

# MOUNTAIN VILLAGE

FOREST MANAGEMENT PLAN

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**Acknowledgements**

**Agencies and Reports Consulted**

**Agencies**

Colorado State Forest Service, Montrose District  
San Miguel County Emergency Management Office  
Telluride Fire Protection District  
United States Forest Service, GMUG Norwood District  
United States Forest Service, GMUG Ouray District  
United States Forest Service, GMUG Gunnison District  
West Region Wildfire Council

**Reports**

Draft Environmental Assessment, Cumbres Vegetation Management Project  
Environmental Assessment, Aspen Skiing Company Forest Health Project  
Environmental Assessment, Breckenridge Forest Health and Fuels Project  
Environmental Assessment, Vail Ski Area Forest Health Project  
San Miguel County Community Wildfire Protection Plan  
USDA Forest Health Protection, Bark Beetles  
Wildfire Insurance and Forest Health Task Force Report

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**Town of Mountain Village Staff**

Chris Hawkins, Director of Community Development  
Deanna Drew, Director of Environmental Services  
Katie Tyler, Planner I  
Ron Cheroske, CAD/GIS

## Preface

Over the last two decades, Colorado's forests have faced historically significant change. Drought conditions and a warming climate have contributed to an increase in wildfires, insect infestations and disease outbreaks that have transformed our forests in a relatively short time frame. Natural resources are among our most valuable assets and are worthy of protection and stewardship. Mountain Village's forests need to be managed to address contemporary and emerging issues, including forest health, wildfire, loss of scenic vistas and aesthetic values, ongoing and potential bark beetle outbreaks, habitat diversity for wildlife, watershed health, carbon sequestration and potential climate change. These goals cannot be attained by a hands-off, leave it to nature approach. If forests are left to rely on natural processes, we can expect insects, diseases and wildfire to shape our forests with negative consequences. As with all natural systems a delicate balance must be maintained. There are no absolutes in this proposed management plan. It is designed to be used as a template for home and landowners in Mountain Village to proactively manage their forested land with an assortment of tools and alternatives.

*"the future has already arrived"*

*~ Andreas Hamann*

## Introduction

The Town of Mountain Village Community Development Department has developed a forest management plan for a variety of vegetation treatments to address wildfire risk (from the San Miguel County Wildfire Protection Plan (CWPP), see **Appendix A**) and declining forest health within the town's boundaries. The fire regimes of the major stand types in Mountain Village, mixed conifer and spruce/fir have fire return intervals of 150 to 300 years on average. Wildfire in mixed conifer stands result in a stand replacing fire 30% of the time where as wildfire in spruce/fir stands result in a stand replacing fire 100% of the time. The likelihood of a fire starting in our major stand types maybe low but the severity of those fires will be devastating. For a fire to start in our major stand types it does take exceptional conditions, warm and dry for extended periods accompanied by high winds, but we have been experiencing those kinds of conditions more regularly in the spring and early summer prior to the monsoons and we can expect those conditions to continue to worsen in the future. The overriding goal of the plan is to reduce the town's risk to wildfire and enhancing overall forest health, while protecting the visual aesthetics that make Mountain Village a desirable place to live and visit. These treatments are designed to minimize risk for homeowners, recreation users and infrastructure, maintain forest cover where in decline and to expedite forest regeneration following Sudden Aspen Decline, sub alpine fir mortality (from beetles and root disease) and the potential threat from spruce bark beetles.

## Plan Location

The Mountain Village Forest Management Plan will be contained within the 2200 acre Town boundary with possible cross boarder projects on USFS National Forest System lands. The Town of Mountain Village is designated as a Wildland Urban Interface (WUI) per the San Miguel County Community Wildfire Protection Plan (CWPP). Total forested acreage in Mountain Village is roughly 1,143 acres. The ownership breakdown of forested acreage in Mountain Village is as follows; 645 acres of privately owned residential lots, 396 acres of Open Space owned by Telluride Ski and Golf (TSG), 69 acres of privately owned Open Space, and 33 acres of forested Open Space owned by the Town of Mountain Village, see **Figure 1** in the appendix.

## **Purpose and Need for Action**

The purpose of these vegetation treatments is to maintain and improve forest health conditions in timber stands located within the town's boundaries, with an emphasis on stands bordering the Wildland Urban Interface (WUI) on the town's northern and southern boundaries. Forest health has deteriorated regionally due to a combination of problems such as bark beetles attacking Douglas fir, sub-alpine fir and spruce, Sudden Aspen Decline and continuing drought. The majority of forest stands within Mountain Village already have mortality rates that are over 30% of the basal area. This increase in fuel loads will continue for the foreseeable future and with it a loss of aesthetic appeal, scenic vistas, a lowering of property values and an increased risk of wildfire. Without intervention, stand resilience and overall forest health is likely to continue to deteriorate and our area's natural beauty will be severely impacted. Maintaining a diversity of tree species and age classes can help encourage stand stability, thereby improving forest health. Age class diversity is one way to assure future stability of a forest ecosystem to a threat such as bark beetles.

## **Proposed Action**

The Town of Mountain Village proposes to meet the need for action by having dead and declining trees removed, regenerating Douglas fir and aspen where they occur and perpetuating mixed conifer and pure aspen stands. The proposed treatments are designed to accommodate changing conditions within each stand type. Treatments would meet the objectives of reducing wildfire risks to the public and town infrastructure from stands that have high mortality and increased fuel loads while stimulating the growth of new regeneration and existing forested areas to maintain forest cover and a positive visitor experience in the long term. All proposed vegetation treatments will be designed with consideration to recreation, wildlife, wetlands and scenic resource values.

## **Proposed Treatments include:**

- Cutting and/or removing dead and declining trees (leaving 1 to 2 wildlife snags per acre) using a variety of silvicultural methods;
- Removing individual hazard trees to minimize risk of falling trees to the public and town/resort infrastructure;
- Removing hazard trees as a sanitation/salvage treatment where appropriate, for instance within a 50-foot buffer zone from the edge of roadways, trails and lift corridors;
- Creation of defensible space around all homes and infrastructure;
- Planting seedlings or transplants to speed up regrowth in key areas;
- Preventing insect attacks of high value trees, which are often larger specimens and potential old growth that are located close to homes or town/resort infrastructure;
- Bark beetle attacks (affecting sub-alpine fir, spruce or Douglas fir) may be mitigated by applying an industry approved insecticide or anti-aggregation pheromone prior to beetle emergence each year until the threat of infestation is over, see **Appendix C** for a list of approved insecticides and anti-aggregate pheromones;
- In the case of spruce bark beetle infestation, mitigation could include treating beetle infested trees by felling and peeling, chipping or removal of the infected trees;

- Pure aspen stands showing signs of Sudden Aspen Decline will have the overstory removed over several years and 25% of the area will be scarified to stimulate aspen regeneration;
- Spruce/Fir stands will have small (<.5 acres) irregular patch cuts made to facilitate spruce regeneration and age class diversity; and
- Slash treatments may include removing logging-generated slash to reduce fuel loads and to stimulate aspen regeneration, use of an air curtain burner to burn slash on site, lop and scatter of slash to distribute conifer seed source or chipping and scattering slash using either a chipper or hydro-axe.

Depending on how the spruce beetle threat progresses, actual stand conditions at the time of plan implementation could depart from existing stand conditions during the drafting of this management plan. The Town's staff is proposing a flexible range of silvicultural prescription options, so that they can choose the treatment option that best fits the actual stand conditions at the time of implementation. Without this flexibility, treatments designed in advance of implementation may be inappropriate for actual stand conditions at the time of implementation because of the on-going epidemic and the constantly evolving stand conditions.

To meet these challenges the Town staff developed a range of stand treatment/prescription options for each stand type. The range of treatments depends on the level of mortality in the stand. Treatments such as hazard tree removal, salvage, and sanitation may occur in stands with minor mortality. Regeneration harvests such as patch cut, shelterwood, or selection harvests may be applied to stands with greater levels of mortality.

### **Treatment Area Selection**

Treatment areas have been identified and treatment options developed to respond to varying levels of forest health needs or insect infestation. Proposed treatments include: a combination of tree cutting and removal methods of dead or infested trees; stimulate regeneration; or reduce the threat of wind throw; applying anti-aggregate pheromones (for Douglas Fir bark beetles); or applying insecticide (for spruce bark beetles) on individual high value trees. Objectives are to remove hazard trees, maintain a diversity of tree species and age classes, and retain forest cover sufficient to maintain a positive guest experience for both property owners and visitors. Treatments are likely to occur between late spring (with snow still on the ground) and early fall (before snow fall) annually over the next 10 years.

### **Issues**

The overriding issue of any forest/vegetation management plan for the Town of Mountain Village is land ownership. Forest stands do not follow lot boundaries, roads or ownership patterns; they follow aspect, topography and drainage patterns. Full implementation of any plan will take coordinated effort and agreement among diverse stakeholders.

Telluride Ski and Golf is the largest landowner within the Town of Mountain Village's boundaries with 1102 acres of Open Space. The ski area is in the process of developing a Vegetation Management Plan for their permitted area on the Uncompahgre National Forest, this plan will have to be coordinated with the Mountain Village Forest Management Plan where the Town's boundaries and the permitted USFS National Forest System lands intersect. The following is a list of issues that will be addressed prior to implementation of any silvicultural treatment options:

- Wildfire Threat
- Soil and Water
- Roads/Trail Safety
- Wildlife
- Forest Vegetation
- Recreation
- Scenery
- Social Impact

### **Decisions to be Made**

In September of 2010 The Mountain Village Town Council passed an ordinance creating Article 12 Forest Health and Fire Mitigation as an amendment to the Town’s Land Use Ordinances. This section of the ordinances made it mandatory for all new development to create a defensible space plan for that particular lot. This section was incorporated into the Community Development Code as Chapter 17.6.1.A Fire Mitigation and Forestry Management that was adopted in February, 2013. Since this ordinance was enacted 15 new single family homes have had to create defensible space plans. There are 383 single family homes that were built prior to this ordinance being enacted totaling roughly 61% of the single family lots in Mountain Village. Going forward the Town of Mountain Village must decide if it wants to require forest management in the form of defensible space requirements on existing homes and structures that are not covered by new development or redevelopment. Does the Town want to implement proactive forest management beyond the defensible space requirements for new development and how will that be implemented? How do we address the loss of scenic vistas and aesthetic values along our roadways when these areas are comprised of Town Right of Ways, private open space and private lots?

*“Sadly, it’s much easier to create a desert than a forest”*

*~ James Lovelock*

### **Public Involvement**

The proposed Mountain Village Forest Health and Fuel Mitigation Plan was first presented to the Mountain Village Town Council at the January 17, 2013 Council meeting. Staff was given direction to proceed with the drafting of this plan at that time.

### **Description of the Alternatives**

#### **Alternative 1: No Action**

Current Mountain Village forest management practices within the Town areas would continue including the requirement for all new development and re-development on lots within the Town to implement defensible space plans. Maintenance of roads, trails, and resort infrastructure would continue. With Town of Mountain Village approval, hazard trees identified within the Town’s boundaries that pose a risk to the public, infrastructure or ski area would continue to be cut to reduce the immediate hazard to home owners, hikers, skiers and infrastructure. There would be no further requirements for landowners, either private single family lots or open space

parcels to remove dead trees or mitigate wildfire hazards. This alternative will lead to an increase in stand mortality with accompanying fuel build up that would result in an increased risk of severe catastrophic wildfires and a loss of scenic beauty. This alternative, the status quo, will not be maintained for long and will have adverse undesirable consequences.

### **Alternative 2: Proposed Action**

Vegetation treatment options have been developed to respond to varying levels of forest health needs or insect infestation for four different stand types within the Town of Mountain Village. Proposed treatments include: a combination of tree cutting and removal methods to eliminate dead or infested trees, stimulate regeneration, reduce the threat of windthrow, applying anti-aggregate pheromones (for Douglas Fir bark beetles), or applying insecticide (for spruce bark beetles) on individual high value trees.

Treatments could take place on approximately 134 acres of pure aspen stands; 156 acres of mixed aspen stands; 666 acres of mixed conifer stands; and 394 acres of spruce/fir stands. These figures represent the maximum area of tree islands and forested stands that could be treated; however, treatments are not expected to occur on every acre identified. Treatments are based on current and desired forest health conditions.

### **Stand Types within the Proposed Plan Area**

Four stand types have been mapped across the Town of Mountain Village. See **Figure 2** in appendix. The following four stand types are as follows;

**Stand Type 1:** Pure Aspen (>90%), light mortality (< 30%), 134 acres. These stands are predominately pure, even-aged aspen with less than 30% mortality from Sudden Aspen Decline. Over the last 10 years these stands have been impacted by an outbreak of Western Tent Caterpillars that defoliated trees and caused stress that has led to crown dieback. These stands all have varying levels of cytospora canker due to heavy browsing from ungulates. They tend to have scattered, advanced-age understory, mostly located near the edges of the stands as well as advanced conifer regeneration. These stands tend to be to the north of Mountain Blvd. and are fragmented by residential development and the Golf Course.

**Stand Type 2:** Mixed Aspen (>50%), light mortality (< 30%), 156 acres. These stands are predominately even-aged aspen with less than 30% mortality resulting from Sudden Aspen Decline and sub alpine fir decline. They tend to have a predominant conifer second story with scattered, advanced-age understory (if any), mostly located near the edges of the stands. These stands are located along Mountain Village Blvd. and tend to follow roadways and ski runs.

**Stand Type 3:** Mixed Conifer (> 75%), moderate mortality (>30%), 666 acres. These stands are predominantly conifer with Douglas fir, sub-alpine fir, Engelmann spruce, blue spruce and aspen. These stands have been impacted by outbreaks of spruce budworm, balsam fir bark beetles and armillaria root disease. They can be even-aged or two storied and tend to have unevenly distributed patches of subalpine fir understory, but can contain other species. These stands are predominant along the northern border of Mountain Village (Coonskin Ridge) and extend up to gondola Station San Sofia. These stands are also located to the south of Mountain Village Blvd. and are the predominant stand type for single family lots.

**Stand Type 4:** Spruce/Fir, (> 90%), moderate mortality (>30%), 394 acres. These stands are predominantly conifer with Engelmann spruce and sub-alpine fir dominant and a component of aspen. These stands have been impacted by spruce budworm, balsam fir bark beetles, armillaria root disease and have the potential of being heavily impacted by the spreading spruce bark beetle outbreak. They can be even-aged or two storied and tend to have unevenly distributed patches of subalpine fir understory, but can contain other species. These stands are concentrated on the southern boundary of Mountain Village and extend up into Prospect Basin.

### **Silvicultural/Vegetation Treatments Options**

Ten (10) different silvicultural prescriptions have been identified for stands within the Town of Mountain Village. These treatment options go beyond the creation of defensible space for developed lots and may only be suitable for larger lots and open space parcels. The following is a list of treatments options that could occur within the aforementioned stand types in Mountain Village. Treatment options are stand-specific and are not intended for all stand types. These treatment options are designed for the stands as a whole even though the stands are comprised of numerous lots and open space areas. All stands will be periodically monitored for insect infestations, bark beetle activity and disease. Instances of bark beetle activity will receive rapid response as laid out in the Proposed Treatments, either treating infested trees or preventative applications of anti-aggregation pheromones or industry approved insecticides.

### **Stand 0: All Stands Where Required**

#### **Option 0.1 – Insecticide or Pheromone Application and Treating Infested Trees**

**(Preventive Action):** This treatment maintains the stand through a potential insect outbreak. If the stand succumbs to bark beetles another option should be used. High value trees would be treated by applying an approved insecticide (for spruce bark beetles) or by applying an approved anti-aggregation pheromone (for Douglas fir bark beetles) prior to beetle emergence each year until the threat of infestation is over, see **Appendix C**. In high value areas beetle-infested trees would be treated by felling and peeling, burning, chipping or removing the trees prior to beetle emergence. This option would address bark beetle outbreaks, increase in wildfire risk and loss of aesthetic appeal.

**Option 0.2 – Hazard Tree Removal (Partial Cut):** This is a sanitation/salvage treatment. This option could be used in any stand type where appropriate, and is an understood component of all prescription options where appropriate. Hazard trees located within a 50-foot buffer zone from homes or structures, roadways, ski lifts and edges of ski runs would be harvested and all other species retained. Dead snags or wildlife trees that pose no hazard would be retained at 1 to 2 snags per acre. This option would address safety, forest health, wildfire risk and loss of scenic values.

### **Stand 1: Pure Aspen (>90%) and advanced conifer regeneration**

**Option 1.1 – Partial Cut (Remove all conifers):** Option 1.1 maintains aspen for the short term. All conifers in the stand would be removed and aspen retained. This option would address wildlife concerns and wildfire risk.

**Option 1.2 – Salvage Cutting (Partial Cut):** Option 1.2 salvages dead aspen and maintains the aspen at current levels. All the dead aspen and declining aspen overstory in the stand would be harvested up to 35% of the basal area (in stands of recently killed trees) to 50% (stands of

mostly older dead trees) of the basal area of the stand, and all other trees retained. This will promote coppice regeneration within the stand. This option would address Sudden Aspen Decline and loss of aesthetic appeal.

### **Stand 2: Mixed Aspen (>50%) and conifer second story**

**Option 2.1 – Partial Cut (Remove all dead and declining conifers):** Option 2.1 maintains aspen dominance in the stand. All dead and declining conifers would be removed, leaving the best spruce, sub alpine fir and Douglas fir as well as all healthy aspen. This option would address forest heath and aesthetic values.

**Option 2.2 – Salvage Cut (Remove all dead and declining aspen overstory):** Option 2.2 converts mixed aspen stands with a declining aspen overstory to a mixed conifer stand. All dead and declining aspen would be removed releasing the suppressed conifer second story. All dead and diseased conifers would be removed. This option would address Sudden Aspen Decline, forest heath and aesthetic values.

### **Stand 3: Mixed Conifer (>75%)**

**Option 3.1 - Salvage Cutting (Partial Cut):** Option 3.1 would remove all dead aspen and dead and declining sub alpine fir in the stand. All Douglas fir and spruce would be retained. This option would address forest heath and aesthetic values.

**Option 3.2 – Modified Fuelbreak:** Option 3.2 would create up to a 300' wide buffer where fuel loads would be reduced to limit the spread of an advancing wildfire. This option would be limited to open space parcels along Coonskin Ridge as outlined in the San Miguel County CWPP. This option would address wildfire risk, wildlife concerns and forest heath.

### **Stand 4: Spruce/Fir (>90%)**

**Option 4.1 – Salvage Cutting:** Option 4.1 would remove all dead and beetle infested sub alpine fir as well as any dead spruce or aspen.

All dead or beetle infested trees in the stand would be harvested, up to 35% of the basal area (in stands of recently killed trees) to 50% (stands of mostly older dead trees) of the basal area of the stand, and all other trees retained. The ground would be scarified to expose 25% of the surface as mineral soil, and tops lopped and scattered evenly. This option would address wildfire risk, forest heath and regeneration.

#### **Option 4.2 – Small Patch cuts within a Thinning (Partial Cut):**

This option would maintain the stand through a potential spruce bark beetle (SBB) outbreak, regenerates it in phases, and moves it to uneven-aged management. A patch cut (with reserves) of approximately 20% of the stand in 1 to 2-acre patches would be performed focusing on areas of spruce bark beetle caused mortality. The remaining 80% of the stand would be thinned to a target of no less than 100 (basal area) square feet per acre to reduce attraction to SBB, removing no more than 35% of the basal area where there are blowdown concerns. Patch shapes would be irregular and mimic natural disturbances. Strip patches along the contour could be used to limit aesthetic impacts. The ground would be scarified to expose 25% of the surface as mineral soil, and tops lopped and scattered evenly to provide a seed source. Natural regeneration would be anticipated, but it may be supplemented by nursery stock

or transplants. This option would address bark beetle outbreaks, wildfire risk, wildlife concerns forest health and regeneration.

## **Implementation Methods**

### **Mechanical Felling**

Mechanical felling consists of using ground-based machinery to harvest trees and remove them from the stand. In most cases this method would only be used for lot clearing during new construction or thinning projects conducted on open space parcels or residential lots in excess of 5 acres. Soil scarification caused by the ground-based machinery would create more favorable conditions for natural regeneration over hand felling. Treatment of slash would be lop and scatter, chipping/masticating or burning on-site with the use of an air curtain burner or similar device. Mechanical treatments are designed to follow forest stand boundaries where possible, with the intent of maintaining scenic integrity by following natural vegetation edges. Mechanical equipment would not be used on slopes greater than 30%.

### **Hand Felling**

In areas with slopes greater than 30%, wetland areas, residential lots smaller than 5 acres or where access by mechanical means is not possible, other methods may be used such as hand felling, mechanical yarding with small machinery, cable yarding, chipping/masticating or burning on-site with the use of an air curtain burner or similar device. Hand felling would consist of using chainsaw crews to fell trees.

## **Summary**

This section will be completed after review from various agencies, the Design Review Board and Mountain Village Town Council.

## Appendix A

### San Miguel County CWPP Risk Ratings and Recommendations for Mountain Village

**Upper Mountain Village – Hazard Rating: High**

**Lower Mountain Village – Hazard Rating: Moderate**

See **Figure 3** in appendix.

Mountain Village CWPP Recommendations;

- A modified fuelbreak should be implemented along the northeast portion of the community near Country Club Drive. See **Figure 4** in appendix.
- A secondary emergency egress should be explored between Ridge Road and San Sophia Drive. See **Figure 5** in appendix.
- A secondary emergency egress should be explored between Touchdown Road and Snowdrift Lane.
- Aspen stands should be thinned in order to reduce fire intensity and improve the health of the stand.
- Mixed Conifer stands should be thinned and limbed to defensible space standards.
- Mixed Conifer stands should be surveyed for beetle infestation and any infected trees removed. This should be done annually before summer.
- All cedar shake roofs should be replaced by Class A roofing materials.
- Provide rental and property management companies with fire safety brochures that can be distributed and made available to guests in the summer months.
- Post fire danger for the day at the gate house entrance. This information will need to be kept current.
- Linked defensible space is recommended for all homes. Simply limbing, mowing or weed whacking for 50 feet around homes and structures, and cleaning leaf and needle litter from roofs and gutters, could profoundly increase structure survivability.
- Discourage the use of combustible materials for the construction of projections below roof line such as decks.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials, especially where such openings are located on slopes above fuels. Use fine mesh metal screen (1/4" or less) to cover eaves, roof, and foundation vents.

- Discourage the planting of flammable ornamental vegetation within 30 feet of homes.
- Add reflective addressing to all driveways or homes, using only non-combustible materials. A good guideline for this practice is to place the markers five feet above ground level on the right side of the driveway.
- Remove wood piles and any flammable yard clutter to at least 30 feet from structures and propane tanks. Wood piles should be located uphill or even with homes; never downhill.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of long driveways and dead-end roads.
- Make certain any fire hydrants are visible, maintained and operable

## **Appendix B**

### **Wildfire Insurance and Forest Health Task Force**

In September of 2013 a report was issued to the Governor of Colorado from the Wildfire Insurance and Forest Health task Force that was created by the Governor's office in January 2013. The Task Force was charged to look at how to best protect citizens who live the wildland-urban interface (WUI) and to protect Colorado's landscape, which is a critical element of the state's economic health.

The Task Force agreed on the following key principles:

- Homeowners in the WUI should bear the majority of the responsibility for risk mitigation on their specific properties in the WUI.
- Sustained, comprehensive mitigation efforts can be effective tools for reducing wildfire risk and losses.
- A one-size-fits-all approach does not work, since ecological conditions such as terrain and vegetation type varies widely across the state.
- Local governments should continue to be active partners in any approach that the state adopts, with attention paid to the limited resources those entities may have available for implementation and/or enforcement.

Task Force Recommendations:

- Update CO-WRAP (Colorado Wildfire Risk Assessment Portal) to identify and quantify risk to properties in the WUI
- Disclose CO-WRAP scores to stakeholders
- Amend standard real-estate contract form to include disclosure of CO-WRAP score
- Create process for appeals/updates of COWRAP scores
- Require Wildfire Mitigation Audits for high risk homes
- Develop and disseminate uniform BMPs
- Implement state-wide model ordinance
- Prohibit inconsistent community building or land use requirements
- Create pilot program for prescribed burns
- Assess a fee on properties in the WUI
- Continue and enhance state grant funding

- Increase awareness of financial assistance and technical support
- Disseminate information about HB 13-1225 (changes in homeowners' insurance laws)

The intent of these recommendations is to create a system that prompts and incentivizes action, not just through legal requirements, but also through better education. Homeowners in the WUI will share in the burden of the costs associated with protecting property in the WUI, and there will be resources available to help, including clear direction on available funding and resources. Homeowners will also receive clear and continuing information about specific risks to their properties and what steps to take to minimize those risks. The system will identify the extent of the WUI, calculate risks for individual properties in high hazard areas, and implement a variety of mitigation and prevention measures at the local level.

The Task Force recognizes that some of its recommendations will be costly and potentially difficult to implement. However, the Task Force accepted that its mission was to identify bold and innovative recommendations to break through the historic barriers. These recommendations can then be further developed, adapted and implemented by the Governor, the Colorado General Assembly, state and local governments, public-private partnerships, and the insurance industry.

## Appendix C

### Chemical Treatments for Bark Beetles

#### PHEROMONES

**MCH for Douglas-fir beetle:** MCH (one-methy-cyclo-hex-3-one) is a chemical used by Douglas-fir beetle to communicate (a 'pheromone'). This pheromone tells the beetle that the tree is already fully occupied and they should look elsewhere for a tree to lay their eggs in. The chemical has been commercially synthesized and is available in small bubble caps that are easily stapled to tree boles just prior to beetle flight in mid-May. Application rates should be 30-40 bubble caps per acre for area protection or 2-4 caps per tree for individual tree protection. The cap slowly releases the pheromone and is generally effective for one season if properly applied.

**VERBENONE for mountain pine beetle:** Verbenone (4,6,6-trimethylbicyclo[3.1.1]-hept-3-en-2-one) is considered the principal pheromone used by mountain pine beetle to tell other beetles that the tree is fully occupied and to move on. As with MCH, this chemical has been commercially synthesized, however the cost is closer to \$8 a pouch. Recommended dosage is 40 pouches per acre (area protection) or 2+ pouches per tree for individual tree protection; applied around mid-June. Verbenone pouches have shown mixed results in repelling mountain pine beetle attacks. In some previously treated sites where population pressures were high, the verbenone applications have had only limited success. Research studies in Idaho and Montana are currently being conducted to determine if population densities affect the performance of verbenone treatments. It is also critical that currently infested trees be removed from the area before the pouches are deployed or efficacy is greatly reduced. Generally, use of verbenone is limited to areas where insecticide application (see section below on Carbaryl) is not feasible.

#### INSECTICIDES

**Carbaryl for mountain pine beetle, Jeffrey pine beetle, spruce beetle, Douglas-fir beetle, and pinyon ips:** Application of this insecticide prior to beetle flight will protect pines, spruces, and Douglas-fir from the beetles described in this pamphlet. However, carbaryl is not approved for use against fir engraver or western balsam bark beetle on true firs. Due to the cost and the need for special equipment, this treatment is generally used only on individual, high value trees, and is generally applied by certified applicators. All tree bole surfaces must be completely soaked up to a height where the tree is too small in diameter to be useful habitat. While labeled as being an annual treatment, research has shown that the effectiveness generally lasts 18-24+ months. Contact your state's forest health specialist (see page 12) to determine if this is an appropriate treatment for your trees. Contact your state's agriculture department, division of pesticides, for assistance finding qualified applicators.

**Other insecticides for bark beetles:** Other insecticides such as pyrethroids are registered for use against some bark beetles. Research has shown some success with pyrethroids but they do not last as long or work as effectively as Carbaryl.

**Systemic treatments** applied to the soil around the tree or inserted into holes drilled in the tree have not been shown to be effective although new injection systems and insecticides are currently being tested.

**PESTICIDE PRECAUTIONS**

Pesticides used improperly can be injurious to humans, animals, and plants. Follow directions and read all precautions on the label. Consult your local county agriculture agent or State extension agent about restrictions and registered uses of particular pesticides.

Figure 1

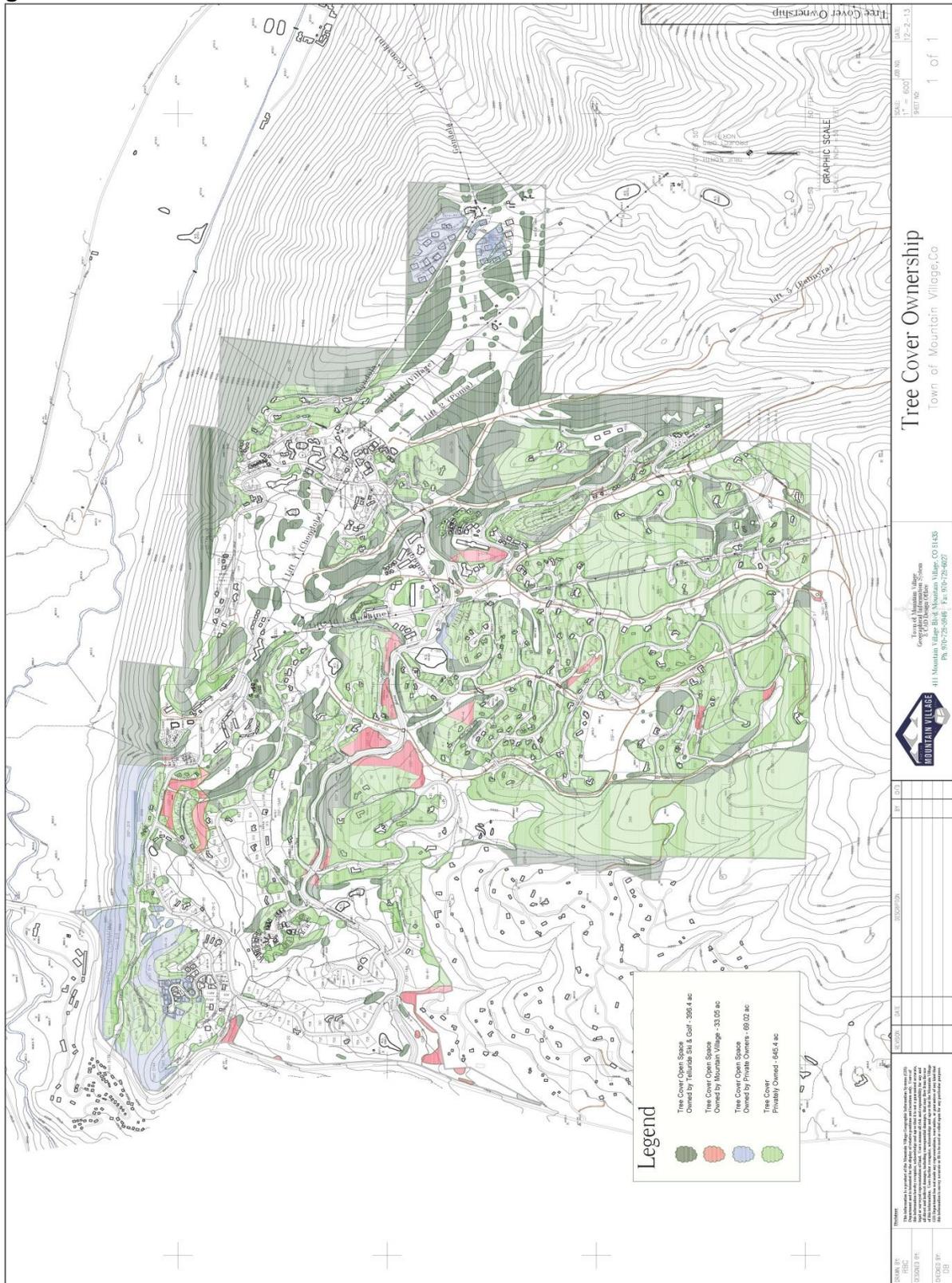


Figure 2

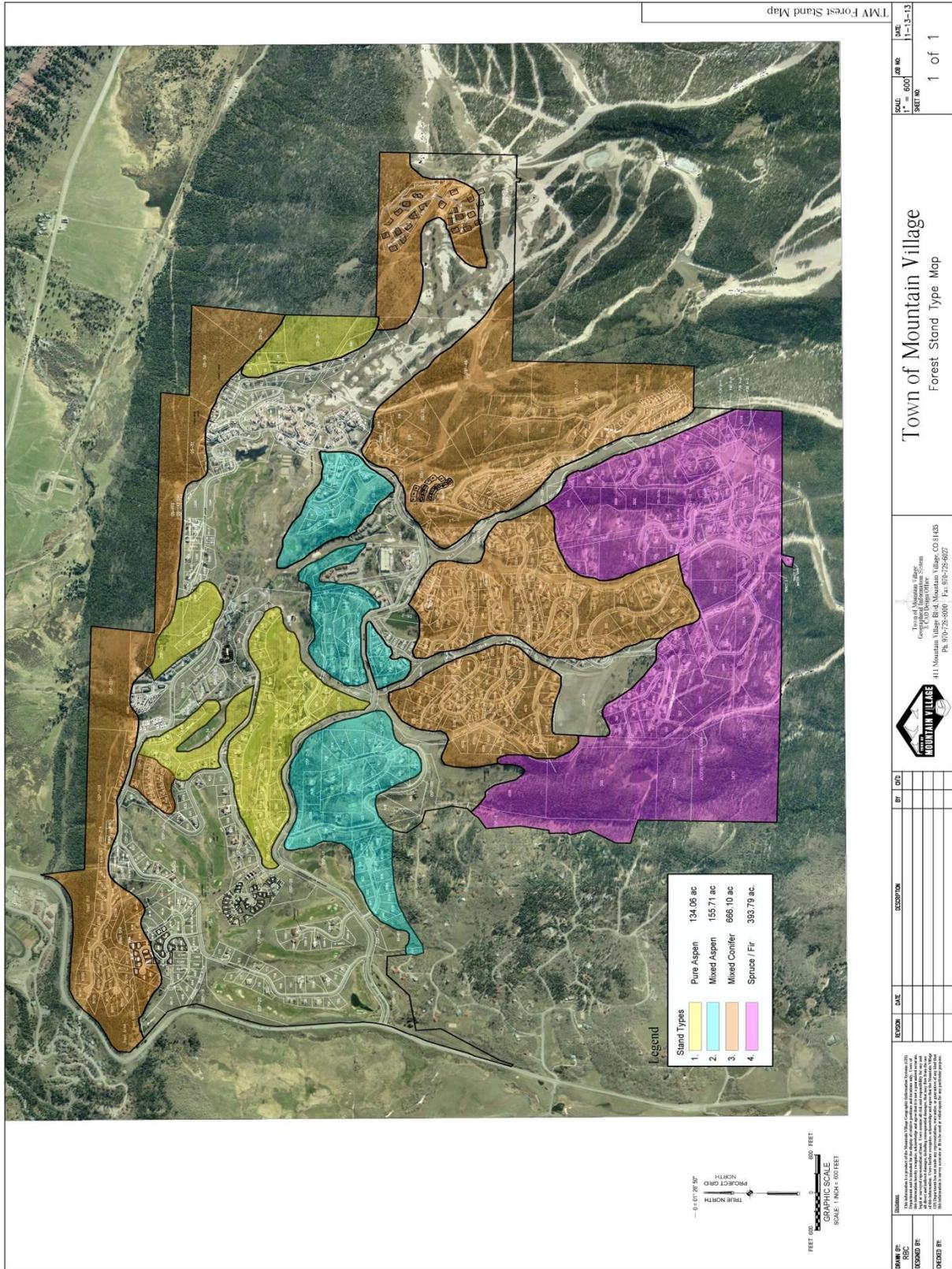
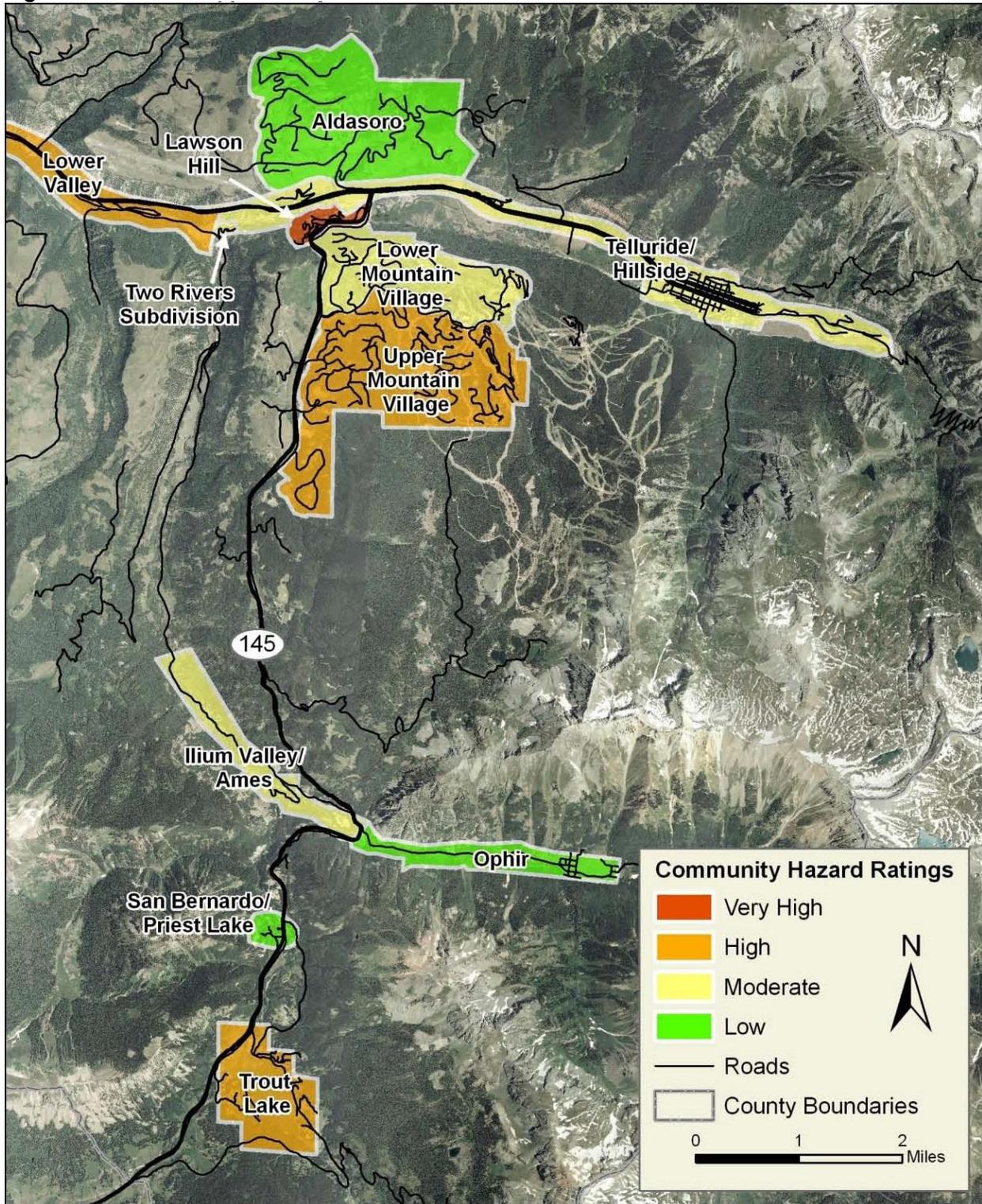
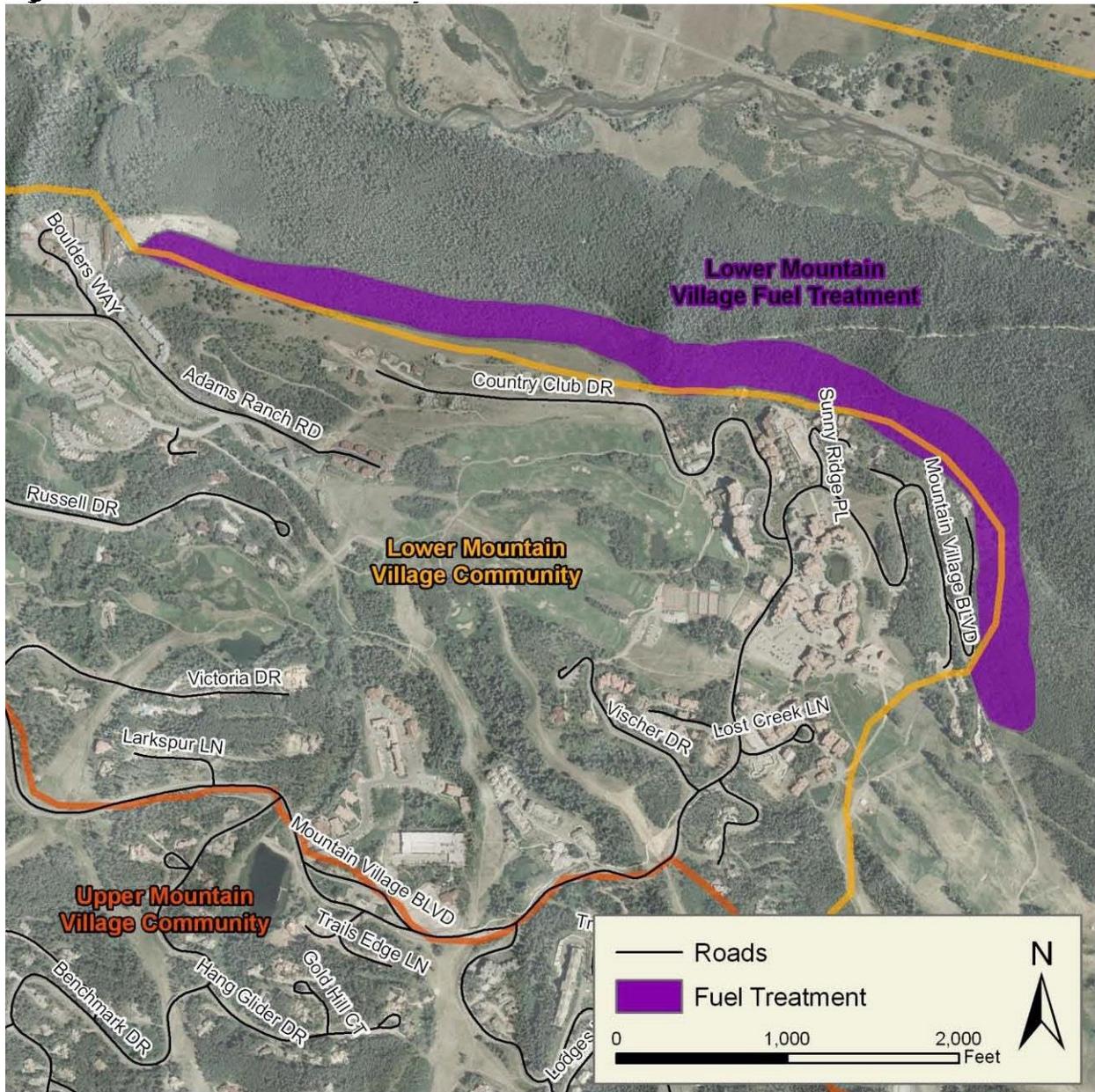


Figure 3



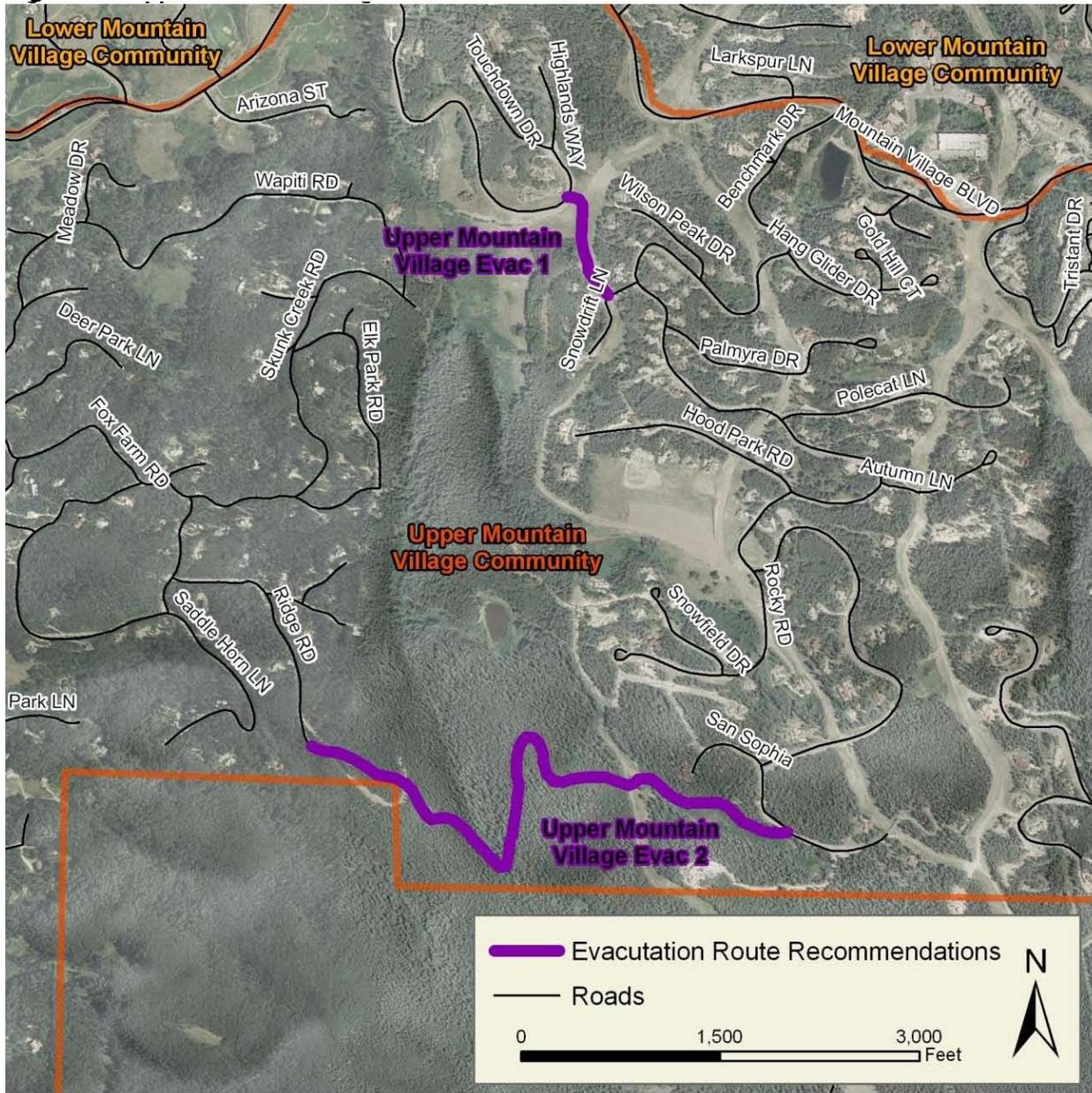
San Miguel County Community Wildfire Protection Plan

Figure 4



San Miguel County Community Wildfire Protection Plan

Figure 5



San Miguel Community Wildfire Protection Plan