types of fuelbreaks.

## Aesthetics

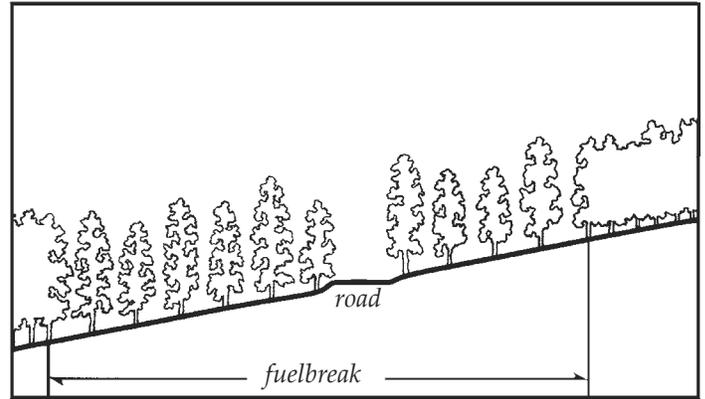
Improperly planned fuelbreaks can adversely impact an area's aesthetic qualities. Careful construction is necessary when combining mid-slope fuelbreaks with roads involving excessive cut-and-fill.



*These photos, far- and near- views of the same site, illustrate that forest can be thinned without impacting aesthetics.*

Care must also be taken in areas that are not thinned throughout for fuel hazard reduction. In such cases the fuelbreak visually sticks out like a "sore thumb" due to contrasting thinned and unthinned portions of the forest. (Especially noticeable are those portions of the fuelbreak above road cuts).

These guidelines are designed to minimize aesthetic impacts. However, some situations may require extensive thinning and, thus, result in a major visual change to an area. Additional thinning beyond the fuelbreak may be necessary to create an irregular edge and to "feather," or blend, the fuelbreak thinning into the unthinned portions of the forest. Any thinning beyond the fuelbreak improves its effectiveness and is highly recommended.



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

## Constructing the Fuelbreak

### Fuelbreak Width and Slope Adjustments

Note: Since road systems are so important to fuelbreak construction, the following measurements are from the toe of the fill for downslope distances, and above the edge of the cut for uphill distances.

The minimum recommended fuelbreak width is approximately 300 feet for level ground. Since fire activity intensifies as slope increases, the overall fuelbreak width must also increase. However, to minimize aesthetic impacts and to maximize fire crew safety, the majority of the increases should be made at the bottom of the fuelbreak, below the road cut.

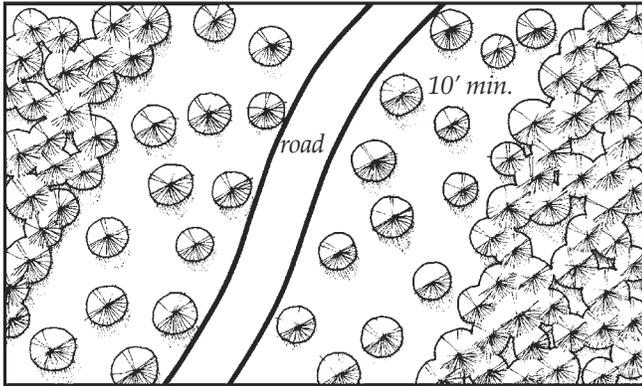
Widths are also increased when severe topographic conditions are encountered. Guidelines for fuelbreak widths on slopes are given below:

| Fuelbreak Width/Slope |                              |                                |                                     |
|-----------------------|------------------------------|--------------------------------|-------------------------------------|
| Percent Slope (%)     | Minimum Uphill Distance (ft) | Minimum Downhill Distance (ft) | Total Width of Modified fuels (ft)* |
| 0                     | 150                          | 150                            | 300                                 |
| 10                    | 140                          | 165                            | 303                                 |
| 20                    | 130                          | 180                            | 310                                 |
| 30                    | 120                          | 195                            | 315                                 |
| 40                    | 110                          | 210                            | 320                                 |
| 50                    | 100                          | 225                            | 325                                 |
| 60                    | 100                          | 240                            | 340                                 |

\*As slope increases, total distance for cut-and-fill for road construction rapidly increases, improving fuelbreak effective width.

## Stand Densities

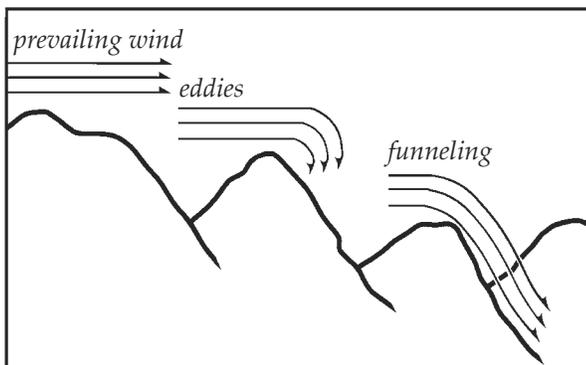
Crown separation is a more critical factor for fuelbreaks than a fixed tree density level. A *minimum* 10-foot spacing between the edges of tree crowns is recommended on level ground. As slope increases, crown spacing should also increase. However, small, isolated groups of trees may be retained for visual diversity. Increase crown spacing around any groups of trees left for aesthetic reasons and to reduce fire intensities and torching potential.



Plan view of fuelbreak showing minimum distance between tree crowns.

In technical terms, a fuelbreak thinning is classified as a heavy “sanitation and improvement cut, from below.” Within fuelbreaks, trees that are suppressed, diseased, deformed, damaged, or of low vigor are removed along with all ladder fuels. Remaining trees are the largest, healthiest, most wind-firm trees from the dominant and co-dominant species of the stand.

Because such a thinning is quite heavy for an initial entry into a stand, prevailing winds, eddy effects, and wind funneling must be carefully evaluated to minimize the possibility of windthrow. It may be necessary to develop the fuelbreak over several years to allow the timber stand to “firm-up” — this especially applies to lodgepole pine and Engelmann spruce stands.



Topography affects wind behavior – an important consideration during fuelbreak construction.

Area-wide forest thinnings are recommended for any subdivisions. Such thinning is not as severe as a fuelbreak thinning, but generally should be completed to fuelbreak specifications along the roads (as outlined on page 6.) In addition, “defensible space thinnings” are highly recommended around all structures (see CSU Coop. Extension Fact sheet 6.302, *Creating Wildfire-Defensible Zones*).

## Debris Removal

Limbs and branches left from thinning (slash) can add significant volumes of fuel to the forest floor, especially in lodgepole pine, mixed-conifer, or spruce/fir timber types. These materials can accumulate and serve as ladder fuels, or can become “jackpots,” increasing the difficulty of defending the fuelbreak during a wildfire. **Slash decomposes very slowly in Colorado and proper disposal is essential.** Proper treatment reduces fire hazard, improves access for humans and livestock, encourages establishment of grasses and other vegetation, and improves aesthetics.

Three treatment methods are commonly used. These are lopping-and-scattering, piling and burning, and chipping. Mulching of small trees and slash using equipment similar to Hydro-axes or Timbcos equipped with mulching heads are becoming a popular method of treatment. Size, amount, and location of slash dictates the method used, in addition to cost and the final desired appearance. The method chosen will also depend on how soon an effective fuelbreak is needed prior to construction in new developments.



Lop and scatter: slash should be no deeper than 12" above ground surface.



*Chipping is the most desirable, but also the most expensive method of slash disposal.*



*Piled slash can be burned but only during certain conditions, such as after a snowfall.*

## Fuelbreak Maintenance

Following initial thinning, trees continue to grow (usually at a faster rate). The increased light on the forest floor encourages heavy grass and brush growth where, in many cases, where little grew before. The site disturbance and exposed mineral soil created during fuelbreak development is a perfect seed bed for new trees that, in turn, create new ladder fuels. Thus, in the absence of maintenance, fuelbreak effectiveness will decrease over time.



*Fuelbreak maintenance is essential. Ingrowth, shown above, will minimize the effectiveness of this fuelbreak within a few years.*

Fuelbreak maintenance problems are most often the result of time and neglect. Misplaced records, lack of follow-up and funding, and apathy caused by a lack of fire events are some of the major obstacles. In addition, the responsibility for fuelbreak maintenance projects is often unclear. For example, control of a fuelbreak completed by a developer passes to a homeowner's association, usually with limited funds and authority to maintain fuelbreaks.

**If fuelbreak maintenance is not planned and completed as scheduled, consider carefully whether the fuelbreak should be constructed. An un-maintained fuelbreak may lead to a false sense of security among residents and fire suppression personnel.**

## Conclusion

An image of well-designed communities for Colorado includes:

- Forested subdivisions where the total forest cover is well-managed through carefully planned, designed, and maintained thinnings. This contributes to reduced wildfire hazards and a much healthier forest — one that is more resistant to insects and disease.
- A system of roads and driveways with their associated fuelbreaks that break up the continuity of the forest cover and fuels. These help keep fires small, while also providing safer locations from which to mount fire suppression activities. In addition to allowing fire personnel in, they will allow residents to evacuate if necessary.
- Individual homes that all have defensible space around them, making them much easier to defend and protect from wildfire, while also protecting the surrounding forest from structure fires.

Creation of such communities is entirely feasible if recognition of the fire risks, a spirit of cooperation, an attitude of shared responsibility, and the political will exists.

*Colorado's mountains comprise diverse slopes, fuel types, aspects, and topographic features. This variety makes it impossible to develop general fuelbreak prescriptions for all locations. **The previous recommendations are guidelines only.** A professional forester with fire suppression expertise should be consulted to "customize" fuelbreaks for particular areas.*



## EMERGENCY PREPAREDNESS CHECKLIST



### READY...

- Show your family how to shut off your gas, electric, and water main.
- Plan several different evacuation routes to ensure a quick evacuation.
- Designate an emergency meeting location outside the fire hazard area.
- Assemble an emergency supply kit as recommended by the Red Cross.
- Appoint an out-of-area friend or relative as a point of contact so you can communicate with family members.
- Maintain a list of emergency contact numbers at home and in your emergency supply kit.
- Keep an extra emergency supply kit in your car in case you can't get to your home because of fire.
- Have a portable radio or scanner so you can stay updated on the fire.
- Learn the location of the Red Cross or other shelters.
- Pack supplies you will need for at least two weeks.
- Pack important records and special belongings.
- Consider moving important heirlooms, property, and large animals to a safe location.
- Learn how to disconnect your automatic garage door opener and open it manually.
- Ensure you have registered your phone to receive emergency notifications.
- Plug in a traditional land-line telephone directly into a phone jack in your home if possible.
- Stay connected to official information sources such as TV, radio, Internet, text alerts, and register cell and home with E-911.

### SET...

- Ensure that you have your emergency supply kit on hand that includes all necessary items, such as a battery powered radio, spare batteries, emergency contact numbers, and ample drinking water to stay hydrated.
- Turn off propane tanks.
- Load your supplies, records, and special belongings into your vehicle (leave room in your vehicle for people and pets.)
- Move large animals to a safe location.

- Stay connected to official information sources such as TV, radio, Internet, text alerts, and register cell and home with E-911.

## **GO...**

- Take your pets now because you will not be able to retrieve them later.
- When you have reached safety, advise your family contact person you are safe.
- Consider text messaging or use social media to communicate with family members.
- Expect to be out of your home for two weeks or longer.

## **Items to Take:**

- Three-day supply of water (one gallon per person per day)
- Non-perishable food for all family members and pets (three-day supply)
- First aid kit
- Flashlight, battery-powered radio, and extra batteries
- An extra set of car keys, credit cards, cash or traveler's checks
- Sanitation supplies
- Extra eyeglasses or contact lenses
- Important family documents and contact numbers
- Prescriptions or special medications
- Family photos and other irreplaceable items
- Easily-carried valuables
- Personal computers (information on hard drives and disks)
- Chargers for cell phones, laptops, etc.