

ALPINE COUNTY COMMUNITY WILDFIRE PROTECTION PLAN



**Alpine Fire Safe Council
PO Box 67
Markleeville CA 96120**

Cover photo of a Walt Monroe painting courtesy of the Alpine County Museum

Alpine County Community Wildfire Protection Plan

Compiled by:

Alpine Fire Safe Council
through a grant from the
Alpine County Board of Supervisors through Rural Schools Title III Funds

December 2018

Disclaimer:

This Community Fire Plan has been compiled from existing information available from local, state, and federal government resources. It is intended to be a compilation of available known datasets with the intent to identify areas in need of update. Some data may be out of date or inaccurate due to the scale at which the data was collected.



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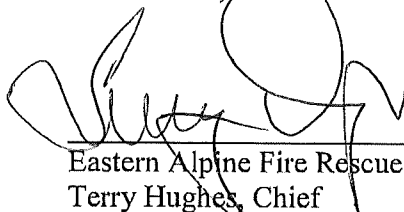
Mutual Agreement


The Alpine County CWPP has been compiled by the Alpine Fire Safe Council for the east and west slope communities in Alpine County. It has been developed in collaboration with the partners listed below in accordance with the Healthy Forest Restoration Act of 2003.


The following entities agree and approve of this CWPP.

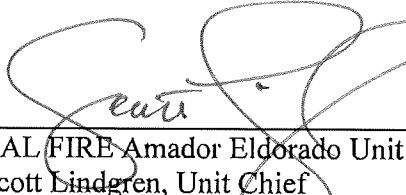

Alpine County Board of Supervisors
Don Jardine, Chair

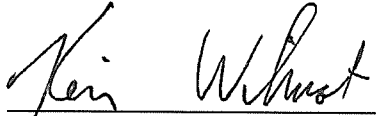

Bureau of Land Management
Tim Roide, Fuels Specialist

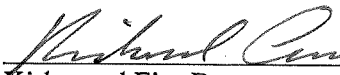

Eastern Alpine Fire Rescue
Terry Hughes, Chief



Lake Valley Fire Protection District
Tim Alameda, Chief


Bear Valley Public Safety Office
Rick Stephens, Sheriff


CAL FIRE Amador Eldorado Unit
Scott Lindgren, Unit Chief


Carson Ranger District, USDA Forest Service
~~Irene Davidson, District Ranger~~
Kevin Wilmot


Kirkwood Fire Department
Sean Trevett, Chief
RICK ANSEL


Calaveras District, Stanislaus Forest, USDA Forest Service
Jon Lucas, Division 2
Scott Cones

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1. Executive Summary

Alpine County has always lived with the threat of wildfire. The most destructive fire in Alpine County occurred in 1987 when 26 homes were lost to the Acorn Fire. As more structures are built in the Wildland Urban Interface (WUI) in the county, this threat continues to grow. The Alpine Fire Safe Council seeks to reduce this threat by developing a coordinated planning effort to address the hazards in our communities.

The Community Wildfire Protection Plan (CWPP) provides a roadmap for the community to mitigate the hazards of wildfire. It outlines the risks and hazards and provides specific recommendations or projects to address those risks. The first section of the plan provides an introduction to risks across all communities in Alpine County, including public policy and education issues. Proposed solutions to these issues are outlined below as Action Items for the Alpine Fire Safe Council.

- **Action Item: Propose changes to the tank and mitigation fee structure.**
- **Action Item: Support the creation of a full time Alpine County Fire Marshal to oversee and enforce Fire Codes in Alpine County and seek funding opportunities for project implementation.**
- **Action Item: Alpine Fire Safe Council should pursue designation of FIREWISE community(s).**
- **Action Item: The Alpine Fire Safe Council should continue to pursue and support the homeowner defensible space inspection program and the education program on appropriate building materials for use in wildland areas.**
- **Action Item: The Alpine Fire Safe Council should pursue biomass disposal options to perpetuate the Turtle Rock Park Biomass pile as a disposal site for residents creating effective defensible space on their property.**
- **Action Item: Alpine Fire Safe Council should actively encourage the Alpine County Board of Supervisors to adopt and enforce an adjacent lot ordinance.**
- **Action Item: The Alpine Fire Safe Council should facilitate a community wildfire preparedness and evacuation meeting to help the Sheriff's Office and residents communicate on evacuation procedures.**
- **Action Item: The Alpine Fire Safe Council recommends the Alpine County Board of Supervisors establish a committee to review the current emergency services radio repeater system and make recommendations for it's improvement.**
- **Action Item: The Alpine Fire Safe Council should continue the school poster program to educate youth on wildfire issues and conduct community education meetings at least twice per year.**
- **Action Item: Research and pursue funding opportunities for project implementation and fire prevention measures.**

All communities in Alpine County are threatened by wildfire to some degree. For the purposes of this plan the communities have been divided into the following planning areas:

- Woodfords
- Markleeville
- Bear Valley
- Kirkwood

Hazards and risks were assessed for communities in each of the planning areas. These hazards and risks were rated low, medium, or high. A number of different elements were evaluated in the hazard assessment. The results of the community hazard assessments are included in the specific Community sections within this plan.

The homeowner is the first line of defense in protecting a structure from wildfire. Creating effective defensible space and using appropriate building materials is crucial to structural survivability. In general, defensible space needs to be improved in our communities.

Modifying the fuel loadings around the communities reduces the risk of a fire spreading into, or out of, a community. The United States Forest Service (USFS) and Bureau of Land Management (BLM) have initiated and completed several fuels reduction projects around these communities to address these fuel loadings. Continued fuels treatments and reduction should be implemented.

To address these issues, this plan outlines a number of recommendations and projects to mitigate the fire threat. They include:

- Continue the public education campaign regarding wildfire. Increase public awareness of wildfire hazards around homes and the need for effective defensible space.
- Review and modify, if necessary, existing county codes and ordinances designed to address fire safe issues in community design and building construction.
- Implement on-the-ground fuels reduction projects.

A list of *specific projects* by Planning Area have been developed as follows:

Woodfords Planning Area Mitigation Projects

| <i>Priority</i> | <i>Name</i> | <i>Acreage</i> | <i>Estimated Cost</i> |
|-----------------|---|----------------|-----------------------|
| 1 | Manzanita Fuels Treatment | 300 | \$600,000 |
| 2 | Diamond Valley Triangle Fuels Treatment | 40 | \$80,000 |
| 3 | Residential Lot Treatment | 50 | \$135,000 |
| 4 | Mesa Vista Brush Treatment | 100 | \$150,000 |

Markleeville Planning Area Mitigation Projects

| <i>Priority</i> | <i>Name</i> | <i>Acreage</i> | <i>Estimated Cost</i> |
|-----------------|--|----------------|-----------------------|
| 1 | Roadway and Utility Access Treatment | 31 | \$96,000 |
| 2 | Develop and implement an Evacuation Plan for the Hot Springs Road Corridor | n/a | \$15,000 |
| 3 | Private Land Fire and Forest Health Co-op | 392 | \$804,000 |
| 4 | Residential Lot Treatment | 50 | \$315,000 |
| 5 | Create Alternative Evacuation Routes study | n/a | \$5,000 |
| 6 | Update Markleeville Pre-Attack Plan | n/a | \$5,000 |

Bear Valley Planning Area Mitigation Projects

| <i>Priority</i> | <i>Name</i> | <i>Acreage</i> | <i>Estimated Cost</i> |
|-----------------|---|----------------|-----------------------|
| 1 | Defensible Space Creation on Residential Lots | n/a | \$50,000-\$200,000 |
| 2 | Fuels Treatment in Common Areas and outside the Homeowner Exemption Zones | 50 | \$50,000-\$100,000 |
| 3 | Road Right-of-Way Fuels Program | 30 | \$30,000-\$50,000 |

A list of *specific responsibilities* has also been developed:

For the Woodfords Planning Area:

Homeowners:

For the entire Woodfords Planning Area

1. **Replace flammable roofing materials with fire-resistant materials.**
2. Provide a minimum 100' defensible space around all structures.

For the Woodfords / Alpine Village Community

1. **In Woodfords Lane, address ingress and egress, ensure the road is passable during a fire event.**
2. Actively pursue creation of defensible space. In Alpine Village, be aggressive about removing brush from near homes and structures which has regrown since the Acorn Fire. In the Woodfords Lane area, ensure pine needles are removed from roofs, gutters, and cleared from houses.
3. Ensure street signage is visible and clear, especially in Woodfords Lane. No street signage currently exists.

For Upper Diamond Valley / Manzanita Lane neighborhood

1. **Widen roads and provide turnouts and turnarounds for fire apparatus. This should be a priority effort in this community as nothing has been completed to this point and the fuels are still extreme.**
2. Pursue the creation of a secondary evacuation route from the Manzanita Lane subdivision.

3. Thin overstory and clear brush as soon as possible and plan for retreatment at four to five-year intervals.
4. Maintain fuel treatment project conducted in 2004 on private land.

For the Crystal Springs Community

1. **Many lots need to reduce the number of trees to limit this spread of wildfire should one occur. The fuels around the neighborhood have been treated effectively but the risk from an ignition within the community spreading is still high.**
2. Actively pursue creation of defensible space, to include cleaning pine needles from roofs, gutters, and away from the structure.

For the Mesa Vista Community

1. **Masticate brush for defensible space and plan for retreatment at four to five-year intervals.**
2. Actively support efforts to install a community hydrant system.

For the Sorensen's Resort / Douglas Way Community

1. **Actively pursue creation of defensible space. Around Sorensen's Resort, ensure there is enough space to create a buffer from wildfires moving into the resort as well as any ignitions moving from the resort into the forest. Along Douglas Way, be aggressive about removing brush from near homes and structures and keeping firewood away from the structures. Clear roofs of pine needles and branches.**
2. Seek opportunities to improve ingress and egress. Ensure the Sorensen's Resort can be evacuated quickly and the people can move out of the area to make way for fire response on State Highway 88. Ensure Douglas Way residents can leave and keep the bridge clear for fire apparatus to make ingress.

Eastern Alpine Fire / Rescue:

1. **Participate in an annual, pre-fire season tabletop exercise with the Alpine County Sheriff's Office, CAL FIRE, and USFS to develop a coordinated agency response to a wildfire incident. Topics should include communications, training, and equipment resources.**
2. Continue to purchase wildland firefighting equipment and train volunteers to the NWCG 310-1 certification levels.

Alpine County Sheriff's Office:

1. **Conduct training session with Search and Rescue and Eastern Alpine Fire and Rescue on evacuation notices and operations in these neighborhoods.**
2. Participate in an annual, pre-fire season tabletop exercise with the Eastern Alpine Fire / Rescue, CAL FIRE, and USFS to develop a coordinated agency response to a wildfire incident. Topics should include communications, training, and equipment resources.

Alpine County Board of Supervisors:

- 1. Enforce existing defensible space ordinances by creating and filling a full time County Fire Marshal position.**
2. Ensure the emergency services agencies are addressing the public safety issues outlined in this plan.
3. Support use of curbside chipping in local fuels reduction projects and defensible space creation.
4. Pursue and enforce legislation, ordinances, or other codes to eliminate wildland fuel hazards within the communities.
5. Collaborate with federal agencies to implement fuels reduction projects on public lands surrounding communities.
6. Conduct fuels treatments on County-owned land and right-of-ways within communities. Specifically, the land across State Highway 89 from the County Yard and the County owned parcel at the intersection of River Ranch road and Highway 88
7. Support community efforts to increase water supply and distribution.
8. Pursue long term solutions for the perpetuity of the Turtle Rock Park biomass pile. The Community Burn Pile, coordinated by the Alpine County Community Development Department, is a success. Every fall and spring, tons of biomass material is cleared from lots in the community. This results in a reduction of fuels in our neighborhoods. This solution should be continued.
9. Support development of grant opportunities fore fire prevention funds.

Alpine County Community Development:

- 1. Continue brush removal along road right-of-ways to reduce the ignition risk and the make the road passable during a fire event. This is a priority to maintain and improve the work that has been completed to this point.**
2. Continue to provide defensible space around the County Yard and buildings. Increase the amount of defensible space around the pile of brush at the back of the County yard and remove pine needles from roofs of county buildings.
3. Participate in an annual, pre-fire season tabletop exercise with the Alpine County Sheriff's Office, Eastern Alpine Fire / Rescue, CAL FIRE, and USFS to develop a coordinated agency response to a wildfire incident. Topics should include communications, training, and equipment resources.

CALTRANS / State of California:

- 1. Maintain and expand the brush management and removal along state highway 88 from Woodfords to the Nevada state line. This is crucial in reducing the potential for ignitions to spread from the roadway to the wildland and to ensure safe evacuation routes during a fire event.**

Alpine Fire Safe Council:

1. **Explore and facilitate community fuels reduction projects. Assist the Alpine County Board of Supervisors as requested with development of fuels reduction solutions.**
2. Establish system for monitoring and maintaining fuels reduction projects.
3. Continue to provide public education information on defensible space at County buildings.
4. Actively support the efforts of the Eastern Alpine Fire / Rescue and other emergency services in mitigating wildfire risk.
5. Pursue grants to fund fire prevention projects and initiatives

Utilities (power and water):

1. **STPUD should maintain brush clearance along Diamond Valley Road, around Diamond Valley School and above the Alpine Village neighborhood.**
2. Encourage Liberty Energy to provide a local power shut-off including necessary training for Eastern Alpine Fire / Rescue and Alpine County Sheriff.
3. Remove fuels from below or around powerlines and power poles in accordance with PRC 4292 and 4293.
4. Conduct annual meetings with Liberty Utilities on fire prevention and fuels reduction efforts around utility infrastructure.

For the Markleeville Planning Area:

Homeowners:

For the entire Markleeville Planning Area

1. **Replace flammable roofing materials with fire-resistant materials.**
2. Provide a minimum 100' defensible space around all structures.

For Markleevillage/Thornburg Subdivisions

1. **Thin overstory and clear brush to create effective defensible space.**
2. Develop an alternative evacuation route out of the subdivision on Timber Lane

For Shay Creek Subdivision

1. **Develop a neighborhood evacuation guide to educate residents and those staying in the homes about evacuation procedures.**
2. Widen roads and provide turnouts and turnarounds for fire apparatus.

For Both Woodfords and Markleeville Planning Areas:

Eastern Alpine Fire and Rescue:

1. **Assist in developing a community evacuation plan for the Hot Springs Corridor.**

2. Insist upon and participate in an annual pre-fire season tabletop exercise with the Alpine County Sheriff's Office, Eastern Alpine Fire and Rescue, CAL FIRE, and USFS to develop a coordinated agency response to a wildfire incident. Topics should include communications, training, and equipment resources
3. Continue to purchase wildland firefighting equipment and train volunteers to the NWCG 310-1 certification levels.

Alpine County Sheriff's Office:

1. **Participate in an annual, pre-fire season tabletop exercise with the Eastern Alpine Fire and Rescue, CAL FIRE, and USFS to develop a coordinated agency response to a wildfire incident. Topics should include communications, training, and equipment resources.**
2. Assist in developing a community evacuation plan for the Hot Springs Corridor.

Alpine County Board of Supervisors:

1. **Enforce existing defensible space ordinances by creating and filling a County Fire Marshal position.**
2. Ensure the emergency services agencies are addressing the public safety issues outlined in this plan.
3. Support use of curbside chipping in local fuels reduction projects.
4. Pursue and enforce legislation, ordinances, or other codes to eliminate wildland fuel hazards within the communities.
5. Collaborate with federal agencies to implement fuels reduction projects on public lands surrounding communities.
6. Support community efforts to increase water supply and distribution.
7. Expand Solutions for Community Fuels Disposal - The Community Biomass Pile, coordinated by the Alpine County Community Development Department, is a success. Every fall and spring, tons of biomass material is cleared from lots in the community. This results in a reduction of fuels in our neighborhoods. This opportunity should be continued. Solutions for fuels reduction within the community during times other than when the burn pile is available should be explored in concert with the Alpine Fire Safe Council.

Alpine Fire Safe Council:

1. **Explore and facilitate community fuels reduction projects. Assist the Alpine County Board of Supervisors as requested with development of fuels reduction solutions.**
2. Establish system for monitoring and maintaining fuel reduction projects.
3. Continue to provide public education information on defensible space at County buildings.
4. Actively support the efforts of the local fire departments and other emergency services in mitigating wildfire risk.

Utilities (power and water):

1. **Remove or chip fuels from underneath power lines and power poles.**
2. Liberty Utilities should provide a local power shut-off, including necessary training for the Eastern Alpine Fire / Rescue and Alpine County Sheriff.
3. Remove fuels from below or around powerlines and power poles in accordance with PRC 4292 and 4293.
4. AFSC to conduct annual meetings with Liberty Utilities on fire prevention and fuels reduction efforts around utility infrastructure.
5. Update existing water utilities and increase storage capacity. Replace water system with year-round, larger lined system. Maintain clearly- marked potable and non-potable water sources.

For the Bear Valley Planning Area:

Homeowners:

For the entire Bear Valley Planning Area

1. **Replace flammable roofing and decking materials with fire-resistant materials.**
2. Provide a minimum 100' defensible space around all structures.
3. Support the Bear Valley Public Safety Department in the actions listed below.

For the Old Subdivision neighborhood

1. **Thin overstory and clear road right of ways.**
2. Widen roads and provide turnouts and turnarounds for fire apparatus.

For the New Subdivision neighborhood

1. **Continue efforts to thin forests and remove ladder fuels outside the 150' homeowner exemption zones.**
2. Continue fuels treatment along the road right of ways.

For the Sherman Acres neighborhood

1. **Thin overstory and clear road right of ways.**
2. Widen roads and provide turnouts and turnarounds for fire apparatus.
3. Provide more options for access to the water supply.

Bear Valley Public Safety Department:

1. **Develop a community evacuation plan and conduct an evacuation drill with the community, Alpine County Sheriff's Office, CALFIRE, Ebbets Pass Fire Department and the USFS.**
2. Participate in a pre-fire season tabletop exercise with the Alpine County Sheriff's Office, Ebbets Pass Fire Department, CALFIRE, and USFS to develop a coordinated agency response to a wildfire incident.
3. Increase the number of trained volunteers.
4. Continue to purchase wildland firefighting equipment and train volunteers to the "red card" certification system.
5. Pursue upgrading wildland apparatus.

6. Install a 911 phone at the Bear Valley Sheriff's Office and Fire Department to aid in reporting of emergencies. Cell phone service is spotty and often reporting parties have use a land line to report issues.

Alpine County Sheriff's Office:

- 1. Develop a community evacuation plan and conduct an evacuation drill with the community. Include relevant partner agencies that might be involved in a major wildfire event.**
2. Participate in a pre-fire season tabletop exercise with the Bear Valley Public Safety Department, CALFIRE, and USFS to develop a coordinated agency response to a wildfire incident.

Alpine County Board of Supervisors:

- 1. Ensure the emergency services agencies are addressing the public safety issues outlined in this plan.**
2. Enforce legislation, ordinances, or other codes to eliminate wildland fuel hazards within the communities.
3. Lobby federal agencies to implement fuels reduction projects on public lands surrounding communities.
4. Continue fuels treatments on County owned land within communities.
5. Explore cost effective biomass disposal solutions and collection options in the Bear Valley Area.

Alpine County Community Development:

- 1. Continue the annual brush treatment along roadways to reduce the ignition risk and to make the road passable during a fire event.**
2. Continue to provide defensible space around County Buildings, (Library, Perry Walther Building, School.)

Alpine Fire Safe Council:

- 1. Actively support the efforts of the local fire department and other emergency services in mitigating wildfire risk.**
2. Collaborate with Calaveras Foothill Fire Safe Council as needed to secure funding and support for Bear Valley projects.
3. Continue to provide public education information on defensible space at County buildings, and through mailings.
4. Assist the Alpine County Board of Supervisors as requested with development of fuels reduction solutions.

Utilities (power and water):

- 1. Replace fittings on hydrants to ensure consistency with standard fire service fittings and couplings.**
2. Remove fuels from below or around powerlines and power poles in accordance with PRC 4292 and 4293.

For the Kirkwood Planning Area:

Homeowners:

For the entire Kirkwood Planning Area

1. **Replace flammable roofing, siding, and decking materials with fire-resistant materials.**
2. Provide a minimum 100' defensible space around all structures.
3. Support the Kirkwood Fire Department in the actions listed below.

For the Lodge Area neighborhood

1. **Discuss evacuation and fire operation activities with local fire departments and emergency response agencies. Preplan with Vail resorts to ensure clarity in facility needs and evacuation operations.**

For the East Meadows neighborhood

1. **Continue efforts to create defensible space and remove ladder fuels.**
2. Continue fuels treatment along the road right of ways.

Kirkwood Fire Department:

1. **Develop a community evacuation plan and conduct an evacuation drill with the community, Alpine County Sheriff's Office and the USFS.**
2. Participate in a pre-fire season tabletop exercise with the Alpine County Sheriff's Office, CALFIRE, and USFS to develop a coordinated agency response to a wildfire incident.
3. Increase the number of trained volunteers.
4. Continue to purchase wildland firefighting equipment and train volunteers to the "red card" certification system.
5. Pursue upgrading wildland apparatus.

Alpine County Sheriff's Office:

1. **Develop a community evacuation plan and conduct an evacuation drill with the community. Include relevant partner agencies that might be involved in a major wildfire event.**
2. Participate in a pre-fire season tabletop exercise with Vail Resorts, the Kirkwood Fire Department, CALFIRE, and USFS to develop a coordinated agency response to a wildfire incident.

Alpine County Board of Supervisors:

1. **Ensure the emergency services agencies are addressing the public safety issues outlined in this plan.**
2. Enforce legislation, ordinances, or other codes to eliminate wildland fuel hazards within the communities.
3. Collaborate with federal agencies to implement fuels reduction projects on public lands surrounding communities.
4. Continue fuels treatments on County owned land within communities.

Kirkwood Public Utility District:

1. **Continue Community Chipper Program to provide a solution for homeowners to create and maintain defensible space around their structures.**
2. Continue to provide defensible space around KMPUD Buildings, (Community Center, Fire Department, Powerhouse.)
3. Continue the annual brush treatment along roadways to reduce the ignition risk and to make the road passable during a fire event.

Alpine Fire Safe Council:

1. **Actively support the efforts of the local fire department and other emergency services in mitigating wildfire risk.**
2. Collaborate with Amador Fire Safe Council as needed to secure funding and support for Kirkwood projects.
3. Continue to provide public education information on defensible space at County buildings, and through mailings.
4. Assist the Alpine County Board of Supervisors as requested with development of fuels reduction solutions.

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2. Introduction

2.1 The Alpine Fire Safe Council

The Alpine Fire Safe Council (AFSC) was established in 2003 through a cooperative effort of the Alpine County Board of Supervisors and the Alpine County Resource Advisory Committee. The Council seeks to reduce the risk from devastating wildfires, which have occurred in our communities in the past. Recent accomplishments include:

- Distribution of Wildfire education material: The Alpine Fire Safe Council maintains educational fire safe material at key county government locations. The Council compiled a set of key fire safe brochures and handouts relevant to our community. This information was placed at the County Administration building and Community Development building. The Building Department disseminates these materials to those who apply for building permits.
- Facilitation of the Fire Services Plan Ad-Hoc Committee: The Alpine Fire Safe Council sponsored a collaborative effort to address the future of fire suppression resources involving the Board of Supervisors, the Washoe Tribe, Fire Departments, EMS, local concerned citizens and a paid consultant. Their work resulted in the Eastern Alpine County Fire Services Plan (2005).
- Encouraged the County to update the Safety Element of the General Plan regarding Fire Goals and Objectives.
- Encouraged the County to update Fire Ordinances and Road and Driveway Standards.

2.2 Mission of the Alpine Fire Safe Council

The mission of the Alpine Fire Safe Council is to provide community leadership, resources, and a forum to improve wildfire preparedness in Alpine County.

2.3 Current Policies and Local Planning

Alpine County created an implementation plan of fire elements in 1991 as the culmination of a citizen review of the 1987 Acorn Fire. These elements have been considered in this plan and updated to reflect the current progress on implementation.

Alpine County incorporated the 1991 fire implementation plan into the Alpine County General Plan. The General Plan, also contains other safety elements pertinent to this document. Where appropriate, those General Plan elements have been referenced

Alpine County has also developed a County Hazard Mitigation Plan (under revision) in accordance with the Disaster Mitigation Act of 2000. Wildfire is a critical element of this plan. The Alpine County Planning Department and the Alpine Fire Safe Council are coordinating their planning efforts.

2.3.1 Federal Policies and Planning

A number of federal agencies have planning efforts at both the national and local levels that affect Alpine County wildfire mitigation projects. These planning efforts encourage federal land management and emergency service agencies to dovetail their mitigation

efforts with local projects and action groups. Alpine County and the Alpine Fire Safe Council are already addressing these efforts.

The USFS and BLM, who administer large tracts of wildland fuels in Alpine County, have planned fuels reduction projects on public lands adjacent to communities and recreation sites. Future projects are in the planning stage. These projects will help reduce the chances of wildfire moving into or out of communities.

2.3.2 State Planning

The Amador-El Dorado Unit of the California Department of Forestry and Fire Protection (CAL FIRE) has recently completed its unit fire plan. This plan will be forwarded to that agency for inclusion in their unit plan.

2.4 Planning Area Boundaries

Figure 1 illustrates the planning area boundaries for this plan. These boundaries correspond to watersheds and more importantly to the local fire protection jurisdictions. Alpine County has been delineated into the following Planning Areas:

- **A. Woodfords** – Communities north of Turtle Rock Park and east of Sierra Crest. There is a long history of wildfire in this area with the Woodfords community, with four major wildfires occurring since 1981. In 1984, the Indian Creek Fire burned approximately 6,000 acres near Indian Creek, only to be followed by a 2,000-acre fire near Fredericksburg in 1986 and then the Acorn Fire in 1987, which burned nearly 6,000 acres and twenty-six homes. Woodfords is listed on the Federal Register as a community threatened by wildfire. Eastern Alpine Fire and Rescue and the USFS provide wildland fire protection
- **B. Markleeville** – Communities south of Turtle Rock Park to Sierra Crest. Some large wildfires have burned in this area, most recently the Washington Fire south of Markleeville which consumed 18,000 acres, and fuel loadings remain high. The Washington Fire burned within 2 miles of the town of Markleeville and the neighborhood of Markleeville, prompting evacuations and significant coordinated response from local, state and federal fire fighting agencies. Markleeville is listed on the Federal Register as a community threatened by wildfire. Eastern Alpine Fire and Rescue and the USFS provide wildland fire protection.
- **C. Bear Valley** – West of the Sierra crest. This area has little wildland interface issues given its elevation and relatively wet climate. However, Bear Valley is listed on the Federal Register as a community at risk for wildfire. The community is geographically isolated from the rest of the county much of the year. Bear Valley provides its own fire protection.
- **D. Kirkwood** - West of the Sierra crest. This area has small area of wildland interface, however the assets at risk are significant due to the value of the homes and infrastructure.

2.5 CAL FIRE State Responsibility Areas (SRA)

Figure 1 also shows wildland urban interface (WUI) boundaries. The WUI zones fall within CAL FIRE State Responsibility Areas (SRA.) In Alpine County, CAL FIRE does not maintain a physical presence (fire station or engine), instead they delegate their

responsibilities to the federal agencies by virtue of a Cooperative Fire Agreement. This agreement allows CAL FIRE to trade wildfire responsibility in some private areas of California, like Alpine County, for protection of federal lands elsewhere. The goal is to efficiently allocate fire suppression resources, with areas of predominately federal land protected by federal resources, predominately private land protected by state resources.

Figure 2 displays general land ownership by federal, state, and private entities in Alpine County. Alpine County is approximately 95% public land.

There are three fire departments within Alpine County which function as three separate response units. Bear Valley is geographically separate, including dispatching. Kirkwood provides their own protection, calling on the Woodfords and Markleeville departments for mutual aid only if necessary. Eastern Alpine Fire and Rescue covers the Woodfords and Markleeville planning areas and provides mutual aid to Kirkwood. Outside county mutual aid comes from Douglas County, Amador County (for Kirkwood) or Lake Tahoe.

2.6 Non-Governmental Organizations

- Other Fire Safe Councils- Bear Valley is a member of the Calaveras-Foothill Fire Safe Council. The Alpine Fire Safe Council provides support as requested. Kirkwood is served by both the Amador and Alpine Fire Safe Councils, though since it is not defined as a community at risk it has not been a priority area for either Council. The Alpine Fire Safe Council has provided the Kirkwood VFD educational materials as requested.
- Alpine Watershed Group- The Alpine Watershed Group, formed in 1999, is active in the planning areas. An Upper Carson Watershed geomorphic assessment was completed in the spring of 2004. Recently the Alpine Watershed group has worked cooperatively with the Alpine Fire Safe Council, Alpine County and the USFS in identifying projects and securing funding for fuels treatment projects.
- Home Owners Associations- Only the Shay Creek homeowners' association near Grover's Hot Springs is active in the Markleeville Planning Area. Other associations in the Woodfords area include the River Ranch and Trail Dust Homeowners association. The Bear Valley Homeowners Association has been active in its community and in its participation in fire safe efforts. Other associations may exist.

Kirkwood
Planning Area

Woodfords
Planning Area

Bear Valley
Planning Area

Markleeville
Planning Area

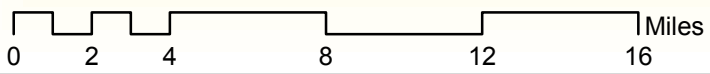




Figure 1: Planning and WUI Area Boundaries

-  **Planing Area Boundary**
-  **WUI Area**

- Map prepared March, 2017 by CG Celio & Sons, Inc.
 - WUI data current as of 2010. Source: SILVIS Lab, Department of Forest Ecology and Management, University of Wisconsin-Madison
 - Map projected to NAD_1983_StatePlane_California_II_FIPS_0402_Feet

- No warranty, expressed or implied, is made by CG Celio & Sons, Inc. regarding the use of these data, nor does the act of distribution constitute any such warranty.



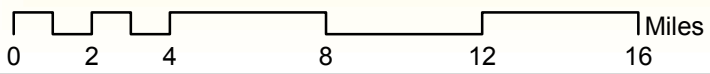
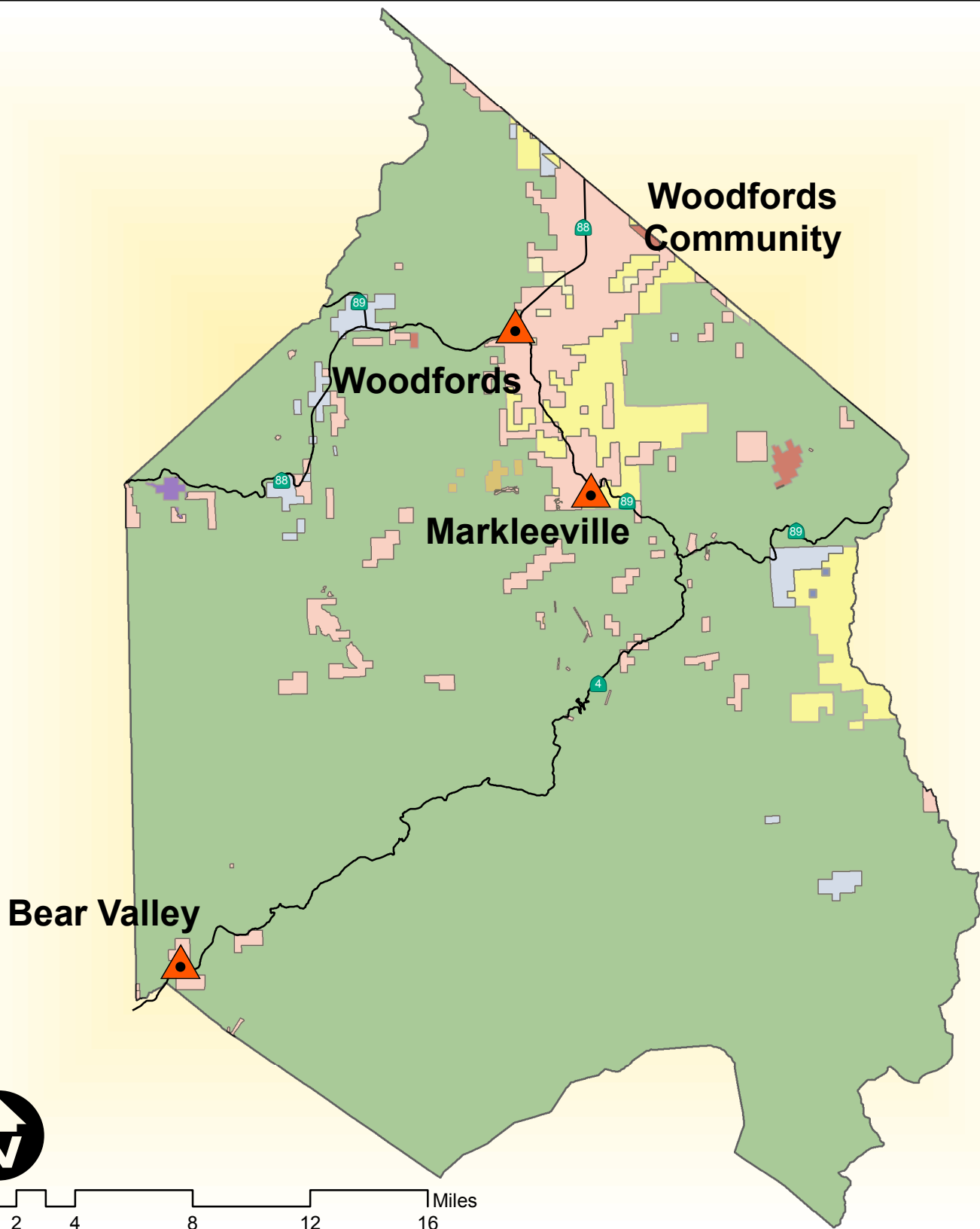


Figure 2: Land Ownership and Communities at Risk

Land Ownership

- USDA Forest Service
- CA Dept. of Fish and Wildlife
- Local Government
- Bureau of Land Management
- CA Dept. of Parks and Recreation
- Other Federal Lands
- Bureau of Indian Affairs
- Other State Lands
- Private Lands



- Map prepared March, 2017 by CG Celio & Sons, Inc.
 - Ownership data current as of 2014.
 Data Source: CalFire FRAP
 NAD_1983_StatePlane_California_II_FIPS_0402_Feet
 - No warranty, expressed or implied, is made by CG Celio & Sons, Inc. regarding the use of these data, nor does the act of distribution constitute any such warranty.



2.7 Regulatory Compliance and Administrative Issues

With the large amount of public land in Alpine County, much of the fuel treatment will have to be completed on public lands. This will invoke NEPA environmental documentation and compliance on federal lands, CEQA documentation and compliance on state and local public lands, and federal lands where state funds are used. Private land treatments will require CEQA environmental documentation and compliance. Some of these projects will require review by the Lahontan Region of the California Water Quality Control Board. Commercial projects involving native timber species on private lands will require a multidisciplinary review by Lahontan Water Quality, California Fish & Wildlife, Alpine County, Tribal Representatives and CAL FIRE (the lead agency.)

In addition to land management issues, finding contractors who can work in residential areas is problematic. Many insurance carriers will no longer insure work in and around houses. This conflicts with increased awareness by the homeowners and a willingness to have the work done.

2.7.1 Legal Mandates

Alpine County adopted ordinances in the mid 1990s to address the wildfire hazard issues in Alpine County (15.12.010, 15.12.020.) These ordinances were based on California Public Resource Code 4290. This code addresses pre-development fire protection issues such as driveway standards, road width, emergency access, road standards, signage, and emergency water supply for fire protection. The ordinances are attached as Appendix 5. The PRC 4290 has been updated and Alpine County should consider updating its ordinances to reflect these changes.

Water Supply

The Alpine County Ordinance includes requirements for a 2,500-gallon water supply or \$2,500 payment in lieu of water for new construction. The Alpine Fire Safe Council conducted an informal review of tanks, ponds, and road design in the spring of 2004. Tanks were not inspected to be sure that they were filled with water. A number of ponds were not filled, and in one instance the pond was removed. The subdivisions reviewed did not meet the county specifications, and in one case the turnaround was built to less than 60% of standard.

Action Item: Propose changes to the tank and mitigation fee structure.

Given the poor reliability of the tank and pond option and the ability of Eastern Alpine Fire and Rescue to be able to get water tenders on scene, the Alpine Fire Safe Council should pursue updating the Alpine County Ordinance to remove the option of allowing homeowners to have a tank or pond in lieu of the mitigation fee. The mitigation fee should be raised to \$3500 and will continue to go to a special fund for water source infrastructure in Alpine County.

The Alpine Fire Safe Council will work with the Eastern Alpine Fire and Rescue and the Alpine County Building Department to bring a collaborative update of ordinance language to the Alpine County Board of Supervisors for approval in updating the ordinance.

Alpine County Fire Code Enforcement

The Alpine County Building Inspector is charged with code enforcement in the absence of a County Fire Marshal. The current building inspector is aware of these issues and has published Fire Prevention Guidelines regarding water tanks for residential fire protection. These guidelines are available on the Alpine County Building Department website and provided when a new permit application is received. The building inspector has updated his procedures for review of residential plans but now new ordinances or changes to ordinance have occurred.

For new construction, the Alpine County Building Inspector has been conducting code enforcement with the current building codes. These have been updated and more formally address fire protection within the home. The building inspector has also conducted defensible space inspections on new construction.

For existing residences and commercial buildings, informal discussions are occurring regarding annual inspections relating to fire code. Alpine County, Eastern Alpine Fire / Rescue and the building inspector are determining who should conduct inspections and at what interval. The County is in the process of the adopting an Adjacent Lot Ordinance for the east side of the County to address these issues specifically. Language does not currently include annual inspections but is rather complaint based. Inspections will be done by the Fire Chief and a Public Safety Officer from Bear Valley. Bear Valley is covered by the existing Defensible Space Ordinance.

Action Item: Support the creation of the Alpine County Fire Marshal to oversee and enforce Fire Codes in Alpine County

While the current solution of sharing these responsibilities with the Alpine County Building Inspector, the Eastern Alpine Fire and Rescue Chief and informal assistance from CALFIRE and Lake Valley Fire District has provided a solution to date, the lines of responsibilities are not clear and the tasks are all secondary to each agencies primary mission. This creates a significant risk of details being missed or inspections dropped due to other pressing priorities. To ensure fire safety remains a top priority to Alpine County residents, Alpine County needs to clearly define and fund the Fire Marshal position to ensure compliance with required fire codes.

2.7.2 Zoning Regulations

The Alpine County General Plan-Safety Element provides for fire and public safety. It is available in this document as Appendix 4.

2.7.3 Fire and Building Codes

The Alpine County Building inspector uses the state building codes and contracts out inspection duties. Appendix 5 is a copy of the adopted county fire safe regulations.

2.7.4 Fire Protection Infrastructure

Given the geographic expanse of Alpine County, there are multiple fire stations within the County. The planning area boundaries correspond to the fire station response areas

(Markleeville – Station 92, Kirkwood – Station 93, Bear Valley, and Woodfords – Station 91 and 95). Kirkwood and Bear Valley stations are funded through assessment fees. Markleeville and Woodfords are not districts and are funded directly by the county general fund to the Eastern Alpine Fire and Rescue.

In each section of the report, a detailed description of the fire infrastructure is discussed. Markleeville, the Woodfords Community (Hung-Lel-A-Ti) and Kirkwood have hydrant systems. Woodfords has a few limited use hydrants off the South Tahoe Public Utility District (STPUD) sewer effluent line that transports secondary effluent. Due to health and legal reasons this effluent cannot be used for structure protection without changing existing state law and incurring substantial costs to the fire departments and the volunteers.

2.7.5 Insurance and Fire Protection Grading and Rating System

ISO ratings are high in the Woodfords Planning Area due to lack of sufficient water supply for fire-fighting purposes and lack of a full time paid fire department. Woodfords has no hydrant system. Some homeowners in Woodfords and Markleeville have had a difficult time in obtaining and keeping homeowners insurance for this reason.

Homeowners unable to get traditional fire insurance are left with the option of enrolling in the state mandated California FAIR plan fire insurance program. This insurance is significantly more expensive and provides minimal coverage if a home is lost to wildfire.

Insurance companies no longer rely exclusively on ISO ratings to determine insurability, instead getting information from a Fireline or “core logic” report. These reports include an assessment of the wildfire hazards including fuels, slope and access. This information, in concert with data on the local fire departments and other fire agencies, is used by insurance companies to determine if they will insure a property.

The updated insurance ratings have made much of Alpine County uninsurable. Only a few insurance companies are currently using these reports, other companies are expected to be employing the same data in their policy updates. This will continue to make it harder for homeowners to renew existing policies or find new policies.

Action Item: Alpine Fire Safe Council should pursue designation of a FIREWISE community. This designation, applied by the national FIREWISE organization, is recognized by USAA insurance company as a mitigation strategy in high wildfire hazard areas. They will write policies for military and federal government service homeowners in FIREWISE communities who are otherwise unable to gain insurance.

2.7.6 Liability

The liability issues surrounding wildfire risk and suppression are complex. Many agencies prefer to sidestep wildfire hazard issues for fear that even if a mitigation measure is completed, if someone gets injured or killed, they will be liable. However, with insurance companies considering lawsuits in Southern California (2003) over whether the fire department did enough, it is becoming clear that it’s a double-edged

sword. No longer will ignoring the hazards of wildfire absolve agencies of liability when wildfires occur.

Regarding projects, the Alpine Fire Safe Council, Alpine County, and contractors are required to have insurance for work completed on private land or in the county right of way. If insurance is available, this is not a problem, however insurance is becoming tougher to get. This slows progress, and in some cases, causes projects to wait another fire season to be completed.

2.8 Strategic Goals

There are a number of strategic goals the Alpine Fire Safe Council hopes to achieve to reduce the wildfire risk in Alpine County communities. They are:

- Reduce fuel loadings in and around communities through on-the-ground projects. Where possible, the Alpine Fire Safe Council will assist landowners with expertise, educational materials, and grant funding to accomplish projects.
- Improve community readiness and fire suppression infrastructure. Secure new water supplies and distribution systems for communities. Work with utility companies, Alpine County, and the Fire Departments towards this goal.
- Increase public awareness through distribution of educational materials, public meetings, and homeowner reviews about the hazards of wildfire.
- Update County Ordinances to reflect the new understanding of the risks to life and property from catastrophic wildfires.
- Develop and implement evacuation plans for high risk, limited access neighborhoods.

2.9 Acknowledgements

Many agencies and individuals contributed to this document, their efforts are appreciated.

- Alpine County Board of Supervisors and USFS for providing the Title III funding to update this document.
- The Carson Ranger District of the USFS for providing their fire planning documents.
- The Carson City BLM office for providing their fire planning documents.
- Alpine County for providing historic information on fire planning activities, such as the General Plan and the 1991 fire implementation plan.
- Eastern Alpine Fire and Rescue for providing background information necessary to develop projects and delineate neighborhoods.
- CAL FIRE for their map resources (FRAP) and organizational input.

3. Fire Safety and Preparedness

3.1 Completed Projects

Community based fuels reduction projects on lands within the neighborhoods are the most visibly recognizable effects of wildfire preparedness. These often result in large amount of land being treated resulting in a more park like look to the landscape and a very direct effect on fire behavior. Or the projects create large piles of biomass for disposal. Over the course of the last decade, the Alpine Fire Safe Council together with Alpine County, Eastern Alpine Fire / Rescue and the various federal and state agencies have succeeded in implementing Fuels reduction and fire preparedness projects. There is more work to be done, but examples of the continued positive outcomes of these efforts include:

Community Biomass Pile – The community biomass pile at Turtle Rock Park continues to provide a very valuable way for homeowners to remove vegetation and maintain defensible space on their property. It is open twice a year, once in the spring and once in the fall, and is extremely popular with the residents. The amount of vegetation collected is significant. The “burn pile” is a misnomer as the material is no longer pile burned and is either removed through chipping, hauling or consumed in the biomass disposal unit.

Curbside Chipping – Eastern Alpine Fire and Rescue continues to coordinate efforts to provide curbside chipping services to landowners who cannot transport material to the biomass pile. Residents leave piles of material at the curb on designated days and the chipping crew will come by and chip the material.

Alpine County Right of Way Treatment – Alpine County annually treats the vegetation within the County road Right Of Way by mowing fuels. Funding for this project was provided by the Sierra Nevada Conservancy Prop 84 grant.

Manzanita Lane Fuels Reduction – The Alpine Fire Safe Council was able to secure a grant to assist homeowners with a fuels reduction project through mastication on Upper Manzanita Lane. A contractor was hired to come in and apply a mastication treatment on the private lands who were willing to participate. Approximately 150 acres were treated creating a fuel break around and within the community. As evidenced by the photographs below, significant regrowth has occurred, and a retreatment of the area should be made a priority.



2004—Post mastication project



2017—Regrowth in project area

In 2016, with Title III money from Alpine County, the Alpine Fire Safe Council completed another project on Lower Manzanita Lane to provide 8 feet of treatment from the side of the road. This was to make Lower Manzanita Lane more accessible during a fire event.

Homeowner Inspections – CALFIRE and the Alpine Fire Safe Council have continued to provide homeowner inspections to residents who desire an evaluation of the defensible space measures employed around their homes. The inspections thus far have been voluntary with CALFIRE staff providing recommendations to homeowners on areas of effectiveness and items needing improvement in their defensible space actions.

Bear Valley Homeowners Association – The Bear Valley Homeowners Association has completed defensible space implementation on all of the lots within the Bear Valley Subdivision.

Eastern Alpine Fire Services Plan and Implementation – The Alpine Fire Safe Council in partnership with Alpine County and Eastern Alpine Fire and / Rescue developed the Eastern Alpine Fire Services Plan. This plan called for and created a consolidated fire department in Eastern Alpine County and helped provide critical support to the volunteer system.

Fire Prevention Poster Program - Another effective method of fire prevention is community outreach and education. The Alpine Fire Safe Council has specifically targeted the local youth with a Fire Prevention poster program at the Diamond Valley Elementary School each year. Students are asked to create a poster best articulating their vision of fire prevention activities and the posters are judged by the local Council members. Awards are presented to students with the most effective posters.

USFS Fuels Treatments – The USFS has treated their lands around many of the Alpine County neighborhoods in Woodfords and Markleeville. They have completed clearing and pile burning along the Highway 88 corridor up through Crystal Springs and behind the Manzanita Lane area. Funding provided by the Sierra Nevada Conservancy recently completed mechanical mastication work around the Markleevillage subdivision and the Shay Creek subdivision on USFS lands. This was a collaborative project between Alpine

County, the Alpine Fire Safe Council and the Alpine Watershed Group and the USFS. Treatment was also applied southwest of the Mesa Vista area.

BLM Fuels Treatments – The BLM has taken a very active role in managing the fuels on their lands around Turtle Rock Park and Indian Creek Reservoir. Though BLM lands abut only a few private parcels with structures, their efforts have protected Airport Road and the Indian Creek campground.

STPUD Fuels Treatments – Since STPUD has acquired the lands in Upper Diamond Valley, they have conducted a number of fuels treatments along Diamond Valley Road and next to Diamond Valley School. They have created fire breaks and done mastication in the brush area around the school.

CALTRANS Right Of Way Treatments – CALTRANS has mowed and masticated the brush along highway 88 from Woodfords to the Nevada state line and from Woodfords to Turtle Rock Park. This has improved the accessibility of the road during a wildfire event and reduced the likelihood of an ignition from a vehicle accident of spreading into the wildland.

Alpine County Community Development –Alpine County Community Development Department completed treatments along county roads in the right of way to clear brush and grass. Like the CALTRANS treatments, it has improved the accessibility of the road during a wildfire event and reduced the likelihood of an ignition from a vehicle accident of spreading into the wildland.

CALFIRE Fuels Treatments – CALFIRE provided a hand crew recently to complete fuels treatments in the right of way for areas with heavy fuels which needed more than simple mastication. They treated the area along Upper Diamond Valley road, Crystal Springs Road and the Museum Road in Markleeville. The crew cut brush and small trees and chipped the material on site.

3.2 Defensible Space and Building Materials

The biggest impact individual residents and homeowners can have on wildfire preparedness is to create the appropriate defensible space around their structures and access. Residents need to ensure they meet the clearance standards and use fire resistant materials in home construction. These actions provide the best changes of home survival with or without the direct protection from fire services during an event.

The previous section in this document regarding legal mandates for defensible space creation and building materials outlines the requirements for homeowners. The Alpine Fire Safe Council provides educational material to the public to assist in creating defensible space. Handouts are provided at all public meetings and have been mailed to residents and landowners. The material includes information on creating defensible space, material disposal, and the use of non-flammable building materials.

California Public Resources Code (PRC) 4291 requires home owners to develop a defensible space zone of 100 feet around all structures, or to the property line, whichever is less. This includes removing or reducing fuels to limit the spread of wildfire from the wildland into the structures causing damage or destruction. Inspections to determine homeowner compliance with PRC 4291 are provided by CALFIRE or the local fire protection district and in extreme cases citations for cleanup can be issued. Compliance is mostly voluntary with inspectors seeking to educate homeowners on how to create defensible space by reviewing the inspection results and providing literature. There are a number of documents included at the end of this plan which outline good defensible space prescriptions and techniques.

There are a number of details to consider in developing defensible space on each piece of property.

The best option is to have no plants next to the structure. Plants next to the structure are likely to be flammable. Ornamental junipers or pines are very common landscaping plants but ignite very easily and burn extremely quickly / hot. Seasonal plants which have dead material in the late summer / fall also pose a fire risk. Best to keep all but short, well irrigated, moist plants away from the structure.



Plants clear of building corners

Even if plants are green and moist, may still give a place next to the structure for burning embers to land immediately next to the building. Of particular concerns are plants in building corners. It is best to remove vegetation immediately next to the structure to keep burning materials from collecting and allow fire personnel clear visibility to structure services and corners.

Further away from the structure, beyond approximately 30 feet on level ground, more if on a slope, the plant structure must be broken so it is not contiguous. It is the structure of the wildfire fuel that makes it so volatile. Being able to break up the structure by either removing plants and creating distance between plants, or by chipping / mulching plants so the material is down on the ground level changes the fire behavior and intensity. The objective of defensible space is to create enough distance so that if a single plant is ignited by embers, it does not spread to neighboring plants and therefore to the structure.

Changing the types of plants on the defensible space zone can be helpful. Most native plants have evolved with fire as a natural process, meaning anything in the 1-8 foot range typically is configured to burn easily and reproduce with fire. The interior of these plants typically dies leaving lots of dead material on the interior of the plant if not removed. Large trees can be an exception with very thick bark, but even these giants are susceptible to crown fires. Opting to plant more fire-resistant species, which don't create as much dead material or have thicker bark like exteriors provide for defensible space while still allowing for some vegetation in this zone.

Lists of specific type / species of plants that are fire resistant can be found at: <http://www.unce.unr.edu/publications/files/nr/2007/eb0701.pdf> and <http://www.firefree.org/wp-content/uploads/2016/02/Fire-Resistant-Plants.pdf>

Trees in the defensible space zone need to be trimmed to separate the canopy from a ground fire. Any single bushes or plants that might catch fire must be far enough away from the limbs / branches of surrounding trees to prevent the fire of reaching into the canopy of the tree and becoming a larger fire. Large trees can remain, but need to have appropriate spacing to keep fire in a single tree from spreading to others.

The goal of defensible space is to create an area around the structure that is defensible during a fire. It would allow fire personnel to be able to safely place apparatus and personnel at the property and stay through the passage of a fire event, the “flame front”. In the absence of fire service staff during a fire event, defensible space should keep flames and heat far enough away from the structure for the appropriate building materials to be within their tolerances for fire resistance.



Defensible space

The goal of fire resistant building material and practices is to prevent the burning embers and heat associated with a fire event from entering the structure and igniting the structure. While these things happen during a fire event and may be when fire service personnel are on the property, many structures are lost after the main flame front has passed and fire services have moved apparatus and staff to a new location to fight the fire. Remaining small embers tucked into roofs, eaves, decks and other small locations can ignite the structure after everyone has left and no one is around.

Ingress and Egress

While the PRC 4291 specifically addresses structures, another important component of homeowner wildfire preparedness is ensuring an appropriate lane for residents and fire services access to the property. The road or accessway has to be passable for the residents to leave during the confusion of a fire event and safe enough for fire apparatus to be able to evacuate should the area around the structure become unsafe.

Most driveways may appear plenty wide and passable during a normal day. But considering the flame length off surrounding vegetation might be driven by wind horizontally across the driveway, the need for reducing the fuel next to the driveway becomes more important. Add to that the reduced



Trees/vegetation near driveways can impede egress

visibility from smoke during a fire event and the width of clearance is significantly increased.

The best rule of thumb is to remove fuels 1.5 times the height of the fuel surrounding the driveway. Like defensible space, the objective is to change the fuel structure, leaving fuels on the ground an inch or two is acceptable. Chipping is a common technique to reducing fuels near a road and scattering the chips back onto the shoulder of the road, reducing erosion but changing the fuel structure so flames near the road will not be large enough to impede traffic.

Removing trees near the road is also more important. Not only can a single tree with fire in the canopy block the roadway, but burnt trees can fail and fall across the roadway also making it impassible. Larger limbs and branches can fall from the tree causing roadway hazards.

Many residents who have completed defensible space measures have not done enough to make the driveways accessible. Often rows of ornamental plants or bushes not appropriate for around the house are planted along the driveway to provide a visual or noise barrier to the road. Creating an unsafe road condition lessens the impact and property saving potential of the home when the driveway is not passable. Alpine County has been working diligently to ensure the county roads have the appropriate clearance to provide the best possible opportunities for homeowner defensible space.

Building Materials

Defensible space is the first line of defense to keep flames from directly affecting a structure. But the materials used to construct the building have an important role in its ability to withstand a fire event. Using the right materials and following the correct construction methods will limit the ignitibility of a structure.

Roofing and Siding

Upgrading roofing material to a product that is fire resistant can significantly improve a home's ability to survive a wildfire. Shake roofs common to home construction in the wildland urban interface 30 years ago have been proven to easily ignite. While visually appearing in a wooded environment, the wood shake shingles ignite easily and allow many small crevices for burning embers and sparks to embed and ultimately heat the material to the point of ignition. These roofs need to be replaced with more heat resistant material.

Metal is an obvious roofing material that is fire resistant. However, composite shingles also provide significant resistance during a fire event. Some manufactures make roofing materials that are composite but have the appearance of wood or shake shingles. These materials are desired from a flame resistance perspective, but still may maintain a shingle like structure that will trap and low burning ember to remain close or within the structure.

It's crucial to find a roofing material that not only provides fire resistance but also has a structure that will not trap burning material.

Siding is also a critical component in making a structure fire resistant. Many siding materials are originally fire resistant, either through painting or sealing, but without maintenance this siding can lose its fire-resistant qualities. Many wood siding products deteriorate to the point where the wood material becomes very dry and splintered, increasing its flammability and providing small areas for embers to be lodged and ignite the structure. Many siding materials come in metal or vinyl which is resistant to fire but can provide a look more compatible with the homes in the trees. Stucco is also a very popular material which provides fire resistance.



Fire resistant roofing and siding

Eaves and Vents

Any small crack or gap which embers and sparks can access will create an opportunity for the structure to catch fire. Sealing the structure as much as possible to prevent these openings will help protect the home. The most common area where cervices and small holes exist are in the eaves and vents of a home.

Eaves should be enclosed and sealed so that embers cannot penetrate the space and then sit against building materials. Or eaves can be completely open and painted wood so that ember have no place to catch and will fall to the ground. Either solution keeps embers from resting against materials and igniting later. Proper maintenance is crucial to ensure eaves remain enclosed and small gaps do not appear where embers can enter. Making sure boards are securely nailed and caulked will ensure eaves are protected.



Enclosed eaves/secure vents

Vents also provide penetrations into the building where embers can enter and then smolder. Most vents are already screened to keep out rodents, birds and other animals, but often these screens are not small enough to ensure burning embers cannot reach.

Make sure that screens are a similar mesh to the window screen and are of a metal material that will not melt if contacted by hot sparks. Screens need to be inspected for holes and secured to the surrounding vent hole for optimum effectiveness. Screens or other protective measures must be able to stay on the vents at all times, expecting to be able to have time to close vents and secure the penetrations is unrealistic. Wildfire can happen in the middle of the night or while residents are out of the area leaving no time to prepare immediately prior to the event.

Windows and Doors

Double pane windows are an important part of making the structure secure. Single pane windows can easily fail due to radiant heat coming from the defensible space zone. Much like the vents, once a window fails and creates an opening for embers and sparks to enter the structure, the likelihood of it igniting greatly increases. Double pane windows provide a layer of insulation in between the panes of glass so that if the outside pane fails or cracks, the inside pane still protects the opening.



Double paned windows

In addition to complete glass failure, single pane windows will also transfer radiant heat directly to the contents inside the structure, potentially igniting them. Couches, drapes, and other combustible materials directly in contact with single pane windows may get hot enough to combust even when the glass has not failed.

Glass doors follow the same guidance. Doors with single pane windows are more prone to failure and allowing hot material into the structure. In addition, doors should be made of or painted with the same flame-resistant material as the rest of the house as to not allow ignition of embers.

Doorways and window sills provide perfect crevices for hot embers and sparks to rest. They also collect fine materials like pine needles and other combustible materials that may more easily ignite than surround materials. It is important to keep door jambs and sills painted and in good condition so they might be able to withstand the heat from hot embers and sparks. Constructing these areas with as small a sill as possible will help keep them clean. Using materials like vinyl and metal also help make it more resistant to fire.

Decks and Overhangs

Common areas for wildfire to impinge on a structure is under a deck or overhang. Decks provide perfect places for hot embers and sparks to land and smolder. Frequently these areas are full of leaves, pine needles, firewood, or other easily ignitable material that can easily carry a fire into the structure. Fire service personnel are trained to prepare to defend a structure by removing all material under decks, a process that can be time consuming with firewood under the deck.



Deck clear of flammable material

Keep decks and overhangs clear of flammable materials and limit the storage of items under the deck where possible. Decks that are enclosed need to be able to allow embers to either be swept off or drop all the way through, so they are not sitting in flammable materials. Constructing decks from materials such as TREX, AZEC or other non-wood based materials will help reduce ignitability.

Overhangs covering open storage areas, firewood, etc next to the structure are also susceptible to these same ignitability hazards. Ensure the overhang is constructed of the same fire-resistant materials and the area is kept clean, easily defensible during a fire event.



Water Supply

Many residents misunderstand the purpose of an on-site water supply for fire protection. The pond / tank solution as outlined by the Alpine County Building Department is to provide water for structure fire protection, not wildland fire. Having water on site is helpful, but not required for a wildland fire event. Fire apparatus have an adequate amount of on-board water to provide water during a wildland fire event. Having an additional water supply is not as attractive to fire personnel / equipment defending the structure as having adequate defensible space and clear ingress / egress.

Water supply is required to provide structure fire protection. The intention of the onsite tank or pond is to be able to meet the fire standards requirement to pump a constant flow for 30 minutes. Fire engines have enough capacity to meet this flow for about 10 minutes and either need to be resupplied by a fire hydrant, tank, or water tender to be able to meet the flow requirements.

Creating effective defensible space not only provides the best chance of reducing fire ignitions around the structure during a wildfire event, it also serves as an advertisement to fire service personally that the building is defensible. When forced with a choice which house to position fire apparatus or personal, fire services will choose those locations with the best chance of survival for both property and personnel involved. Properties with good defensible space represent the safest place to position apparatus and firefighters.

The Calaveras County Community Wildfire Protection Plan has a very good description of defensible space and building materials, including scientific testing conducted on various situations, to help guide homeowners in details to consider in making their structure and property wildfire prepared. A portion of this plan have been included at the end of this document for Alpine County residents to reference.

Defensible Space Inspections

The Alpine Fire Safe Council began implementation of Defensible Space Inspections in 2004 and have been conducted with various private homeowners. Eastern Alpine Fire and Rescue and CALFIRE joined the effort in recent years and have conducted defensible space inspections under PRC 4291. Anyone interested in having a review done can contact the Alpine Fire Safe Council or Eastern Alpine Fire and Rescue to schedule a time for a review. As time allows, the Alpine Fire Safe Council, Eastern Alpine Fire Rescue and CALFIRE conduct reviews across an entire neighborhood.

Implementing the mitigation measures outlined in the reviews can require work beyond what the homeowner can physically do. Limited surveys of the communities indicate that many local landowners need to improve their defensible space. This includes removing brush and pine needles away from structures, removing single trees or limbs, and disposing of the material off-site. A number of contractors can provide this type of service for the individual homeowner. A list of current contractors is available in the report as Appendix 2.

Action Item: The Alpine Fire Safe Council should continue to pursue and support the homeowner defensible space inspection program and the education program on appropriate building materials for use in wildland areas. This program has successfully educated homeowners on the value of using the appropriate building materials for the environment and creating effective defensible space on their property. The program will continue to improve providing subsequent inspections and a continued presence in the community of the need for defensible space.

Turtle Rock Biomass Disposal

The community biomass pile at Turtle Rock Park is a successful solution for helping landowners improve defensible space by providing a method for biomass disposal. Alpine County provides funding to open the biomass pile to the public longer, resulting in a two-fold increase in material collected. The community biomass pile is a very

effective community biomass disposal solution and should be continued. It is very cost effective when compared to other fuel treatment alternatives.

Disposal of the material at the pile has been challenging over the years and is costly. Originally the pile was burned by the local fire departments, however this was difficult to time based on changing weather conditions and resource availability. It was not feasible to do in the spring. Recently the pile has been chipped and hauled away to other biomass disposal sites. A Burn Boss was purchased through grant funding, but is too labor intensive to be an effective means of disposal for the large amount of material collected. Ultimately chipping and hauling the material has been the final disposal method.

The Alpine Biomass Collaborative was formed in 2016 to explore other options for biomass disposal in Alpine County. They hold monthly meetings on various topics around biomass management in Alpine County, including watershed management, wildlife management, tourism impacts, and presentations on cogeneration facilities in neighboring counties.

Action Item: The Alpine Fire Safe Council should pursue biomass disposal options to perpetuate the Turtle Rock Park Biomass pile as a disposal site for residents creating effective defensible space on their property.

Adjacent Lots

The Alpine Fire Safe Council, Eastern Alpine Fire and Rescue, and Alpine County have formed a committee in an attempt to develop a County ordinance to address wildfire risk from adjacent and / or vacant lots. The committee continues to meet to explore language for a revised ordinance and to provide recommendations on funding and enforcement.

The need to address vacant lots is important. Large lot sizes and the number of lots with owners outside of the community make addressing the fuels on vacant lots a critical component of mitigating the wildfire hazard within the communities. More data may be required to help Alpine County quantify the risk vacant lots pose and dedicate the dollars necessary to address the hazard. Eastern Alpine Fire and Rescue will work with CALFIRE to begin assessing the hazards within the community.

Action Item: Alpine Fire Safe Council actively encourage the Alpine County Board of Supervisors to adopt and enforce an adjacent lot ordinance.

3.3 Evacuation

The recent fires in northern California have underscored the need for immediate and effective evacuation operations in a wildfire event. In Alpine County, the variety of agencies involved in a major wildfire event further complicate a coordinated evacuation effort. It is imperative wildfire evacuation planning be conducted and implemented to ensure the safety of the residents and tourists in the area in the event of wildfire.

The Alpine County Sheriff's Office is in the process of updating the evacuation mapping and run books available to emergency responders during a fire event. They are attempting

to simplify the document and provide a more organized set of maps for each community to provide those unfamiliar with our neighborhoods an easy to read reference.

Evacuation operations during a wildfire are the responsibility of the Alpine County Sheriff's Office and will be coordinated through the unified command of any fire operation. Deputies and Search and Rescue personnel, in addition to any available fire personnel, will use an evacuation notice form to provide instructions to residents about the event, the type of evacuation and document the notification. It has a carbon copy so notification personnel can keep a record of all notices distributed and leave a notice conspicuously posted on all residences they have visited, even if the residents are not at home.

To date there have been no incident drills or evacuation drills. An evacuation handout has been created by the Sheriff's Office and Fire Safe Council and is attached as Appendix 3. Community preparedness and evacuation meetings have not been held in recent years. Many residents may not be aware of updated evacuation procedures and new residents have not had any exposure to the community evacuation procedures. The Sheriff's Office has not had any feedback on the new evacuation measures and notices.

Action Item: The Alpine Fire Safe Council should facilitate a community wildfire preparedness and evacuation meeting to help the Sheriff's Office and residents communicate on evacuation procedures. Further, the Council should support the efforts of the Sheriff's Office to train SAR personnel in evacuation procedures.

3.4 Training, Certifications, and Qualifications

As part of the 1991 ad-hoc committee recommendations, the local fire department volunteers are certified for wildland firefighting under the National Wildfire Coordinating Group (NWCG) 310-1 requirements. The USFS, with jurisdiction for all local wildland fire response, is requiring this certification be kept current. All volunteer firefighters are required to complete annual refresher training in wildland fire fighting.

3.5 Emergency Communication

Evacuation orders would be communicated by Sheriff Deputies during a fire event. Currently, sirens are not installed within the communities, but two are available for use. The County Office of Emergency Services has a portable AM radio transmitter for community notification during a disaster. The County also has implemented a reverse 911 system to call residents in the event of an emergency with instructions on preparation or evacuation.

Radio communication between the responding emergency services agencies is crucial during a major fire event. Currently, there are challenges with the main Alpine Sheriff's Office / Fire repeaters during normal operations. Repeaters go offline sometimes and transmissions are often scratchy and unreadable. These issues are exacerbated during a large fire event impeding effective allocation of resources and putting emergency responders at greater risk. Alpine County has invested significantly the radio repeater system and it should function at a high level of continuity and clarity.

Action Item: The Alpine Fire Safe Council recommends the Alpine County Board of Supervisors establish a committee to review the current emergency services radio repeater system and make recommendations for it improvement.

3.6 Agency Fire Response Plan

CALFIRE has prepared pre-attack plans for the Markleeville Area. These plans have been developed in concert with Alpine County and the Eastern Alpine Fire / Rescue. They are available at the County Admin Building and the fire stations.

Agencies may also employ the CALFIRE WUI Placards during an incident to provide information on structure defensibility to responding engines. The placards provide quick easy to read information on accessibility, water supply, defensible space, and residents for each property. The goal is to help fire personnel quickly identify those structures they can save and which are too risky protect.

3.7 Community Education and Outreach

The Alpine Fire Safe Council has conducted very successful community outreach programs in the past. The current defensible spec inspections began as Courtesy Fire Safe Reviews. The Council has conducted community meetings on fuels reduction projects, fire service needs, and community evacuation preparedness. These efforts have been successful in educating the public on wildfire risks and solutions.

Action Item: The Alpine Fire Safe Council should continue the school poster program to educate youth on wildfire issues and conduct community education meetings at least twice a year. The Council should conduct at least 2 community outreach meetings each year on topics such as defensible space, ingress / egress, vacant lots, evacuation preparedness, and fire agency cooperation. These meetings will allow the Council to provide critical information to the community and gain feedback from the community on pressing wildfire issues.

3.8 Funding Opportunities

Implementation of community preparedness and fuels mitigation projects requires funding to complete. The Alpine Fire Safe Council has historically been very effective and finding funding solutions for various projects. Today, funding is harder to come by as many grant programs become increasingly competitive for fewer dollars. It is important for the Alpine Fire Safe Council to continue to seek funding alternative to implement their projects.

Below is a list of previously used and potential funding sources for Alpine County CWPP projects.

Title III funding- These funds are provided to Alpine County as part of the Secure Rural Schools Initiative from the Federal government through the USFS. These funds have historically been used by the Alpine Fire Safe Council to fund operations, chipping, education and outreach projects.

Sierra Nevada Conservancy grants – The Alpine Fire Safe Council successfully applied for and received these funds to complete fuels reduction projects around Markleevillage. These funds may be available again in the future and are geared toward not only fire fuels reduction but also watershed improvement.

California Fire Safe Council grants clearinghouse – The California Fire Safe Council has an annual program for receiving grant applications on a variety of CWPP related projects and then providing funding to those projects. The pool of dollars has shrunk and the number of applicants have increased limiting the success of obtaining these funds.

CALFIRE has a Forest Health grant program funded by the California Climate Investments program geared specifically for improving forest health. These funds are geared toward large landscape level projects that improve forest health and protect upper watersheds. Priorities are given to projects that include multiple stakeholders working together to achieve a variety of forest health benefits.

CALFIRE also provides a simpler Fire Prevention Grant Program which aims to reduce the risk of wildland fires to habitable structures and maximize carbon sequestration in wildland habitat. These grants are typically smaller than the larger forest health grants and might be more manageable for the Alpine Fire Safe Council. Existing fuels reduction efforts and projects proposed in this plan might be good candidates for these grants.

Action Item: Research and pursue funding opportunities for project implementation and fire prevention measures.

4. Planning Process

4.1 Stakeholders

Local stakeholders are the key to the success of the community fire plan. They include:

- Alpine Fire Safe Council
- Eastern Alpine Fire / Rescue
- Alpine County Disaster Council
- Alpine County Board of Supervisors
- Alpine Watershed Group
- Homeowners associations
- Woodfords Community
- Bear Valley/Kirkwood
- General public

With the large amount of public land in Alpine County, other stakeholders are important:

- USFS, Carson Ranger District
- BLM, Carson City Field Office
- CAL FIRE (CAL FIRE), Amador/El Dorado Unit and Tuolumne/Calaveras Unit
- California State Parks
- South Tahoe Public Utilities District (STPUD)
- California Fish & Wildlife
- Bureau of Indian Affairs (BIA)
- Lahontan Water Quality Control Board
- Liberty Utilities (east side of the County) and PG&E (west side of the County)

4.2 Current Process and Plan Development

The Alpine Fire Safe Council completed the background research information for initial plan development. Public meetings have been conducted to inform the public about the wildfire issues, including the community fire plan. More public meetings are scheduled to inform the public of the plan and solicit input on its further development.

4.3 Review of Existing Plans and Reports

Existing information from local, state, and federal resources are the foundation of this plan. Base Geographic Information System (GIS) data was provided by Alpine County Planning Department, USFS and CALFIRE. Fire Hazard GIS data was compiled from CALFIRE.

Alpine County provided a 1991 report from the ad-hoc fire committee, outlining recommendation for the fire agencies in improving fire suppression.

4.4 Local Jurisdictional Involvement, Approval, Adoption

Upon final review of the document by stakeholders and local jurisdictions, the document will be presented to all jurisdictions that were involved in the process for formal adoption.

Sections 5-9 of this report are organized by Planning Areas, as defined. Sections are intended to be standalone documents for communities to use in their neighborhood wildfire planning.

5A. Communities – Woodfords

5.1 General Environmental Conditions

The Woodfords neighborhoods are in the rain shadow of the Sierra. Relatively dry, much of the area surrounding neighborhoods is covered by brush. Where trees are present, there is usually a well-developed brush understory. Wildland fuels are present where no urban development exists.

There are seven neighborhoods in the Woodfords Planning Area. They are:

- Woodfords / Alpine Village
- Crystal Springs
- Mesa Vista
- River Ranch
- Woodfords Community
- Diamond Valley / Manzanita Lane
- Sorensen’s Resort / Douglas Way

5.1.1 Elevation

Figure 3 shows the terrain within the Woodfords Planning Area. The terrain at the southern end of the planning area is typically very steep as the crest of the Sierra Nevada’s run though Alpine County. The northern portion of the planning area encompasses the southern tip of the Carson Valley, which is comparatively flat.

5.1.2 Meteorology, Climate, Precipitation

The climate is relatively dry with most of the precipitation falling in the winter months as rain or snow. Afternoon thunderstorms in the summer present variable winds, lightning strikes and sometimes heavy precipitation in small areas. It is not uncommon for little to no rain to fall during lightning events.

5.1.3 Threatened and Endangered Habitat Type

There are a number of ecologically sensitive areas and wildlife habitat. After considering the threat to life and property, projects should be considered in how they address these areas. California Fish & Wildlife and the U.S. Fish and Wildlife Service have information on Threatened and Endangered Species in the Woodfords Planning Area. Bald eagles and mountain yellow-legged frogs are some of the threatened or endangered species that inhabit the forest and lakes within the Planning Area. The BLM and USFS have found no threatened or endangered species within their projects. Surveys or mitigation measures for threatened or endangered species should be implemented prior to project initiation.

5.2 Population and Demographics

The year-round population in the Woodfords Planning Area is fairly small, typically less than 1000 people. Tourism attracts a significantly higher number of visitors throughout the year. During the summer months, high numbers of visitors use the campgrounds and trails in the area. During the winter, vehicular traffic is extremely high with visitors passing through the area for winter recreation.

5.3 Infrastructure

As a rural, sparsely populated area, Woodfords has relatively little infrastructure at risk from wildfire. But the loss of only a few key facilities can have a big impact.

Woodfords power and phone services originate in Nevada and reach the Planning Area through a single, fire-prone corridor. Any interruption of the overhead utilities knocks out service to Markleeville as well as Fire Stations 91 and 92.

Key county facilities exist in the Woodfords area. The Alpine County Community Development Department and County Yard, threatened in the 1987 Acorn Fire, are surrounded by wildland fuels. The Fire Station 91 and the Alpine County Health and Human Services Buildings are also near the County Yard. A new Behavioral Health Service facility is scheduled to be constructed at this location in 2018. All of these facilities will be critical to an effective county response to a wildfire incident.

Diamond Valley School is also in the Woodfords Planning Area. The school is a critical facility for two reasons; it is likely the best possible staging area for resources responding to a wildland fire incident or as an evacuation center, but also an evacuation problem should school be in session during a wildfire event.

(These key facilities are shown on the individual neighborhood maps.)

Woodfords has no fresh water hydrants. A few hydrants exist along the STPUD effluent export line, but since the effluent is secondary treated, its use is limited for firefighting due to public health concerns

5.3.1 Business

The tourism industry dominates the economy of the Woodfords Planning Area. A store in Woodfords provides a year-round restaurant, camping supplies and sundry items to visitors. Sorensen's Resort provides lodging and dining at the lower end of Hope Valley. Lodging is available at a bed and breakfast or at the Woodfords Inn.

Ranching is also a significant business in the Woodfords Planning Area. Approximately 1,000 acres of land is used for growing hay or grazing at the northern end of the area. Many of these ranches have survived previous wildfires.

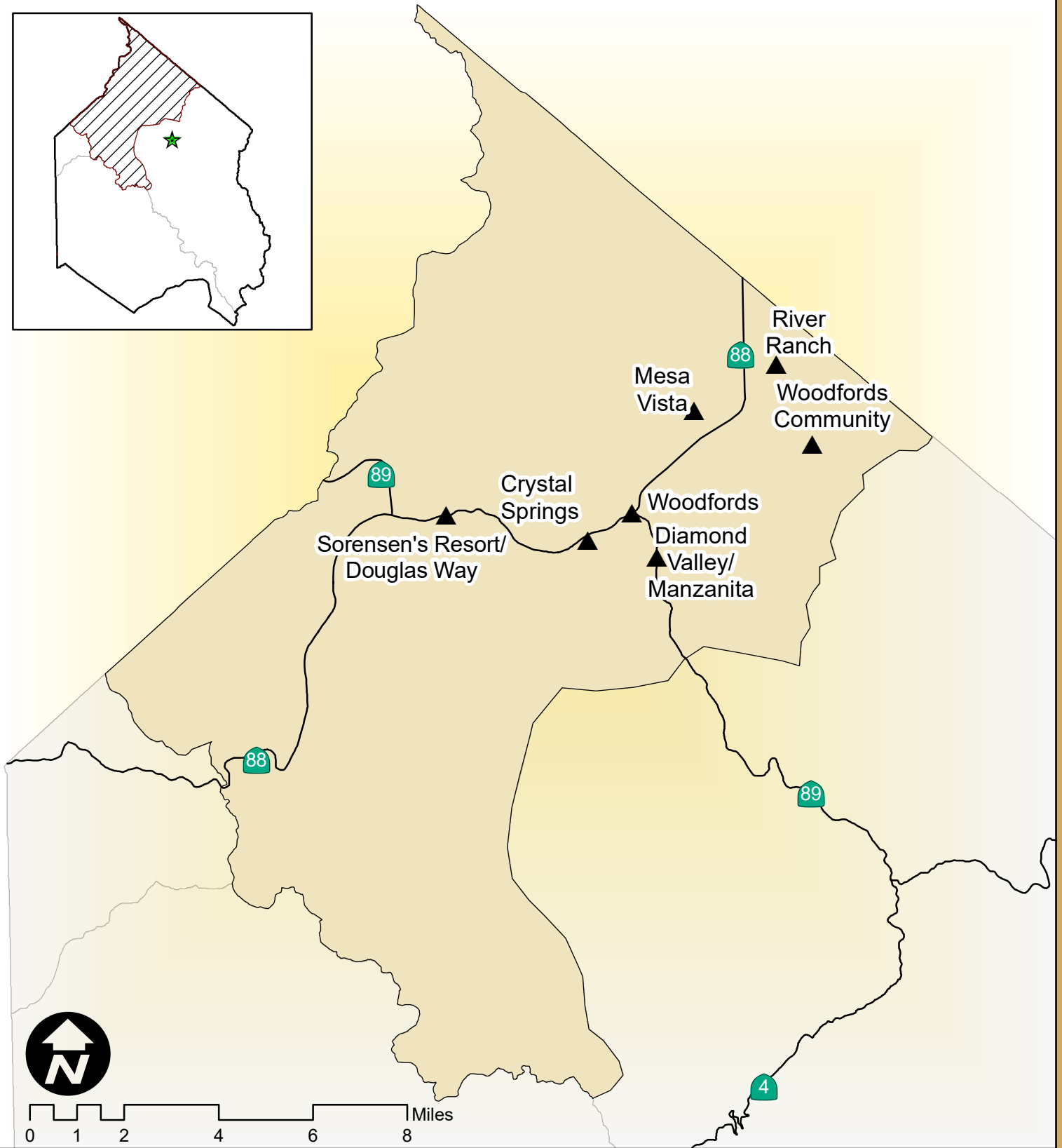
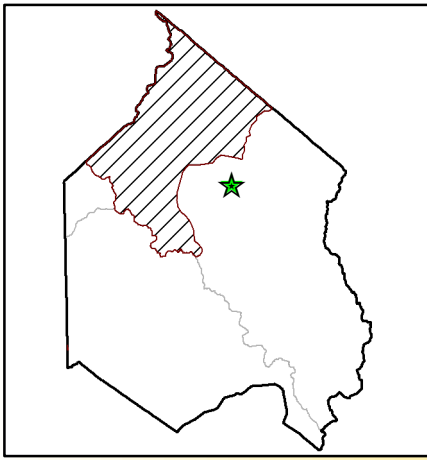


Figure 3: Woodfords Planning Area

- ▲ Communities
- ★ County Seat
- State Highways

- Map prepared December, 2018 by CG Celio & Sons, Inc.
 - Map projected to NAD_1983_StatePlane_California_II_FIPS_0402_Feet
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5.3.2 Recreation

Recreation creates many concerns for wildfire planning. Areas of dispersed camping, with campfires and barbecues are likely sources of ignitions for wildfires. A wildfire in heavily used recreation areas poses problems for evacuations. Wildfire that destroys key recreation resources would have a significant impact on the tourist industry in Alpine County.

Camping: The Woodfords Planning Area hosts a popular BLM campground at Indian Creek and numerous developed and undeveloped USFS and BLM campgrounds and campsites.

Fishing: The West and East Fork of the Carson River with its many tributaries provides highly-valued opportunities to fish for native and planted trout species.

Other popular recreational opportunities:

Hunting, bicycling, backpacking, hiking, horse pack trips, cross country skiing, snowmobiling.

5.3.3 Cultural Resources

Prehistoric and historic cultural resources exist within the project areas. The area was used by Native Americans, and sites have been found within the planning area.

5.4 Emergency Services

Fire suppression for wildland fire incidents are provided primarily by the federal agencies and Eastern Alpine Fire / Rescue. The USFS guard station at Turtle Rock Park staffs two engines in the summer to provide wildland fire response. BLM engines respond from the Carson City District. The USFS has command and control responsibility on private lands as part of a Cooperative Fire Agreement (see the above sections on jurisdictional information).

Response distances are commonly within 5 miles from either a federal or volunteer fire station.

5.5 Insurance Ratings

Most of Woodfords Planning Area is rated at an ISO 8. Some portions of River Ranch and along Foothill Road are at a ISO 9 due to distance from fire station. The lack of a paid full-time fire department, water source and distance from the volunteer fire department are significant impacts on the ISO rating. As outlined in the discussion in the previous section, insurance companies are expected to use FIRELINE reports to augment their ISO ratings. These reports, based on fuels, terrain, and access, will further hamper the ability to get affordable fire insurance in the area.

5.6 Land Use Development Trends

Development has significantly increased in recent years. In a county with only a few new buildings a year, a single subdivision can be a significant impact. There are a number of

large private parcels that could potentially be developed, expanding residential development further into extreme hazard areas. Current water storage solutions are based on SRA Fire Safe Regulations adopted as county code for pond or tank water storage near a home.

6A. Current Fire Environment – Woodfords

6.1 Wildland Fire History

Devastating wildfires have occurred in Alpine County communities in the past. The largest was the Acorn Fire in 1987 destroying 26 homes. This fire occurred in the Woodfords Planning Area.

Each year there are additional small fires in the planning area. These have been suppressed by fire agencies in short order resulting in burned areas of 10 acres or less. They do underscore the prevalence of ignitions, both natural and man caused.

6.2 Local Fire Ecology and Forest Health

Effective management of the wildland fire risks on the landscape today must include an understanding of forest health issues, fire ecology, and climate adaptation. Without understanding the processes in a forest ecosystem, we will continue to attempt to control it, rather than live within it. Deteriorating forest health increases the wildland fire hazards around our communities. Improving forest health results in forests less susceptible to catastrophic fire, reducing the fire risk to our communities.

The science of fire ecology is concerned with understanding how fires determine a forest's structure and species composition, and describing fire's role in changing that structure and composition. A fire regime is defined as the frequency and severity of fire occurrence in a given forest type.

Some plant communities depend upon stand-replacing, high intensity fires. Lodgepole pine and fir forests evolved with the occurrence of infrequent, high-intensity, "stand destroying" wildfires that eliminated the existing forest stand. Few trees within the fire perimeter survived, and the low frequency of fires in these plant communities allow long periods of time for the accumulation of fuels and the reestablishment of vertical continuity ("ladder fuels") and horizontal continuity (closed canopies) in the fuel strata. This was conducive to the simultaneous combustion of all fuels during a single fire event.

Other plant communities have evolved to burn frequently with low intensity; for example, mature Jeffrey pine forests. Under a historic fire regime, low-intensity surface fires reduced fuel loading from grasses and shrubs, suppressing regeneration of shade-tolerant white fir seedlings, and leaving the adult trees, protected by thick, fire-resistant bark, unaffected. Forests with frequent fire occurrence had an open, "park-like" appearance with an understory of grass or low shrubs. Though shaded by large, mature trees, spacing between trees was sufficient to allow sunlight to reach the forest floor and encouraged regeneration of shade-intolerant species like Jeffrey pine. Pockets of heavy fuels existed under these conditions, but their discontinuous nature reduced the likelihood that a fire would burn with enough intensity to affect mature trees. Frequent surface fires also remove accumulated dead-and-down woody fuels and the green "ladder fuels" that would otherwise carry flames into the coniferous overstory, potentially provoking a catastrophic, stand-destroying crown fire.

The forest that regenerates with an infrequent, high-intensity crown fire regime is generally very dense and of a single age structure. This density often results in the exclusion of sunlight to the forest floor and subsequent recruitment of shade-tolerant species such as white fir, which contributes to extremely high fuel loadings in the understory. This arrangement of fuels, or fuel structure, creates an ideal mixture of oxygen and fuel for high intensity fire.

Both forest types exist in Alpine County, historically and today. They are separated by elevation, at roughly the 7,000-foot contour. Above 7,000 feet, temperatures are low enough and moisture high enough to infrequently allow ignitions to grow into large fires. Below 7,000 feet, in warmer, drier areas, frequent ignitions resulted in consumption of the fuels. This constant consumption of fine fuels kept fuel loadings and fire intensity low.

With the clearing of forested lands by logging in the Comstock era and the development of fire suppression policies, natural fire regimes have been modified. Areas that formerly burned with high frequency but low intensity (fires more amenable to control and intervention) have large accumulations of unburned fuels, which once ignited, will burn at higher intensities. The regeneration of altered plant communities under suppressed fire regimes (for example, the abundance of white fir regeneration into the fire-suppressed forests that regenerated in Alpine County after the Comstock era) have also contributed greatly to the alteration of historic fire regimes.

The fire regime in the Woodfords Planning Area can be characterized by high frequency, low intensity fires. Bitterbrush, sagebrush, manzanita, and Jeffrey pine are plant species that favor frequent fires. Low intensity fire does not kill any of these plants, rather it removes dead material from mature plants and increases plant vigor. Jeffrey pine and incense cedar have thick bark to protect the tree from low intensity fire.



Typical fuels in the Manzanita Lane area.

Some lower elevations of the Woodfords Planning area contain forest stands with highly altered fire regimes. The loggers of the 1860's that worked in the region to satisfy the timber demands of the Comstock mines uniformly cut the native forests, originally characterized by uneven tree ages, wide spacing between trees in mature stands, and small openings created by other mortality. The forest that regenerated after this period of intensive logging activity developed into a much denser stand. The increasing effectiveness of fire suppression activities during the 20th century and the eventual elimination of mechanical harvesting in the Alpine County have further inhibited variability in this forest's age classes and crown structure.

The best local illustration of this phenomenon can be found near Manzanita Lane. The fire safe council completed a fuels reduction project in this area. The Manzanita Lane neighborhood escaped the 1987 Acorn Fire, therefore the brush has not burned for at least 50 years, likely longer. Manzanita and bitterbrush are tall and overly mature, with a significant amount of dead material within each plant. Mistletoe is prevalent in the trees, reaching epidemic levels at the upper end of the subdivision. Overall forest health is very poor and deteriorating. The lack of fire in this area has increased competition among the trees, reducing vigor and allowing disease to spread. The amount of dead material in the brush layer has increased fuel loadings to extremely high levels.

The northern edge of the treatment area lies within acreage burned by the Acorn Fire. The manzanita is moderately tall, five feet in some places. There is little to no dead component within the brush. A number of Jeffrey pine seedlings have established and show no signs of mistletoe. Forest health is good and fuel loadings re relatively low.

George Gruell's book *Fire in Sierra Nevada Forests, A photographic interpretation of the ecological change since 1849*, pairs historic photos with recent ones taken from the same vantage point, and effectively illustrates this phenomenon across various locations in the Sierra Nevada, including Alpine County.

Most commercial and residential development in Alpine County—those areas most needing protection from infrequent, catastrophic wildfires--is concentrated in areas well below the 7,000-foot elevation prescription for frequent, low-intensity, light-fuel clearing ground fires. **Our objective must be to model the natural fire regime as much as possible in our communities.** This requires diligence on our part to reduce the fuel loadings to manageable levels that protect our communities and the forest environment from the extraordinary effects of catastrophic fire.

6.2.1 Fire Frequency

The Mesa Vista and Woodfords / Alpine Village neighborhoods have had frequent fires in the last 20 years. Since 1980, at least three fires have burned in the area, some over the same ground multiple times. Fuels are flashy, making fires difficult to contain on initial attack, but loadings are not near the level of other communities. Homes and structures have been lost in these fires. Wildfire has also burned frequently in the Indian Creek drainage and around the Woodfords Community.

CAL FIRE developed fire rotation or frequency measures for the entire state. Data is stratified into 3 classes of frequency. These classes represent the amount of time necessary for fires to have burned an entire area, based on historic fires. For example, in an area classified as < 100 years, the entire area would have burned over at least once in < 100 years. This could be by a single fire, though is more commonly the culmination of many fires in that area.

6.3 Fire Weather

Lightning causes most wildland fire ignitions in the Woodfords Planning Area. Summer thunderstorms bring erratic winds and lightning to the area. Fire behavior is most extreme

after long periods of hot, dry weather with no precipitation. It is common to have a southwesterly wind coming over the Sierra's in the afternoons during the summer. Most catastrophic fires have occurred during these conditions along the Sierra Front.

6.4 Fuels Map

Fire fuels have been mapped by both CAL FIRE and the Sierra Front Wildfire Cooperators (Sierra Front). The CAL FIRE data covers the entire county but is less detailed. The Sierra Front data is more detailed but only covers the eastern slope of Alpine County.

Both data identify fuels based on the 13 standard fuel models developed by Rothermel. Though the absolute model numbers differ, they are consistent across the general fuel model categories; grass, brush, and timber. For example, the CAL FIRE classes may indicate fuel model 9, but Sierra Front data indicates fuel model 10. However, they are both of the timber fuel model category.

Assignment of fuel models and hazards were based on vegetation data collected from satellite imagery. For the data from the Sierra Front, the satellite data was from the early 1990's, so some the data is out of date, particularly where fires have occurred. This data is intended for use on a regional basis, it should be updated around communities as planning becomes more specific.

Figure 4 shows the fuel models in the Woodfords Planning Area from CAL FIRE. The table in Appendix 8 briefly describes the models and which ones apply to the Woodfords planning area.

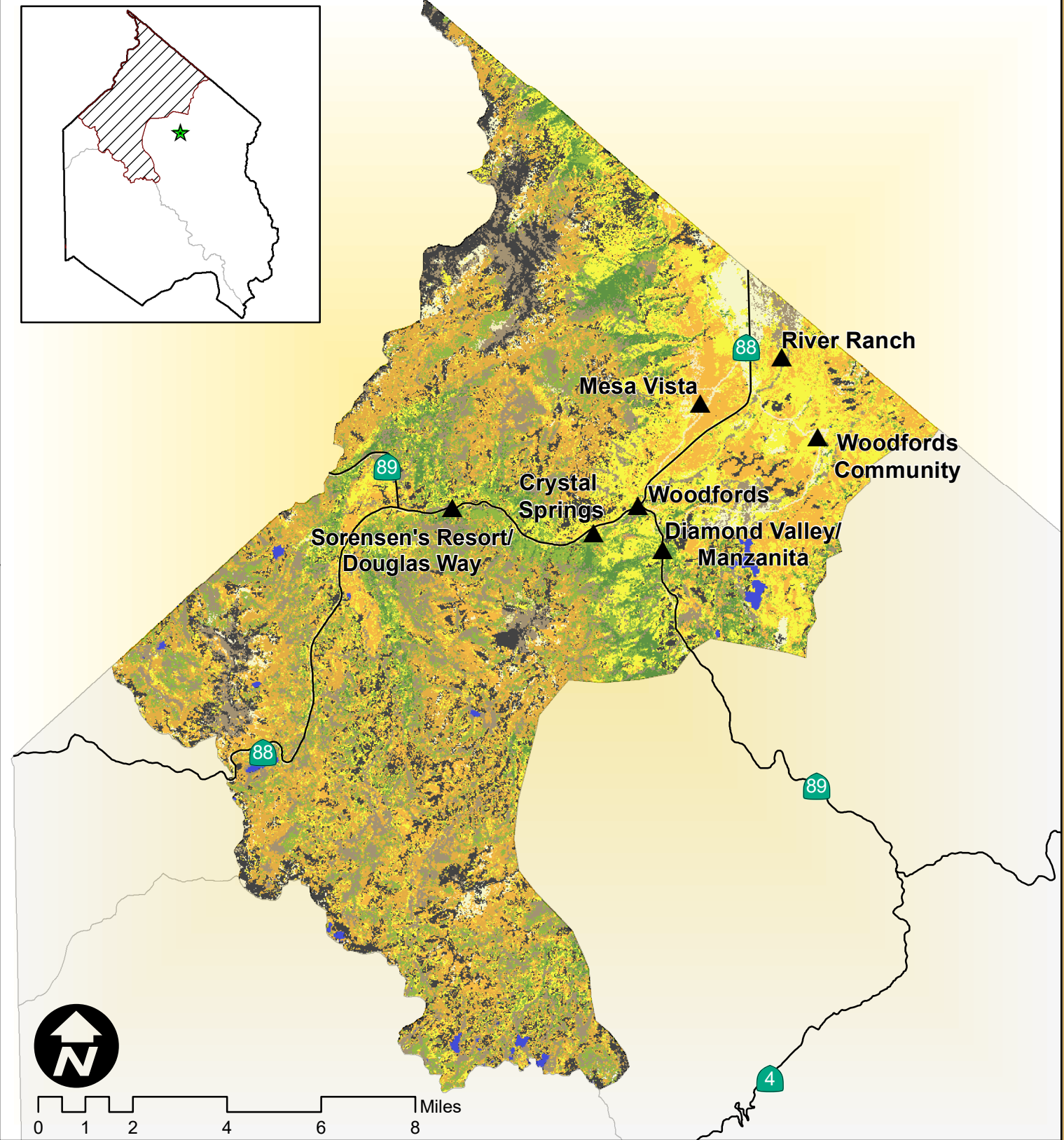




Figure 4: Woodfords Fuel Models

FBFM Category

| | | |
|--|---|--|
|  1 |  6 |  10 |
|  2 |  8 |  Water |
|  5 |  9 |  Barren |

- Map prepared December 2018 by CG Celio & Sons, Inc.
 - Map projected to 1983_StatePlane_California_II_FIPS_0402_Feet
 - Fire Behavior Fuels data compiled by USGS Landfire; 2014; available from <https://landfire.cr.usgs.gov/>
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6.4.1 Hazard Maps

Combining the wildfire fuels data with other information that would affect fire behavior, such as slope, fire agencies compile wildfire hazard maps. These maps show areas that, given the specific fuel and slope conditions, would have extreme to moderate fire behavior. These hazard maps can help prioritize wildfire mitigation projects. Hazards have been developed by CAL FIRE.

Figure 5 is a more detailed look at the hazards in neighborhoods in the Woodfords Planning Area. The data is from CAL FIRE and has been adopted by the Alpine Fire Safe Council.

6.4.2 Condition Class

Both the National Fire Plan and Healthy Forest Act dictate that the federal agencies use Condition Class as criteria for planning projects. As defined previously in the fire ecology section, the Condition Class represents a relative measure of how far an area is from its historical fire regime. As dictated by the National Fire Plan, areas of Condition Class 3 have a higher priority for treatment than those of lower condition class. CAL FIRE has calculated condition class across the state. Figure 6 shows condition class for Woodfords Planning Area.

6.4.3 Natural Fire Breaks

There are few natural fire breaks in the Woodfords Area. The Carson River near Crystal Springs was not effective as a fire break during the Acorn Fire. Except for the irrigated pastures and hay fields, wildland fuels cover the entire landscape. The large irrigated meadows can be effective natural fire breaks if the grass is wet and succulent during the summer months.

6.5 Fire History

Figure 7 describes the previous fires in the Woodfords Area. Wildfire is a frequent event in the Woodfords Planning Area. In 1984, a large fire burned from Indian Creek to the southern edge of Gardnerville. Though one of the largest acreage fires, it did not destroy any structures in Alpine County. In 1986, the Fredericksburg Fire burned a portion of the Mesa Vista area. It did not destroy any homes but did cause losses to the agricultural producers along Foothill Road and destroyed the Fredericksburg school. In 1987, the Acorn Fire swept through Woodfords and the Mesa Vista area, destroying 26 homes. Large, uncontrollable wildfires not only occur within the Woodfords Planning Area, but occur frequently. This fact is especially important for residents living in areas where fire has not yet burned, and fuel loadings are extremely high.

In addition to large wildfire, numerous smaller fires and ignitions occur in the area. A number of fires between 1 and 40 acres have occurred in the area in the last 25 years. Ignitions are frequently caused by lightning and humans. Vehicles have accounted for multiple ignitions in recent years. Escaped pile burns on private land have also spread into wildfires.

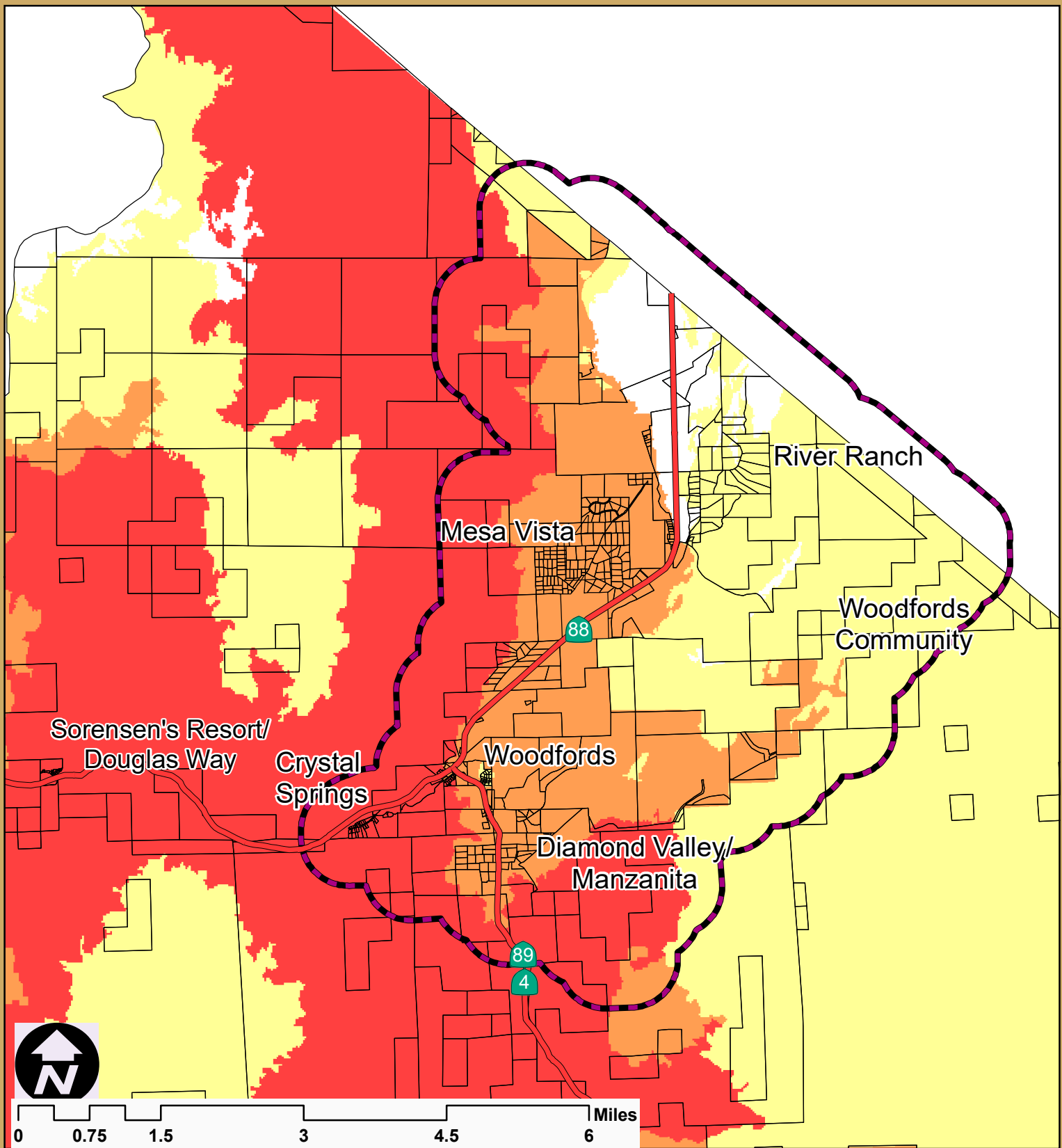


Figure 5: Woodfords Fire Hazard Map

Fire Hazard Class

- Very High
- High
- Moderate
- WUI
- Parcels

- Map prepared December 2018 by CG Celio & Sons, Inc.
 - Map projected to
 NAD_1983_StatePlane_California_II_FIPS_0402_Feet
 Hazard data provided by CalFire FRAP

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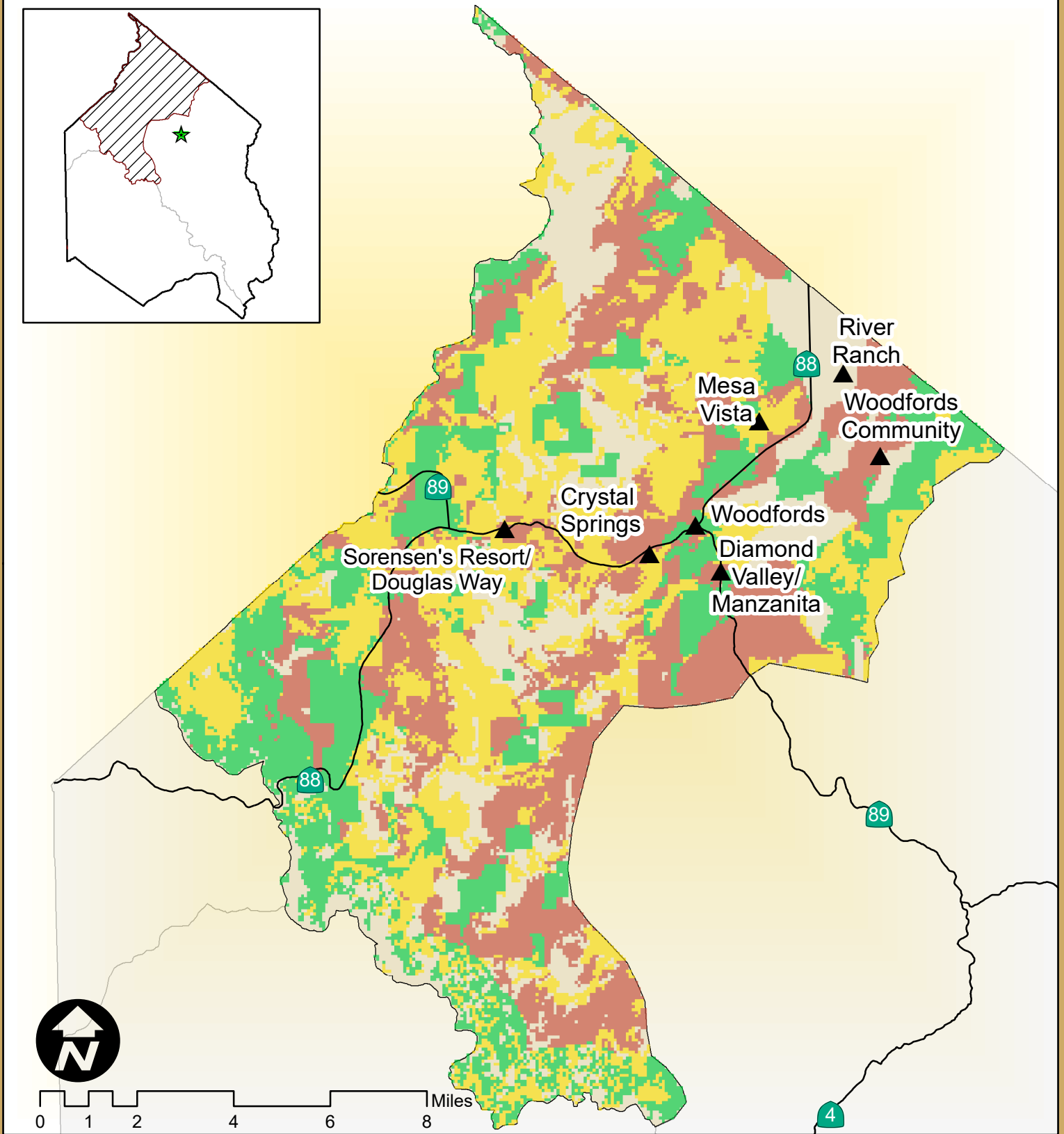
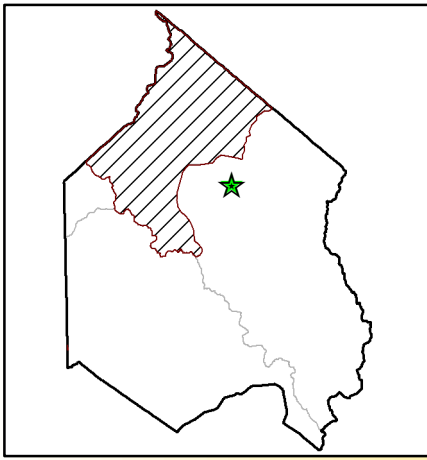


Figure 6: Woodfords Condition Class

▲ Communities

Condition Class

- Class 1 (historic fire regime)
- Class 2 (slightly altered regime)
- Class 3 (significantly altered regime)
- Not classified

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 - Condition data obtained from CalFire FRAP data
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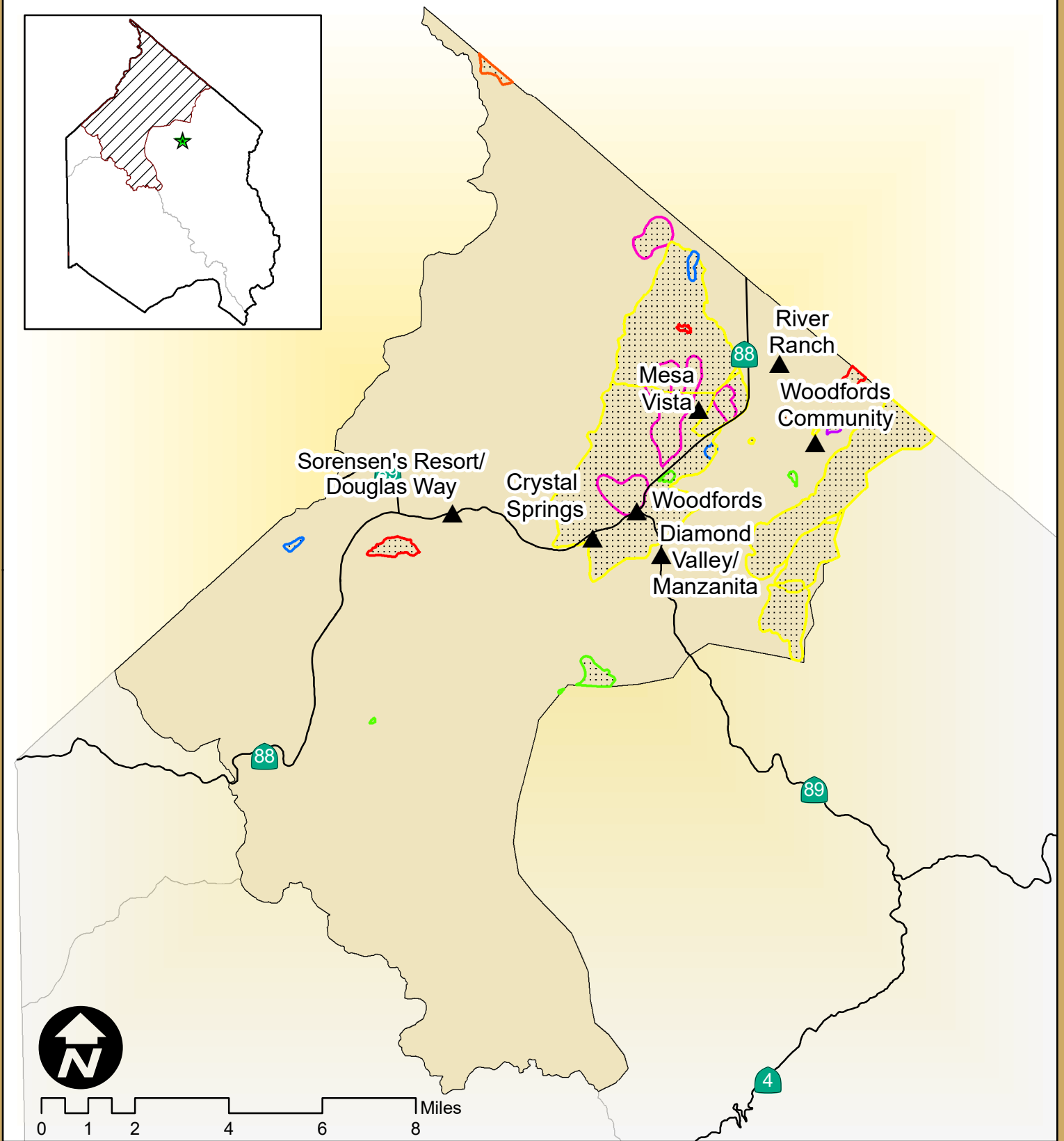


Figure 7: Woodfords Fire History

Fire Perimeter (Decade)

- ▲ Communities
- 2000
- 1990
- 1980
- 1970
- 1960
- 1950
- 1940

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6.6 Expected Fire Behavior

Fire behavior is expected to be extreme and uncontrollable during the worst-case conditions. Slopes are steep, wind commonly increases in the afternoon, and fuel loadings are high. While a wide range of fire behavior can be expected in the various fuel types and weather conditions, extreme fire behavior is likely during severe fire weather conditions.

6.7 Range of Fire Conditions

A wide range of fire conditions can be found in the Woodfords Planning Area. Conditions range from heavy fuels on steep slopes to flat grass meadows and low sage on rocky ridges.

6.8 Wildland Urban Interface (WUI)

The Wildland Urban Interface is typically considered to be within ½ mile of a community, but can be adjusted based on fuels, topography and other fire behavior factors. The proposed WUI around the neighborhoods in in Woodfords planning area is based on the distance from the communities but has been adjusted to create a contiguous area including all of the communities and accounts for the private land in between the structures and the public lands. Figure 8 demonstrates the WUI around in the Woodfords Planning Area

6.9 Completed Projects

A number of fuels treatment projects have been completed within the Woodfords Planning Area. These include projects on private lands, Alpine County Road Department Right of Way treatments and USFS projects. STPUD has also completed a number of fuels treatments on land in Upper Diamond Valley. These projects are outlined on Figure 8.

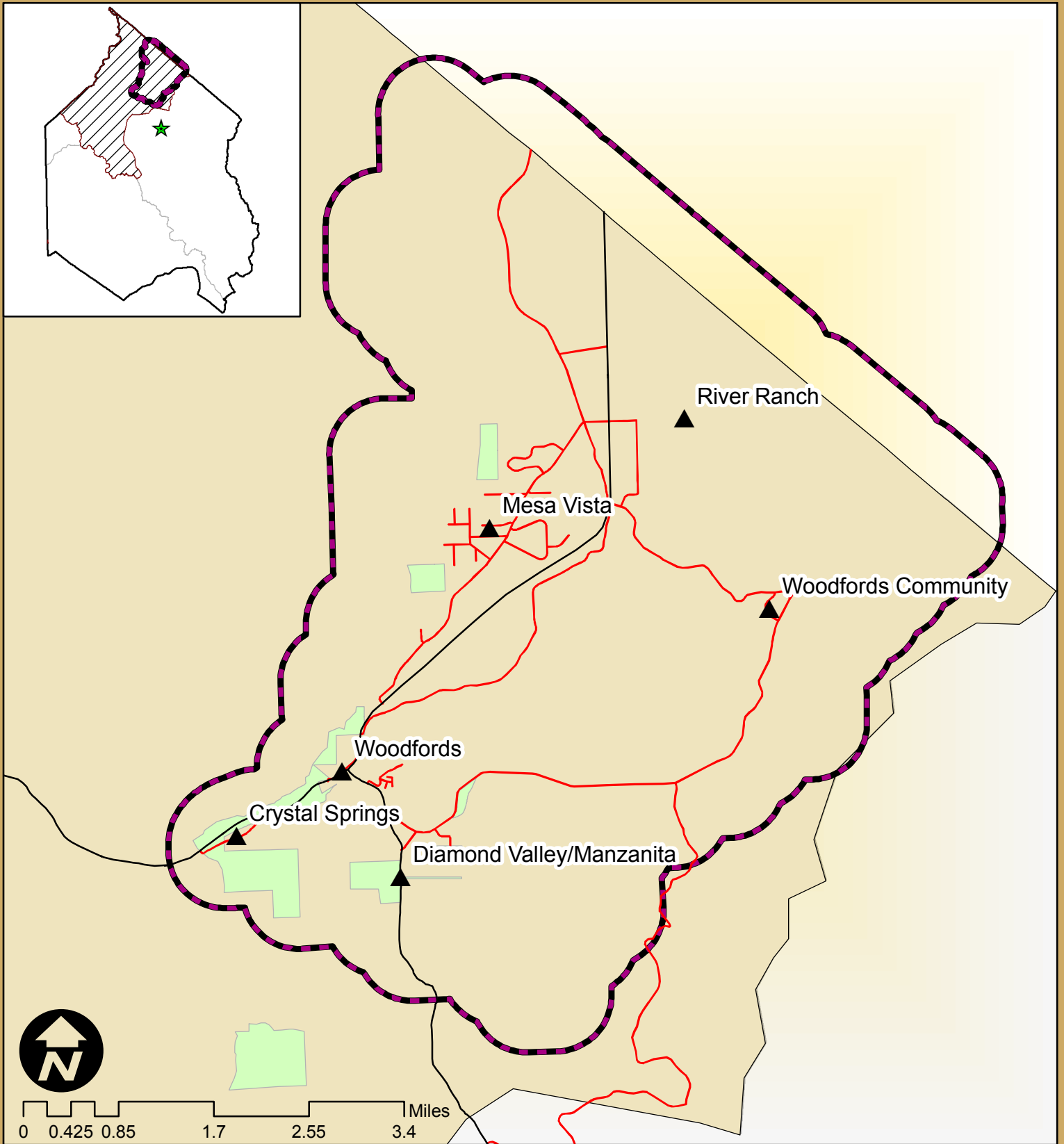


Figure 8: Woodfords Planning Area Completed Projects in the WUI

- Completed Projects
- WUI
- Treated County Roads
- Communities
- State Highways

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7A. Risk Evaluation – Woodfords

7.1 Risk Evaluation

Many of the neighborhoods within the Woodfords Planning Area are at high risk or extreme high risk for catastrophic wildfire. Fuels around the neighborhoods are dense brush and forest types. Slopes are moderate to steep and the wind blows downslope from the southwest during hot summer and early fall afternoons.

Natural and human ignitions are likely. The ignition risk is highest from the tourist and recreational user groups who are unfamiliar with the area and commonly use outside barbeques and campfires. The increased amount of tourist traffic on the road also increases the risk of ignition from vehicles.

Fire protection is provided by Eastern Alpine Fire / Rescue (all volunteer) from two stations within the planning area, station 91 in Woodfords and station 95 at the Woodfords Community. Station 91 has a structure engine, a wildland engine, a heavy rescue, and a water tender. Station 95 has a structure engine, a water tender, and a patrol engine. A few sewer effluent hydrants exist around the Alpine Village area, however their use in a wildfire event is limited. Tanks and ponds at local homes, if available and serviceable, are the best water source. The West Fork of the Carson River runs through the area but is difficult to access for drafting except in a few locations.

Alpine County completed its Field Operations Guide with evacuation maps for neighborhoods in Woodfords. Except for long driveways and neighborhood roads, egress from the communities is good. Once on a state highway or county road, the risk of entrapment is low. Many roads are looped and there are no designated safety zones since the risk of entrapment is low.

Neighborhoods are most at risk from a wind-driven fire through the forest and brush fuel types. Wind-driven flame fronts in these fuels will be difficult to stop, as has been proven by previous fires passing through the area. In all of the previous fires, the devastation occurred in a single afternoon.

7.2 Risk Evaluation Summary

| <u>Asset</u> | <u>Rating</u> |
|--|---------------|
| Structures | |
| 1. Woodfords / Alpine Village | High |
| 2. Crystal Springs | Very High |
| 3. Mesa Vista | High |
| 4. River Ranch | Moderate |
| 5. Woodfords Community | Moderate |
| 6. Upper Diamond Valley / Manzanita Lane | Very High |
| 7. Sorensen's / Douglas Way | High |

| | |
|--|-----------|
| | |
| Business | |
| 1. Woodfords / Alpine Village | High |
| 2. Sorensen's / Hope Valley Store | High |
| | |
| Infrastructure | |
| 1. Woodfords / Alpine Village | High |
| 2. Upper Diamond Valley / Manzanita Lane | Very High |
| 3. Woodfords Community | Moderate |
| 4. Power Lines | Moderate |
| 5. Evacuation Routes | Moderate |
| | |
| Recreation | |
| 1. Indian Creek BLM Campground | Very High |
| 2. Crystal Springs Campground | Very High |
| 3. USFS and BLM Campgrounds | Very High |
| | |
| Fishing | |
| 1. West Fork Carson River | High |
| | |
| Wildlife Habitat | High |
| | |
| Endangered Species | Medium |
| Watersheds | Medium |
| | |
| Historical Resources | Medium |
| | |
| Cultural Resources | High |

7.3 Fire Hazard Assessment by Location

1. Woodfords / Alpine Village

Rating: High

Fuels: Woodfords is surrounded by fuel models 2 (grasses), 5 (brush) and 10 (timber) with fuel loadings of moderate to high density. Jeffrey pine, bitterbrush, and manzanita are the primary vegetation types. The Acorn Fire reduced fuel loadings in this neighborhood, however in the decades since the fire, the vegetation has grown back to moderately dense levels. In many areas, fuels are continuous and would easily carry another wildfire.



The wildland interface surrounding Alpine Village

Weather: The Acorn Fire demonstrated the dangerous fire weather conditions that occur in this neighborhood. Extreme summer temperatures dry fuels for many weeks. In the afternoon, high winds blow down the Woodfords Canyon. These winds pushed the Acorn Fire downslope and through the community. Lightning ignitions occur within the community.

Topography: Slopes are moderate to very steep in the neighborhood, which sits at the mouth of the Woodfords Canyon. Aspects vary with a few small hills and ridges throughout the community.

Human Sources of Ignition: A number of sources of human ignitions exist in the town of Woodfords. The majority of residences use wood heating, leading to chimney fires and burning embers. Structure fires can easily spread to the wildland if they occur during wildland season. Power is supplied through overhead lines adjacent to roads. Lines have been knocked down during storm events and traffic accidents. Fires in the Woodfords neighborhood have been started by downed powerlines and vehicle accidents.



Alpine Village brush lands

The large influx of tourists during the summer, particularly on weekends, increases the number of potential ignition sources, from recreation fire use and from vehicle accidents.

Community Preparedness:

Having survived one large fire, the neighborhood is moderately prepared for another. Building construction is improving, some residents are replacing shake roofs and using fire resistant decking. However, a significant number of

structures still use flammable siding and roofing material. Many structures have adequate defensible space, either from the hard work of the homeowners or from the Acorn Fire. Most of the homes are on well-paved, wide access roads or right on State Highway 88, making ingress and egress possible during a fire event. Fuels along these access ways are typically light. Entrapment was not an issue during the Acorn Fire event.

Fire Protection Resources: Eastern Alpine Fire / Rescue Station 91 is located within ¼ mile from the neighborhood and can respond engines in less than ten minutes if volunteers are available. Alpine Village has a small municipal water tank, but there are no other fresh water sources within the neighborhood. No predefined draft sites are located within the neighborhood. The STPUD sewer effluent hydrants are in this neighborhood, but their use is limited.

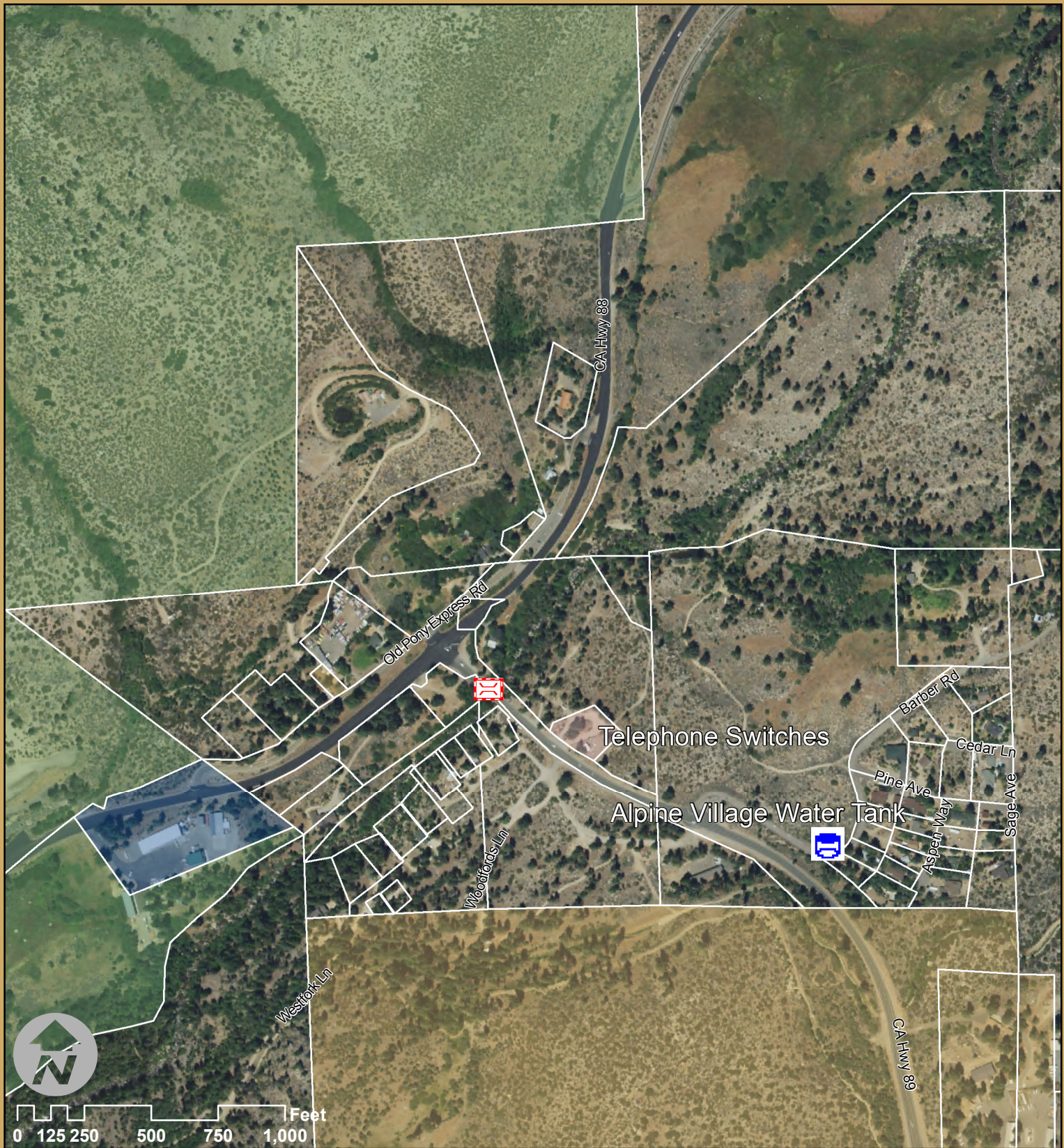











Figure 9: Woodfords / Alpine Village Neighborhood

Land Ownership (Non-Private)

- | | | |
|--|--|--|
|  Alpine County |  State Property |  Bridge |
|  BIA |  USFS |  Cemetery |
|  BLM |  Utility |  Water Tank |

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2. Crystal Springs

Rating: Very High

Fuels: Crystal Springs is surrounded by fuel models 5 (brush) and 10 (timber), with moderate fuel densities. Around the homes and campground, the fuel type is forested, with some brush understory. Buildings and landscaping break up wildland fuels, but tree density is high and ladder fuels are prevalent. Jeffrey pine is the dominant tree species with white fir in the understory. Manzanita, bitterbrush, and sagebrush compose the understory.

Weather: The Acorn Fire demonstrated the dangerous fire weather conditions that occur in this neighborhood. Extreme summer temperatures dry fuels for many weeks. In the afternoon, high winds blow down the Woodfords Canyon. These winds pushed the Acorn Fire down-canyon and through the community. Lightning ignitions occur around the community.

Topography: Slopes are moderate to very steep in the neighborhood, which sits at the mouth of the Woodfords Canyon. It is a primarily north-facing aspect at the bottom of the canyon.

Human Sources of Ignition: A number of sources of human ignitions exist in the neighborhood of Crystal Springs. The majority of residences are summer cabins and use wood heating, leading to chimney fires and burning embers. Structure fires can easily spread to the wildland if they occur during wildfire season. Much of the population is in the community during wildfire season. Power is supplied through overhead lines adjacent to roads. Lines have been knocked down during storm events and traffic accidents. The USFS Crystal Springs campground is on the up-canyon side of the neighborhood and has open campfires. The large influx of tourists during the summer, particularly on weekends, increases the number of potential ignition sources, from recreation fire use and from vehicle accidents.



Crystal Springs subdivision lies in Woodfords Canyon

Community Preparedness: Having survived one large fire, the neighborhood is moderately prepared for another. Building materials are still flammable, with combustible siding and roofing material present throughout the community. Many structures have adequate defensible space, either from the hard work of the homeowners or from the Acorn Fire. Structure density and landscaping preclude most wildland fuels in the understory, but pine needles on the ground and tree density are constant hazards. Almost all of the homes are on Crystal Springs Road, which connects to State Highway 88 both above and below the community, providing two access points out of the neighborhood. Entrapment was not an issue during the Acorn Fire event, but some homes were lost.

Fire Protection Resources: Eastern Alpine Fire / Rescue Station 91 is located within three miles of the neighborhood and can respond engines in less than 15 minutes if volunteers are available. No predefined draft sites are located within the neighborhood; however the West Fork of the Carson River forms the west edge of the community. No hydrants exist within the neighborhood.

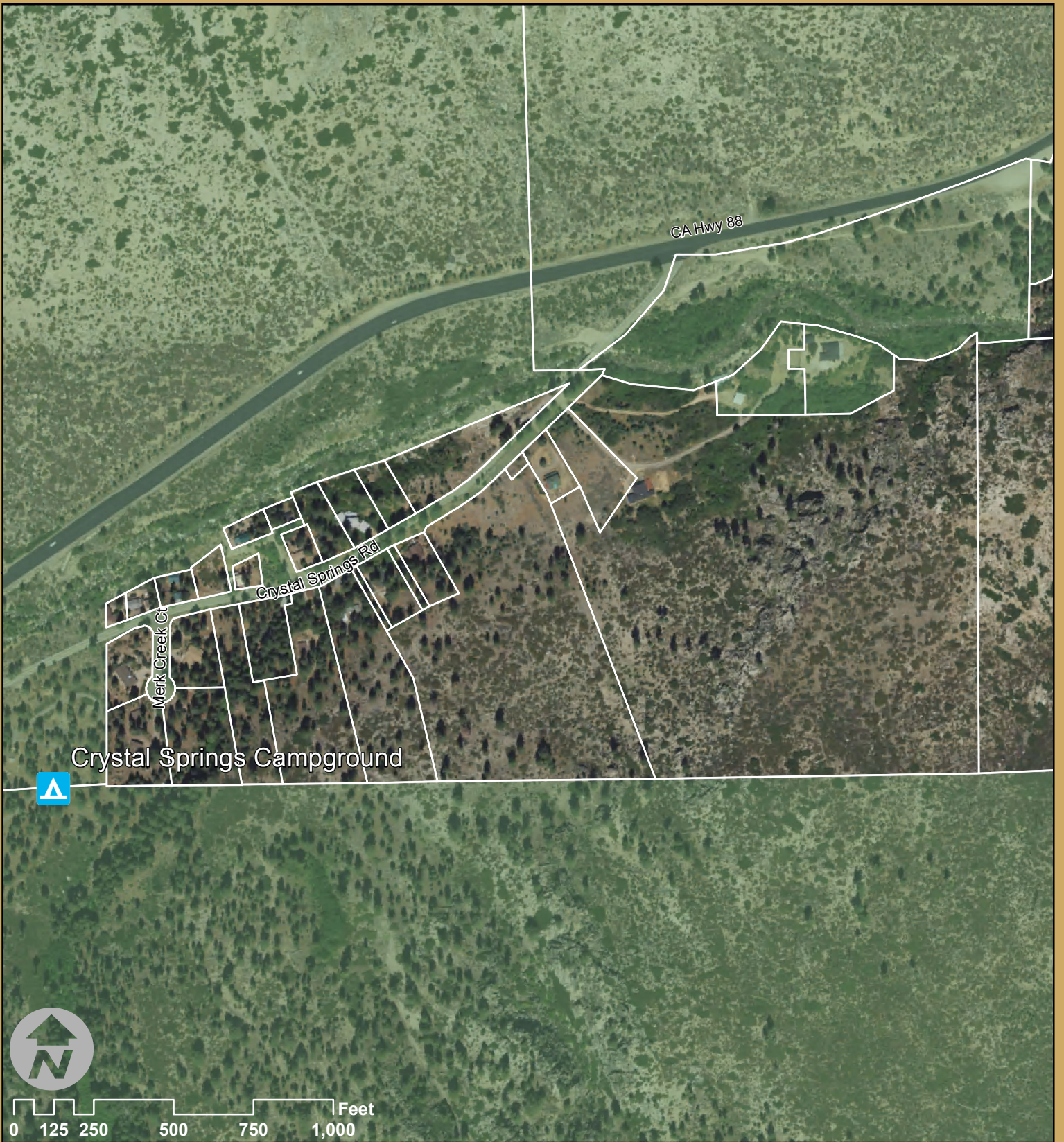


Figure 10: Crystal Springs Neighborhood

Land Ownership (Non-Private)

- Alpine County
- BIA
- BLM
- State Property
- USFS
- Utility
- Campground

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3. Mesa Vista**Rating: High**

Fuels: Mesa Vista is composed entirely of fuel model 5 (brush). The fuel bed is continuous across the neighborhood and fairly dense. The entire area burned during the Acorn and Fredericksburg Fires, and smaller portions have burned since. The sagebrush and bitterbrush has grown to a height of 3-6 feet.

Weather: The southwest wind blows across the mesa regularly in afternoons during the summer. Wind has driven all of the past fires across Mesa Vista, creating extreme fire behavior.

Topography: Slopes in the Mesa Vista neighborhood are moderate, with a



Emigrant Trail, a primary access road in the Mesa Vista area

predominately southeast-facing aspect.

Human Sources of Ignition: A number of sources of human ignitions exist in the neighborhood of Mesa Vista. Some residences use wood heating, leading to chimney fires and burning embers.

Structure fires can easily spread to the wildland if they occur during wildland season, which has happened before in Mesa Vista. Some power is supplied through overhead lines adjacent to roads. Lines have been knocked down during storm events and traffic accidents. The increased number of vehicles on State Highway 88 increases the likelihood of an ignition from a vehicle. Previous fires in the Mesa Vista have been started by vehicles and burning structures. Pile burns on private lots have also spread to the wildland.

Community Preparedness:

Having survived multiple fires, the neighborhood is moderately prepared for another. Building construction is improving, some residents are replacing shake roofs and using fire resistant decking. However, a significant number of structures still use flammable siding and roofing material. Many structures have adequate defensible space, either from the hard work of the homeowners or from the previous fires. Most of the homes are on well-paved, wide access roads or right on Emigrant Trail, making ingress and egress possible during a fire event. Most



A panorama of Mesa Vista.

roads have two points of ingress and egress, with other dirt roads on undeveloped parcels. Fuels along the paved access ways are typically moderate. Entrapment was not an issue during the Acorn Fire event.

Continued development without adequate fire safe techniques is the greatest risk to values in Mesa Vista. The fastest growing residential development in Alpine County is in this neighborhood, and many new residents are unfamiliar with the previous fire history. The neighborhood is an intermixed community, with lot sizes large enough for wildland fuels to be present throughout the neighborhood. Defensible space is more important than community fuel breaks in this situation.

Fire Protection Resources: Eastern Alpine Fire / Rescue Station 91 is located within four miles from most of the neighborhood and can respond engines in less than 15 minutes if volunteers are available. Eastern Alpine Fire / Rescue Station 95 is also within four miles of the neighborhood and can respond. Through the Mutual Threat Agreement with East Fork Fire Protection District in Douglas County, they will also respond to any fire event within 3 miles of the Nevada state line. Homeowner tanks and ponds are the only fire department sources of water in the neighborhood and these sources are not regularly inspected by the county to ensure serviceability. There is no hydrant system in the neighborhood. The nearest draft source, other than in the community, is the Carson River, at least a 15-minute turnaround time from the neighborhood.



Figure 11: Mesa Vista Neighborhood

Land Ownership (Non-Private)

- Alpine County
- State Property
- BIA
- USFS
- BLM
- Utility



School

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4. River Ranch

Rating: Moderate

Fuels: River Ranch is composed of fuel model 2 (grasses) with patches of fuel model 5 (brush). The fuel bed is continuous across the neighborhood and fairly dense. This area has not burned in recent history. The sagebrush and bitterbrush have grown to a height of 5-8 feet.

Weather: The southwest wind blows across the River Ranch neighborhood regularly in afternoons during the summer.

Topography: The area is predominantly flat, located in the southern end of the Carson Valley.

Human Sources of Ignition: A number of sources of human ignitions exist in the neighborhood of River Ranch. Structure fires can easily spread to the wildland if they occur during wildfire season. Some power is supplied through overhead lines adjacent to roads, but most utilities are underground. The increased number of vehicles on State Highway 88 increases the likelihood of an ignition from a vehicle. Numerous accidents have occurred at the southwest end of the neighborhood near Paynesville. Pile burns on private lots have also started fires in River Ranch in the past.



The River Ranch subdivision lies within the Carson Valley

Community Preparedness: Building construction is new using many flame-resistant building materials. The bare ground surrounding these newly constructed homes provides excellent defensible space, but homeowners need to maintain it. Most of the homes are on well-paved, wide access roads, making ingress and egress possible during a fire event. Chambers Lane exits each side of the community for good egress. River Ranch Road is a gated access with one way in and out, however it is wide enough to provide adequate access during a fire event. Fuels along the paved access ways are typically moderate.

Continued development without adequate fire safe techniques is the greatest risk to values in River Ranch. The neighborhood is an intermixed community, with lot sizes large enough for wildland fuels to be present throughout the neighborhood. Defensible space is more important than community fuel breaks in this situation.

Fire Protection Resources: Eastern Alpine Fire / Rescue Station 95 is located within 2 miles from most of the neighborhood and can respond engines in less than 15 minutes if volunteers are available. Through the Mutual Threat Agreement with East Fork Fire Protection District in Douglas County, they will also respond to any fire event

within 3 miles of the Nevada state line. Homeowners tanks and ponds provide the fire department sources of water in the neighborhood and these sources are not regularly inspected by the county to ensure serviceability. There is no hydrant system in the neighborhood. The nearest draft source, other than in the neighborhood, is the Carson River, which comprises the eastern boundary of the community.

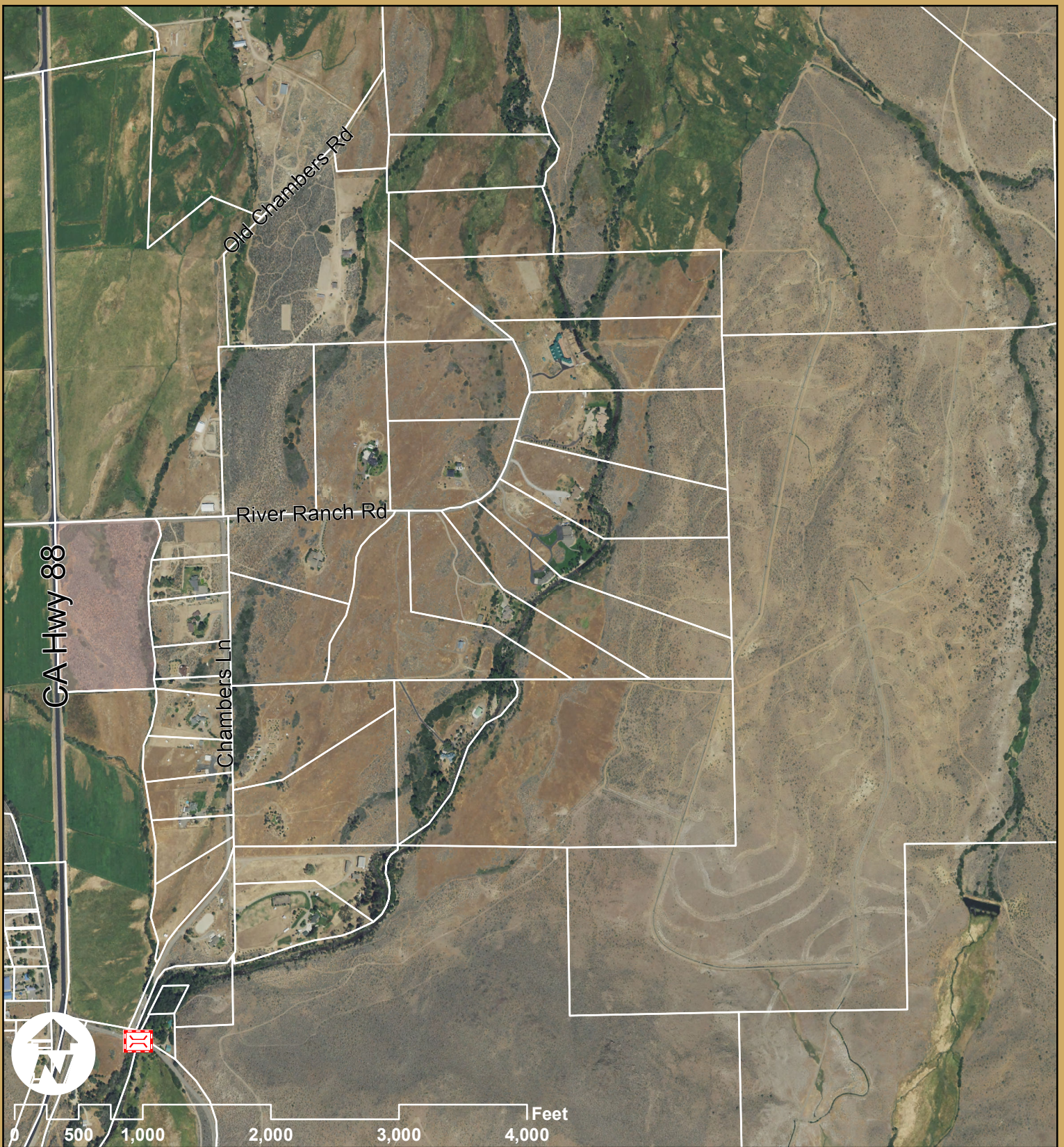









Figure 12: River Ranch Neighborhood

Land Ownership (Non-Private)

- | | | | | | |
|--|---------------|---|----------------|---|--------|
|  | Alpine County |  | State Property |  | bridge |
|  | BIA |  | USFS | | |
|  | BLM |  | Utility | | |

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5. Woodfords Community (WIC)**Rating: Moderate**

Fuels: WIC is surrounded by fuel model 2 (grasses) and fuel model 5 (brush). Numerous small fires have burned around the neighborhood in recent years, creating a variety of grass and brush fuel types. Where it exists, the sage and bitterbrush have grown to a height of 2-4 feet.

Weather: The southwest wind blows across the WIC neighborhood regularly in afternoons during the summer.

Topography: The area is predominantly flat, above the floor of Dutch Valley.

Human Sources of Ignition: A number of sources of human ignitions exist around the neighborhood of WIC. Structure fires can easily spread to the wildland if they occur during wildfire season. Power is supplied through overhead lines with propane tanks throughout the community. Burning trash piles on lots also have the potential of starting fires and have started fires around WIC in the past.

Community Preparedness: The community is a typical interface community, with wildland fuels to the neighborhood boundary, but no wildland fuels within the neighborhood. Building materials are adequate, but in poor condition and may have lost their flame resistance. Roadways are wide and paved with good access out of the community. Housing density is high, so structures are in very close proximity and stacks of firewood between homes increase the potential of fire spreading to neighboring structures.

Fire Protection Resources: Eastern Alpine Fire / Rescue Station 95 is located in the neighborhood and can respond engines in less than 5 minutes if volunteers are available. Through the Mutual Threat Agreement with East Fork Fire Protection District in Douglas County, they will also respond to any fire event within 3 miles of the Nevada












Woodfords Community

state line. A hydrant system serves the neighborhood with tanks large enough to store an appropriate amount of water for fire suppression. The nearest draft source, other than in the community, is the Carson River which is approximately 20 minutes round trip.



Figure 13: Woodfords Community Neighborhood

Land Ownership (Non-Private)

- | | | |
|--|--|---|
|  Alpine County |  State Property |  fstation |
|  BIA |  USFS |  hydrant |
|  BLM |  Utility |  watertank |

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6. Upper Diamond Valley / Manzanita Lane**Rating: Very High**

Fuels: The neighborhood Upper Diamond Valley / Manzanita Lane is surrounded by fuel models 2 (grasses), 5 (brush), and 10 (timber) with fuel loadings of moderate to high density. Jeffrey pine, bitterbrush, and manzanita are the primary vegetation types. The Acorn Fire reduced fuel loadings next to the neighborhood, however in the decades



Continuous fuels in the Manzanita Lane area

since the fire, the vegetation has grown back to moderately dense levels. In the unburned areas, vegetation is overly mature, with significant disease in the Jeffrey pines.

Weather: The Acorn Fire demonstrated the dangerous fire weather conditions that occur near this neighborhood. Extreme summer temperatures dry the fuels for many weeks. In the afternoon, high winds blow down through Woodfords Canyon. These winds can push

around the ridge between this community and Woodfords, creating unpredictable swirling winds in the neighborhood. Winds also come from the southwest, along the foot of Hawkins Peak, through the neighborhood. Lightning ignitions occur within the community.

Topography: Slopes are moderate to very steep in the neighborhood. Two ridges separate this neighborhood from the Woodfords neighborhood. These ridges provided natural fire breaks during the Acorn Fire. Aspect is predominantly west with a few small hills and ridges throughout the community.

Human Sources of Ignition: A number of sources of human ignitions exist in the neighborhood of Upper Diamond Valley / Manzanita Lane. The majority of residences use wood heating, leading to chimney fires and burning embers. Structure fires can easily spread to the wildland if they occur during wildfire season. Power is supplied through overhead lines adjacent to roads. Lines have been knocked down during storm events and traffic accidents. The large influx of tourists during the summer, particularly on weekends, increases the number of potential ignition sources, from recreation fire use and from vehicle accidents. Pile burning is also a potential source of ignition.



Summer time lightning fire above Manzanita Lane

Community Preparedness: The Acorn Fire did not burn into this neighborhood, so fuel loadings are still extremely high. Use of appropriate building materials is limited, with most residents having flammable siding and unenclosed deck structures. In general, defensible space is poor with trees and brush in very close proximity to the homes. Except for Manzanita Lane and Hawkins Ranch, most homes are on the county roads or State Highway 89, allowing for easy egress and ingress. Manzanita Lane has the most difficult access, with a narrow single lane road as the sole entrance and exit to the neighborhood and no turnaround. The fuels reduction work completed by the Alpine Fire Safe Council reduced this threat, but must be maintained to be effective. Entrapment is likely in this neighborhood. Similarly, Hawkins Ranch has a single road entrance and an inadequate turnaround.

Fire Protection Resources: Eastern Alpine Fire / Rescue Station 91 is located within the neighborhood and can respond engines in less than 10 minutes if volunteers are available. Homeowner's tanks and ponds provide the fire department sources of water in the neighborhood, but these sources are not regularly inspected by the county to ensure serviceability. There is no hydrant system in the neighborhood. The nearest draft source, other than in the community, is the West Fork of the Carson River.

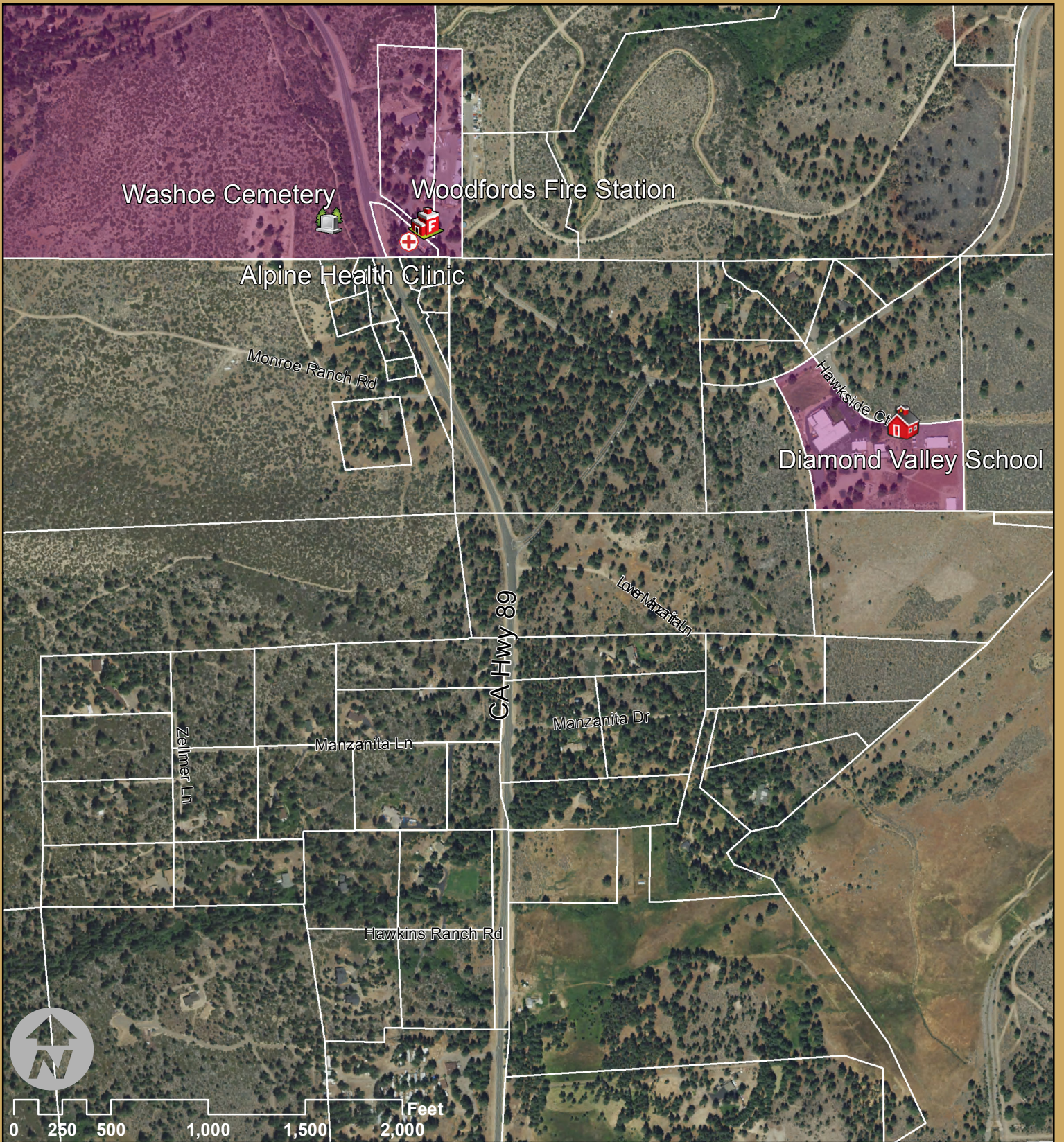


Figure 14: Upper Diamond Valley / Manzanita Lane Neighborhood

**Land Ownership
(Non-Private)**

- Alpine County
- BIA
- BLM
- State Property
- USFS
- Utility
- Fire Station
- school
- Clinic
- Cemetery

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7. Sorensens's Resort / Douglas Way**Rating: High**

Fuels: Sorensen's and Douglas Way are surrounded by fuel models 5 (brush) and 10 (closed timber) with fuel loadings of moderate to high density. Around Sorensen's and the Hope Valley Store the timber is fairly dense with lodgepole and fir the predominate species. There is a meadow with willows that runs along the river corridor. The Douglas Way cabins are surrounded by brush and Jeffrey Pine. There has been little fuel treatments or previous fires in the area leaving fuels heavy and continuous. A wildfire would easily carry through the fuelbed.

Weather: The fire weather in the neighborhood can be dangerous, however the higher elevation and the shade of the canyon walls provide typically cooler temperatures and high humidity. In mid to late summer weather can still be conducive to carrying a large fire, with high temperature, low humidity and strong southwest winds coming down Hope Valley into the canyon. Summer thunderstorms produce lightning ignitions in the area.

Topography: The neighborhood is situated at the bottom of the canyon as the West Fork or the Carson River starts down into Woodfords Canyon. Slopes are steep and north or south facing. The West Fork of the Carson River bisects the neighborhood.

Human Sources of Ignition: There are a number of human sources of ignition in the neighborhood. State Highway 88 runs through the neighborhood with heavy traffic during the high fire season. Ignitions may come from items discarded from vehicles or from a vehicle accident. The high commercial use in the area means there are a number of transient people for both the day and overnight using the area with many opportunities for potential human ignitions. There is the Kit Carson Campground in the neighborhood which allows campfires while burn restrictions are not in effect.

Community Preparedness: The community is poorly prepared for a wildfire event. There is little defensible space around many of the structures and often firewood and other materials are on or near the porches. Building materials are often still combustible shake roofs and wood siding providing little protection. Access to State Highway 88 is close for both Sorensen's and Hope Valley Store allowing for easy egress during a fire event. Douglas Way has a single road for ingress and egress over a narrow bridge across the West Fork of the Carson River. Access out of both the Hope Valley Store Campground and Kit Carson Campground is also one way in and out.

Fire Protection Resources: Eastern Alpine Fire and Rescue station 91 is approximately 4 miles down the canyon and can respond engines in less than 15 minutes, provided a fire is not blocking the road between the neighborhood and the station. Lake Valley Station 7 is approximately 9 miles away and can respond as well on a mutual aid request. No predefined draft sites are located within the neighborhood; however the West Fork of the Carson River forms the west edge of the community. No hydrants exist within the neighborhood.

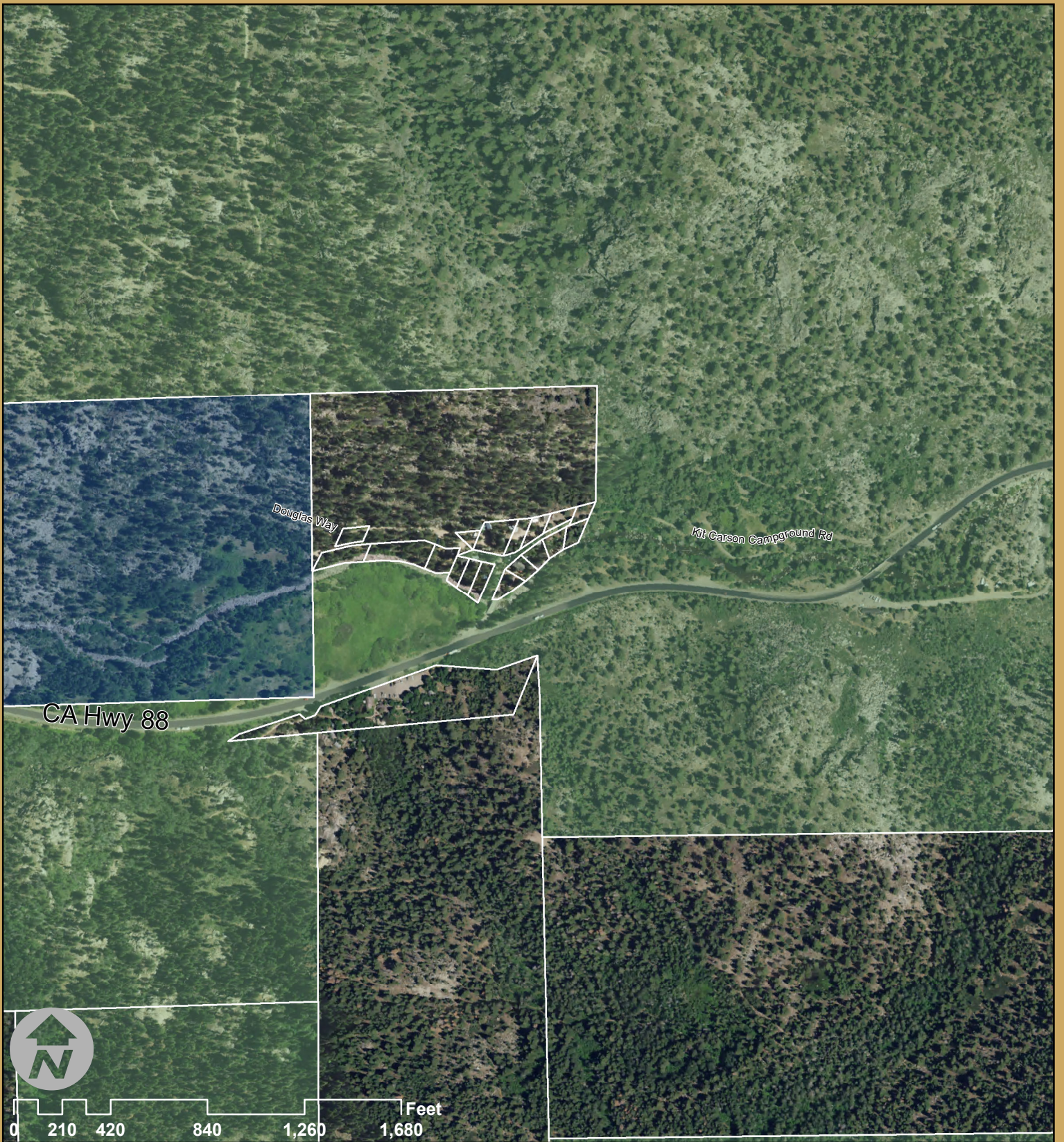


Figure 15: Sorensen's Resort / Douglas Way Neighborhood

**Land Ownership
(Non-Private)**

- Alpine County
- State Property
- BIA
- USFS
- BLM
- Utility
- F Fire Station
- S school

- + Clinic
- + Cemetery

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8A. Action Plan – Woodfords

8.1 Desired Future Conditions

1. Reduced threat to residents and their property from wildfires.
2. Increased community preparedness for wildfire.
3. Improved forest health with lower tree mortality.

8.2 Mitigation Goals and Responsibilities

Goals:

Initiate long term planning for vegetation: species types, density, and maximum brush height for the Woodfords Planning Area

Objectives:

Determine strategies for vegetation management, prescriptions, fuels reduction, and maintenance.

Responsibilities:

Homeowners:

For the entire Woodfords Planning Area

- 1. Replace flammable roofing materials with fire-resistant materials.**
2. Provide a minimum 100' defensible space around all structures.

For the Woodfords / Alpine Village Community

- 1. In Woodfords Lane, address ingress and egress, ensure the road is passable during a fire event.**
2. Actively pursue creation of defensible space. In Alpine Village, be aggressive about removing brush from near homes and structures which has regrown since the Acorn Fire. In the Woodfords Lane area, ensure pine needles are removed from roofs, gutters, and cleared from houses.
3. Ensure street signage is visible and clear, especially in Woodfords Lane. No street signage currently exists.

For Upper Diamond Valley / Manzanita Lane neighborhood

- 1. Widen roads and provide turnouts and turnarounds for fire apparatus. This should be a priority effort in this community as nothing has been completed to this point and the fuels are still extreme.**
2. Pursue the creation of a secondary evacuation route from the Manzanita Lane subdivision.
3. Thin overstory and clear brush as soon as possible and plan for retreatment at four to five-year intervals.
4. Maintain fuel treatment project conducted in 2004 on private land.

For the Crystal Springs Community

1. **Many lots need to reduce the number of trees to limit this spread of wildfire should one occur. The fuels around the neighborhood have been treated effectively but the risk from an ignition within the community spreading is still high.**
2. Actively pursue creation of defensible space, to include cleaning pine needles from roofs, gutters, and away from the structure.

For the Mesa Vista Community

1. **Masticate brush for defensible space and plan for retreatment at four to five-year intervals.**
2. Actively support efforts to install a community hydrant system.

For the Sorensen's Resort / Douglas Way Community

3. **Actively pursue creation of defensible space. Around Sorensen's Resort, ensure there is enough space to create a buffer from wildfires moving into the resort as well as any ignitions moving from the resort into the forest. Along Douglas Way, be aggressive about removing brush from near homes and structures and keeping firewood away from the structures. Clear roofs of pine needles and branches.**
4. Seek opportunities to improve ingress and egress. Ensure the Sorensen's Resort can be evacuated quickly and the people can move out of the area to make way for fire response on State Highway 88. Ensure Douglas Way residents can leave and keep the bridge clear for fire apparatus to make ingress.

Eastern Alpine Fire / Rescue:

1. **Participate in an annual, pre-fire season tabletop exercise with the Alpine County Sheriff's Office, CAL FIRE, and USFS to develop a coordinated agency response to a wildfire incident. Topics should include communications, training, and equipment resources.**
2. Continue to purchase wildland firefighting equipment and train volunteers to the NWCG 310-1 certification levels.

Alpine County Sheriff's Office:

1. **Conduct training session with Search and Rescue and Eastern Alpine Fire and Rescue on evacuation notices and operations in these neighborhoods.**
2. Participate in an annual, pre-fire season tabletop exercise with the Eastern Alpine Fire / Rescue, CAL FIRE, and USFS to develop a coordinated agency response to a wildfire incident. Topics should include communications, training, and equipment resources.

Alpine County Board of Supervisors:

1. **Enforce existing defensible space ordinances by creating and filling a County Fire Marshal position.**
2. Ensure the emergency services agencies are addressing the public safety issues outlined in this plan.
3. Support use of curbside chipping in local fuels reduction projects.
4. Pursue and enforce legislation, ordinances, or other codes to eliminate wildland fuel hazards within the communities.
5. Lobby federal agencies to implement fuels reduction projects on public lands surrounding communities.
6. Conduct fuels treatments on County-owned land within communities. Specifically, the land across State Highway 89 from the County Yard and the County owned parcel at the intersection of River Ranch road and Highway 88
7. Support community efforts to increase water supply and distribution.
8. Pursue long term solutions for the perpetuity of the Turtle Rock Park biomass pile. The Community Burn Pile, coordinated by the Alpine County Community Development Department, is a success. Every fall and spring, tons of biomass material is cleared from lots in the community. This results in a reduction of fuels in our neighborhoods. This solution should be continued.

Alpine County Community Development:

4. **Continue brush removal along road right-of-ways to reduce the ignition risk and the make the road passable during a fire event. This is a priority to maintain and improve the work that has been completed to this point.**
5. Continue to provide defensible space around the County Yard and buildings. Increase the amount of defensible space around the pile of brush at the back of the County yard and remove pine needles from roofs of county buildings.
6. Participate in an annual, pre-fire season tabletop exercise with the Alpine County Sheriff's Office, Eastern Alpine Fire / Rescue, CAL FIRE, and USFS to develop a coordinated agency response to a wildfire incident. Topics should include communications, training, and equipment resources.

CALTRANS / State of California:

2. **Maintain and expand the brush management and removal along state highway 88 from Woodfords to the Nevada state line. This is crucial in reducing the potential for ignitions to spread from the roadway to the wildland and to ensure safe evacuation routes during a fire event.**

Alpine Fire Safe Council:

6. **Explore and facilitate community fuels reduction projects. Assist the Alpine County Board of Supervisors as requested with development of fuels reduction solutions.**
7. Establish system for monitoring and maintaining fuels reduction projects.
8. Continue to provide public education information on defensible space at County buildings.

9. Actively support the efforts of the Eastern Alpine Fire / Rescue and other emergency services in mitigating wildfire risk.

Utilities (power and water):

5. **STPUD should maintain brush clearance along Diamond Valley Road, around Diamond Valley School and above the Alpine Village neighborhood.**
6. Encourage Liberty Energy to provide a local power shut-off including necessary training for Eastern Alpine Fire / Rescue and Alpine County Sheriff.
7. Remove or chip fuels from underneath powerlines and power poles.

8.3 Mitigation Projects

Only a few mitigation projects have been completed in the Woodfords Planning Area. Figure 8 identifies completed project areas, and Figure 15 identifies proposed project areas. The BLM has continually worked on fuels treatment efforts on BLM land near Indian Creek Reservoir and Turtle Rock Park. These treatments have reduced the fire hazard along State Highway 89, Airport Road and near Indian Creek campground. Due to the distance of BLM lands to most private residences, the projects have not directly reduced the hazard to the communities.

The USFS has completed pile burning and mastication fuel treatment projects around the Woodfords neighborhoods. These projects have attempted to address the threat of wildland fire to the Crystal Springs, Woodfords, Upper Manzanita, and Mesa Vista neighborhoods.

The Alpine Fire Safe Council completed the Manzanita Lane Fuel Reduction project in the fall of 2004. This project was entirely on private land in the Upper Manzanita Lane area. The AFSC secured a grant through the Sacramento Regional Foundation to construct a fuel break around the neighborhood and treat the fuels alongside the road leading into the neighborhood. A portion of the grant was also used to help construct defensible space around individual homes. The project protected not only the homes in Upper Manzanita Lane, but also extended to the north, protecting the homes across from the County Yard. These homes were threatened during the Acorn Fire. The fuels have regrown and need to be treated again to maintain the usefulness of the project.

In 2016 The Alpine Fire Safe Council received Title III funds to provide fuels treatment for 8 feet on each side of the narrow road on Lower Manzanita Lane. This provide improved the ingress and egress to the neighborhood during a fire event.

STPUD has masticated brush on their land in Upper Diamond Valley, providing a fuel break around Diamond Valley School and along Diamond Valley Road.

Very little of the overall very high and high hazard area within the WUI area around the communities has been treated. Projects could be completed in many locations in the WUI around the neighborhoods. A visual inspection of the neighborhoods was conducted to

identify areas with the highest priority for project definition and completion. All of these projects occur in the high or very high hazard areas within the WUI.

8.4 Actions

The following summary of projects has been developed for the Woodfords Planning area. The project worksheets are intended to provide the background information necessary for grant application development and funding. Where possible, they are identified on the project map, Figure 15.

| <i>Priority</i> | <i>Name</i> | <i>Acreage</i> | <i>Estimated Cost</i> |
|-----------------|---|----------------|-----------------------|
| 1 | Manzanita Fuels Treatment | 300 | \$600,000 |
| 2 | Diamond Valley Triangle Fuels Treatment | 40 | \$80,000 |
| 3 | Residential Lot Treatment | 50 | \$135,000 |
| 4 | Mesa Vista Brush Treatment | 100 | \$150,000 |

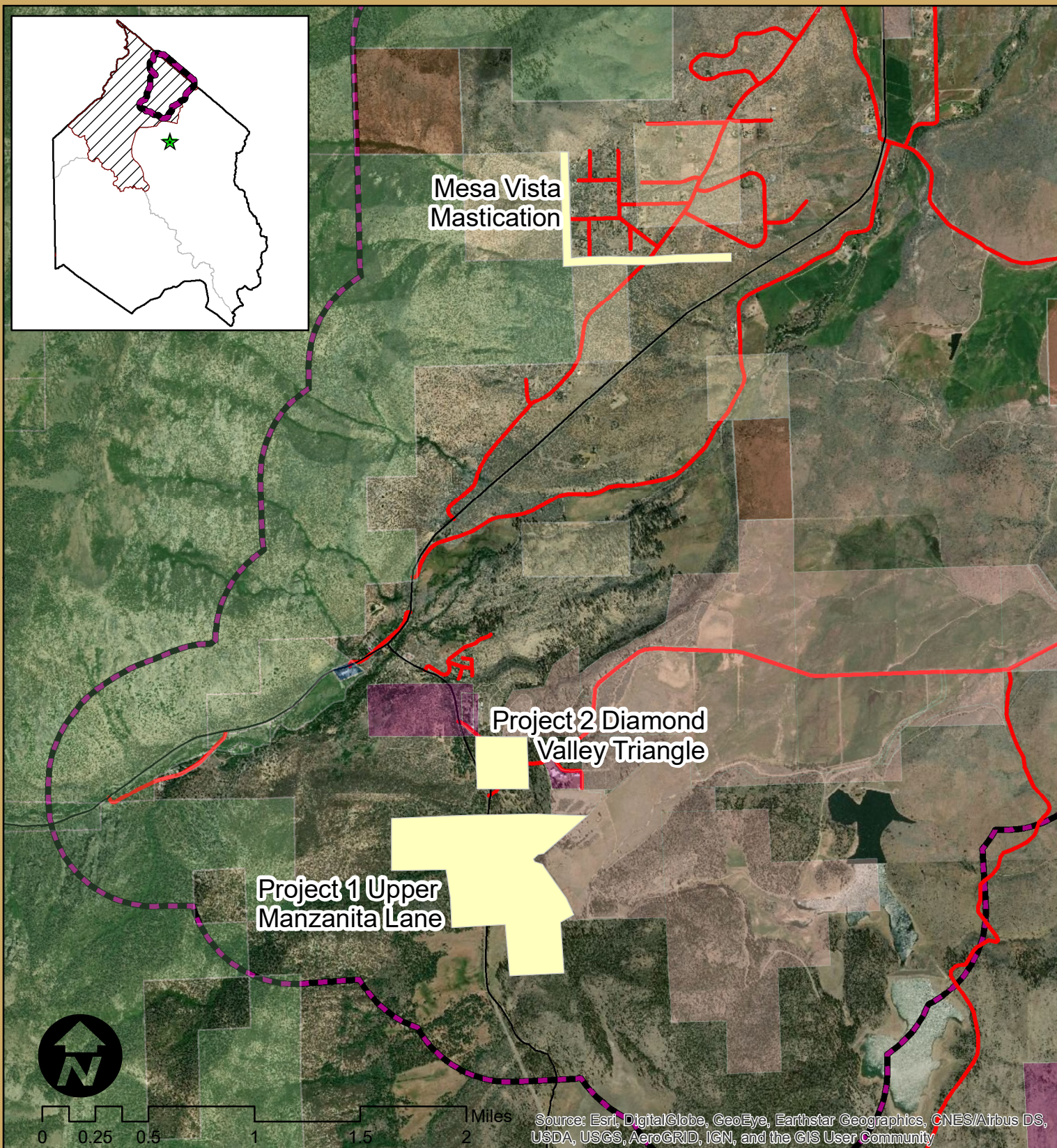


Figure 16: Woodfords Planning Area Proposed Projects

- Alpine County
- Woodfords Proposed Projects
- BIA
- Communities
- BLM
- State Highways
- State Property
- Treated County Roads
- USFS
- WUI
- Utility
- STPUD

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PROJECT 1: Fuels Treatment in Upper Diamond Valley / Manzanita Lane

Goal: Reduce the wildland fuels on large lots in the Upper Diamond Valley / Manzanita Lane community.

Vegetative condition and topography: Tree density within the project area is extremely high, with complete canopy closure and significant ladder fuels. In areas where tree spacing is more open, the bitterbrush and manzanita is very dense and tall. Slopes in the area are very flat, allowing the use of mechanical equipment for treatment. Much of the treatment area is in close proximity to State Highway 89 and Diamond Valley Road, allowing good access (see Figure 15).

Prescription for treatment: Throughout the project area, tree density and brush density need to be reduced. The forest stand should be thinned from below to a basal area of approximately 100 square feet of basal area per acre. Residual trees (those that remain) should have a crown spacing of at least 10 feet. Trees under or impinging on the powerlines should be removed. Trees can be removed as firewood, with the slash and other material to be chipped. Brush must also be thinned. Acceptable methods of treatment would include cutting and chipping the material or using mechanical mastication where appropriate. Individual plants should be thinned to a spacing of 1½ times the height of the remaining plants (i.e. plants 3 feet tall should be 4½ feet apart). Power poles should be cleared for a radius of 30 feet around the poles, removing trees and brush. Near county facilities, such as the County Yard and Diamond Valley School, the treatment should be more aggressive, with spacing between plants two to three times the height of the plants. Treatment should include mastication and tree pruning to the edge of the county property and should be retreated at 2 to 3-year intervals.

Estimated Cost: \$2,000 per acre X 300 acres = **\$600,000**

Estimated Time to Complete: This project will likely need to be completed in phases as landowners come onboard with the project. The Alpine Fire Safe Council should seek to identify 5 landowners per year that are willing to complete the work and maintain it. It will require both hand crews and a mastication contractor to be most efficient, so completing the bulk of the work with one treatment will be most cost effective. Environmental compliance will be necessary on both public and private land, with simple surveys conducted and mitigation measures in place during implementation. Environmental compliance could be completed in the fall with work on the ground commencing the following field season.

Ownership and Partners: A number of different landowners would be involved in this project. There are approximately 30 private land owners in the project area. In addition, public lands from Alpine County, Alpine County School District, South Tahoe Public Utility District, and the Washoe Tribe would also be involved. Where utility lines cross, public utilities could also be an important partner.

PROJECT 2: Fuels Treatment in the Diamond Valley Road Triangle

Goal: Reduce the wildland fuels in the area between Diamond Valley Road and Highway 89.

Vegetative condition and topography: Tree density within the project area is extremely high, with complete canopy closure and significant ladder fuels. Slopes in the area are very flat, allowing the use of mechanical equipment for treatment. Much of the treatment area is in close proximity to State Highway 89 and Diamond Valley Road, allowing good access (see Figure 15).

Prescription for treatment: Throughout the project area, tree density needs to be reduced. The stand density is so thick little brush or understory fuels have developed. The forest stand should be thinned from below to a basal area of approximately 100 square feet of basal area per acre. Residual trees (those that remain) should have a crown spacing of at least 10 feet. Trees under or impinging on the powerlines should be removed. Trees can be removed as firewood, with the slash and other material to be chipped. Brush must also be thinned. Acceptable methods of treatment would include cutting and chipping the material or using mechanical mastication where appropriate. Individual plants should be thinned to a spacing of 1½ times the height of the remaining plants (i.e. plants 3 feet tall should be 4½ feet apart). Power poles should be cleared for a radius of 30 feet around the poles, removing trees and brush. Near county facilities, such as the Alpine County Health and Human Service Building, the treatment should be more aggressive, with spacing between plants two to three times the height of the plants. Treatment should include mastication and tree pruning to the edge of the county property and should be retreated at 2 to 3-year intervals.

Estimated Cost: \$2,000 per acre X 40 acres = **\$80,000**

Estimated Time to Complete: This project should be completed within one field season. It is fairly small with easy access and flat terrain. It will require just hand crews, so completing the bulk of the work with one treatment will be most cost effective. Environmental compliance will be necessary on both public and private land, with simple surveys conducted and mitigation measures in place during implementation. Environmental compliance could be completed in the fall with work on the ground commencing the following field season.

Ownership and Partners: The land is privately owned, but by local Washoe tribal members, so partnership should be easier than multiple landowners. Given the land ownership, this project would be particularly well suited for the Washoe CHIPS crew who complete vegetation mitigation work in the area. Where utility lines cross, public utilities could also be an important partner.

PROJECT 3: Residential Lot Treatment – Woodfords Planning Area

Goal: Develop a neighborhood centric fuels reduction program within the Woodfords Planning Area neighborhoods.

Community Situation: Community design in the Woodfords Planning Area emphasizes the need for effective defensible space. The community burn pile is growing in popularity, but its long-term sustainability is uncertain. An alternative is a curbside fuels reduction program, where materials would be picked up at participating properties.

Prescription for Treatment: Establish a neighborhood fuels treatment program to help homeowners remove excess fuels and maintain areas with good fuels clearance. This program would have a number of elements to the various needs of the neighborhood.

Curbside chipping program – Hire a contractor or tree service to provide curbside chipper services in the neighborhood. Like similar programs, residents could either set material at the curb to be chipped and hauled away on certain days or could call to schedule an appointment for chipping. Material would be disposed of by the contractor. Residents would be responsible for hauling approved chipping material to the side of the road for disposal.

Tree Removal – Hire a tree service to remove trees near houses. The general prescription across the community would be to create defensible space around the homes and thin the forest stand from below, removing the smaller, suppressed trees. A professional tree service could remove trees without damaging homes and dispose of the slash material by chipping and hauling. Any firewood produced could be provided to the homeowners.

Estimated Cost: It is difficult to estimate the cost of these programs since they are dictated by the amount of public participating in the program. For the curbside chipping program, assuming that a contractor would charge approximately \$1000 per day to go to each of the neighborhoods and the service was available for 15 separate days throughout the summer season, the cost would be \$15,000. For tree removal, assuming that 10 homes participated and that on average a contractor removed 10 trees per lot at \$1200 per tree, the total would be \$120,000. It would vary by lot, where larger trees right next to houses would drive the cost up.

Total project cost: \$15,000 + \$120,000 = **\$135,000.**

Estimated Time to Complete: This project should operate for at least two years. It will take time for the community to become comfortable with the prescription and treatment. At that time the program’s effectiveness should be re-evaluated and, if appropriate, continued.

Environmental Compliance: Environmental compliance should be minimal with these treatment methods. The curbside chipping will require no compliance, as the homeowners will be doing the work. Tree removal from private lands is exempt from the

Forest Practices Act if the material is not sold, bartered, exchanged or traded as per California Public Resource Code 4527. Otherwise, the appropriate tree harvesting document must be filed at no charge with CAL FIRE. Depending on the document required (i.e. Timber Harvesting Plan, or some form of harvesting exemption notice), the document must be prepared by a California Registered Professional Forester and the document also signed by and the material harvested by a Licensed Timber Operator. These requirements must be met even when removing trees from within 150 feet of any structures. These requirements are triggered any time native commercial tree species are planned for commercial harvest from non-federal lands anywhere in California.

Other Partners: A number of organizations or agencies could participate in this program. The Fire Safe Council has coordinated these types of projects in the past, however a county department, such as the fire department would also be an excellent choice for taking the lead on implementation. Regardless of who takes the lead, the Alpine Fire Safe Council, CAL FIRE, fire departments, homeowners groups, and community groups will be instrumental in project implementation. A concerted community effort to educate the public about these programs and the need to create defensible space will increase participation.

PROJECT 4: Fuels Treatment around the Mesa Vista neighborhoods

Goal: Change the structure of the wildland fuels on the southwest sides of the Mesa Vista Communities.

Vegetative condition and topography: Sagebrush and bitterbrush grow to a height of 5-12 feet in the area and have recovered significantly in the 30 years since the Acorn Fire. Slopes in the area are very flat, allowing the use of mechanical equipment for treatment. There is good access to the area off Emigrant Trail.

Prescription for treatment: Throughout the project area, the brush density needs to be reduced and the brush masticated to change the structure of the fuel. Acceptable methods of treatment would include cutting and chipping the material or using mechanical mastication where appropriate. Individual plants should be thinned to a spacing of 1½ times the height of the remaining plants (i.e. plants 3 feet tall should be 4 ½ feet apart). Power poles should be cleared for a radius of 30 feet around the poles, removing brush. Treatment should include mastication and tree pruning to the edge of the county property and should be retreated at 2-3-year intervals.

Estimated Cost: \$1,500 per acre X 100 acres = **\$150,000**

Estimated Time to Complete: This project should be completed within one field season. It is fairly small with easy access and flat terrain. It will require just mechanical mastication, so completing the bulk of the work with one treatment will be most cost effective. Environmental compliance will be necessary on both public and private land, with simple surveys conducted and mitigation measures in place during implementation. Environmental compliance could be completed in the fall with work on the ground commencing the following field season.

Ownership and Partners: The land is privately owned by local Washoe tribal members. Given the land ownership, this project would be particularly well suited for the Washoe CHIPS crew who complete vegetation mitigation work in the area.

5B. Communities – Markleeville

5.1 General Environmental Conditions

The Markleeville neighborhoods are in the rain shadow of the Sierra at a higher elevation than those in Woodfords. Much of the area surrounding neighborhoods is covered by a mix of dense timber and brush. Where trees are present, there is usually a well-developed brush understory. The following communities/subdivisions comprise the Markleeville Planning Area and are identified on Figure 17 as numbered:

1. Downtown Markleeville
2. Markleevillage/Thornburg Subdivision
3. Shay Creek Subdivision
4. Carson Ridge Subdivision

These four areas contain the majority of structures found in the Markleeville Planning Area.

5.1.1 Elevation

Figure 16 shows the terrain within the Markleeville Planning Area. The terrain is typically very steep as the crest of the Sierra Nevada runs through Alpine County.

5.1.2 Meteorology, Climate, Precipitation

The climate is relatively dry with most of the precipitation falling in the winter months as rain or snow. Summer thunderstorms are common and have produced flash floods on occasion. Lightning is common with these storms, sometimes with little precipitation.

5.1.3 Threatened and Endangered Habitat Types

There are a number of ecologically sensitive areas and wildlife habitat. After considering the threat to life and property, projects should be considered in how they address these areas. California Fish & Wildlife and the U.S. Fish and Wildlife Service have information on Threatened and Endangered Species in the Markleeville Planning Area. Bald eagles, Lahonton cutthroat trout, and Paiute cutthroat trout are some of the threatened or endangered species that inhabit the forest, lakes, and streams within the Planning Area. The BLM and USFS have found no threatened or endangered species within their projects. Surveys or mitigation measures for threatened or endangered species should be implemented prior to project initiation.

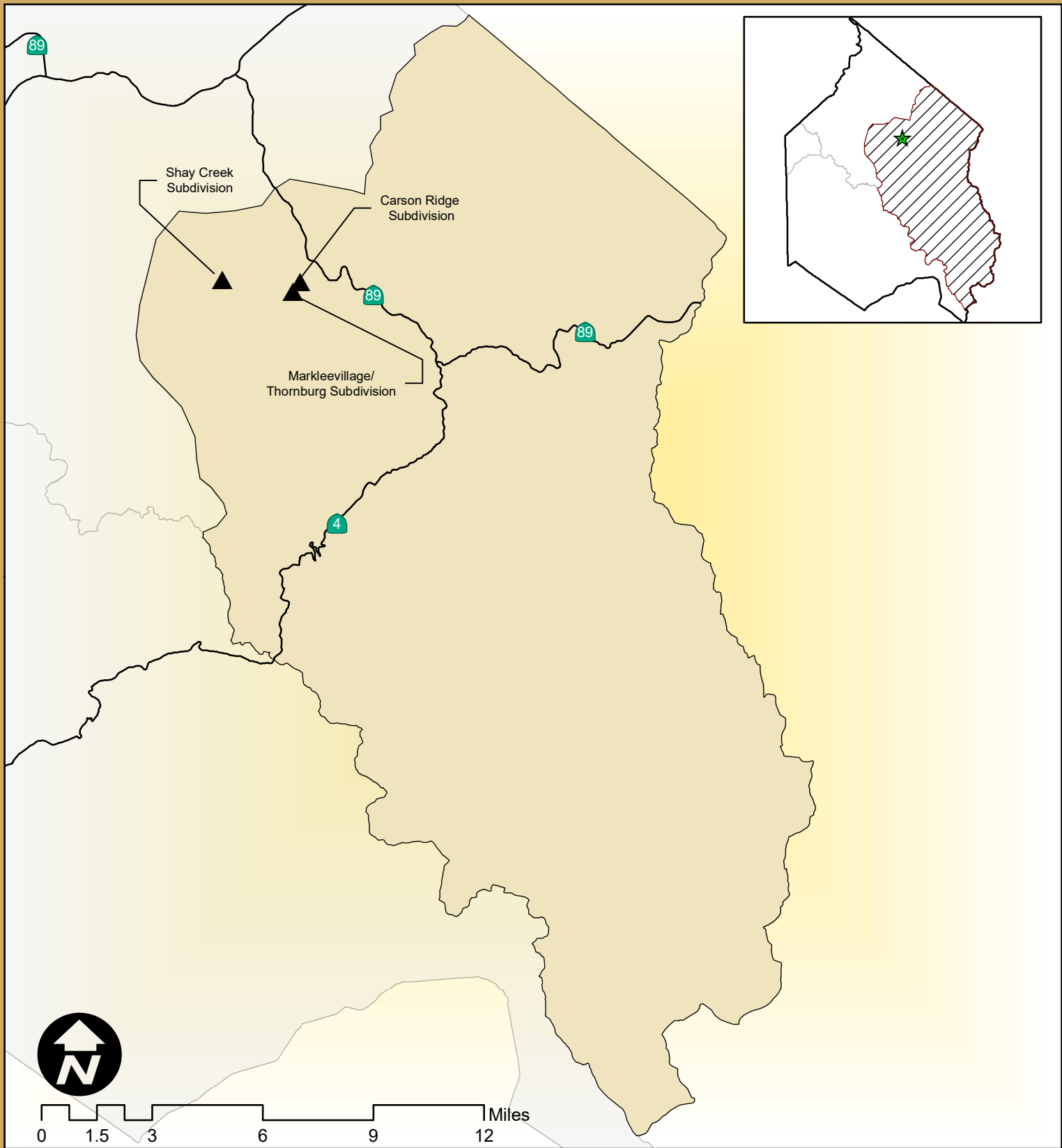


Figure 17: Markleeville Planning Area

- ▲ Communities
- ★ County Seat
- State Highways

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5.2 Population

The local year-round population of the Markleeville neighborhoods is fairly small, less than 500 people. However, the tourism industry brings a significant number of people into the community, particularly during the summer months. The tourist population at the Grover's Hot Springs State Park and along the dispersed recreation sites can add hundreds of people to the community. Vehicular traffic significantly increases during summer months.

5.3 Infrastructure

As a rural, sparsely populated area, Markleeville has relatively little infrastructure at risk from wildfire. But the loss of only a few key facilities can have a big impact.

Markleeville's power and phone services originate in Nevada and reaches the Planning Area through a single, fire-prone corridor. Any interruption of this line knocks out service to Markleeville, and subsequently the Eastern Alpine Fire and Rescue Station 92.

Key county facilities exist in the Markleeville area. The seat of county government is in Markleeville at the county administration building. The primary dispatch center is in the Sheriff's Office in the county administration building. Eastern Alpine Fire and Rescue Station 92 is at the intersection of Hot Springs Road and Pleasant Valley Road. Other key facilities include:

- Turtle Rock Park Community Center (a multi-use building vital to any county disaster response as a shelter, staging area, command post etc.)
- Markleeville Water Co. Treatment Plant and Pump Station
- Markleeville PUD Sewage Treatment Facilities
- Bridges-(two on Hot Springs Rd., one on Hwy. 89 in Downtown Markleeville, one on Laramie by Library, and Hangman's Bridge on Highway 89 south of Markleeville) unlikely to burn but vital to evacuation routes.

Markleeville Water Co. receives most of its water from a surface collection facility up Musser-Jarvis Canyon west of Markleevillage. A wildland fire in this drainage, even if it does not directly burn treatment or storage facilities, would have a dramatic impact on the Markleeville water system. Runoff from a burned area would be so contaminated with sediment and burned material the water would likely not be treatable. Further the collection facility would not be able to handle the large amount of debris that would come down the drainage from a burn. Treatment on the public lands feeding this water system should be a high priority.

All of these facilities will be critical to an effective county response to a wildland incident and are shown on the neighborhood maps.

Standard hydrant systems exist in Downtown Markleeville, Markleevillage/Thornburg Subdivision, and in the Carson Ridge Subdivision. Two 40,000-gallon water tanks are located on Hot Springs Road and one 238,000-gallon tank is located at the top of the Markleevillage subdivision on Pleasant Valley Road. One 60,000-gallon tank serves the

Carson Ridge Subdivision as a dedicated fire suppression supply. Water lines range from aging 2", found in some cul de sacs in Markleevillage, to newer 8" diameter pipes found along Montgomery Street in Markleeville. Seasonal 1 1/2" hydrants supply Shay Creek Subdivision, Turtle Rock Park, and Grover Hot Springs State Park.

5.3.1 Business

Tourism-based business dominates the economy of the Markleeville Planning Area. Downtown Markleeville and Carson River Resort provide lodging, restaurants, gas, camping supplies and sundry items to the estimated 70,000 annual visitors. Ranching continues as a historically significant business with cattle grazing in several larger agricultural parcels.

5.3.2 Recreation

Recreation creates a number of concerns for wildfire planning. Areas of dispersed camping, with campfires and barbeques are likely sources of ignitions for wildfires. A wildfire in heavily used recreation areas poses problems for evacuations. Wildfire that destroys key recreation resources would have a significant impact on the tourist industry in Alpine County.

Camping: The Planning Area hosts a popular California State Park (Grover's Hot Springs), a county-owned campground at Turtle Rock Park, as well as numerous developed and undeveloped USFS and BLM campgrounds and campsites.

Fishing: The East Fork of the Carson River with its many tributaries provides highly-valued opportunities to fish for native and planted trout species.

Other popular recreational opportunities:

Hunting, bicycling, backpacking, hiking, horse pack trips, rafting, and cross-country skiing

5.3.3 Cultural Resources

Prehistoric and historic cultural resources likely exist within the project areas. The area was used by Native Americans and sites have been found within the Planning Area. Historic mining resources are scattered throughout the area as well, with significant use in the late 1800's to 1981. Surveys by the USFS and BLM have located resources in the planning area.

Specific resources are found around the Markleeville area. The Wolf Creek Restaurant and Bar in Downtown Markleeville is listed as a State Historical Landmark. The Alpine County Courthouse and Markleeville Schoolhouse are registered National Historic Buildings. The Alpine County Museum houses a large collection of county artifacts. The Alpine County Library houses the archives for the county.

5.4 Emergency Services

Fire services for wildland fire incidents are provided by the federal agencies and the Eastern Alpine Fire and Rescue departments. The USFS guard station at Turtle Rock

Park staffs two engines (subject to availability of crews) in the summer to provide wildland fire response. USFS has command and control responsibility as part of a Cooperative Fire Agreement (see the above sections on jurisdictional information).

Response distances are commonly within five miles from either a volunteer or USFS fire station.

Though CALFIRE does not have a continual presence in Alpine County, they commonly respond from the Tahoe Basin to any vegetation fire and will provide mutual aid as requested. During the Washington Fire, CALFIRE provided numerous engines, handcrews, and bulldozers in support of structure protection in the Markleeville area. A Pre Attack Plan was also developed for the area based on information gathered during the incident.

5.5 Insurance Ratings

The Markleeville Planning Area has a combination 6-8 rating. Where the hydrant system exists, ISO ratings are a 6. Areas without hydrants but within five miles of the Markleeville Fire Station are rated an 8.

5.6 Land Use Development Trends

In a county with only a few new buildings a year, a single subdivision can be a significant impact. There are a number of large private parcels near existing development that could potentially be developed, expanding residential development into hazard areas. At least one new subdivision is under construction in the Markleeville Planning Area near Markleevillage and a development application has been submitted for Downtown Markleeville.

6B. Current Fire Environment – Markleeville

6.1 Wildland Fire History

Devastating wildfires have occurred in Alpine County communities in the past. The most destructive wildfire was in the Woodfords Planning Area, the Acorn Fire in 1987 destroying 26 homes. More recently, the Washington Fire south of Markleeville burned 18,000 acres and threatened the community. This fire history underscores the potential for devastating wildfire in the area.

6.2 Local Fire Ecology and Forest Health

Effective management of the wildland fire risks on the landscape today must include an understanding of forest health issues and fire ecology. Without understanding the processes in a forest ecosystem, we will continue to attempt to control it, rather than live within it. Deteriorating forest health increases the wildland fire hazards around our communities. Improving forest health results in forests less susceptible to catastrophic fire, reducing the fire risk to our communities.

The science of fire ecology is concerned with understanding how fires determine a forest's structure and species composition, and describing fire's role in changing that structure and composition. A fire regime is defined as the frequency and severity of fire occurrence in a given forest type.

Some plant communities depend upon stand-replacing, high intensity fires. Lodgepole pine and fir forests evolved with the occurrence of infrequent, high-intensity, "stand destroying" wildfires that completely eliminated the existing forest stand. Few trees within the fire perimeter survived, and the low frequency of fires in these plant communities allow long periods of time for the accumulation of fuels and the reestablishment of vertical continuity ("ladder fuels") and horizontal continuity (closed canopies) in the fuel strata. This was conducive to the simultaneous combustion of all fuels during a single fire event.

Other plant communities have evolved to burn frequently with low intensity; for example: mature Jeffrey pine forests. Under a historic fire regime, low-intensity surface fires reduced fuel loading from grasses and shrubs, suppressing regeneration of shade-tolerant white fir seedlings, and leaving the adult trees protected by thick, fire-resistant bark unaffected. Forests with frequent fire occurrence had an open, "park-like" appearance with an understory of grass or low shrubs. Though shaded by large, mature trees, spacing between trees was sufficient to allow sunlight to reach the forest floor and encouraged regeneration of shade-intolerant species like Jeffrey pine. Pockets of heavy fuels existed under these conditions, but their discontinuous nature reduced the likelihood that a fire would burn with enough intensity to affect mature trees. Frequent surface fires also remove accumulated dead-and-down woody fuels and the green "ladder fuels" that would otherwise carry flames into the coniferous overstory, potentially provoking a catastrophic, stand-destroying crown fire.

The forest that regenerates with an infrequent, high-intensity crown fire regime is generally very dense and of a single age structure. This density often results in the exclusion of sunlight to the forest floor and subsequent recruitment of shade-tolerant species such as white fir, which contributes to extremely high fuel loadings in the understory. This arrangement of fuels, or fuel structure, creates an ideal mixture of oxygen and fuel for high intensity fire.

Both forest types exist in Alpine County, historically and today. They are separated by elevation, at roughly the 7,000-foot contour. Above 7,000 feet, temperatures are low enough and moisture high enough to infrequently allow ignitions to grow into large fires. Below 7,000 feet, in warmer, drier areas, frequent ignitions resulted in consumption of the fuels. This constant consumption of fine fuels kept fuel loadings and fire intensity low.

With the clearing of forested lands by logging in the Comstock era and the development of fire suppression policies, natural fire regimes have been modified. Areas that formerly burned with high frequency but low intensity (fires more amenable to control and intervention) have large accumulations of unburned fuels, which once ignited, will burn at higher intensities. The regeneration of altered plant communities under suppressed fire regimes (for example, the abundance of white fir regeneration into the fire-suppressed forests that regenerated in Alpine County after the Comstock era) have also contributed greatly to the alteration of historic fire regimes.

The fire regime in the Markleeville Planning Area can be characterized by high frequency, low intensity fires. Bitterbrush, sage brush, manzanita, and Jeffrey pine are plant species that favor frequent fires. Low intensity fire does not kill any of these plants, rather it removes dead material from mature plants and increases plant vigor. Jeffrey pine and incense cedar have thick bark to protect the tree from low intensity fire.

The lower elevations of the Markleeville Planning Area contain forest stands with highly altered fire regimes. The loggers of the 1870's who worked in the region to satisfy the

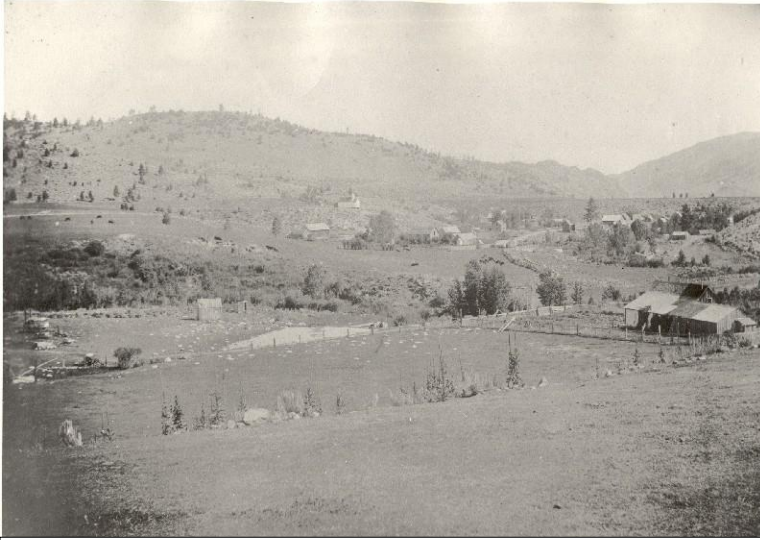
timber demands of the Comstock mines uniformly cut the native forests, originally characterized by uneven tree ages, wide spacing between trees in mature stands, and small openings created by other mortality. The forest that regenerated after



Markleeville, circa 1866

this period of intensive logging activity developed into a much denser stand. The increasing effectiveness of fire suppression activities during the 20th century and the

eventual elimination of mechanical harvesting in the Alpine County have further inhibited variability in this forest's age classes and crown structure.



Markleeville, circa 1916

These historic photos demonstrate the change in forest structure and fire regime around Markleeville. The oldest photo is from approximately 1866. You can see the forests in the background have been completely removed from the logging for mining. However, also notice the prevalence of undisturbed sagebrush around the town of Markleeville and lack of stumps. This suggests that the forest did not extend to the town of Markleeville

proper, rather the town was constructed within reach of the forest but on upland sage ground that was later converted to agricultural. The next picture shows some of this transition about 1916. Still note the lack of trees on the hillsides.

The last photo in the series demonstrates what the town appears like today. Except for the areas that have been continually irrigated, the trees have encroached on the entire town. The forest stand is very even and contiguous, facilitating the spread of a high intensity fire.

George Gruell's book *Fire in Sierra Nevada Forests, A photographic interpretation of the ecological change since 1849*, pairs historic photos with



Markleeville, circa 2004

recent ones taken from the same vantage point, and effectively illustrates this phenomenon across various locations in the Sierra Nevada, including Alpine County.

The change in forest structure to a denser, more competitive stand has had an effect on forest health. In 1992, the Alpine County Forest Lands Advisory Committee reported on the increased mortality in fir and pine species. While no specific cause was researched,

the drought and closed canopy competition between trees were likely the culprits.

The committee pointed out the effect increased mortality would likely have on wildland fire fuels. Today, instead of the brown trees seen in the photo, the trees are contributing to fuel loadings as either standing dead snags or as dead and



Tree mortality above Markleeville.

down material on the forest floor. This has only increased the likelihood of a high intensity wildfire around our communities.

Most commercial and residential development in Alpine County, (those areas most needing protection from infrequent, catastrophic wildfires), is concentrated in areas well below the 7,000-foot elevation prescription for frequent, low-intensity, light-fuel clearing ground fires. Our objective must be to model the natural fire regime as much as possible in our communities. This requires diligence on our part to reduce the fuel loadings to manageable levels that protect our communities and the forest environment from the extraordinary effects of catastrophic fire.

6.2.1 Fire Frequency

CAL FIRE developed fire rotation or frequency measures for the entire state. Data is stratified into three classes of frequency. These classes represent the amount of time necessary for fires to have burned an entire area, based on historic fires. For example, in an area classified as < 100 years, the entire area would have burned over at least once in < 100 years. This could be by a single fire, though is more commonly the culmination of many fires in that area.

6.3 Fire Weather

Lightning causes most wildland fire ignitions in the Markleeville area. Summer thunderstorms bring erratic winds and lightning to the area. Fire behavior is most extreme after long periods of hot, dry weather with no precipitation. It is common to have a southwesterly wind coming over the Sierra's in the afternoons during the summer. Most catastrophic fires have occurred during these conditions along the Sierra Front.

6.4 Fuels Map

Wildfire fuels are mapped by fire agencies in an effort to understand what fire behavior might be like in specific areas. Areas with dense, heavy fuels, such as trees, would have more extreme fire behavior than areas with lighter fuels, such as grass. Fire fuels have

been mapped by both CAL FIRE and the Sierra Front Wildfire Cooperators. The CAL FIRE data covers the entire county but is less detailed. The Sierra Front data is more detailed but only covers the eastern slope of Alpine County. Both data identify fuels based on the 13 standard fuel models developed by Rothermel. Though the absolute model numbers differ, they are consistent across the general fuel model categories; grass, brush, and timber. For example, the CAL FIRE classes may indicate fuel model 9, but Sierra Front data indicates fuel model 10, however, they are both of the timber fuel model category.

Assignment of fuel models and hazards were based on vegetation data collected from satellite imagery. For the data from the Sierra Front, the satellite data was from the early 1990's, so some the data is out of date, particularly where fires have occurred. This data is intended for use on a regional basis, it should be updated around communities as planning becomes more specific.

Figure 18 shows the fuel models in the Markleeville Planning Area from CAL FIRE. The table in Appendix 8 briefly describes the models and which ones apply to the Markleeville planning area.

6.4.1 Hazard Maps

Combining the wildfire fuels data with other information that would affect fire behavior, such as slope, fire agencies compile wildfire hazard maps. These maps show areas that, given the specific fuel and slope conditions, would have extreme to moderate fire behavior. These hazard maps can help prioritize wildfire mitigation projects. Hazards have been developed by both CAL FIRE and the Sierra Front Cooperators.

Figure 19 is a more detailed look at the hazards in neighborhoods in the Markleeville Planning Area.

6.4.2 Condition Class

The National Fire Plan and Healthy Forest Act dictate that the federal agencies use Condition Class as criteria for planning projects. As defined previously in the fire ecology section, the Condition Class represents a relative measure of how far an area is from its historical fire regime. As dictated by the national fire plan, areas of Condition Class 3 have a higher priority for treatment than those of lower condition class. CAL FIRE has calculated Condition Class across the state. Figure 20 shows Condition Class for Markleeville Planning Area. Note that much of the area is in Condition Class 3.

6.4.3 Natural Fire Breaks

There are few natural fire breaks in the Markleeville Area. The meadows around Markleeville would provide the best natural fire break. However, meadows, like the one at Grover's Hot Springs, may be too loaded with grass fuels to be effective fire breaks during a fire event. At the upper edges of communities, such as ridgelines, rock outcroppings create natural fire breaks, however they are not large enough to be effective.

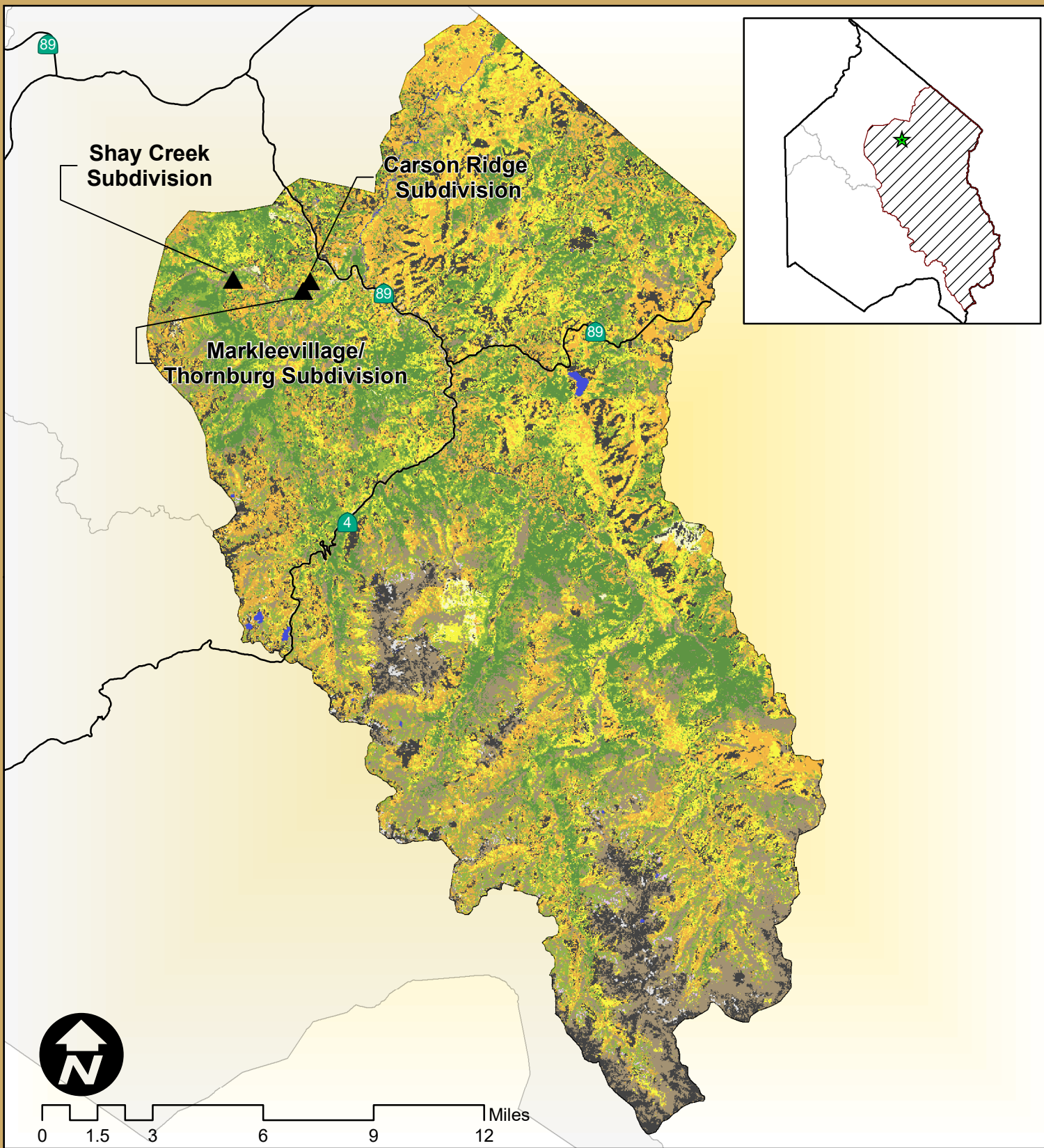


Figure 18: Markleeville Fuel Models

FBFM Category

| | | | |
|--|---|---|--------|
|  | 2 |  | 9 |
|  | 5 |  | 10 |
|  | 6 |  | Water |
|  | 8 |  | Barren |

- Map prepared March, 2017 by CG Celio & Sons, Inc.
 - Map projected to 1983_StatePlane_California_II_FIPS_0402_Feet
 - Fire Behavior Fuels data compiled by USGS Landfire; 2014; available from <https://landfire.cr.usgs.gov/>
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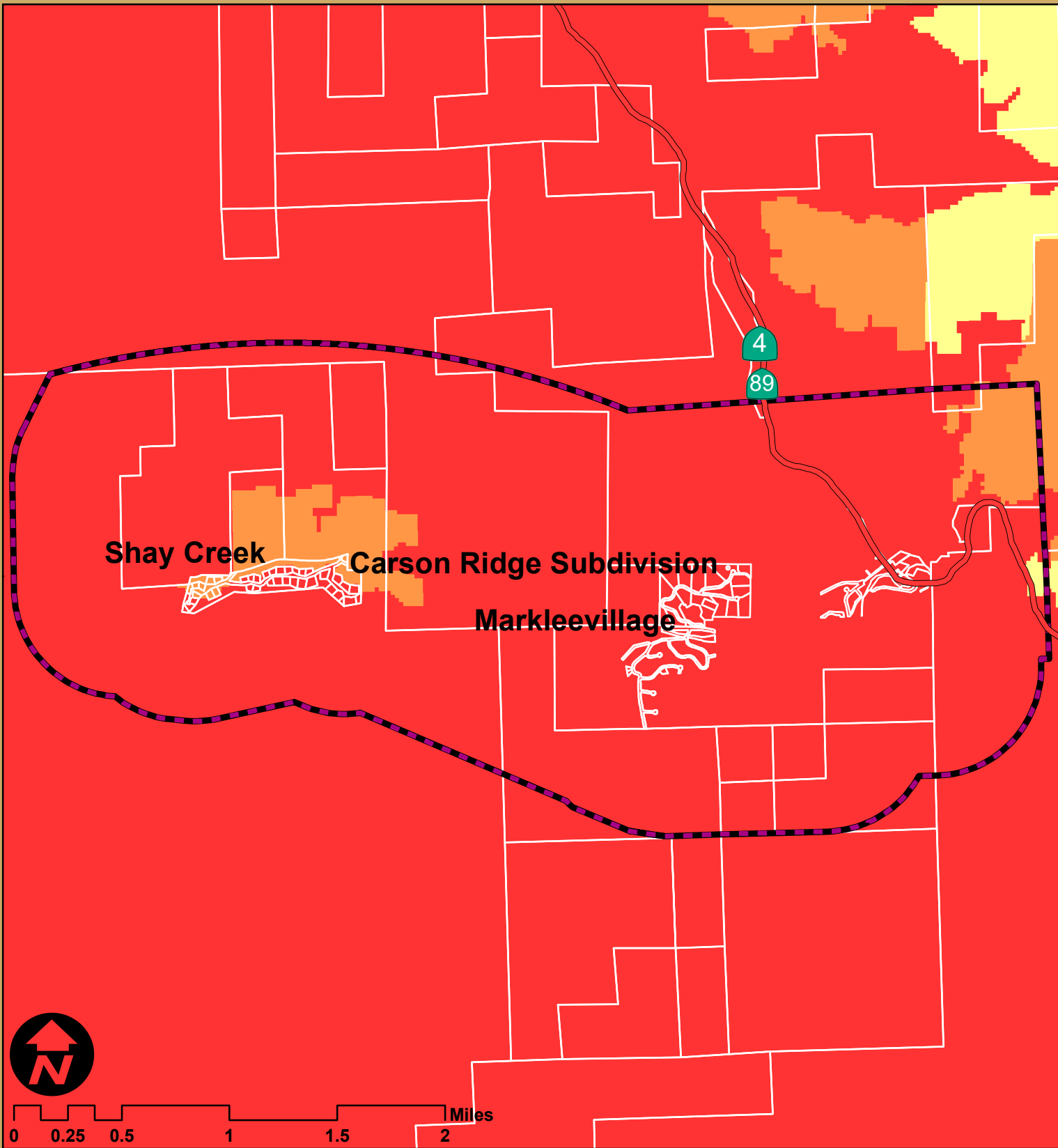


Figure 19: Markleeville Fire Hazard Map

**Fire Hazard Severity
(Parcels overlaid)**

- Very High
- Moderate
- High
- WUI

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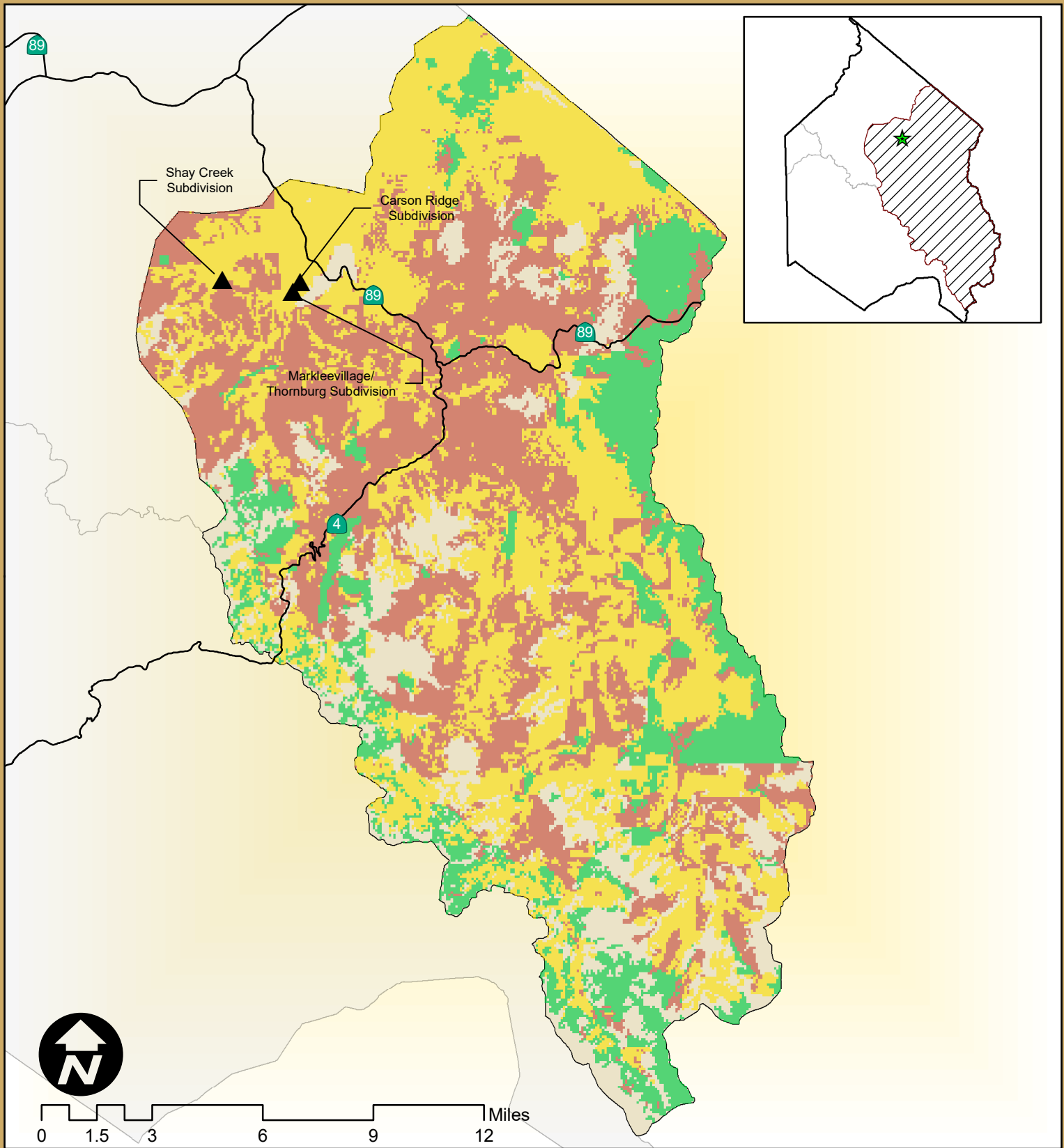






Figure 20: Markleeville Condition Class

Condition Class

-  Class 1 (historic fire regime)
-  Class 2 (slightly altered fire regime)
-  Class 3 (significantly altered fire regime)
-  Not classified

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6.5 Fire History

Figure 20 describes the previous fires in the Markleeville area. Most fires have occurred at the lower elevations on the eastern slope of Alpine County. The largest recorded fire in Alpine County occurred in the Markleeville Planning Area in 1947, stretching from Silver Mountain City to Gardnerville in Nevada.

In 2015, the Washington Fire burned 18,000 acres near the East Fork of the Carson River and came within 2 miles of Markleeville. The majority of the burn occurred in a single day.

6.6 Expected Fire Behavior

Fire behavior is expected to be extreme and uncontrollable during the worst-case conditions. Slopes are steep, wind commonly increases in the afternoon, and fuel loadings are high. While a wide range of fire behavior can be expected in the various fuel types and weather conditions, extreme fire behavior is likely during severe fire weather conditions.

6.6.1 Range of Fire Conditions

A wide range of fire conditions can be found in the Markleeville Planning Area. Conditions range from heavy fuels on steep slopes to flat grass meadows and low sage on rocky ridges.

6.7 Wildland Urban Interface (WUI)

The Wildland Urban Interface is typically considered to be within ½ mile of a community, but can be adjusted based on fuels, topography and other fire behavior factors. The proposed WUI around the neighborhoods in the Markleeville planning area is based on the distance from the communities but has been adjusted to create a contiguous area including all of the communities and accounts for the private land in between the structures and the public lands. Figure 21 demonstrates the WUI around in the Markleeville Planning Area

6.8 Completed Projects

A number of fuels treatment projects have been completed within the Markleeville Planning Area. These include projects on private lands, Alpine County Road Department Right of Way treatments and USFS projects. These projects are outlined on Figure 22.

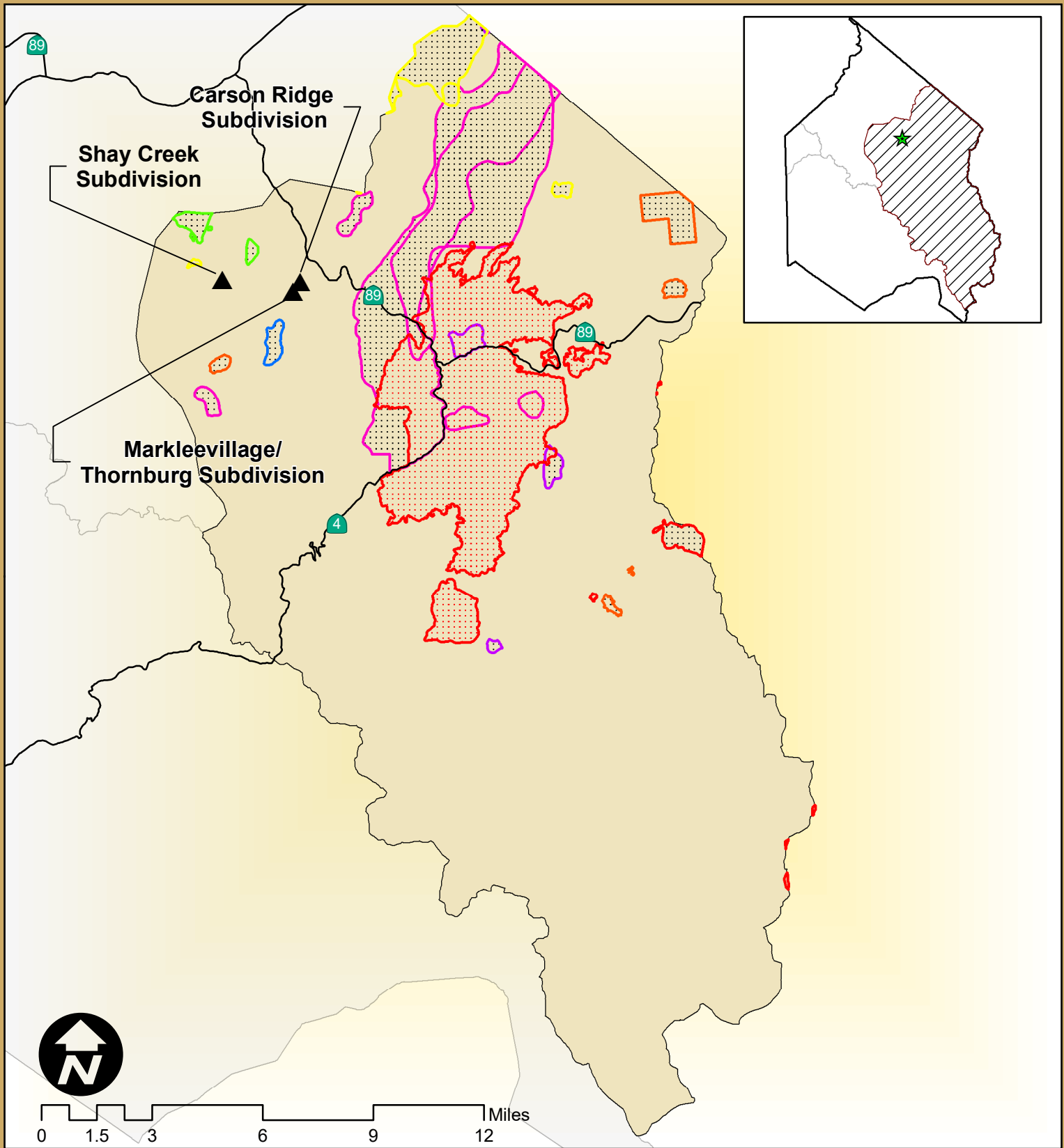


Figure 21: Markleeville Fire History

Fire Perimeters (Decade)

- 2010
- 2000
- 1990
- 1980
- 1970
- 1960
- 1950
- 1940

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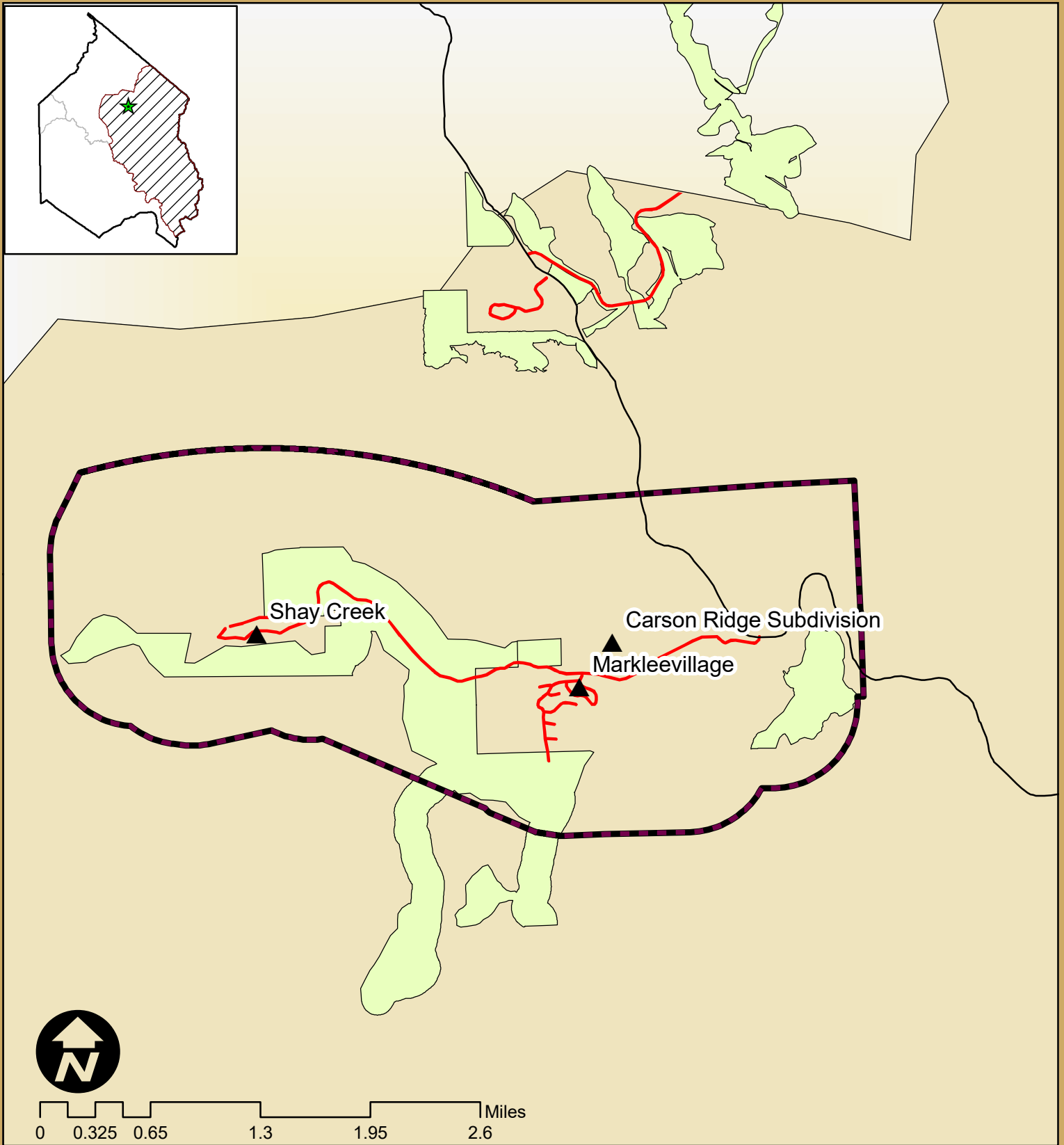


Figure 22: Markleeville Planning Area Completed Projects in the WUI

- ▲ Communities
- State Highways
- Treated County Roads
- ▭ WUI
- Treatments

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7B. Risk Evaluation – Markleeville

7.1 Risk Evaluation

Most of the neighborhoods within the Markleeville Planning Area are at high risk for catastrophic wildfire. Fuels around the communities are of the forest type and typically dense. Slopes are steep, and the wind blows from the southwest during hot summer afternoons.

Natural and human ignitions are common. The highest ignition risk is from the tourist and recreational user groups who are unfamiliar with the area and commonly use outside barbeques and campfires. The amount of tourist traffic on the road increases the risk of ignition from vehicles.

Fire protection is provided by the Eastern Alpine Fire and Rescue for all the neighborhoods. They have a single structure engine, a single wildland engine, and a single water tender at Station 92. Resources from Station 91 in Woodfords are also automatically dispatched to any fire in the Markleeville area. They also have a small squad truck. The hydrant system extends from Markleevillage to Markleeville, but is small and aging. There are a number of draft sites around, including year-round creeks and the pools at Grover’s Hot Springs State Park.

Alpine County completed its Field Operations Guide complete with evacuation maps for neighborhoods in Markleeville. Safety zones and strategic fuel breaks are available but not well coordinated. There are some meadows around the state park, Markleeville, and the Markleevillage Subdivision. Safety in these areas will be dependent upon the height of the grass that season. The USFS has completed fuel breaks around the neighborhoods.

The neighborhoods along Hot Springs road represent the most dangerous wildland fire situations in Alpine County. A single two-lane paved road stretches four miles from Markleeville to a dead-end terminus at Grover’s Hot Springs State Park. On any given summer weekend, the total population in this area can easily reach into the thousands. The population peak could easily correspond with long periods of hot, dry, severe fire weather conditions.

These conditions make the likelihood of an ignition relatively high. Should a fire occur, evacuating the Hot Springs Road corridor while moving suppression resources to the fire will be extremely difficult. An accident or other roadway obstruction would result in many people trapped in the area. Without alternatives such as safety zones or other evacuation routes, loss of life is likely.

7.2 Risk Evaluation Summary

| Asset | Rating |
|---|---------------------|
| Structures | |
| 1. Downtown Markleeville | Medium |
| 2. Markleevillage/Thornburg Subdivision | High |
| 3. Shay Creek Subdivision | High |
| 4. Carson Ridge Subdivision | Medium (when built) |
| 5. Carson River Resort | Medium |
| Business | |
| 1. Downtown Markleeville | Medium |
| 2. Carson River Resort | Medium |
| Infrastructure | |
| 1. Downtown Markleeville | Medium |
| 2. Markleevillage/Thornburg Subdivision | High |
| 3. Turtle Rock Park | High |
| 4. Power Lines | High |
| 5. Evacuation Routes | High |
| 6. Markleeville Water System | High |
| Recreation | |
| 1. Grover's Hot Springs State Park | High |
| 2. Turtle Rock Park Campground | High |
| 3. USFS and BLM Campgrounds | Medium |
| Fishing | |
| 1. East Fork Carson River | Medium |
| Wildlife Habitat | |
| | Medium |
| Endangered Species | |
| | Medium |
| Watersheds | |
| | Medium |
| Historical Resources | |
| 1. Downtown Markleeville | Medium |
| Cultural Resources | |
| 1. Downtown Markleeville | Medium |

7.3 Fire Hazard Assessment by location

1. Downtown Markleeville

Rating: Medium

Fuels: Nearly 50% of the downtown Markleeville perimeter is exposed to fuel model 5 (brush) and 10 (timber) fuels of Jeffrey pine and sagebrush / bitter brush with medium to high density on adjacent (mostly private) lands.

Weather: The prevailing wind blows from the Southwest across irrigated pasture and forested lands.

Historically, lightning ignitions occur all around the area.



Topography: Downtown Markleeville sits near the confluence of two drainages.

Human Sources of Ignition: A number of sources of human ignitions exist in the town of Markleeville. The majority of residences use wood heating. Power is supplied through overhead lines adjacent to roads. Lines have been knocked down during storm events and traffic accidents. To date, no major fires have resulted. Vehicles often park on unpaved shoulders in and around Markleeville near flammable vegetation. The large influx of tourists during the summer, particularly on weekends, increases the number of potential ignition sources.

Community Preparedness: Building construction is primarily wood frame with wood siding and composition roofing. Paved roadways offer some degree of defensible space however the high density of buildings within the neighborhood would likely result in rapid fire spread. Markleeville is served by a hydrant system and the nearest draft site is approximately two miles away on the East Fork of the Carson River. Eastern Alpine Fire and Rescue Station 92 is located 3/4 mile away. The USFS fire station is at Turtle Rock Park approximately 2 miles away and is staffed seasonally with 2 wildland engines. Ingress and egress is along Laramie St. (over Markleeville Creek) and Montgomery St. to Highway 89 in two directions. The southeastern egress passes over one bridge on Highway 89. There are three two-lane paved roads leading out of town, providing good egress during a fire event. Cars parked along Hot Springs Road (Montgomery Street) create crowded conditions, it may be difficult for fire apparatus to pass. Evacuation of the tourist population will be a challenge during a fire event.

Fire Protection Resources: Eastern Alpine Fire and Rescue Station 92 is located $\frac{3}{4}$ of a mile from the town and can respond engines within ten minutes. No predefined safety zones have been identified, however the large meadow to the south of town would provide one possible safety zone. No fuels breaks are currently completed around Markleeville.



Figure 23: Markleeville Neighborhood

Land Ownership (Non-Private)

- | | | | |
|---------------|----------------|-----------------|------|
| Alpine County | State Property | Hydrant | MPUD |
| BIA | USFS | Public Building | |
| BLM | Utility | Bridge | |

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2. Markleevillage/Thornburg Subdivision**Rating: High**

Fuels: The entire area is surrounded by medium to high density fuel model 5 (brush) and 10 (timber) fuels of Jeffrey pine and sagebrush / bitter brush. Since 1990, fuel reduction projects have focused on a half-mile strip along forest lands adjacent to

Markleevillage/Thornburg Subdivision (see photo). The treatment involved overstory thinning with understory burning or chipping. This accounts for approximately 50% of the direct wildland exposure. The remaining 50% on private lands contain higher density fuel loads. Though ground fuels are generally light in the neighborhood,



Forest boundary next to Markleevillage subdivision

stand density is too high with many crowns touching creating a contiguous canopy across the neighborhood.



Markleevillage neighborhood.

Weather: Prevailing winds from the southwest and west blow from adjacent forested lands.

Topography:

Markleevillage/Thornburg Subdivision sits on a north/northwest facing aspect with moderate to steep slopes above Hot Springs Creek. The subdivision is bounded by three creek drainages with several smaller drainages contained within it.

Human Sources of Ignition: Numerous human ignition sources exist including fuelwood heating in homes, campfires on private and public lands, and overhead power lines. Firewood cutting activities and vehicles parked on vegetated areas also pose ignition sources. Hot Springs Road carries most tourists past the neighborhood to Grover's Hot Springs State Park providing a significant ignition risk, though no tourist

destinations are actually in the neighborhood. A small number of visitors drive through the neighborhood to Pleasant Valley to the south of the neighborhood.

Community Preparedness: Building construction is primarily wood frame with wood siding and composition roof. Decks are common and not enclosed, some have significant material stored underneath, providing an excellent place for embers to ignite a home. Building density is fairly low with approximately 80 homes on 1/2 acre lots. Defensible space varies by owner with approximately 50% compliant with the 30' clearance requirement. Tree density is too high with many homes having one or more trees within the defensible space perimeter. An aging hydrant system supplies water for fire protection resources. The system has one 238,000-gallon tank and the nearest draft site is within one quarter mile. Eastern Alpine Fire and Rescue Station 92 is within one quarter mile and can respond in less than five minutes if volunteers are available. The USFS station is three miles away at Turtle Rock Park and is staffed with wildland engines in the summer. No predefined safe zones have been identified and no natural areas exist near the neighborhood. With some treatment, an area above the subdivision may be useable as a safe zone.

Evacuation issues are critical. All roads in the subdivision are dead-ends with the exception of Timber Lane. There is one route for access/egress from the subdivision over a bridge at the bottom of Pleasant Valley Road. Once on Hot Springs Road, there is only one way out to Markleeville. Power lines cross over the road in numerous locations. To the south of the subdivision is a dirt road to Pleasant Valley, however it is also a dead end. Should



Hot Springs Road, the dead-end primary access route for residents of Markleevillage and Shay Creek

a fire event start between this neighborhood and Markleeville, egress from the area would be cut off. Further, the small double lane road leading out of the neighborhood will be quickly clogged with traffic during a fire event.

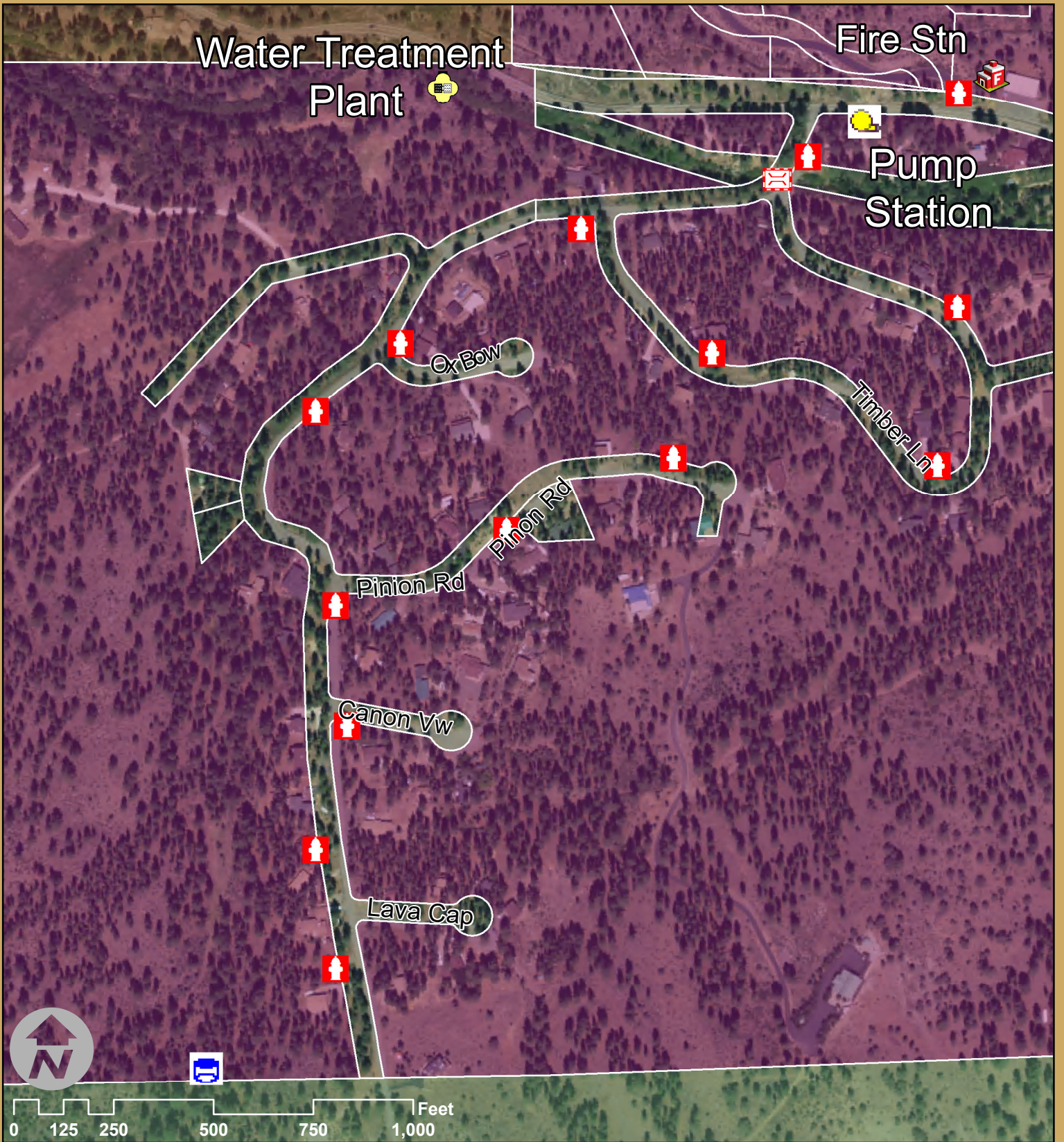


Figure 24: Markleevillage / Thornburg Subdivision Neighborhood

Land Ownership (Non-Private)

- | | | | |
|---------------|----------------|----------|-----------------|
| Alpine County | State Property | bridge | Pump Station |
| BIA | USFS | fstation | Water Treatment |
| BLM | Utility | hydrant | Water Tank |

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3. Shay Creek Subdivision

Rating: High

Fuels: The entire subdivision is surrounded by fuel model 5 (brush) and 10 (timber) fuels of Jeffrey pine and fir with variable density. Beginning in 1990, the USFS conducted three fuel reduction projects on forest lands adjacent to the subdivision (overstory thinning, understory removal, burning, chipping). Approximately 300 acres have been treated. These projects provide a margin of lower density fuels one quarter to one half mile wide along the subdivision/forest boundary. The homeowners association has also hired Nevada Division of Forestry crews to complete some fuels projects on the private land common areas. The remainder of adjacent interface exposure is privately owned or Grover’s Hot Springs State Park (GHSSP). Fuel loads on these lands vary from light to heavy.



Shay Creek timber stands

Weather: Prevailing winds from the southwest and west blow from adjacent forested lands.

Topography: Shay Creek Subdivision occupies a north-facing slope of low to steep slopes. The west end of the subdivision sits near a rolling meadow at GHSSP. Several small drainages run through the subdivision.

Human Sources of Ignition: Numerous ignition sources exist in the Shay Creek neighborhood due to



Shay Creek Road

the seasonal residency and surrounding recreational population base. These include campfires, propane lanterns, cook stoves, generators from the campground at GHSSP. Most homes in the Shay Creek neighborhood use fuelwood heating and are of a more flammable construction. Other ignition sources are firewood cutting activities and overhead power lines.

Community Preparedness: Building materials are similar to Markleevillage, though more cabin-like in nature. Many homes have been updated with metal or composite roofs. Siding, decks and eaves still are older, often untreated wood. Building density is moderate with structures on ¼ acre lots. Some residents have done a good job of reducing and removing ground fuels, including pine needles. Tree stand density is still too high with a contiguous canopy in places.

Community Design: Access and egress is very poor, with roads that are steep, single lane, and winding, particularly in the southern portion of the neighborhood. As two vehicles can barely pass, fire apparatus have limited ability to function. Portions of the neighborhood have a loop road with two exits, but some areas dead-end with no turnaround. Roads do not meet county standards for fire equipment. Once out on Hot Springs Road, a single two-lane road leads to Markleeville and ends at the State Park. This is the only route out of the neighborhood to Markleeville. There is a single bridge crossing out of the neighborhood and multiple overhead powerlines within and out of the neighborhood.

Fire Suppression Resources: Eastern Alpine Fire and Rescue Station 92 is two miles away and can respond in 10 to 15 minutes if volunteers are available. A small (1 1/2") seasonal hydrant system provides water for fire suppression. Draft sites exist at the Hot Springs pool, and within one mile at the Hot Springs Creek Bridge. No predefined safety zones exist, however the large meadow in the state park could be used depending upon the condition of the grass.

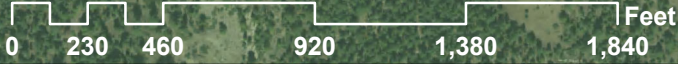


Figure 25: Shay Creek Neighborhood

Land Ownership (Non-Private)

- | | | | |
|---------------|----------------|----------|--------------|
| Alpine County | State Property | Fire Stn | Water Tank |
| BIA | USFS | Hydrant | Pump Station |
| BLM | Utility | Bridge | |

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4. Carson Ridge Subdivision

Rating: Medium

Fuels: The Carson Ridge Subdivision sits entirely within medium to high density fuel model 5 (brush) and 10 (timber) fuels of Jeffrey pine, sagebrush, and bitter brush. A small BLM fuels reduction project in 2002 thinned timber on 40 acres on the western boundary. Private lands abut the remainder of the subdivision and show similar fuel types and loading. Below the ridgeline, large open areas of low sage and scattered pinion juniper trees create lower fuel loadings.



A typical parcel in the largely undeveloped Carson Ridge subdivision

Weather: Prevailing southwest winds blow across the Markleevillage/Thornburg Subdivision before reaching the Carson Ridge Subdivision. Westerly winds blow down-canyon from the Hot Springs Valley and GHSSP.

Topography: The subdivision lies on a south-facing slope of moderate to steep angle, traversed by a low to moderate angle bench. Hot Springs Creek follows the southern boundary and several small drainages run through the subdivision.

Human Sources of Ignition: The subdivision currently has two homes with occupants. Power is underground. Heavy equipment use during construction has been a source of past ignitions. One likely source of ignition is traffic on Hot Springs Road.

Community Preparedness: Defensible space assessments and treatments apply primarily to the infrastructure and are adequate. The roads are wide enough and fuels surrounding the roads light enough to allow for easy access and fire suppression.

Community Design: Roads within the subdivision meet the county standard for fire protection and would allow two fire apparatus to pass during a fire event. Turnarounds do not meet standard but would likely allow fire apparatus to turn around. There is a gated dirt road at the top of the subdivision that would allow egress during a fire event, but it is locked. Both roads exit onto Hot Springs Road, the only access into Markleeville.

Fire Protection Resources: A hydrant system with its own 60,000-gallon water tank serves the subdivision. A draft site is within two miles. Eastern Alpine Fire and Rescue Station 92 is at the main entrance to the subdivision.

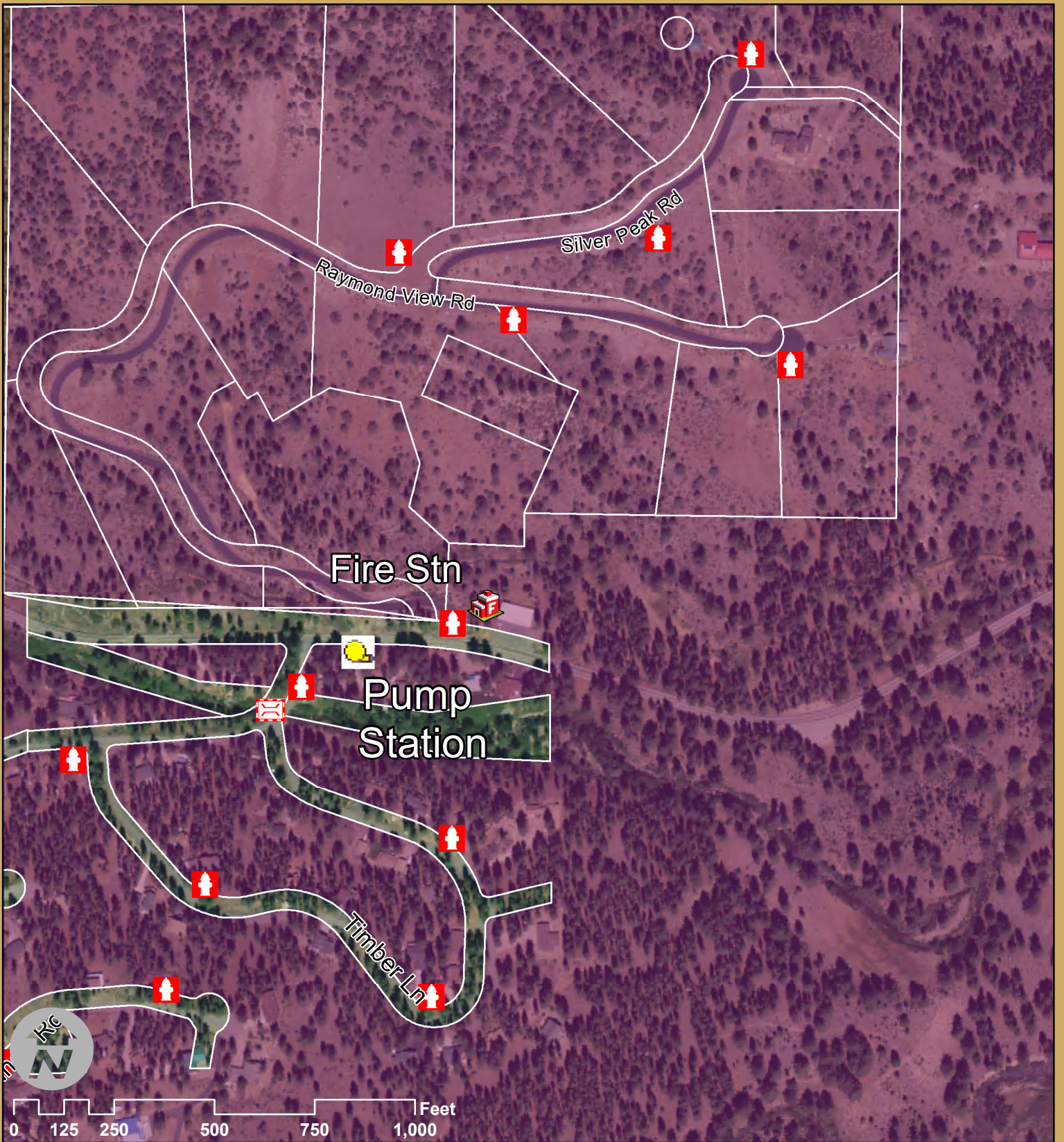


Figure 26: Carson Ridge Neighborhood

Land Ownership (Non-Private)

- | | | | |
|---------------|----------------|--------------|---------|
| Alpine County | State Property | Pump Stn | Hydrant |
| BIA | USFS | Bridge | |
| BLM | Utility | Fire Station | |

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8B. Action Plan – Markleeville

8.1 Desired Future Conditions

1. Reduced threat to residents and their property from wildfires.
2. Increased community preparedness for wildfire.
3. Improved forest health.

8.2 Mitigation Goals and Responsibilities

Goals:

Initiate long term planning for vegetation: species types, density, and maximum brush height for the Markleeville Planning Area.

Objectives:

Determine strategies for vegetation management, prescriptions, fuels reduction, and maintenance.

Responsibilities

Homeowners:

For the entire Markleeville Planning Area

- 1. Replace flammable roofing materials with fire-resistant materials.**
2. Provide a minimum 100' defensible space around all structures.

For Markleevillage/Thornburg Subdivisions

- 1. Thin overstory and clear brush to create effective defensible space.**
2. Develop an alternative evacuation route out of the subdivision on Timber Lane

For Shay Creek Subdivision

- 1. Develop a neighborhood evacuation guide to educate residents and those staying in the homes about evacuation procedures.**
2. Widen roads and provide turnouts and turnarounds for fire apparatus.

Eastern Alpine Fire and Rescue:

- 1. Assist in developing a community evacuation plan for the Hot Springs Corridor.**
2. Insist upon and participate in an annual pre-fire season tabletop exercise with the Alpine County Sheriff's Office, Eastern Alpine Fire and Rescue, CAL FIRE, and USFS to develop a coordinated agency response to a wildfire incident. Topics should include communications, training, and equipment resources
3. Continue to purchase wildland firefighting equipment and train volunteers to the NWCG 310-1 certification levels.

Alpine County Sheriff's Office:

1. **Participate in an annual, pre-fire season tabletop exercise with the Eastern Alpine Fire and Rescue, CAL FIRE, and USFS to develop a coordinated agency response to a wildfire incident. Topics should include communications, training, and equipment resources.**
2. Assist in developing a community evacuation plan for the Hot Springs Corridor.

Alpine County Board of Supervisors:

1. **Enforce existing defensible space ordinances by creating and filling a County Fire Marshal position.**
2. Ensure the emergency services agencies are addressing the public safety issues outlined in this plan.
3. Support use of curbside chipping in local fuels reduction projects.
4. Pursue and enforce legislation, ordinances, or other codes to eliminate wildland fuel hazards within the communities.
5. Lobby federal agencies to implement fuels reduction projects on public lands surrounding communities.
6. Support community efforts to increase water supply and distribution.
7. Expand Solutions for Community Fuels Disposal - The Community Biomass Pile, coordinated by the Alpine County Community Development Department, is a success. Every fall and spring, tons of biomass material is cleared from lots in the community. This results in a reduction of fuels in our neighborhoods. This opportunity should be continued. Solutions for fuels reduction within the community during times other than when the burn pile is available should be explored in concert with the Alpine Fire Safe Council.

Alpine Fire Safe Council:

1. **Explore and facilitate community fuels reduction projects. Assist the Alpine County Board of Supervisors as requested with development of fuels reduction solutions.**
2. Establish system for monitoring and maintaining fuel reduction projects.
3. Continue to provide public education information on defensible space at County buildings.
4. Actively support the efforts of the local fire departments and other emergency services in mitigating wildfire risk.

Utilities (power and water):

1. **Remove or chip fuels from underneath power lines and power poles.**
2. Liberty Utilities should provide a local power shut-off, including necessary training for the Eastern Alpine Fire and Rescue and Alpine County Sheriff.
3. Update existing water utilities and increase storage capacity. Replace water system with year-round, larger lined system. Maintain clearly- marked potable and non-potable water sources.

8.3 Mitigation Projects

The USFS has conducted fuels reduction projects around the Markleevillage area in recent years. This year, 2017, a project funded by the Alpine Watershed Group, the Sierra Nevada Conservancy, Alpine County and the Alpine Fire Safe Council, completed mastication on USFS lands at the upper end of Pleasant Valley Road and around the Markleevillage subdivision.

Past fuels reduction has occurred west of Shay Creek and north of Hot Springs road. In these projects, fuels have been treated using the hand thin, cut, pile, and burn method. It is labor intensive, requiring a hand crew to use chainsaws and hand tools to remove fuels and pile them for burning. After fire season, the piles are burned. The areas are treated by opening pockets within the continuous fuel beds, breaking up the canopy. In this method, the entire area is not treated, rather small areas are treated so that they might slow the spread of a wildfire and allow an anchor point for hand crews during a fire event.

In addition to completed projects, the USFS and BLM are seeking to identify future fuels reduction projects. Most of these projects are continued maintenance of previous fuels reduction work. It is imperative that treatments on USFS lands are identified in concert with the proposed fuels projects on private lands to effectively mitigate the wildfire risk to these communities. All past fuels projects should be reviewed in the field by representatives of all concerned fire agencies to evaluate the potential effectiveness of completed and proposed projects.

8.4 Actions

The following summary of projects has been developed for the Markleeville Planning Area. They are intended to provide the background information necessary for grant development and funding. Where possible they are identified on the project maps, Figures 26-27.

| <i>Priority</i> | <i>Name</i> | <i>Acreage</i> | <i>Estimated Cost</i> |
|-----------------|--|----------------|-----------------------|
| 1 | Roadway and Utility Access Treatment | 31 | \$96,000 |
| 2 | Develop and implement an Evacuation Plan for the Hot Springs Road Corridor. Explore the feasibility of Alternative Evacuation Routes and Community Safety Zones. | n/a | \$15,000 |
| 3 | Private Land Fire and Forest Health Co-op | 392 | \$804,000 |
| 4 | Residential Lot Treatment | 50 | \$315,000 |
| 5 | Create Alternative Evacuation Routes study | n/a | \$5,000 |
| 6 | Update Markleeville Pre-Attack Plan | n/a | \$5,000 |

PROJECT 1: Roadway and Utility Access Treatment

Description and Location: Reduce the fuels along Hot Springs Road and along the power line corridor from Markleeville to Shay Creek.

Objective: To ensure Hot Springs Road is passable for evacuation during a fire event. To limit the risk of power poles burning during a fire event or igniting a fire should a power line fall to the ground.

Vegetative condition and topography: Along Hot Springs Road from Markleeville to Markleevillage, trees and brush grow right to the edge of the roadway. Tree density is thick, with the stand overstocked. Bitterbrush and sage are 4-6 feet tall in the understory and are close to the roadway edge. Next to the road, slopes are < 30% but drop off sharply 10-30 feet from the road edge. Trees grow very close to the power lines, sometimes into them, and there is no cleared area at the base of the poles.

Prescription for treatment: Next to the roadway, trees and brush need to be removed so that flames cannot be blown across the road. Within 100 feet of the road centerline, tree density needs to be thinned from below to a stocking level of 100 square feet per acre of basal area. Residual trees (those that remain) should have a canopy spacing of at least 1 ½ times the size of the canopy. Trees under or impinging on the power lines should be removed. Trees can be removed as firewood, with the slash and other material to be chipped.

Brush must also be removed along the roadway. Acceptable methods of treatment would include cutting and chipping the material or using mechanical mastication where appropriate. Within 100 feet of the road, individual plants should be thinned to a spacing of 1 ½ times the height of the remaining plants (i.e. plants 3 feet tall should be 4 ½ feet apart). Power poles should be cleared for a radius of 30 feet around the poles, removing trees and brush.

Estimated cost: \$3,000 per acre X 32 acres = **\$96,000**

Expected completion time: This project should be completed within one field season.
Environmental Compliance: Within the utility right of way, environmental compliance may already be completed with the construction and maintenance of the lines. On the private land, simple cultural resource surveys would be required, and mitigation measured used during project implementation. On USFS, BLM, and county land, some level NEPA and CEQA compliance will be necessary, but should be limited given the small size of the projects and the proposed treatment methods.

Ownership and Partners: A variety of partners will need to be incorporated for successful project completion. The proposed treatment crosses four private properties. CAL FIRE would be involved with treatment on these parcels. A small portion of USFS and BLM land may also be affected. Alpine County has jurisdiction over right-of-way maintenance for the county road and Liberty Utilities holds the right-of-way for the utility lines.

Note: In 2005, the Alpine Fire Safe Council received grant funds to carry out this project. While Liberty Utilities was able to complete their portion of the project, lack of cooperation from the primary landowners along Hot Springs Road resulted in a premature termination of the project and forfeiture of the grant funds. The primary objective (securing safe public access during a wildfire) was not met and remains to be completed.

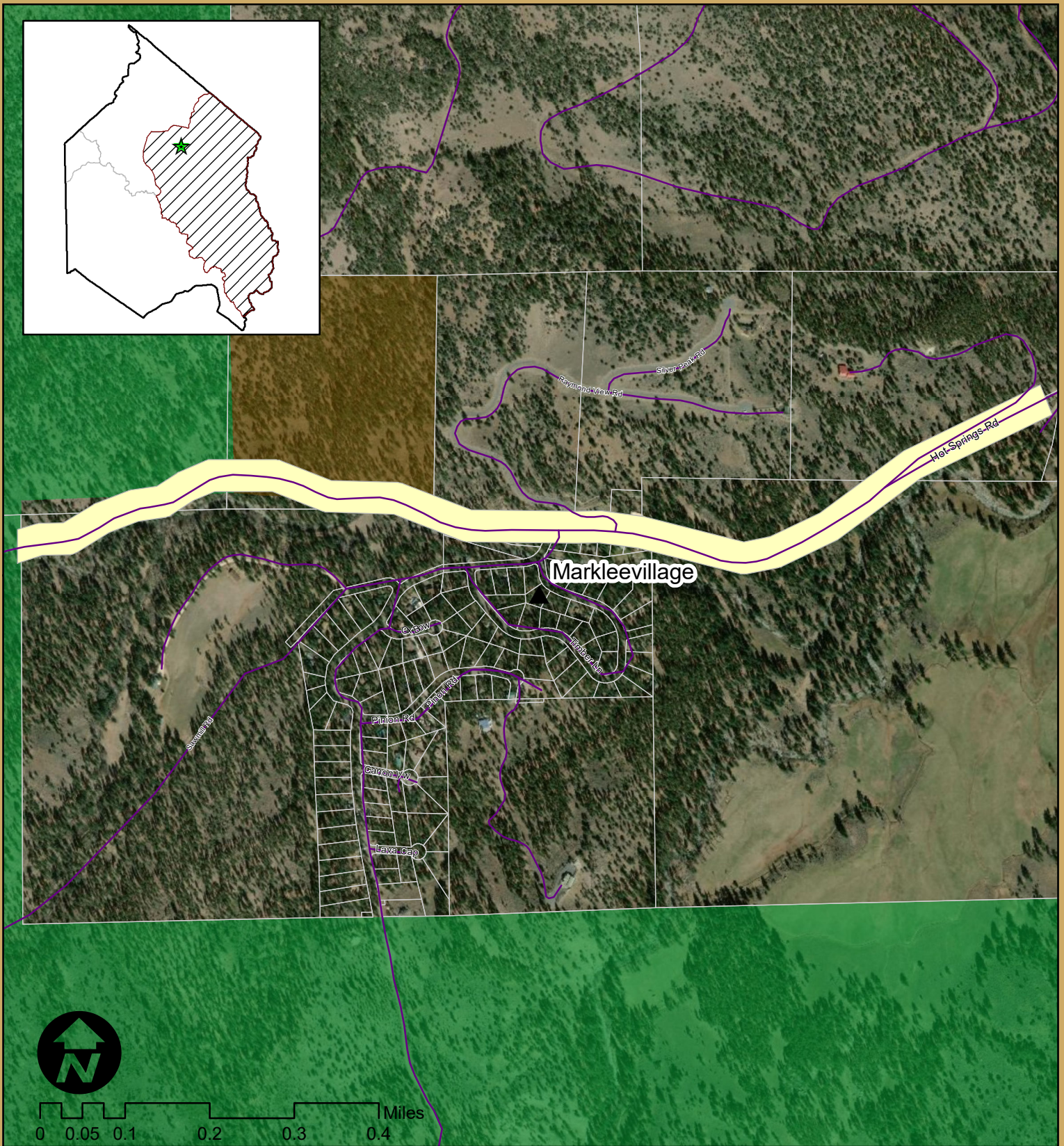


Figure 27: Markleeville Project 1 - Roadway and Utility Access Treatment

- Proposed Project
- Communities
- Parcels
- Streets
- Land Ownership Non-Private**
- BLM
- USFS

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PROJECT 2: Hot Springs Road Corridor Evacuation Plan

Goal: Develop clear and concise information for an orderly response and evacuation to a major wildfire threatening the Hot Springs Road Corridor.

Description and Location: Create an evacuation plan that allows Alpine County Sheriff's Office, Eastern Alpine Fire and Rescue, the USFS, other agencies and the residents pre-plan for an evacuation event along the Hot Springs Road Corridor. Distribute relevant packets to visitors, residents, and emergency response agencies.

Current conditions:

Hot Springs Road provides the only egress from the neighborhoods during an evacuation. During a wildfire event, this route will quickly become congested with fire and emergency personnel responding to an event and residents evacuating from the area. It is a two-lane road from Markleeville all the way to Grover's Hot Springs State Park with small neighborhood roads intersecting it at various locations. Fuels are moderate to heavy on both sides of the road, especially between Pleasant Valley Road and Markleeville. With the high amount of anticipated traffic during a fire event and the fuel loadings on either side, it is imperative that evacuation operations be as orderly and efficient as possible to ensure continued operation of the road throughout a fire event.

Proposed Project:

An evacuation plan will be developed to outline roles, responsibilities, and operations of an evacuation during a fire event. The plan should include the following elements:

- Identification of agencies involved in an event
- Operational plan of how an evacuation would be conducted based on 3 general events and conditions
- Identification of agency responsible for evacuation order
- Identification of tasks necessary to carry out evacuation and agency responsible for each task
- Outline of how evacuation order and operations will be integrated into Incident Command structure
- Pre-incident instructions / plans provided to each agency on the plan operations and their roles
- Pre-incident instruction provided to the homeowners / residents on evacuation procedures and preparation
- Outline of communication with tourist population, in both campgrounds and in season homes, on evacuation procedures and operations

The plan should also include a requirement for annual meetings with responsible agencies and residents (2 separate meetings) to review the evacuation procedures and prepare for the upcoming wildland fire season.

Cost: The estimated cost to compile this plan is \$15000

PROJECT 3: Private Land Fire and Forest Health Co-op

Description and Location: Develop a coordinated fuels reduction and forest health plan for the large landowners surrounding the Markleevillage and Carson Ridge Subdivisions

Vegetative Condition and Topography: Forests on private land around the Markleevillage subdivision are typically overstocked, with mortality in some areas. The understories have significant amounts of brush and other ladder fuels. Previously treated areas are in need of retreatment. Slopes range from flat meadows to steep south-facing aspects.

Prescription for Treatment: Establish a coordinated effort to develop a single forest management prescription for fuels reduction and forest health is necessary and cost effective. Each landowner could have their own Forest Management Plan developed, specific to their property, but doing so in concert with surrounding landowners will make environmental compliance more cost effective and ensure that treatment prescriptions are consistent across ownerships.

Fuels reduction should be accomplished with the following prescription:
Thin stands from below (remove smaller trees, keep the larger ones) to a basal area of 100 square feet per acre. Trees can be removed as fuelwood, with the slash and other debris chipped. Brush should be reduced so that individual plants are thinned to a spacing of 1 ½ times the height of the remaining plants (i.e. plants 3 feet tall should be 4 ½ feet apart). Where appropriate, mechanical mastication could be employed to reduce brush and chip slash on site.

Estimated Cost: Should the landowners wish to complete a collective plan, the cost is estimated at \$50 per acre for the plan and environmental compliance for projects. If the landowners do not want to collectively address these issues, each will have to pay a similar cost for project preparation on individual projects.

Specific treatments would include hand crews, mechanical thinning, and mastication. An average treatment cost of \$2000 per acre is assumed.

392 acres X \$50 per acre = **\$19,600**
392 acres X \$2,000 per acre = **\$784,000**
Total project cost: **\$803,600**

Estimated time to complete: Six months to get the landowner agreements and common elements of the forest management plan developed. Treatment would occur on an annual basis after that, having the entire area treated within four years.

Environmental Compliance: Development of the coordinated forest management plan should have little environmental compliance steps. Implementation of the prescriptions and projects in the plan would involve cultural resource surveys and operational mitigation measures. Tree removal from private lands is exempt from the Forest Practices

Act if the material is not sold, bartered, exchanged or traded as per California Public Resource Code 4527. Otherwise, the appropriate tree harvesting document must be filed at no charge with CAL FIRE. Depending on the document required (i.e. Timber Harvesting Plan, or some form of harvesting exemption notice), the document must be prepared by a California Registered Professional Forester and the document also signed by and the material harvested by a Licensed Timber Operator. These requirements must be met even when removing trees from within 150 feet of any structures. These requirements are triggered any time native commercial tree species are planned for commercial harvest from non-federal lands anywhere in California.

With a combined effort, costs for environmental compliance might be a little less than each landowner pursuing compliance individually.

Owners and Partners: The private landowners involved would be the primary partners. The Alpine Fire Safe Council or Alpine Resource Conservation District could facilitate plan development and provide technical and project management assistance to the landowners. CAL FIRE has regulatory authority for the harvesting of native commercial tree species on these lands.

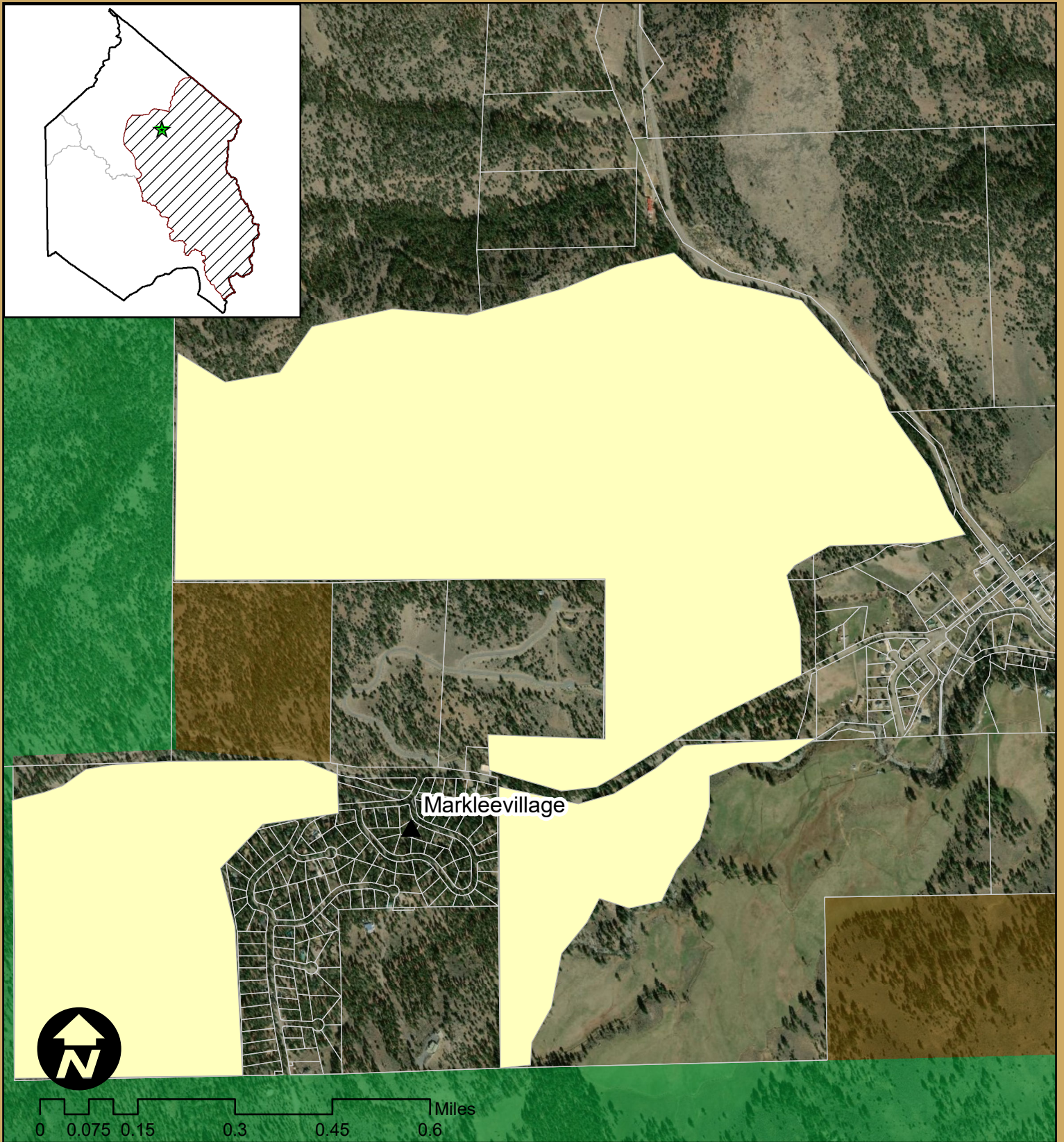







Figure 28: Markleeville Project 3 - Private Land Forest Health Co-op

-  Proposed Project
-  Communities
-  Parcels
- Land Ownership Non-Private**
-  BLM
-  USFS

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PROJECT 4: Residential Lot Treatment – Markleevillage Planning Area

Description and Location: Develop a neighborhood centric fuels reduction program within the Markleevillage Planning Area neighborhoods.

Vegetative Condition and Topography: The forest stand within the Markleevillage and Shay Creek subdivisions are over stocked. Trees are stressed from competition and from residential development. Forest health is declining, with an increase in mistletoe and beetle-infested trees. In many cases, individual or groups of trees are too close to residential structures for effective defensible space during a fire event. A fire could easily move through the neighborhood or, more likely, be carried from an ignition within the neighborhood (such as a house fire to the surrounding wildland fuels.)

The area has steep slopes, but the residential development allows for good access through most of the subdivision.

Prescription for Treatment: Establish a neighborhood fuels treatment program to help homeowners remove excess fuels and maintain areas with good fuels clearance. This program would have a number of elements to the various needs of the neighborhood.

Curbside chipping program – Hire a contractor or tree service to provide curbside chipper services in the neighborhood. Like similar programs, residents could either set material at the curb to be chipped and hauled away on certain days or could call to schedule an appointment for chipping. Material would be disposed of by the contractor. Residents would be responsible for hauling approved chipping material to the side of the road for disposal.

Tree Removal – Hire a tree service to remove trees near houses. The general prescription across the community would be to create defensible space around the homes and thin the forest stand from below, removing the smaller, suppressed trees. A professional tree service could remove trees without damaging homes and dispose of the slash material by chipping and hauling. Any firewood produced could be provided to the homeowners.

Estimated Cost: It is difficult to estimate the cost of these programs since they are dictated by the amount of public participating in the program. For the curbside chipping program, assuming that a contractor would charge approximately \$1000 per day to go to each of the neighborhoods and the service was available for 15 separate days throughout the summer season, the cost would be \$15,000. For tree removal, assuming 50 homes participated (approximately 50% of the total homes) and that on average a contractor charged \$1200 per tree with 5 trees per lot, the total would be \$300,000. It would vary by lot, where larger trees right next to houses would drive the cost up.

Total project cost: \$15,000 + \$300,000 = **\$315,000.**

Estimated Time to Complete: This project should operate for at least two years. It will take time for the community to become comfortable with the prescription and treatment.

Environmental Compliance: Environmental compliance should be minimal with these treatment methods. The curbside chipping will require no compliance as the homeowners will be doing the work. Tree removal from private lands is exempt from the Forest Practices Act if the material is not sold, bartered, exchanged or traded as per California Public Resource Code 4527. Otherwise, the appropriate tree harvesting document must be filed at no charge with CAL FIRE. Depending on the document required (i.e. Timber Harvesting Plan, or some form of harvesting exemption notice), the document must be prepared by a California Registered Professional Forester and the document also signed by and the material harvested by a Licensed Timber Operator. These requirements must be met even when removing trees from within 150 feet of any structures. These requirements are triggered any time native commercial tree species are planned for commercial harvest from non-federal lands anywhere in California.

Other Partners: A number of potential organizations or agencies could participate in this program. The Alpine Fire Safe Council has coordinated these types of projects in the past, however a county department, such as the fire department would also be an excellent choice for taking the lead on implementation. Regardless of who takes the lead, the Fire Safe Council, CAL FIRE, fire departments, homeowners groups, and community groups will be instrumental in project implementation. A concerted community effort to educate the public about these programs and the need to create defensible space will increase participation.

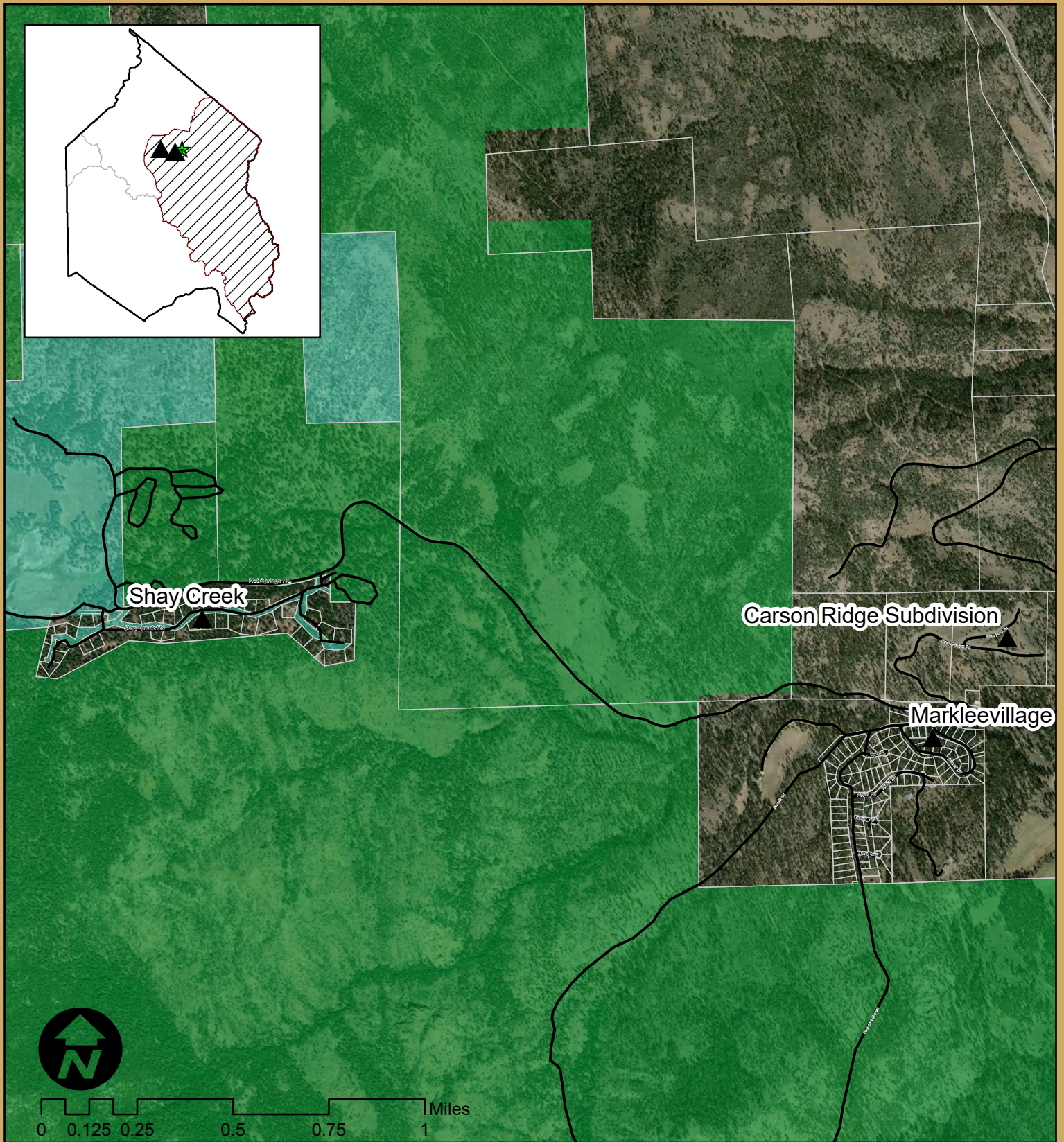


Figure 29: Markleeville Project 4 - Residential Area Treatment

- ▲ Communities
- Alpine Streets
- Streets
- Parcels

Land Ownership Non-Private

- State
- USFS

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PROJECT 5: Create Alternative Evacuation Routes

Description and Location: Develop alternative evacuation routes within or near all neighborhoods between Markleeville and Shay Creek. Ensure all agencies are aware of these zones and educate the public on their use

Current conditions:

Safety Zones – Hot Springs road provides the only egress from the neighborhoods during an evacuation. Should this route become blocked, there are no designated community safety zones in the neighborhoods between Markleeville and Shay Creek. Natural openings exist, such as the Thornburg meadow and the meadow at Grover’s Hot Springs, but unless the grass in these areas is reduced during the fire season, they cannot be counted upon during a fire event. Other potential sites for safety zones exist but will require some vegetative treatment. There is no educational material to let the public, particularly the tourist population, know where safety zones might be.

Alternative Access – In the Shay Creek neighborhood, some roads dead-end. Hot Springs Road is the only access / egress to these neighborhoods. Alternative routes are necessary to provide a secondary means of evacuation.

Proposed Project: Safety zones and alternative evacuation routes should be established. Potential safety zone sites should be identified and evaluated for feasibility during a fire event. Contact must be made with the landowner regarding use of the site as a safety zone and how access would be allowed. Specific vegetative treatments in these zones should be defined and provided to the landowner to achieve the necessary vegetative treatment prior to fire season. Where possible, safety zones should be created within existing public right of ways and on public land. The final list of potential safety zones needs to be compiled in the Alpine County Emergency Operation Plan (EOP) and Field Operation Guide (FOG) manuals, as well as provided to the public through educational material. Information also needs to be provided to tourists visiting the State Park.

Alternative Access Research:

Shay Creek – Evaluate the feasibility of connecting the dead-end road at the end of “C” loop with the State Park access road to the hot springs. This would provide another critical access to this neighborhood.

Markleevillage – Timber Lane Egress – Discuss with the private landowners east of Markleevillage the possibility of developing a fire access road from Markleevillage off Timber Lane to the meadow south of Markleeville. Access would be gated, available only during a fire event. This would provide a route to the meadow as a safety zone, people would not be able to get all the way to Markleeville. The access would require a bridge to cross Hot Springs Creek to reach the meadow. If the landowner is willing, evaluate the feasibility and estimate the cost to develop this alternative route. Figure 28 outlines this route.

Hot Springs Road / Carson Ridge Subdivision – Discuss with the private landowner north and east of the Carson Ridge Subdivision the possibility of developing an alternative fire access road from the Carson Ridge Subdivision to State Highway 89 north of Markleeville. Dirt roads have connected these areas in the past. If the landowner is willing, evaluate the feasibility and estimate the cost to develop this alternative route. This route, in concert with the Hot Springs Road, could allow for one-way traffic in (fire engines) and Hot Springs Road could allow one-way traffic out.

Estimated Cost: Landowner and agency cooperation will determine the feasibility of these proposed projects. Once the scope of work is determined, a project or projects can be outlined, and the costs estimated. The estimated cost for the feasibility study is \$5,000.

Estimated time to complete: Landowner contacts, brief field research, and a basic report with letters of agreement could be completed within three months. This portion of the project cannot last more than one year.

Environmental Compliance: None for this project. Environmental compliance on new access construction could be significant.

Responsible Parties: Alpine County as the local public safety agency must be the project lead. The Sheriff's Office, Eastern Alpine Fire and Rescue, or Community Development department would all be appropriate departments to head this project. The Alpine Fire Safe Council could facilitate the project.

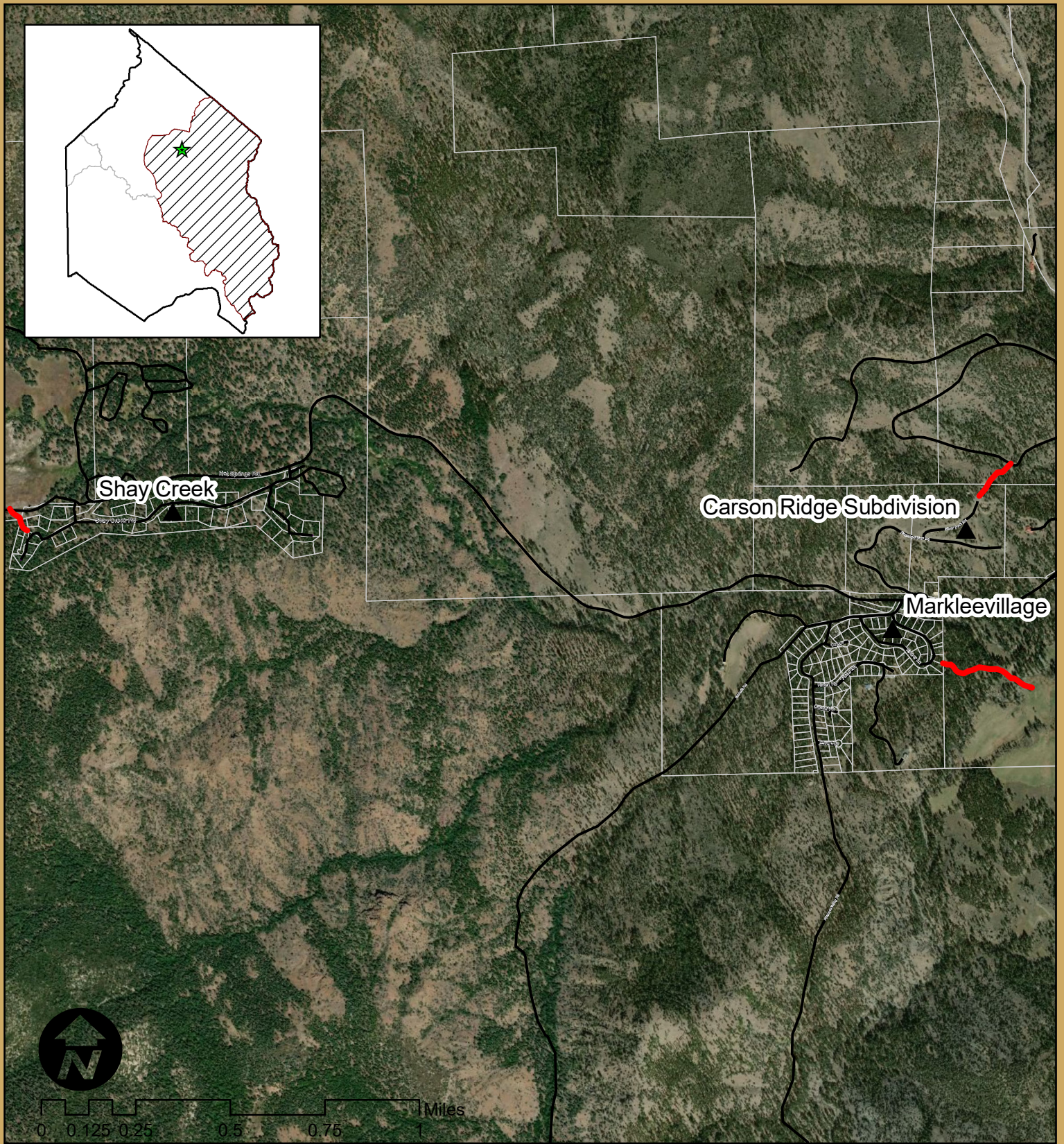


Figure 30: Markleeville Project 5 - Proposed Evacuation Routes

▲ Communities

— AlpineStreets

— Roads

□ Parcels

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PROJECT 6: Update the Markleeville Pre-Attack Plan

Goal: Update the current CALFIRE Pre-Attack plan developed for the Markleeville communities after the Washington Fire. Ensure all affected agencies are aware of the plan and conduct annual tabletop exercise to coordinate incident response.

Description and Location: A Pre Attack Plan was developed for the Markleeville communities at the conclusion of the Washington Fire. The response data collected during the fire event allowed CALFIRE to complete a large two sided document outlining the communities, available resources, and coordinated response. This plan was a good first step in developing a full Pre-Attack plan, but it needs to be further updated with local agency information and briefed on an annual basis to ensure the conditions and details still accurate.

Current conditions:

The current Pre-Attack Plan has a significant amount of details regarding fire suppression resources, utility infrastructure, and fuel conditions around the Markleeville area. The plan includes Operational Guidelines, Community Specifics and Tactical Considerations for a wildfire incident. The maps locate fire hydrants, tanks, power lines, structures, potential command post locations, and fuel breaks.

Proposed Project:

The proposed update will validate the existing data on the plan and capture any updates to infrastructure, completed fuel treatments, and operational considerations. Once the plan has been updated, the affected agencies will meet to review the plan and understand how it can assist in creating a coordinated response by all agencies to a large fire event.

Cost: The estimated cost to compile this plan is \$5,000

5C. Communities – Bear Valley

5.1 General Environmental Conditions

The Bear Valley neighborhoods lie on south facing slopes above a large meadow near the headwaters of the Stanislaus River. The Stanislaus National Forest surrounds the Planning Area and exhibits the well-timbered characteristics of the upper elevations of the west slope of the Sierras. Wildland fuels are present throughout the neighborhoods.

The neighborhoods in the Bear Valley Planning Area are:

- Old Subdivision
- New Subdivision
- Sherman Acres

5.1.1 Elevation

Figure 30 shows the location of the subdivisions, north of Highway 4. The communities sit near 7,000 feet on south facing slopes and drainages below Bloods Ridge and Bear Top. The terrain along the Highway 4 corridor is steep to the north and relatively flat to the south.

5.1.2 Meteorology, Climate, Precipitation

Bear Valley receives heavy winter snows. Most of the precipitation occurs during the winter months. Summer high temperatures reach the mid-eighties, with relative humidities as low as the single digits.

5.1.3 Threatened and Endangered Habitat Type

There are a number of ecologically sensitive areas and wildlife habitat. After considering the threat to life and property, projects should be considered in how they address these areas. California Fish & Wildlife and the U.S. Fish and Wildlife Service have information on Threatened and Endangered Species in the Bear Valley Planning Area. Bald eagles and mountain yellow-legged frogs are some of the threatened or endangered species that inhabit the forest and lakes within the Planning Area. The USFS has found no threatened or endangered species within their projects. Surveys or mitigation measures for threatened or endangered species should be implemented prior to project initiation.

5.2 Population and Demographics

The year-round population in the Bear Valley Planning Area is fairly small, typically around 150 people. Primarily a “second home community,” seasonal attractions bring a significantly higher number of people to the area. During the summer months, large numbers of visitors use the campgrounds, lakes and trails in the area. The Bear Valley Music Festival brings 6,000 visitors to the area during a two-week period in late July/early August. During the winter, vehicle traffic is high with visitors arriving in the area for winter sports at the Bear Valley Resort, Bear Valley Cross Country, and the snow parks at Lake Alpine and Spicer Reservoir.

5.3 Infrastructure

As a rural, sparsely populated area, Bear Valley has relatively little infrastructure at risk from wildfire. But the loss of only a few key facilities can have a big impact.

Key facilities found in the Bear Valley area include: the Library (Health and Community Services Center), the Bear Valley School, the Perry Walther Community Center, Bear Valley Resort, the P.G. & E. substation, the sewage treatment plant, the water treatment plant, the A.T. & T. phone switching station and the Bear Valley Public Safety Department. Some of these facilities will be critical to an effective local response to a wildland incident. The key facilities are shown on individual neighborhood maps.



Bear Valley Library

Firefighting water supply comes from hydrants (New subdivision,) standpipes (Old subdivision,) and draft sites (Bear Lake, Lake Alpine, and the pool at Bear Valley Lodge). Sherman Acres subdivision has no hydrants; water for fire suppression is drawn from a few standpipes and directly from the water tanks.

Development potential has significantly increased in recent years. In a county with only a few new buildings a year, a single subdivision can be a significant impact. Recent land purchases by development interests ensure this trend will continue at an even faster pace. A planned ski lift from the Village to the Bear Valley Resort will likely increase tourist visits and parking within the Village.

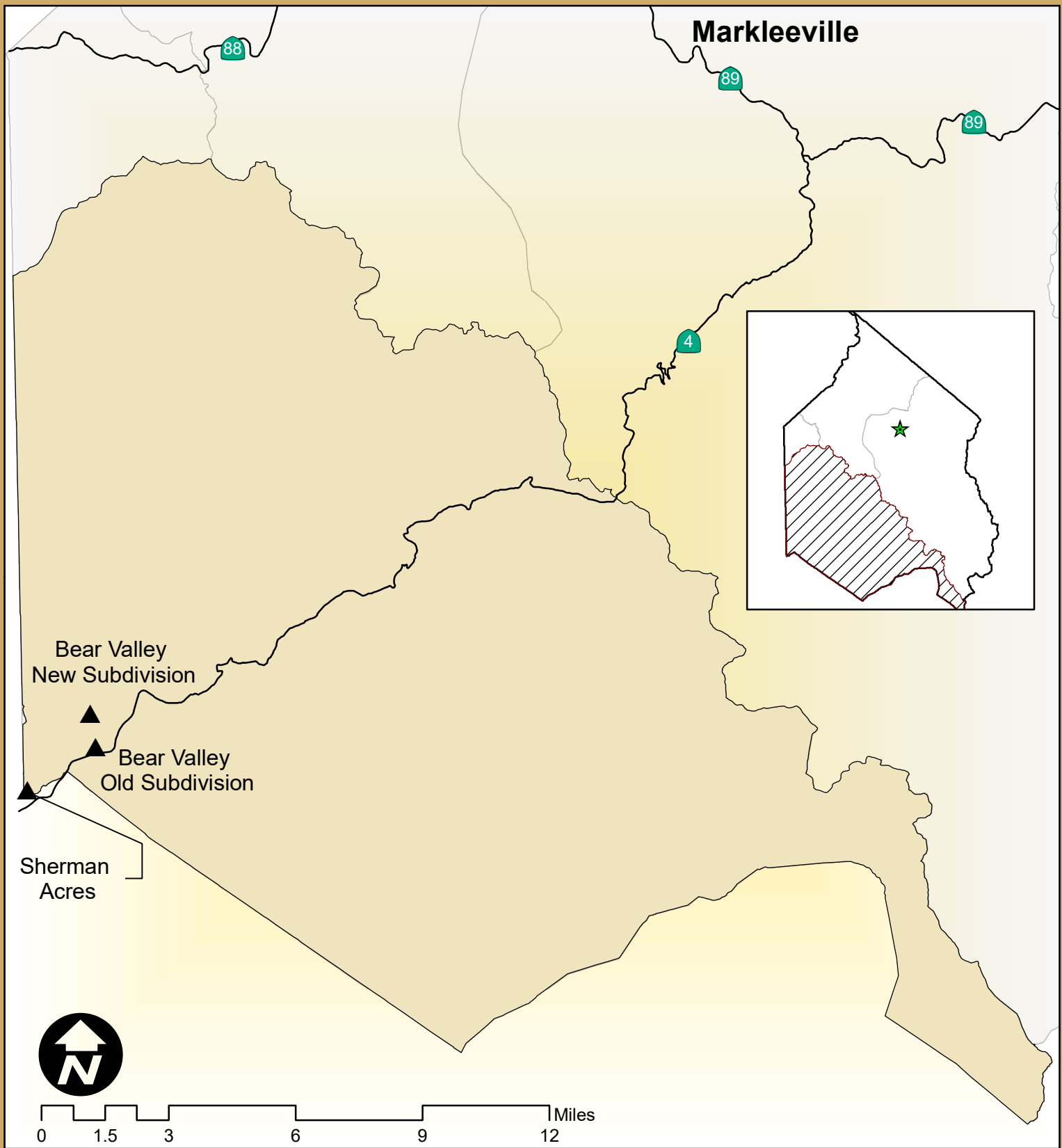


Figure 31: Bear Valley Planning Area

- ▲ Communities
- ★ County Seat
- State Highways

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- Map projected to NAD_1983_StatePlane_California_II_FIPS_0402_Feet

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5.3.1 Business

The tourism industry dominates the economy of the Bear Valley Planning Area. A general store in the village provides year-round food, recreation supplies and sundry items to visitors. Popular local rentals include: mountain bikes, kayaks, ski and snowboard gear, snowshoes, and snowmobiles. Local guides and adventure classes are also available.

5.3.2 Recreation

Recreation creates a number of concerns for wildfire planning. Areas of dispersed camping, with campfires and barbecues are likely sources of ignitions for wildfires. A wildfire in heavily used recreation areas poses problems for evacuations. Wildfire that destroys key recreation resources would have a significant impact on the tourist industry in Alpine County.

Camping: The Bear Valley Planning Area hosts several popular USFS campgrounds at Lake Alpine, Highland Lakes, Mosquito Lake, and Hermit and Pacific Valleys. Utica, Union, and Spicer reservoirs also have popular campgrounds.

Fishing: Reservoirs nearby include Utica, Union and Spicer. Lake Alpine, Mosquito Lake, Highland Lakes and the Stanislaus and Mokelumne rivers all attract fishermen to the Planning Area.

Other popular recreational opportunities:

Bicycling, backpacking, hiking, cross country skiing, snowmobiling, rock climbing, skiing, snowshoeing, hunting and boating.

5.3.3 Cultural Resources

Prehistoric and historic cultural resources exist within the project areas. The area was used by Native Americans, sites have been found within the planning area.

5.4 Emergency Services

Fire suppression for wildland fire incidents is provided by the Bear Valley Public Safety Department, Ebbetts Pass Fire Department, CALFIRE and the USFS. The USFS guard station in Dorrington staffs one engine and a ten-person wildland fire use crew in the summer to provide wildland fire response.

Response distances are primarily within 5 miles from the Bear Valley Fire Station. Mutual aid response from Ebbetts Pass F.D., CALFIRE and USFS is a minimum of 30 minutes away.

5.5 Insurance Ratings

ISO ratings for Bear Valley are 5 for the New Subdivision and 5X for the Old Subdivision and Sherman Acres.

5.6 Land Use Development Trends

Development has the potential to increase significantly. Major changes are proposed for the Village area which could potentially triple the population during the summer months, however the projects have not moved forward in the last 20 years. The proposed development and rights have been sold multiple times in recent years and is waiting on funding from investors to move forward. These projects have yet to move forward for years and the likelihood of progress remains low.

6C. Current Fire Environment – Bear Valley

6.1 Wildland Fire History

Devastating wildfires have occurred in Alpine County communities in the past, however few large fires have occurred in the Bear Valley area. The higher elevations create lower temperatures and higher humidity resulting in less likely condition for a major wildland fire event.

6.2 Local Fire Ecology and Forest Health

(This section inserted from *Bear Valley Community Plan to Reduce Wildfire Risk and Improve Forest Health* by Don Stickers, 2004. Portions of it have been edited.)

Background: Bear Valley's New Subdivision was developed in the mid-1960s. The Old Subdivision dates back earlier. The Old Subdivision consists of 61 lots on the north side of Highway 4 west of the main entrance to Bear Valley Village. 42 of these lots are developed. The New Subdivision consists of 426 lots plus six lots in the Granite Vista area. 304 of these lots are developed plus several commercial, condominium, and county government parcels in Bear Valley Village. Overall, this number represents 79% of the lots as developed. In addition, there are about 110 acres of common ownership and several commercial and residential parcels undeveloped. The common areas that support forest cover are about 75 acres.

Current Conditions: When the New Subdivision was initially developed, road right-of-way trees and trees needing removal for initial commercial facilities were removed along with dead and dying trees that represented a hazard to public safety. A couple of timber harvest operations occurred over the years to remove high risk and dying trees as well as tree removal for homesites and other commercial and public facilities. The remainder of the stands have been allowed to develop with little interference and a restrictive tree removal policy. Disturbed ground from initial development created favorable conditions for regeneration of Red Fir and Lodgepole Pine and to a lesser degree, Jeffrey Pine. This reproduction, including young trees originally present, has grown over the last 40 years into a very dense stand of timber. These areas occur throughout the subdivisions but are concentrated in the Old Subdivision, the south half of the New Subdivision, along Bear Creek above the Bear Valley Lodge, west of Creekside Drive, and around Bear Lake. Dense horizontal crown continuity exists through the lower third of the New Subdivision and up Bear Valley Road and the Orvis and Schimke Road loops. There are also dense areas of understory sapling and pole size trees that provide fuel ladders to accelerate fire into the crown layer. Under the right fire weather conditions this situation could support a difficult to control crown fire and threaten most homes in this area where a majority of lots are developed.

The most likely direction of a fire would be from the southwest with afternoon winds coming up the Stanislaus River canyon. Under extreme burning conditions such as occurred in the 1987 Stanislaus Complex, the main fire could combine with multiple starts from lightning. Blowup conditions can then occur which throw burning material miles ahead of the main fire front and rapidly spread the fire perimeter. Fire columns can reach 60,000 feet in height. Under these conditions, firefighter safety is a primary

concern and fires can only be fought in lighter fuel areas. Red Fir stands similar in elevation to Bear Valley were totally consumed in Yosemite Park areas in the 1987 fire and in the Donner Ridge Fire of 1960 in the Donner Pass area. There are extensive stands of dense timber west of Bear Valley between the Alpine County line and Cottage Springs. Forest cover is fairly continuous between the Stanislaus River and Summit Level Ridge. This area could support a large fire, which in addition to moving toward Bear Valley on the ground, would throw burning firebrands into the community from the fire column. Under current conditions, these firebrands would rapidly ignite spot fires which would quickly develop into a size and intensity that would be difficult to control. It would not be safe for firefighters to operate in much of the subdivisions and many structures would be lost. Current fuel loading in the subdivisions would burn with high intensity and put intense radiant heat on exposed wood siding and decks. If the forest is thinned and treated, these spot fires could be quickly contained and efforts to save the subdivisions would have a much higher probability of success.

While the right fire start under the right conditions that could seriously threaten Bear Valley may occur only every 40 years, it is too often for sustainable community. Bear Valley represents a substantial economic investment. Although insurance can replace a lot of lost structures, the forest environment will be lost for generations along with property value loss. In addition, insurance companies are looking closely at wildland-urban interface risks and homes adjacent to hazardous fuel conditions can be expected to pay increasingly higher insurance rates.

Some other considerations regarding risk are not only a fire threatening the community from the outside but that a structure fire within the subdivisions is a much greater threat to nearby homes and forest under the present conditions. Also, if there were a major fire in the area requiring protection of structures, the firefighters would, by necessity, concentrate their efforts where they can operate with reasonable safety and have a reasonable chance of saving a structure. During a major fire event, resources are always short and will be deployed where they can be used most effectively and safely. It is called triage, similar to the treatment of casualties in war or disasters.

Forest Health: There is a second threat to the Bear Valley forests which is more insidious and highly probable if no action is taken. Stand densities along upper Bear Creek west of Creekside Drive and along Fremont, Quaking Aspen, and Monty Wolf Roads approach and exceed 500 square feet of basal area per acre. These stands consist of trees about 40 years old with a scattered larger tree overstory. A stand of 100 square feet of basal area per acre can fully utilize a site. This means trees are in intense competition for soil moisture, nutrients, and sunlight. In Bear Valley, the moisture stored in the soil at the end of the winter must sustain the trees through the long dry summer. Too many trees will result in all of the trees being weaker with the weakest ones susceptible to death from insect attack or drought. A drought year or several in a row can be expected to accelerate tree mortality. Mortality is currently scattered through the subdivisions and can be expected to accelerate in the future, even without a dry year. The fewer trees, the more vigorous the trees in the stand will be, and the more resistant they will be to insect attack and drought. A lot of desirable trees will be lost if these stands are not thinned. Secondly,

these younger trees left after thinning will reach a large size much sooner with more available sunlight and soil moisture. They will also have more live crown and higher green moisture in the foliage and be more resistant to fire. Many trees are slow growing under present conditions and will gradually be lost rather than reach maturity. A stand of large, well-spaced trees will also be much more resistant to fire loss in the future. Most of the area above Creekside Drive is fairly open with interspersed granite outcrops and does not need treatment except near the school. Understory brush, while scattered through the subdivisions, does not occur in dense, extensive areas needing attention.

Summary: The forest in Bear Valley is like anywhere else, a product of its history. It has suffered from a well-intentioned policy of benign neglect. This works for a while, but the forest is dynamic and as new trees are recruited into the stand, overcrowding, stagnation in growth, and loss of tree vigor occurs. Mother Nature's response prior to European settlement was for fire of light intensity to pass through the stand, killing and thinning younger trees. Ignition was provided by lightning and Native Americans using fire to keep stands open for hunting and to drive game. Studies of Red Fir stands in the Sierra indicate a history of a 25-30-year return rate of light intensity fires. In Bear Valley, fire suppression since early in the 20th century and accelerated regeneration due to development soil disturbance, has resulted in a stand condition that needs attention. Once the desirable future sustainable stand condition is decided, treatments need to be scheduled to bring that about. After treatment, the stands need maintenance once a decade or so to retain the desired condition and stand development.

6.2.1 Fire Frequency

CALFIRE developed fire rotation or frequency measures for the entire state. Data is stratified into three classes of frequency. These classes represent the amount of time necessary for fires to have burned an entire area, based on historic fires. For example, in an area classified as < 100 years, the entire area would have burned over at least once in < 100 years. This could be by a single fire, though is more commonly the culmination of many fires in that area.

6.3 Fire Weather

Lightning causes most wildland fire ignitions in the Bear Valley area. Summer thunderstorms bring erratic winds and lightning to the area. Fire behavior is most extreme after long period of hot, dry weather with no precipitation. It is common to have a southwesterly wind coming over the Sierra's in the afternoons during the summer. Most catastrophic fires on the west slope of the Sierras have occurred during these conditions.

6.4 Fuels Map

Fire fuels have been mapped by CALFIRE for the Bear Valley Planning Area. CALFIRE classifies fuels based on the 13 standard fuel models developed by Rothermel. Assignment of fuel models and hazards were based on vegetation data collected from satellite imagery.

Figure 32 shows the fuel models in the Bear Valley Planning Area from CALFIRE data. The table in Appendix 8 briefly describes the models and which ones apply to the Bear Valley planning area.

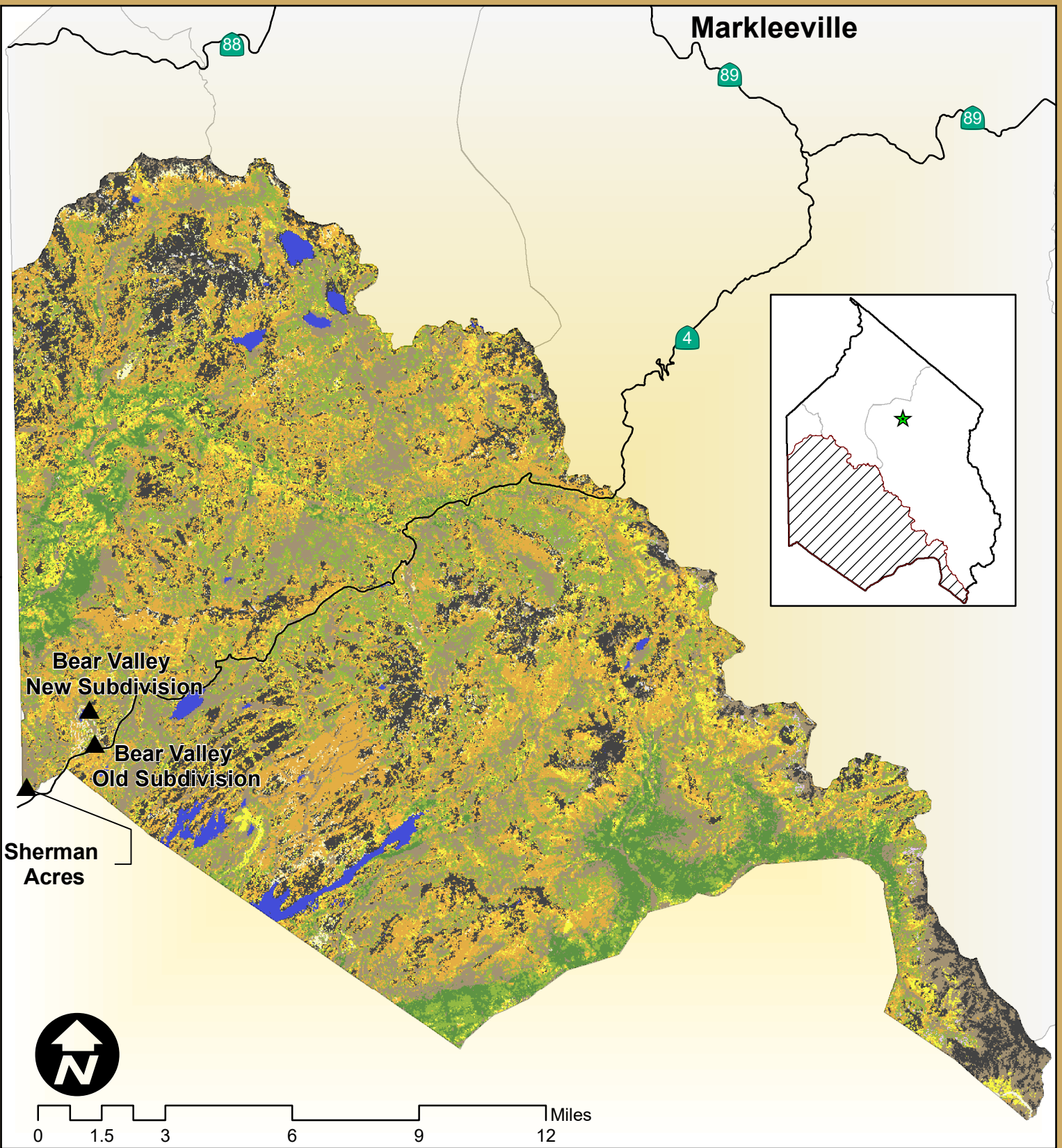


Figure 32: Bear Valley Fuel Models

FBFM Category

| | | | |
|--|---|---|--------|
|  | 2 |  | 10 |
|  | 6 |  | Water |
|  | 8 |  | Barren |
|  | 9 | | |

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 - Map projected to 1983_StatePlane_California_II_FIPS_0402_Feet
 - Fire Behavior Fuels data compiled by USGS Landfire; 2014; available from <https://landfire.cr.usgs.gov/>
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6.4.1 Hazard Maps

Combining the wildfire fuels data with other information that would affect fire behavior, such as slope, fire agencies compile wildfire hazard maps. These maps show areas that, given the specific fuel and slope conditions, would have extreme to moderate fire behavior. These hazard maps can help prioritize wildfire mitigation projects. Figure 33 is a more detailed look at the hazards in neighborhoods in the Bear Valley Planning Area. The data is from 2007 CALFIRE Fire Hazard Severity maps.

6.4.2 Condition Class

The National Fire Plan and Healthy Forest Act dictate that the federal agencies use Condition Class as criteria for planning projects. The Condition Class represents a relative measure of how much an area differs from its historical fire regime. As dictated by the national fire plan, areas of Condition Class 3 have a higher priority for treatment than those of lower condition class. CALFIRE has calculated condition class across the state. Figure 34 shows Condition Class for the Bear Valley Planning Area.

6.4.3 Natural Fire Breaks

There are few natural fire breaks in the Bear Valley Area. The sparsely vegetated granite ridge east of the New Subdivision is the only significant fire break. Bear Lake serves as a smaller, man-made fuel break.

6.5 Fire History

Figure 35 shows previous fires in the vicinity of the Bear Valley. Wildfire is an infrequent event in the Bear Valley Planning Area. However, there have been two large fires within five miles of the Planning Area in the last eight years. The “Mud Fire” (4,340 acres), and the “Hiram Fire” (2,753 acres) burned at similar elevations and aspects as the Bear Valley subdivisions. Four large fires have burned in the neighboring watershed of the North Fork of the Mokelumne River. Two large fires have burned in the North Fork of the Stanislaus River drainage on the south side. All of these fires have burned from the southwest to the northeast, following terrain and prevailing winds. It is reasonable to expect that an ignition on the north side of the North Fork Stanislaus drainage, (west of Bear Valley), would follow a similar path toward the Bear Valley neighborhoods.

More recently the Donnell Fire in August of 2018 burned approximately 20,000 acres in Alpine County. No structures burned in Alpine County, but it was a significant fire event for the Bear Valley area.

6.6 Expected Fire Behavior

Fire behavior is expected to be extreme and uncontrollable during the worst-case conditions. Slopes are steep, wind commonly increases in the afternoon, and fuel loadings are high. While a wide range of fire behavior can be expected in the various fuel types and weather conditions, extreme fire behavior is likely during severe fire weather conditions.

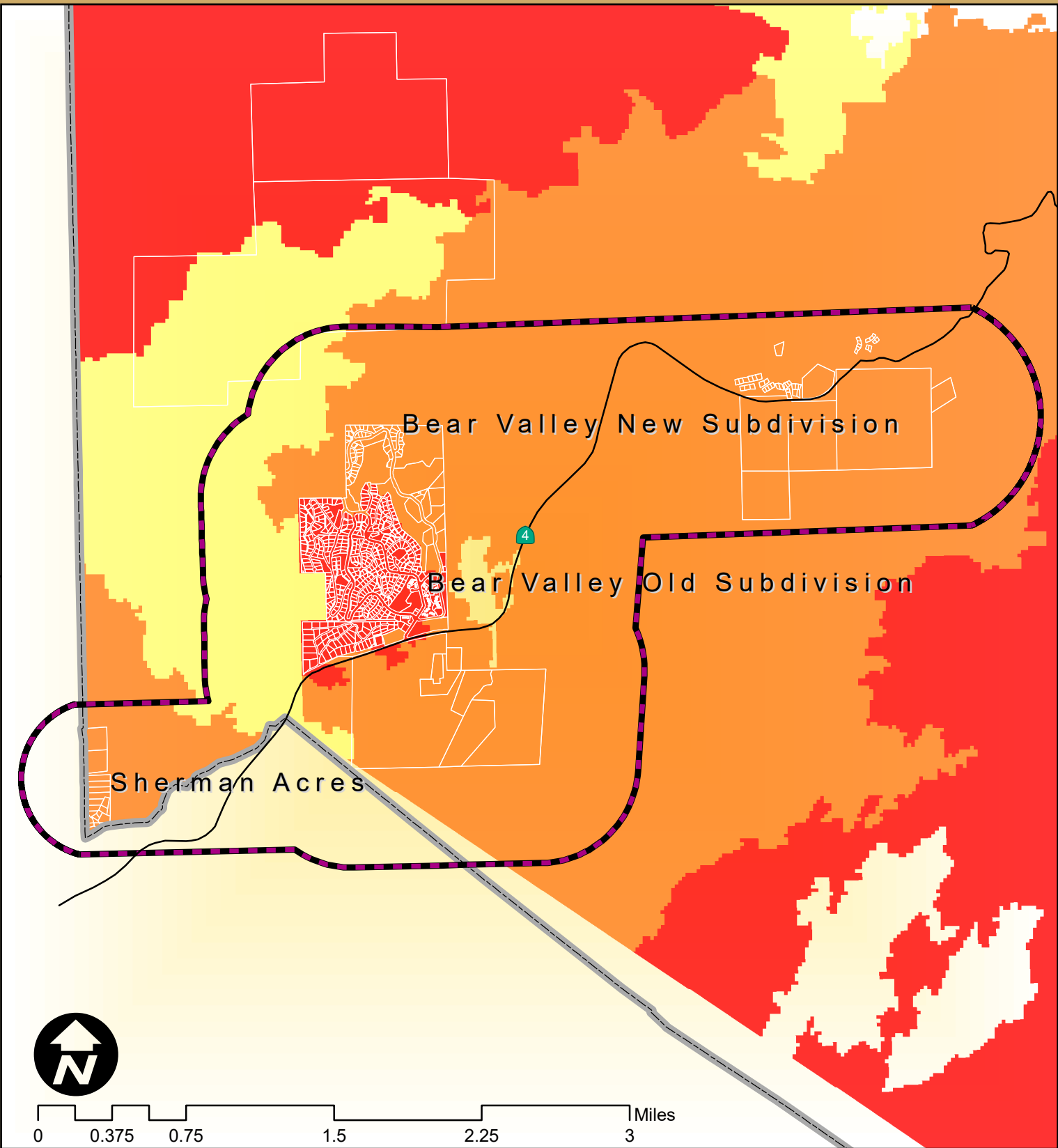







Figure 33: Bear Valley Fire Hazard Map

Fire Hazard Severity (Parcels Overlaid)

-  WUI
-  Alpine County Line
-  Very High
-  High
-  Moderate

- Map prepared March, 2017 by CG Celio & Sons, Inc.
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- Fire Severity data compiled by Calfire
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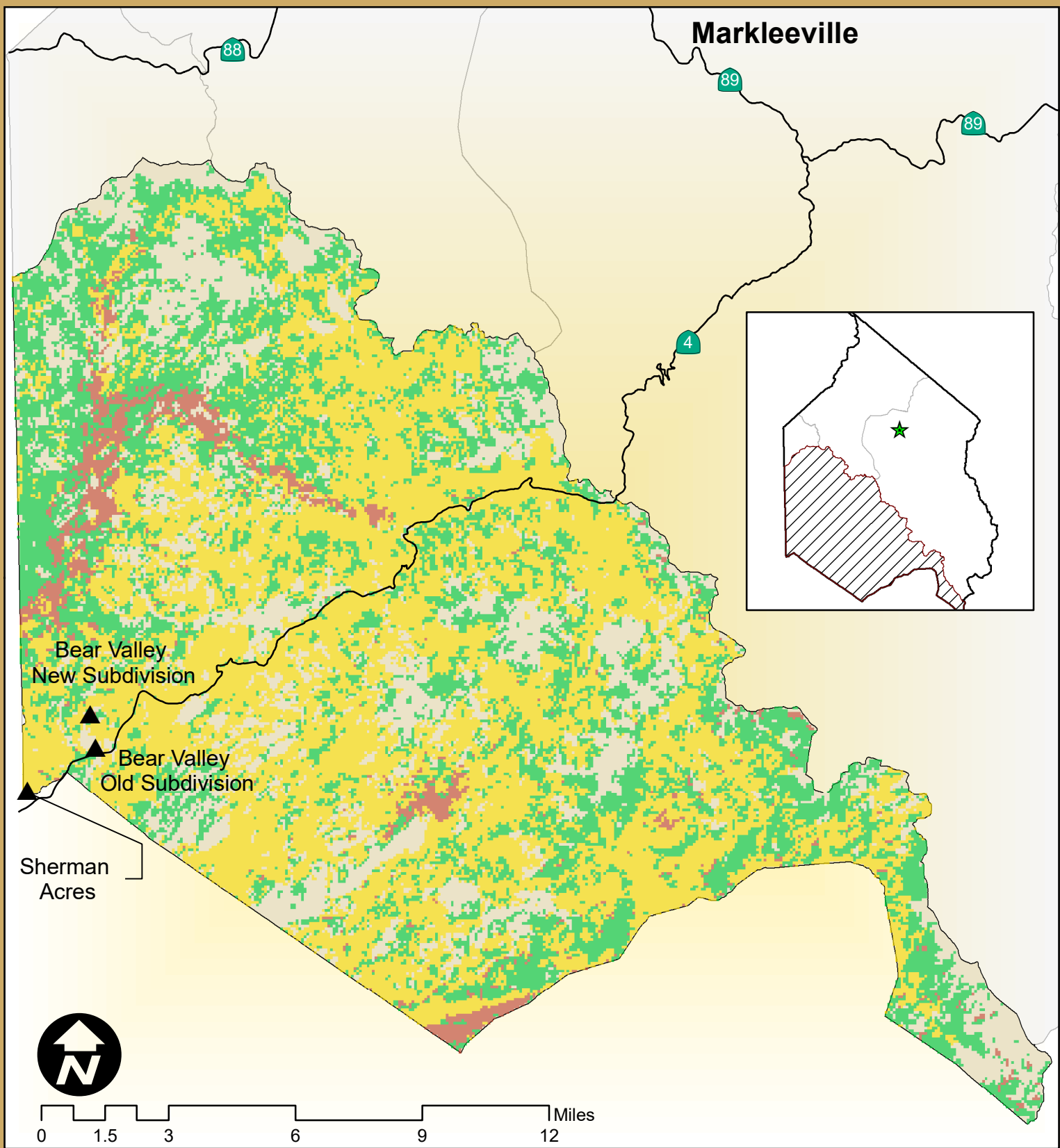


Figure 34: Bear Valley Condition Class

Condition Class

- Class 1 (historic fire regime)
- Class 2 (slightly altered fire regime)
- Class 3 (highly altered fire regime)
- Not Classified

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 - Condition data obtained from Calfire FRAP
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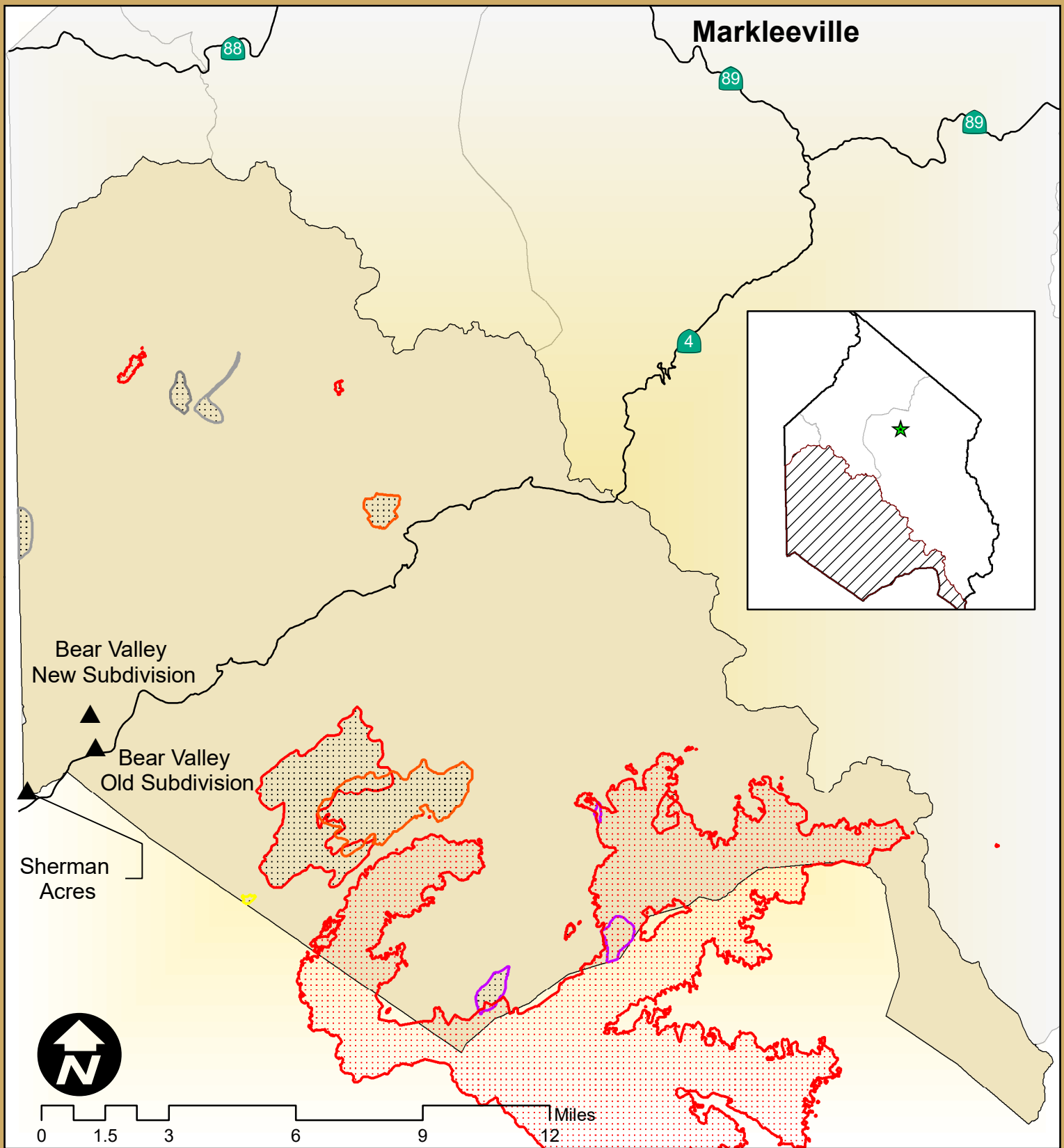


Figure 35: Bear Valley Fire History

Fire Perimeter (Decade)

| | | | |
|--|------|--|------|
| | 2010 | | 1960 |
| | 2000 | | 1950 |
| | 1990 | | 1940 |
| | 1980 | | 1930 |
| | 1970 | | 1920 |

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 - Fire data obtained from CalFire FRAP database
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6.7 Wildland Urban Interface (WUI)

The Wildland Urban Interface is typically considered to be within ½ mile of a community, but can be adjusted based on fuels, topography and other fire behavior factors. The proposed WUI around the neighborhoods in the Bear Valley Planning Area is based on the distance from the communities but has been adjusted to create a contiguous area including all of the communities and accounts for the private land in between the structures and the public lands. Figure 35 demonstrates the WUI around in the Bear Valley Planning Area.

6.8 Completed Projects

A number of fuels treatment projects have been completed within the Bear Valley Planning Area. These include projects on private lands and common areas within the community, Alpine County Road Department Right of Way treatments and USFS projects. These projects are outlined on Figure 36.

Bear Valley Residents, Inc, has completed a number of projects on the common area properties in the Bear Valley new subdivision. To date they have completed about 40% of 53 acres completed for treatment and are seeking funding to complete the remaining acreage. The prescription is to hand cut and burn or chip materials on the open space lots.

The USFS has completed a variety of projects around the Bear Valley Communities. They are outlined on Figure 35 as well. They include:

Bloods Ridge Fuel Break – This fuel break, constructed in 2011, was a 300 foot buffer from the private property that joins up with the USFS lands around the town of Bear Valley, both the new and old subdivision. Vegetation was cut and pile burned, approximately 50 acres was treated.

Tamarack and Sherman Acres – Work on this fuel break is ongoing, it is a 300 foot buffer from the private property that joins up with the USFS lands around the Sherman Acres and Tamarack communities. This project includes areas in both Alpine and Calaveras counties. The treatment are will be hand cut and pile burned. Approximately 20 acres fo the total estimate 150 acres have currently been treated.

USFS Leased Cabins near Lake Alpine – A timber stand improvement project was completed in 2013 on a 150 buffer behind the cabins near Lake Alpine. A total of 36 areas were treated by hand cutting and pile burning the material.

Hazard Trees around Bear Valley – In 2014 and 2015 hazard trees were felled, cut and piled burned in and around the town of Bear Valley and the Bear Valley Ski Resort.

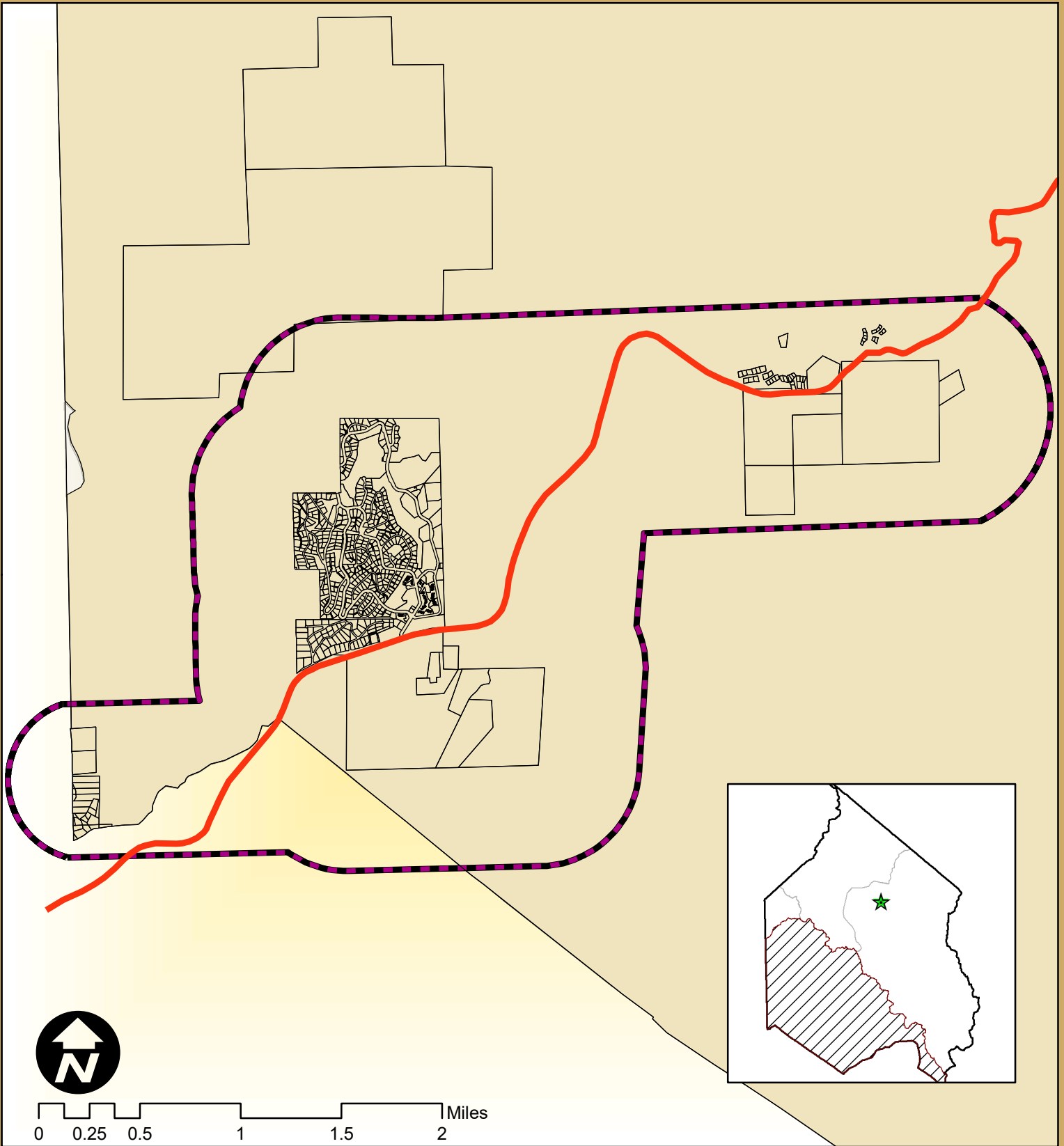





Figure 36: Bear Valley Planning Area Completed Projects in the WUI

-  WUI
-  State Highways
-  County Seat

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7C. Risk Evaluation – Bear Valley

7.1 Risk Evaluation

The neighborhoods within the Bear Valley Planning Area are at medium to high risk for catastrophic wildfire. Fuels surrounding the neighborhoods are continuous, overstocked forest types. Slopes are moderate to steep and the wind blows upslope from the southwest during hot summer and early fall afternoons.

Natural and human ignitions are likely. The ignition risk is highest from the tourist and recreational user groups who are unfamiliar with the area and commonly use outside BBQ's and campfires. The increased amount of tourist traffic on the road also increases the risk of ignition from vehicles. A structure fire that spreads to the wildland during extreme fire weather is a very likely possibility.

Fire protection is provided by the Bear Valley Public Safety Department (a combination department consisting of paid sheriff/firefighters and volunteer firefighters). There is one structure engine and one wildland engine at their firehouse. Water sources include: standpipes in the Old Subdivision, hydrants in the New Subdivision, Bear Lake (for drafting), and standpipes or a direct tank hookup in Sherman Acres.

Fire Protection within the community is good, however mutual aid is a significant distance away. Unlike the east slope areas, mutual aid will likely be 35 minutes or more away. The CALFIRE station between Arnold and Bear Valley is staffed seasonally and is often committed on other incidents. The USFS engine in Dorrington is not dispatched unless called and is also often committed. Ebbetts Pass Fire Department in Arnold is the closest, paid, consistently available resource. Eastern Alpine Fire / Rescue in Markleeville is also usually available but will be at least an hour response time.



Alpine County recently completed its Field Operations Guide complete with evacuation maps for neighborhoods in Bear Valley. Except for Sherman Acres, egress from the communities is good. Once on a state highway or county road, the risk of entrapment is low. Many roads are looped and there are large open parking lots for safety zones. Neighborhoods are most at risk from a wind driven fire burning through the forest to the southwest. Wind driven flame fronts in these fuels will be difficult to stop.

Evacuation notices would be by reverse 911 and notices posted on residents doors. The local community newsletter outlines how to signup for reverse 911, but there has been no community meetings or notices about evacuation planning. There is no information published for residents or those who might be renting a vacation home about what to do during a fire event.

7.2 Risk Evaluation Summary

| <u>Asset</u> | <u>Rating</u> |
|-----------------------------|----------------|
| Structures | |
| 1. Old Subdivision | Medium to High |
| 2. New Subdivision | Medium to High |
| 3. Sherman Acres | High |
| | |
| Business | |
| 1. Bear Valley Village | Medium to High |
| | |
| Infrastructure | |
| 1. Bear Valley Village | Medium to High |
| 2. Old Subdivision | Medium to High |
| 3. New Subdivision | Medium to High |
| 4. Power Lines | High |
| 5. Evacuation Routes | Medium |
| 6. Airport | Low |
| | |
| Recreation | |
| 1. Bear Lake | Medium |
| 2. Tennis courts/ball field | Medium to High |
| 3. USFS Campgrounds | Medium to High |
| | |
| Fishing | |
| 1. Stanislaus River | Medium |
| | |
| Wildlife Habitat | Medium |
| | |
| Endangered Species | Medium |
| | |
| Watersheds | Medium to High |
| | |
| Historical Resources | Medium |
| | |
| Cultural Resources | Medium to High |

7.3 Fire Hazard Assessment by Location

1. Old Subdivision

Rating: Medium to High

Fuels: The Old Subdivision is surrounded by Fuel Models 2 (grasses), and 10 (closed timber) with fuel loadings of moderate to high density. Red Fir, Lodgepole Pine, and grasses are the primary vegetation types. The residents have been working to reduce fuels along roads and around structures, but much remains to be done. In many areas, fuels are continuous and would easily carry a wildfire.



Weather: Summer weather is typical for the west slope of the Sierras with afternoon winds from the southwest. Temperatures rarely exceed 85 degrees but humidities can drop as low as 10%.

Topography: Slopes are low to moderate in the neighborhood, which sits on a south facing aspect.



Human Sources of Ignition: A number of sources of human ignitions exist in and near the Old Subdivision. Many residences use wood heating, leading to a potential for chimney fires and burning embers. Structure fires can easily spread to the wildland if they occur during wildland season. Power is supplied through overhead lines adjacent to roads. Lines have been knocked down during storm events and traffic accidents. The large

influx of tourists during the summer, particularly on weekends, increases the number of potential ignition sources, from recreation fire use and from vehicle accidents.

Community Preparedness: The neighborhood is moderately prepared for a wildfire event. Building construction is improving. Some residents are replacing shake roofs and using fire resistant decking. However, a significant number of existing structures have flammable siding and roofing material. Many structures have inadequate defensible space. Most of the homes are on unpaved, narrow access roads or right off State Highway 4, making ingress and egress challenging during a fire event. The Bear Valley Fire Department would not be able to get a type 1 fire apparatus to many of these

structures, increasing the likelihood of a structure fire spreading to the wildland. Fuels along these access ways vary in density. Power lines follow the roads. Entrapment could easily be an issue during a fire event. The Perry Walther Community Center and the Public Safety Department serve as local shelters. The Bear Valley Resort has also been used as a larger shelter when needed.

Fire Protection Resources: The Bear Valley Public Safety Department is located within ¼ mile of the neighborhood and can respond engines in less than 10 minutes. Water supply comes from the standpipe system or from a hose lay to the New Subdivision hydrants. Mutual aid fire resources come from Ebbetts Pass Fire Department, CALFIRE, and USFS with a 30-minute response time.

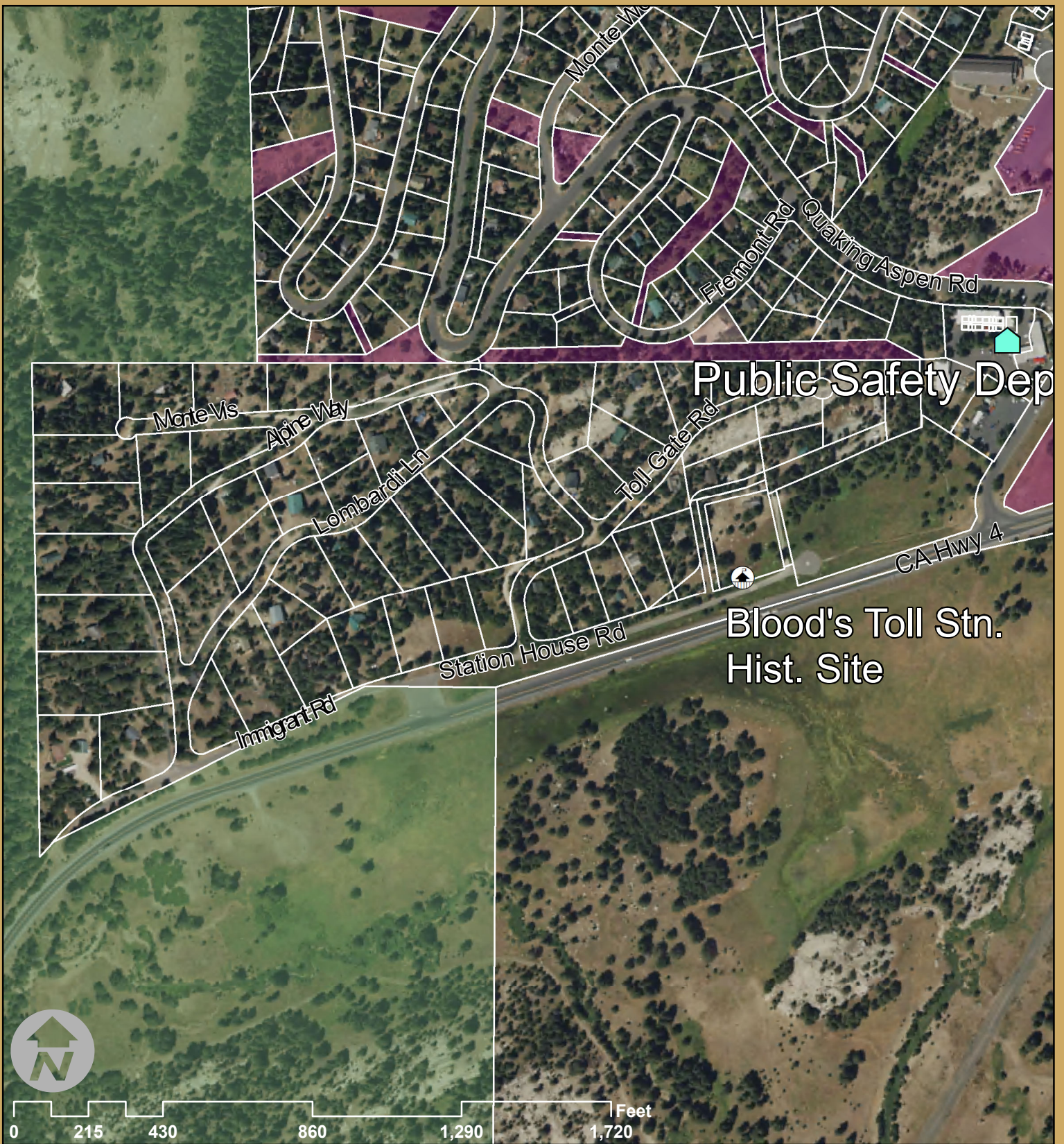






Figure 37: Bear Valley Old Subdivision Neighborhood

Legend

-  Alpine County
-  USFS
-  Utility
-  Old Subdivision Boundary

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2. New Subdivision**Rating: Medium to High**

Fuels: The New Subdivision lies in Fuel Models 2 (grasses) and 10 (closed timber), with moderate fuel densities. Buildings and landscaping break up wildland fuels, but tree density is high and ladder fuels are present. Lodgepole Pine and Red Fir predominate with a grass understory.

Weather: Summer weather is the primary concern with afternoon winds from the southwest and low humidities.

Topography: Slopes are moderate to steep in the neighborhood, which sits at the mouth of the Bear Creek drainage. The subdivision is primarily south facing.



Human Sources of Ignition: A number of sources of human ignitions exist in and adjacent to the neighborhood of the New Subdivision. Some of the residences use wood heating, leading to potential for chimney fires and burning embers. Structure fires can easily spread to the wildland if they occur during wildland season. The Bear Valley Village lies within this neighborhood. A large summer influx of tourists in the Village increases possible ignitions from barbeques, vehicles, cigarette butts etc.

Community Preparedness: The neighborhood is moderately prepared for a wildland fire. Building materials vary with combustible siding, decks and roofing material present throughout the community. Many structures have adequate defensible space, though there are some incidences where trees touch homes and are contiguous to the wildland canopy. Structure density and landscaping preclude most wildland fuels in the understory, but pine needles on the ground and tree density remain as hazards. Access and egress on wide, paved roads eliminates entrapment concerns. Bear Valley Residents Inc (the homeowners' association) has taken an active role in identifying and mitigating some fuel hazards within the subdivision utilizing the Volunteers in Prevention program and a vacant lot fuels abatement ordinance. The Perry Walther Community Center and Public Safety Department serve as local shelters. The Bear Valley Resort has also been used as a larger shelter when needed.

Roads are wide and well maintained. Most loop around and provide two exists during a fire event.

The New Subdivision neighborhood has a vested interest in the community preparedness for the old subdivision. A very likely source of ignition would be a structure fire in the old subdivision. With a southwest wind (likely during extreme fire weather), this fire would be driven directly into the New Subdivision and threaten homes.

Fire Protection Resources: The Bear Valley Public Safety Department is located at the entrance to the neighborhood and can respond engines in less than 5 minutes. A hydrant system fed by Bear Lake and tanks above the community provide sufficient water supply. Mutual aid comes from Ebbetts Pass Fire Department, CALFIRE, and USFS with a 30-minute response time.

The hydrant system in the New Subdivision does not have a consistent set of fixtures for connecting to fire apparatus. While the Bear Valley Fire Department may be aware of these issue and have adapters to make adjustments, mutual aid agencies will not. This will hamper their abilities to provide adequate defense of the structures and could result in significant increased hazards. Bringing all the hydrants into compliance with standard fire fighting fixtures should be a top priority.

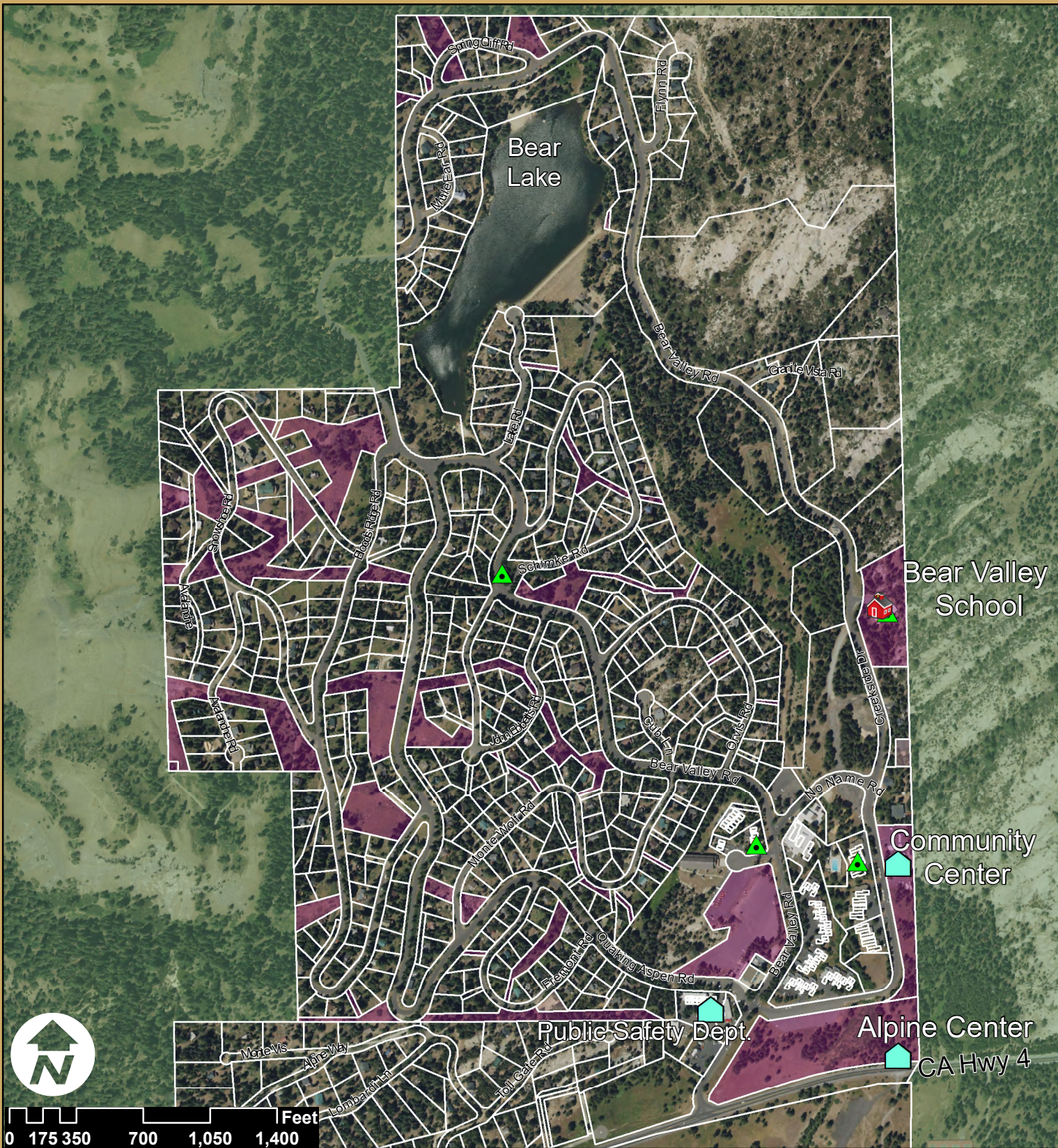









Figure 38: Bear Valley New Subdivision Neighborhood

Legend

-  Alpine County
-  USFS
-  Utility
-  New Subdivision Boundary
-  Assembly Point
-  building
-  School

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3. Sherman Acres

Rating: High

Fuels: Sherman Acres homes sit in a heavily forested area composed primarily of Fuel Model 10 (closed timber).

Weather: The weather mirrors that of the Old and New Subdivisions with afternoon southwest winds during the summer months. Humidities can drop as low as 10%.

Topography: Slopes range from gentle to moderate with south to southeast aspects.



Human Sources of Ignition: A number of sources of human ignitions exist in the neighborhood of Sherman Acres. Many residences use wood heating, leading to potential chimney fires and burning embers. Structure fires can easily spread to the wildland if they occur during wildland season. Power is supplied through overhead lines adjacent to roads.

Community Preparedness:

Building construction is improving; some residents are replacing shake roofs and using fire resistant decking. However, a significant number of existing structures have flammable siding and roofing material. Many structures have inadequate defensible space. Roads are narrow and unpaved making ingress and egress difficult during a fire event. Fire apparatus are likely not going to be able to access the structures during a wildfire event, especially if residents and renters are attempting to evacuate. Fuels crowd the road margins making entrapment a major concern in the subdivision.

Fire Protection Resources: The Bear Valley Public Safety Department is located within two miles from most of the neighborhood and can respond engines in less than 10 minutes. Two water tanks near the center of the subdivision are the only sources of water in the neighborhood. There are several standpipes in the neighborhood but no hydrants. The nearest draft source is Bear Lake, at least a 15-minute turnaround time. Mutual aid arrives from Ebbetts Pass Fire Department, CALFIRE, and USFS with a 30-minute response time. While the subdivision straddles the Alpine/Calaveras County line, the Bear Valley Public Safety Department provides first response fire and medical services.

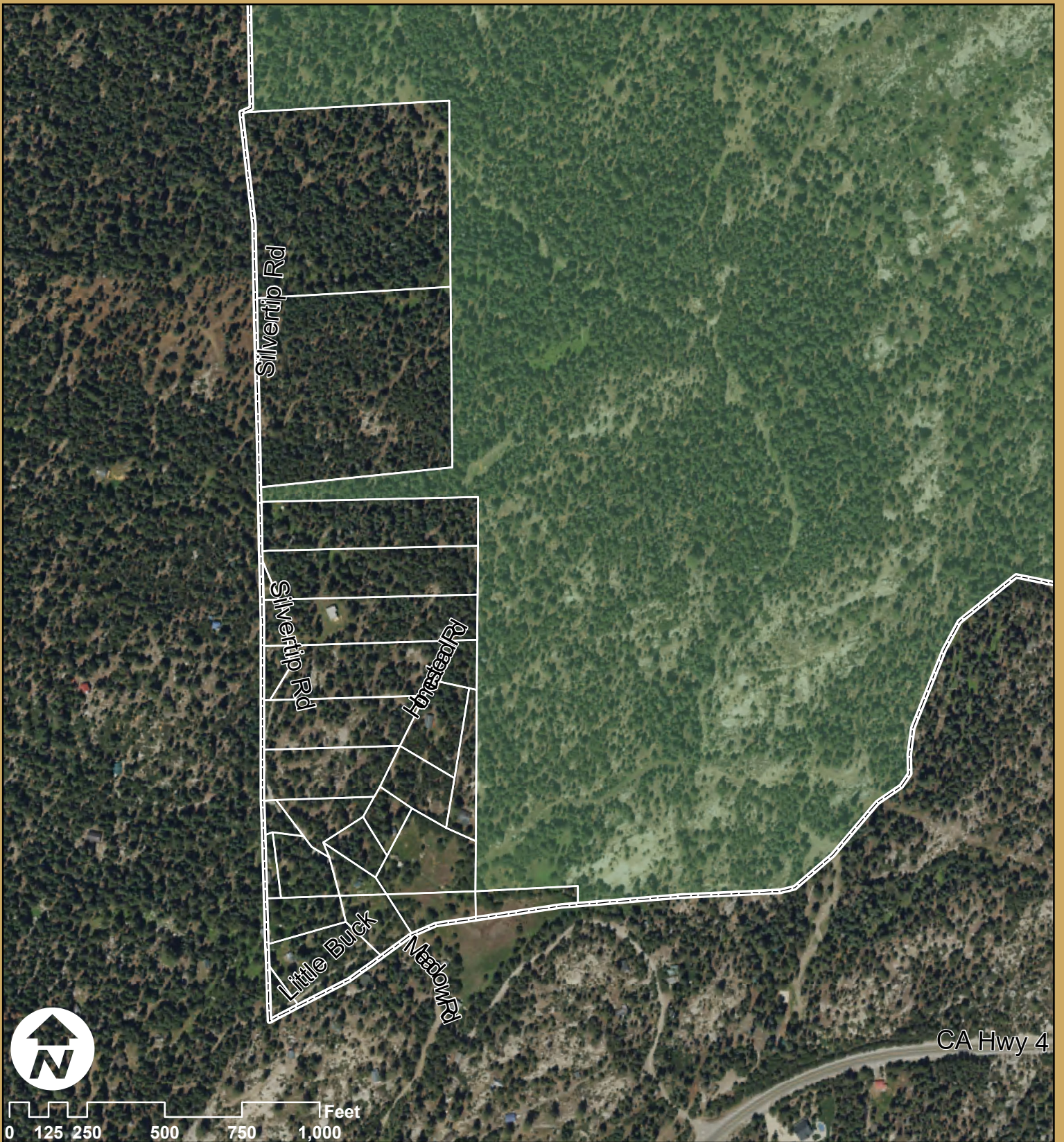


Figure 39: Sherman Acres Neighborhood

Land Ownership (Non-Private)

- Alpine County
- BIA
- BLM
- State Property
- USFS
- Utility
- Alpine County Line

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8C. Action Plan – Bear Valley

8.1 Desired Future Conditions

1. Reduced threat to residents and their property from wildfires.
2. Increased community preparedness for wildfire.
3. Increased fire suppression capabilities.
4. Improved forest health with lower tree mortality.

8.2 Mitigation Goals and Responsibilities

Goals:

Initiate long term planning for vegetation: species types, density and maximum brush height for the Bear Valley Planning Area.

Objectives:

Determine strategies for vegetation management, prescriptions, fuels reduction, and maintenance.

Responsibilities:

Homeowners:

For the entire Bear Valley Planning Area

1. **Replace flammable roofing and decking materials with fire-resistant materials.**
2. Provide a minimum 100' defensible space around all structures.
3. Support the Bear Valley Public Safety Department in the actions listed below.

For the Old Subdivision neighborhood

1. **Thin overstory and clear road right of ways.**
2. Widen roads and provide turnouts and turnarounds for fire apparatus.

For the New Subdivision neighborhood

1. **Continue efforts to thin forests and remove ladder fuels.**
2. Continue fuels treatment along the road right of ways.

For the Sherman Acres neighborhood

1. **Thin overstory and clear road right of ways.**
2. Widen roads and provide turnouts and turnarounds for fire apparatus.
3. Provide more options for access to the water supply.

Bear Valley Public Safety Department:

7. **Develop a community evacuation plan and conduct an evacuation drill with the community, Alpine County Sheriff's Office, CALFIRE, Ebbetts Pass Fire Department and the USFS.**
8. Participate in a pre-fire season tabletop exercise with the Alpine County Sheriff's Office, Ebbetts Pass Fire Department, CALFIRE, and USFS to develop a coordinated agency response to a wildfire incident.

9. Increase the number of trained volunteers.
10. Continue to purchase wildland firefighting equipment and train volunteers to the “red card” certification system.
11. Pursue upgrading wildland apparatus.
12. Install a 911 phone at the Bear Valley Sheriff’s Office and Fire Department to aid in reporting of emergencies. Cell phone service is spotty and often reporting parties have use a land line to report issues.

Alpine County Sheriff’s Office:

- 1. Develop a community evacuation plan and conduct an evacuation drill with the community. Include relevant partner agencies that might be involved in a major wildfire event.**
2. Participate in a pre-fire season tabletop exercise with the Bear Valley Public Safety Department, Ebbetts Pass Fire Department, CALFIRE, and USFS to develop a coordinated agency response to a wildfire incident.

Alpine County Board of Supervisors:

- 1. Ensure the emergency services agencies are addressing the public safety issues outlined in this plan.**
2. Enforce legislation, ordinances, or other codes to eliminate wildland fuel hazards within the communities.
3. Lobby federal agencies to implement fuels reduction projects on public lands surrounding communities.
4. Continue fuels treatments on County owned land within communities.
5. Explore cost effective biomass disposal solutions and collection options in the Bear Valley Area.

Alpine County Community Development:

- 1. Continue the annual brush treatment along roadways to reduce the ignition risk and to make the road passable during a fire event.**
2. Continue to provide defensible space around County Buildings, (Library, Perry Walther Building, School.)

Alpine Fire Safe Council:

- 1. Actively support the efforts of the local fire department and other emergency services in mitigating wildfire risk.**
2. Collaborate with Calaveras Foothill Fire Safe Council as needed to secure funding and support for Bear Valley projects.
3. Continue to provide public education information on defensible space at County buildings, and through mailings.
4. Assist the Alpine County Board of Supervisors as requested with development of fuels reduction solutions.

Utilities (power and water):

- 3. Replace fittings on hydrants to ensure consistency with standard fire service fittings and couplings.**

4. Reduce or clear fuels from underneath power lines and power poles.

8.3 Mitigation Projects

Several mitigation projects have been initiated in the Bear Valley Planning Area. The projects have been sponsored by the residents, the Calaveras Fire Safe Council, CALFIRE (Proposition 40 funds), and the Alpine County Resource Advisory Committee (RAC).



Since 2004, Bear Valley Residents, Inc, and the Bear Valley Fire Department have completed a number of projects on the common area properties in the Bear Valley new subdivision. To date they have completed about 40% of 53 acres prescribed for treatment and are seeking funding to complete the remaining acreage. The prescription is to hand cut and burn or chip materials on the open space lots. To date, much of the common areas have been treated and are complete. These include common areas next to the subdivision roadways and county-owned open space lots within the community. A few piles and logs remain to be removed but the overall treatments have removed significant amounts of vegetation in the understory.

The USFS has completed a variety of projects around the Bear Valley Communities, outlined on Figure 35. They include:

Bloods Ridge Fuel Break – This fuel break, constructed in 2011, was a 300-foot buffer from the private property that joins up with the USFS lands around the town of Bear Valley, both the new and old subdivision. Vegetation was cut and pile-burned; approximately 50 acres was treated.

Tamarack and Sherman Acres – Work on this fuel break is ongoing, it is a 300-foot buffer from the private property that joins up with the USFS lands around the Sherman Acres and Tamarack communities. This project includes areas in both Alpine and Calaveras counties. The treatment will be hand cut and pile-burned. Approximately 20 acres of the total estimated 150 acres have currently been treated.

USFS Leased Cabins near Lake Alpine – A timber stand improvement project was completed in 2013 on a 150 buffer behind the cabins near Lake Alpine. A total of 36 acres were treated by hand cutting and pile-burning the material.

Hazard Trees around Bear Valley – In 2014 and 2015 hazard trees were felled, cut and piled burned in and around the town of Bear Valley and the Bear Valley Ski Resort.

Additional treatments need to occur on the privately-owned parcels in all the subdivisions. Some lots have a fair amount of defensible space, but there is still more work to be done. Specifically, removing some trees to break up the continuity of the forest canopy between the houses and the forest. There are some cases where there is a continuous canopy from a house to the wildland.

8.4 Actions

The following summary of projects has been developed for the Bear Valley Planning area. The project worksheets are intended to provide the background information necessary for grant application development and funding.

| <i>Priority</i> | <i>Name</i> | <i>Acreage</i> | <i>Estimated Cost</i> |
|-----------------|---|----------------|-----------------------|
| 1 | Defensible Space Creation on Residential Lots | n/a | \$50,000-\$200,000 |
| 2 | Fuels Treatment in Common Areas | 50 | \$50,000-\$200,000 |
| 3 | Road Right-of-Way Fuels Program | 30 | \$30,000-\$50,000 |

PROJECT 1: Defensible Space Creation on Residential Lots – chipper program - \$6-8 per year

Goals:

Short range-Help residents create defensible space on their lots. Help residents comply with the updated state public resources code.

Long range-Improve forest health, protect the watershed, and develop an ongoing defensible space fuels treatment and removal program for the Bear Valley Subdivisions.

Objective: Reduce: fire intensity, potential spot fire ignitions, rate of fire spread, and fuel continuity.

Community Situation: Fuel densities and types vary to some degree between the three neighborhoods. Dense timber stands characterize Sherman Acres, while a mix of continuous grasses and younger timber can be found in the Old and New Subdivisions.

Estimated Cost: Costs will vary with the choice of treatment methods. Options for treatment include:

1. Hand crew removal of ground fuels and smaller trees: \$1,200/day
(approximately 2-3 lots per day)
2. Hand crew chipping of fuels: \$1,200/day
(approximately 10 -15 lots per day)
3. Mastication: \$4,000/day
(approximately 5-8 acres per day)
4. Tree removal services: \$1,200/day
(approximately 1-2 lots per day)

Project manager: \$5,000

Approximate total cost: \$50,000 to \$200,000

Expected completion time: Dependent on the number of participants. Initial work to bring lots into compliance may take several years.

PROJECT 2: Fuels Treatment in Common Areas

Goal: Reduce fuel density and continuity on commonly owned property.

Objective: Reduce fire intensity, rate of fire spread, and potential spot fire ignitions. Improve forest health.

Vegetative condition and topography: Fuels in the common areas and outside the HEZ are discussed earlier in this plan and consist mainly of grasses and timber types.

Prescription for treatment: Fuels treatment in these areas should focus on breaking the horizontal and vertical continuity of the fuels. Timber should have a minimum crown spacing of ten feet. Ground fuels should be thinned or mowed to allow firefighters access around these areas. Detailed project prescriptions will need to be developed with the assistance of a Registered Professional Forester.

Estimated Cost: Approximate average cost per acre: \$1,000-2,000
Approximate number of acres to treat: 53
Approximate total cost: \$50,000-200,000

Expected completion time: The field work portion of this project could be completed in one summer season.

Ownership and partners: Approval of the common ownership component may take some time depending on the neighborhood. Participation of the property owners on land outside the defensible space zone may increase with a cooperative approach. A vacant lot fuels abatement ordinance may also come into play in this project.

PROJECT 3: Road Right-of-Way Fuels Program – new sub roads county roads

Goal: Safeguard access along road right-of-way for evacuations and emergency response.

Objectives: Reduce: fire intensity, rate of fire spread, direct flame impingement on vehicles. Improve long term health of the young trees.

Community Situation: Young Lodgepole pines and Red Firs crowd the road right-of-way within the subdivisions as well as along Highway 4. A result, primarily, of subdivision development, these trees form continuous fuel belts which could help move fire from the roadside to the subdivisions. A fire traveling through these fuels will also threaten residents and emergency vehicles trying to make access or egress. Power poles near these stands of young trees will be threatened as well and could pose access problems if they fall across the roads.

Prescription for Treatment: Working with a Registered Professional Forester, thin younger trees to a basal area consistent with reduced fire behavior and forest health.

Estimated Cost: Costs will vary with the choice of treatment methods. Options for treatment include:

1. Hand crew removal of ground fuels and smaller trees: \$1,200/day
2. Hand crew chipping of fuels: \$1,200/day
3. Mastication: \$4,000/day
4. Tree removal services: \$1,200/day

Project manager: \$5,000

Approximate total cost: \$30,000 to \$50,000

Estimated Time to Complete: The field work component of this project could be completed in one summer season. Planning and approvals could require one to two years' time prior to the field work.

Ownership and Partners: Project approval from the state, county, and private property owners will require coordination by a project manager.

5D. Communities – Kirkwood

5.1 General Environmental Conditions

The Kirkwood neighborhood lies on the east side of a large alpine valley. The Alpine County / Amador County line splits the community and is surrounded by the Eldorado Nations Forest. Kirkwood Mountain Ski Resort is at the southern end of the community. The Kirkwood Planning Area and exhibits the well-timbered characteristics of the upper elevations of the west slope of the Sierra. Wildland fuels are present throughout the neighborhoods.

There are two neighborhoods in the Kirkwood Planning Area:

- Lodge Area
- East Meadows

5.1.1 Elevation

Figure 40 shows the location of the Alpine County portion of Kirkwood, south of Highway 88. The communities sit near 7,000 feet on west facing slopes. The terrain along the Highway 88 corridor is steep to the north and relatively flat to the south.

5.1.2 Meteorology, Climate, Precipitation

Kirkwood receives heavy winter snows. Most of the precipitation occurs during the winter months. Summer high temperatures reach the mid-eighties.

5.1.3 Threatened and Endangered Habitat Type

There are a number of ecologically sensitive areas and wildlife habitat. After considering the threat to life and property, projects should be considered in how they address these areas. California Fish & Wildlife and the U.S. Fish and Wildlife Service have information on Threatened and Endangered Species in the Kirkwood Planning Area. Bald eagles and mountain yellow-legged frogs are some of the threatened or endangered species that inhabit the forest and lakes within the Planning Area. Surveys or mitigation measures for threatened or endangered species should be implemented prior to project initiation.

5.2 Population and Demographics

The year-round population in the Kirkwood Planning Area is fairly small, typically around 250 people. Primarily a “second home community,” seasonal attractions bring a significantly higher number of people to the area. During the summer months, large numbers of visitors use the campgrounds, lakes and trails in the area. During the winter, vehicle traffic is high with visitors arriving in the area for winter sports at the Kirkwood Mountain Resort, Cross Country Ski Center, and the snow park at Carson Pass.

5.3 Infrastructure

With a number of high end homes and a ski resort, Kirkwood has significant infrastructure at risk from wildfire. The loss of only a few key facilities can have a big impact.

Key facilities found in the Kirkwood area include: Kirkwood Meadows Public Utility District (KMPUD) Building, Community Service Building, the Kirkwood Power House, The propane tank farm, the water treatment facility and sewer treatment facility. Some of these facilities will be critical to an effective local response to a wildland incident. The key facilities are shown on individual neighborhood maps.



Firefighting water supply comes from hydrants, which are spread throughout the community. They are maintained by the KMPUD.

Kirkwood, especially the east meadows, has seen significant development in the last 10 years. There are over 50 newer, very large homes in the area. There are still more vacant lots for development on the east meadows, but the building pace has slowed significantly. Additional condominiums have also been constructed in the base lodge area, but no new buildings are under construction.

5.3.1 Business

The tourism industry dominates the economy of the Kirkwood Planning Area. Kirkwood Mountain resort is part of the Vail family of resorts. Skiing is the primary tourist activity, but Vail has sought to increase the off-season usage as well with mountain biking and hiking. There are some businesses in the area, a general store in the village provides year-round food, recreation supplies and sundry items to visitors. There are a couple of restaurants in the area around the main lodge. The Kirkwood Inn is on Highway 88 at the near the entrance to Kirkwood Meadows and has been a popular restaurant in the past, but is only open seasonally. Popular local rentals include: mountain bikes, kayaks, ski and snowboard gear, snowshoes, and snowmobiles. Local guides and adventure classes are also available.

5.3.2 Recreation

Recreation creates a number of concerns for wildfire planning. A wildfire in heavily used recreation areas poses problems for evacuations. Wildfire that destroys key recreation resources would have a significant impact on the tourist industry in Alpine County.

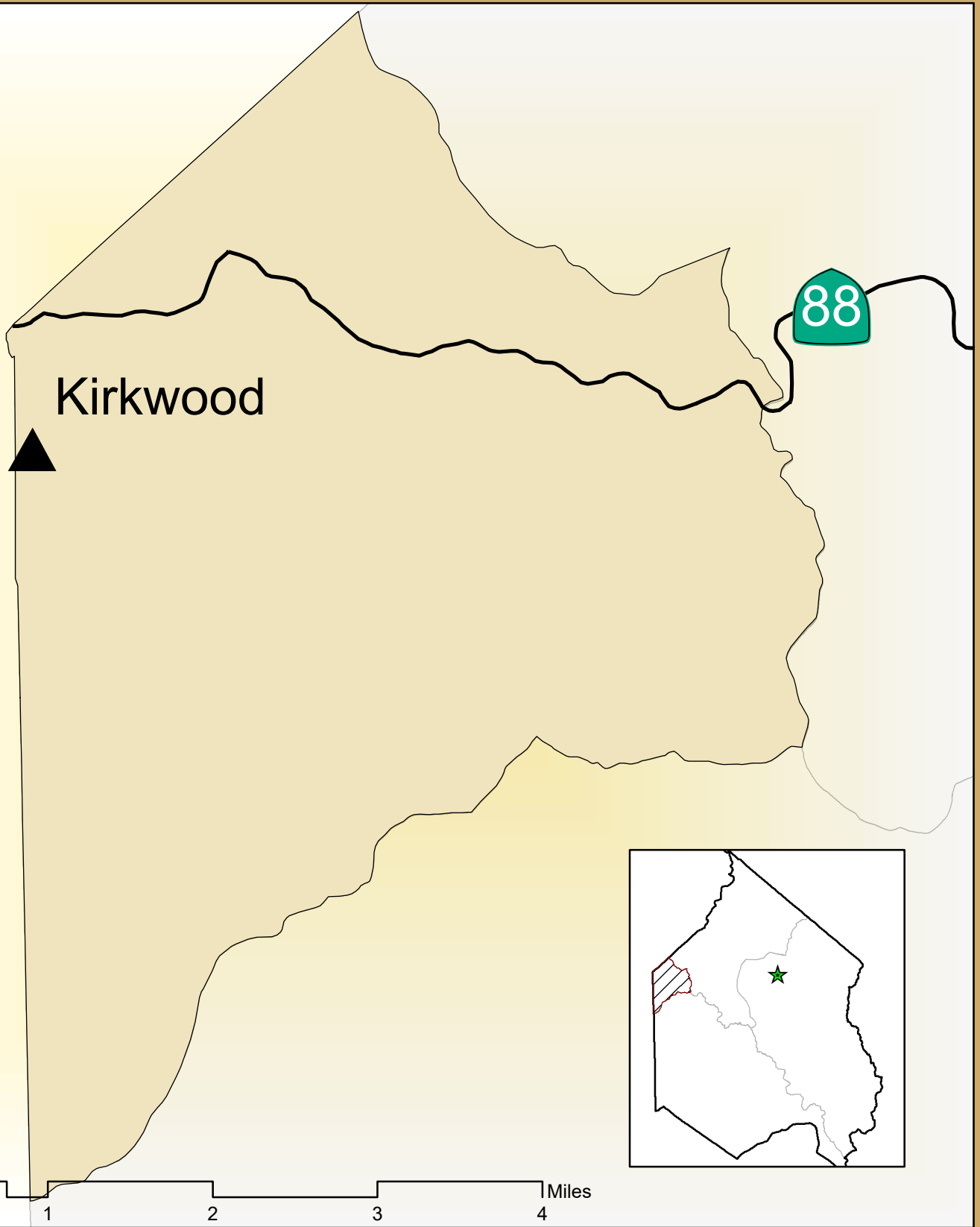





Figure 40: Kirkwood Planning Area

-  Communities
-  County Seat
-  State Highways

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- Map projected to NAD_1983_StatePlane_California_II_FIPS_0402_Feet

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Camping: There is no camping in the Kirkwood meadows are proper, however there are campgrounds in the planning area outside of the valley. Ignitions from those campgrounds would not likely reach back to Kirkwood. Lake Kirkwood at the northmost end of the meadows would have to cross Highway 88 and run against the predominant wind.

Fishing: There is limited fishing around the community, however Caples Lake, Lake Kirkwood, and Woods Lake are all important recreational fisheries.

Other popular recreational opportunities:

Bicycling, backpacking, hiking, cross country skiing, snowmobiling, rock climbing, skiing, snowshoeing, hunting and boating.

5.3.3 Cultural Resources

Prehistoric and historic cultural resources exist within the project areas. The area was used by Native Americans, sites have been found within the planning area. The Kirkwood Inn is a significantly historic site; however the building has had many renovations to it and flood damage repair.

5.4 Emergency Services

Fire suppression for wildland fire incidents is provided by the Kirkwood Fire Department (which is funded in part by the KMPUD), CALFIRE and the USFS. The USFS and CALFIRE stations on to the west on Highway 88 towards Jackson.

Response distances are primarily within 2 miles from the Kirkwood Fire Station. Mutual aid response from CALFIRE and USFS is a minimum of 30 minutes away. Eastern Alpine Fire / Rescue and Lake Valley Fire Protection District also provide automatic mutual aid.

5.5 Insurance Ratings

The ISO rating for Kirkwood Meadows is a 4. The combination of a paid fire department with a hydrant system significantly reduces the ISO rating relative to the rest of Alpine County. As indicated on the hazard maps, the area is also is a moderate to below moderate wildland fire hazard rating due to elevation and weather.

5.6 Land Use Development Trends

Development has significantly increased in recent years. At this point new development has slowed and there are not currently any homes under construction. With limited vacant lots there is little likelihood of significant development. The largest development opportunities exist in new condominiums near the lodge proper.

6D. Current Fire Environment – Kirkwood

6.1 Wildland Fire History

Devastating wildfires have occurred in Alpine County communities in the past, however none have occurred at the higher elevations like Kirkwood. There have been small wildland fires, but they have not spread and been extinguished quickly. The high elevation creates lower temperatures and high humidity, lowering the likelihood of large wildland fire events.

6.2 Local Fire Ecology and Forest Health

Effective management of the wildland fire risks on the landscape today must include an understanding of forest health issues and fire ecology. Without understanding the processes in a forest ecosystem, we will continue to attempt to control it, rather than live within it. Deteriorating forest health increases the wildland fire hazards around our communities. Improving forest health results in forests less susceptible to catastrophic fire, reducing the fire risk to our communities.

The science of fire ecology is concerned with understanding how fires determine a forest's structure and species composition, and describing fire's role in changing that structure and composition. A fire regime is defined as the frequency and severity of fire occurrence in a given forest type.

Some plant communities depend upon stand-replacing, high intensity fires. Lodgepole pine and fir forests evolved with the occurrence of infrequent, high-intensity, "stand destroying" wildfires that eliminated the existing forest stand. Few trees within the fire perimeter survived, and the low frequency of fires in these plant communities allow long periods of time for the accumulation of fuels and the reestablishment of vertical continuity ("ladder fuels") and horizontal continuity (closed canopies) in the fuel strata. This was conducive to the simultaneous combustion of all fuels during a single fire event.

Other plant communities have evolved to burn frequently with low intensity; for example, mature Jeffrey pine forests. Under a historic fire regime, low-intensity surface fires reduced fuel loading from grasses and shrubs, suppressing regeneration of shade-tolerant white fir seedlings, and leaving the adult trees, protected by thick, fire-resistant bark, unaffected. Forests with frequent fire occurrence had an open, "park-like" appearance with an understory of grass or low shrubs. Though shaded by large, mature trees, spacing between trees was sufficient to allow sunlight to reach the forest floor and encouraged regeneration of shade-intolerant species like Jeffrey pine. Pockets of heavy fuels existed under these conditions, but their discontinuous nature reduced the likelihood that a fire would burn with enough intensity to affect mature trees. Frequent surface fires also remove accumulated dead-and-down woody fuels and the green "ladder fuels" that would otherwise carry flames into the coniferous overstory, potentially provoking a catastrophic, stand-destroying crown fire.

The forest that regenerates with an infrequent, high-intensity crown fire regime is generally very dense and of a single age structure. This density often results in the exclusion of sunlight to the forest floor and subsequent recruitment of shade-tolerant species such as white fir, which contributes to extremely high fuel loadings in the understory. This arrangement of fuels, or fuel structure, creates an ideal mixture of oxygen and fuel for high intensity fire.

Both forest types exist in Alpine County, historically and today. They are separated by elevation, at roughly the 7,000-foot contour. Above 7,000 feet, temperatures are low enough and moisture high enough to infrequently allow ignitions to grow into large fires. Below 7,000 feet, in warmer, drier areas, frequent ignitions resulted in consumption of the fuels. This constant consumption of fine fuels kept fuel loadings and fire intensity low.

The forest within the Kirkwood planning area is above 7000 feet and is typical high elevation forest. Tree species are commonly lodgepole pine and red fir, in fairly close stands or clumps, and include a lot of material in the understory. Wildland fires in the area would typically be stand destroying, easily getting into the canopy and then be driven by wind to burn both the overstory and understory.

Forest stands within the Kirkwood meadows are not contiguous, with expanses of open area of low sage in between groups of lodgepole pine and fir. The brush in these open area is low and would have difficulty carrying a high intensity fire. A large fire would likely consume a single group of trees, but it would require extreme fire conditions (high winds, low humidity, high temperatures) to have a fire that would carry effectively across the entire landscape.

The overall forest health appears positive with relatively few dead trees and no visible signs of infestations.

6.2.1 Fire Frequency

CALFIRE developed fire rotation or frequency measures for the entire state. Data is stratified into three classes of frequency. These classes represent the amount of time necessary for fires to have burned an entire area, based on historic fires. For example, in an area classified as < 100 years, the entire area would have burned over at least once in < 100 years. This could be by a single fire, though is more commonly the culmination of many fires in that area.

6.3 Fire Weather

Lightning causes most wildland fire ignitions in the Kirkwood area. Summer thunderstorms bring erratic winds and lightning to the area. Fire behavior is most extreme after long period of hot, dry weather with no precipitation. It is common to have a southwesterly wind coming over the Sierra's in the afternoons during the summer. Most catastrophic fires on the west slope of the Sierras have occurred during these conditions.

6.4 Fuels Map

Fire fuels have been mapped by CALFIRE for the Kirkwood Planning Area. CALFIRE classifies fuels based on the 13 standard fuel models developed by Rothermel. Assignment of fuel models and hazards were based on vegetation data collected from satellite imagery.

Figure 41 shows the fuel models in the Kirkwood Planning Area from CALFIRE data. The table in Appendix 8 briefly describes the models and which ones apply to the Kirkwood planning area.

Kirkwood

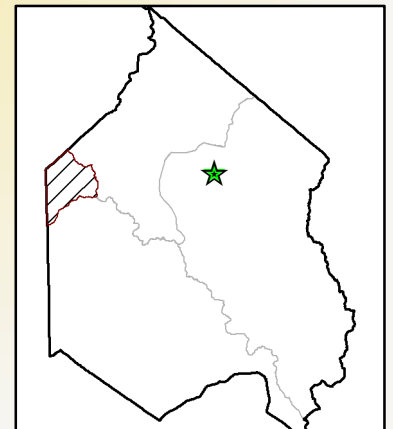
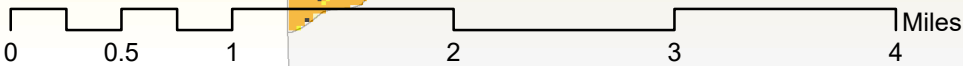


Figure 41: Kirkwood Fuel Models

FBFM Category



- Map prepared March, 2017 by CG Celio & Sons, Inc.
 - Map projected to 1983_StatePlane_California_II_FIPS_0402_Feet
 - Fire Behavior Fuels data compiled by USGS Landfire; 2014;
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6.4.1 Hazard Maps

Combining the wildfire fuels data with other information that would affect fire behavior, such as slope, fire agencies compile wildfire hazard maps. These maps show areas that, given the specific fuel and slope conditions, would have extreme to moderate fire behavior. These hazard maps can help prioritize wildfire mitigation projects. Figure 42 is a more detailed look at the hazards in neighborhoods in the Kirkwood Planning Area. The data is from 2007 CALFIRE Fire Hazard Severity maps.

6.4.2 Condition Class

The National Fire Plan and Healthy Forest Act dictate that the federal agencies use Condition Class as criteria for planning projects. The Condition Class represents a relative measure of how much an area differs from its historical fire regime. As dictated by the national fire plan, areas of Condition Class 3 have a higher priority for treatment than those of lower condition class. CALFIRE has calculated condition class across the state. Figure 43 shows Condition Class for the Kirkwood Planning Area.

6.4.3 Natural Fire Breaks

There are a number of fire breaks in the Kirkwood area. Large areas of open low brush occur within the forest stand. The cleared runs from the ski resort also act as natural firebreaks to any fire from the south. The meadow, wet most of the summer, also provides a natural fire break.

6.5 Fire History

There are no previous wildfires of noticeable size in the Kirkwood area. Wildfire is an infrequent event in the Kirkwood Planning Area. There have been few ignitions during the summer months from both lightning and manmade sources, but these fires have not grown and have been quickly extinguished.

6.6 Expected Fire Behavior

Fire behavior could be extreme and uncontrollable during the worst-case conditions. Slopes are steep, wind commonly increases in the afternoon, and fuel loadings in the small stands of trees are high. While a wide range of fire behavior can be expected in the various fuel types and weather conditions, extreme fire behavior is likely during severe fire weather conditions.

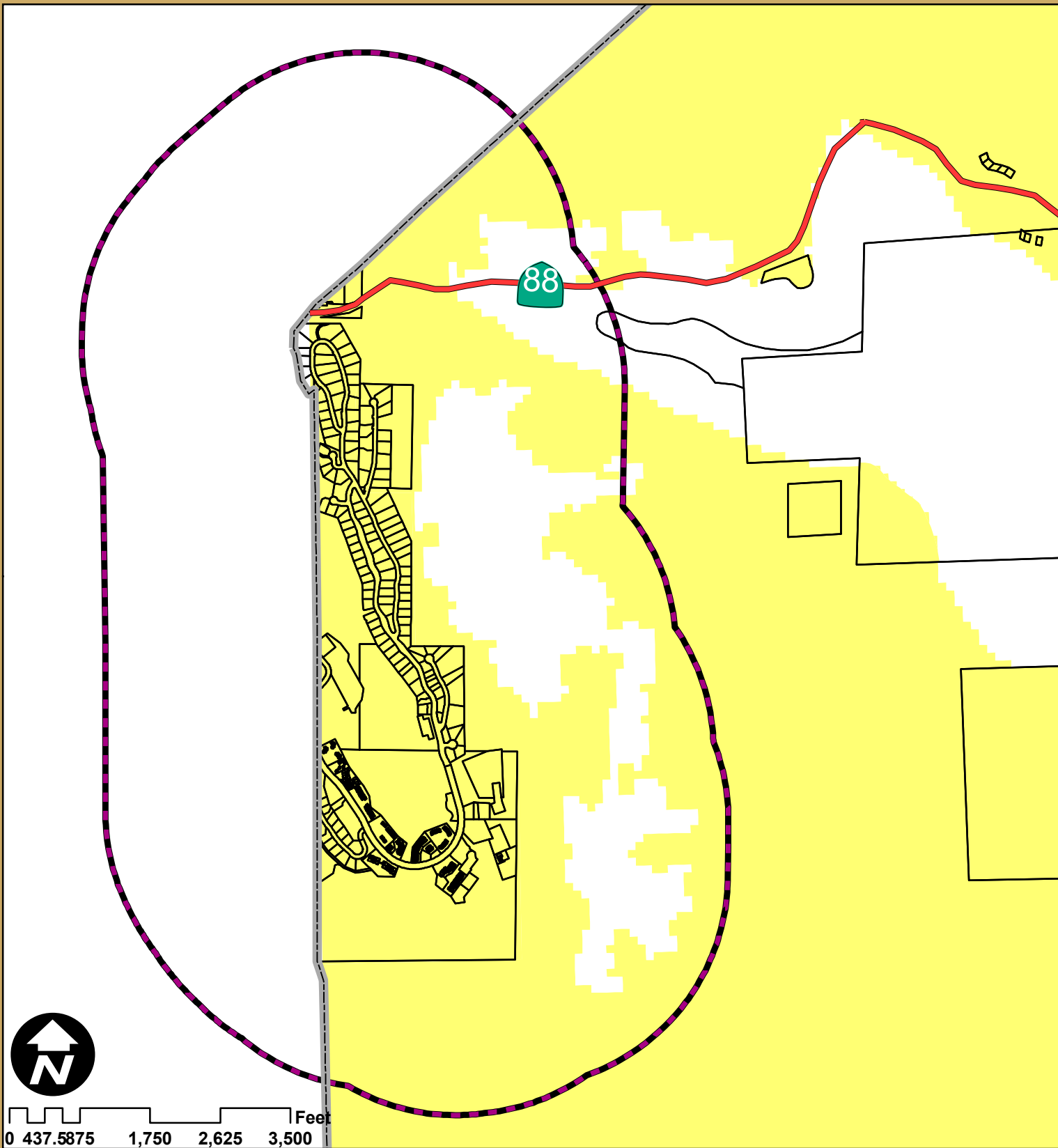


Figure 42: Kirkwood Fire Hazard Map

Fire Hazard Severity

- Very High
- High
- Moderate
- WUI
- Parcels
- Alpine County Line

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 - Fire hazard data computed by CalFire
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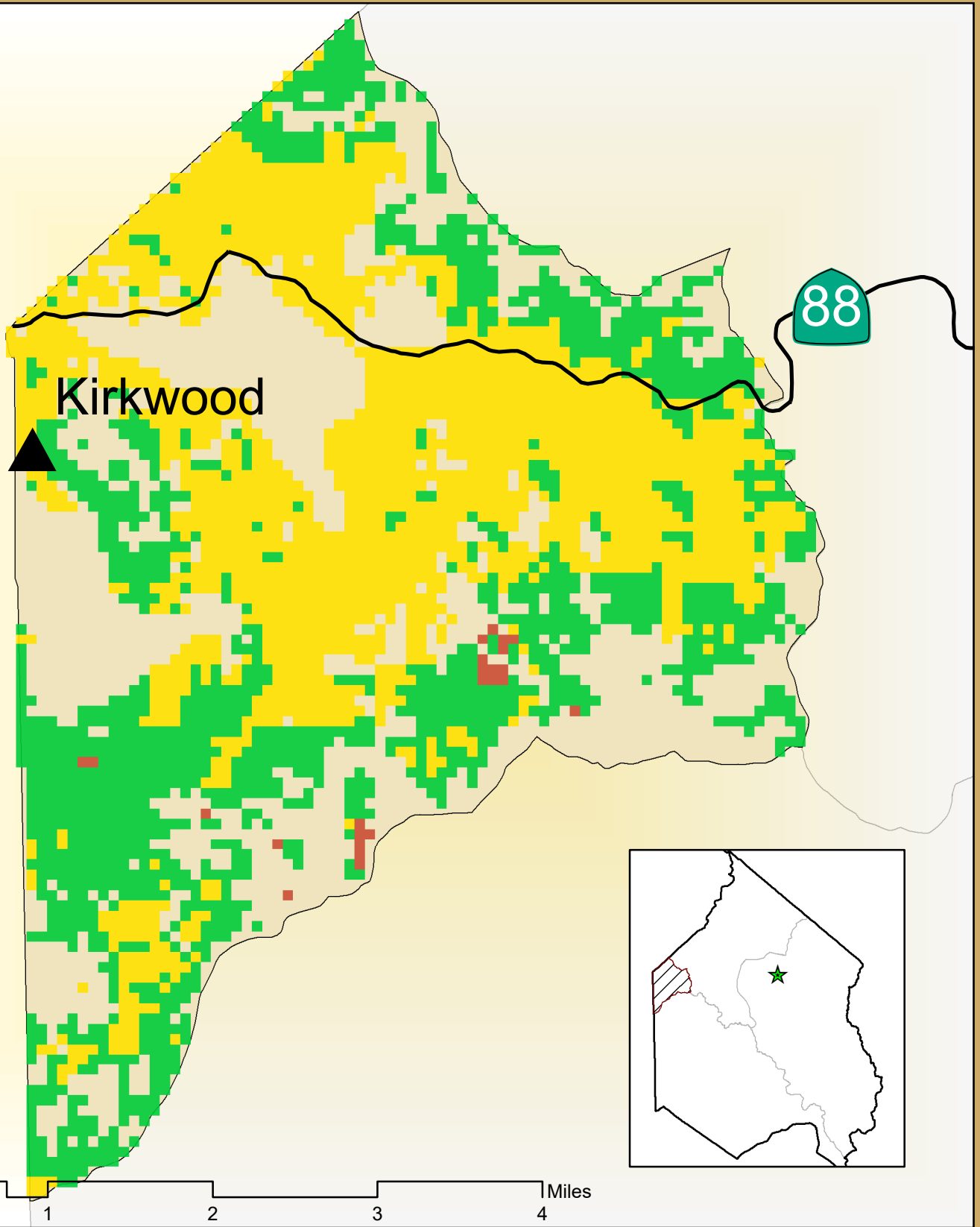


Figure 43: Kirkwood Condition Class

Condition Class

- Class 1 (historic fire regime)
- Class 2 (slightly altered fire regime)
- Class 3 (significantly altered fire regime)
- Not classified

- Map prepared March, 2017 by CG Celio & Sons, Inc.
 - Condition data from Calfire FRAP database
 - Map projected to NAD_1983_StatePlane_California_II_FIPS_0402_Feet
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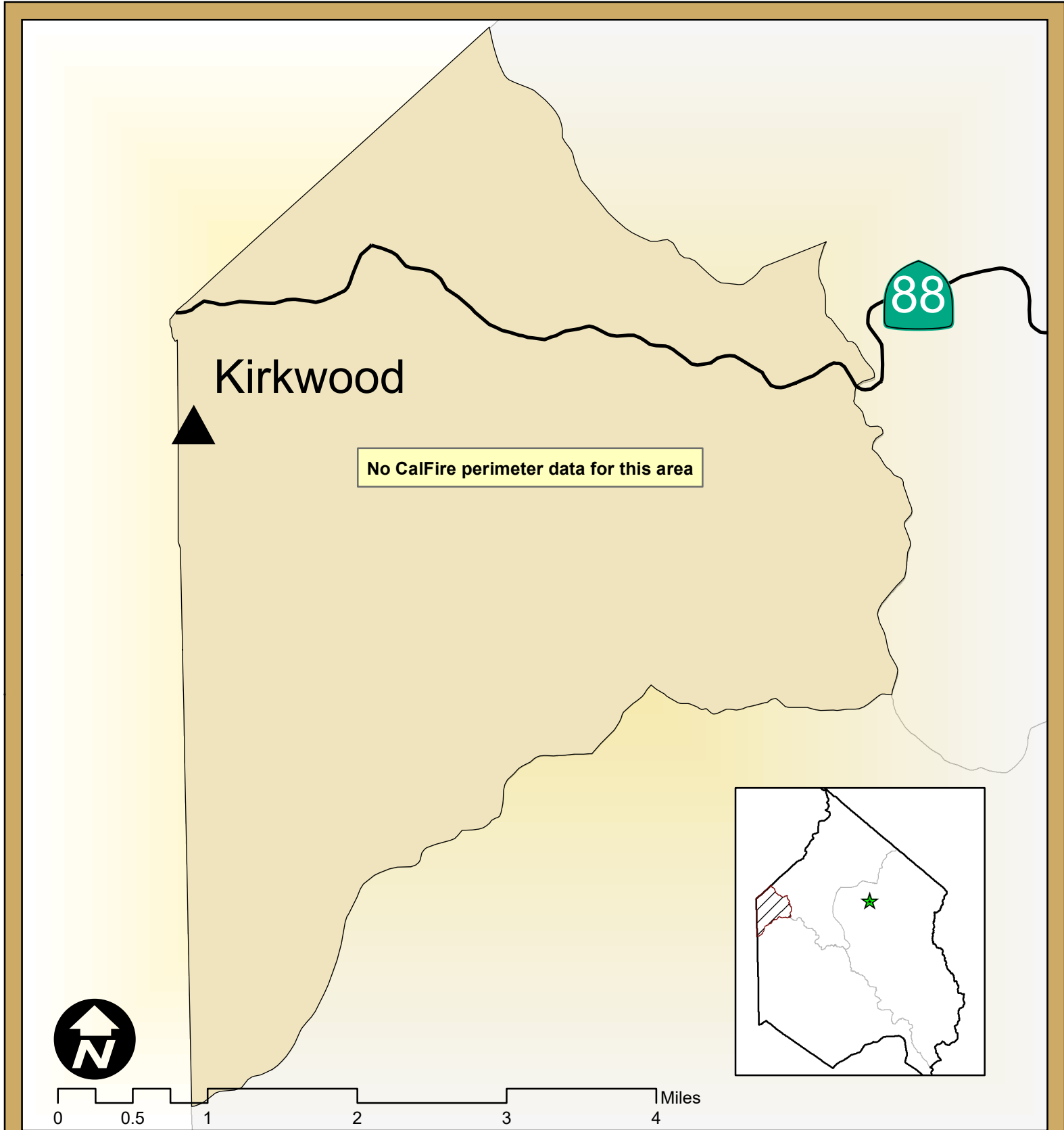





Figure 44: Kirkwood Fire History

-  Communities
-  County Seat
-  State Highways

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- Map projected to NAD_1983_StatePlane_California_II_FIPS_0402_Feet

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6.7 Wildland Urban Interface (WUI)

The Wildland Urban Interface is typically considered to be within ½ mile of a community, but can be adjusted based on fuels, topography and other fire behavior factors. The proposed WUI around the neighborhoods in the Kirkwood Planning Area is based on the distance from the communities but has been adjusted to create a contiguous area including all the communities and accounts for the private land in between the structures and the public lands. Figure 45 demonstrates the WUI around the Kirkwood Planning Area.

6.8 Completed Projects

The Kirkwood Fire Department has completed a curbside shipping program in recent years. It is provided to the homeowners on an as needed basis, the homeowners must call to schedule a time for the chipper to come by and dispose of material. Through this program homeowners on many lots in the area have improved defensible space and disposed of vegetation material.

The Eldorado National Forest (USFS) has been conducting pile burning and broadcast burning fuel treatments on 169 acres in the Caples Lake drainage north and west of Kirkwood. This is part of a larger fuels treatment effort to be conducted by the USFS over the next 5-10 years.

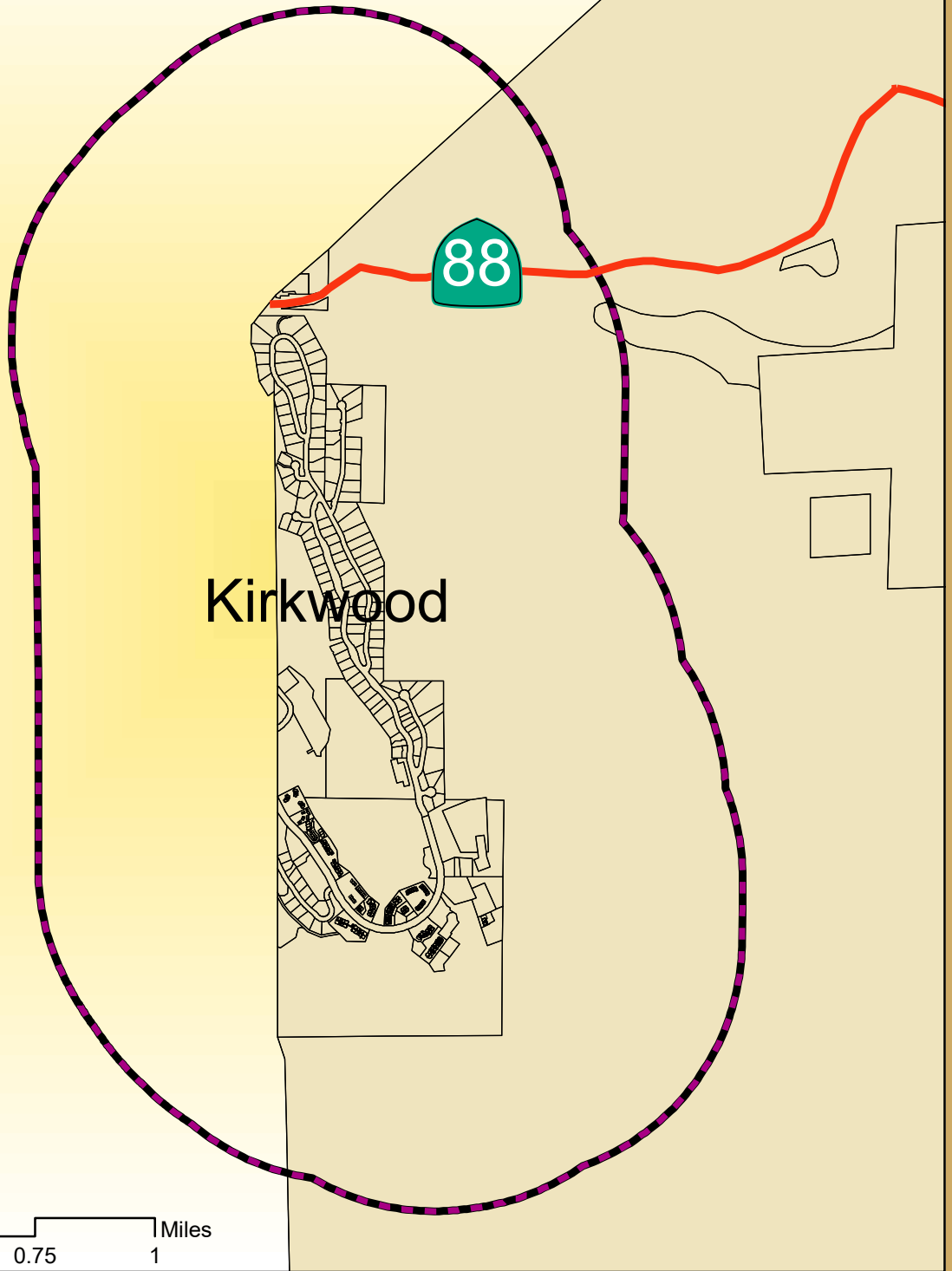
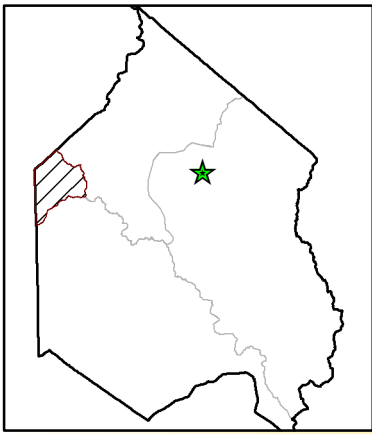


Figure 45: Kirkwood Planning Area WUI



WUI



County Seat



State Highways

- Map prepared March, 2017 by CG Celio & Sons, Inc.

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7D. Risk Evaluation – Kirkwood

7.1 Risk Evaluation

The neighborhoods within the Kirkwood Planning Area are at low to medium for catastrophic wildfire. Fuels surrounding the neighborhoods are patchy forest types. Slopes are moderate to steep and the wind blows across the valley from the southwest during hot summer and early fall afternoons.

Natural and human ignitions are likely. The ignition risk is highest from the tourist and recreational user groups who are unfamiliar with the area and commonly use outside BBQ's and campfires. The increased amount of tourist traffic on the road also increases the risk of ignition from vehicles.

Fire protection is provided by the Kirkwood Fire Department. There is one structure engine and one wildland engine at their firehouse. Water sources include hydrants throughout the community.

Alpine County recently completed its Field Operations Guide complete with evacuation maps for neighborhoods in Kirkwood. Egress from the communities is good, with good circulation in the parking lots at the south end of the valley and two ways out of the east meadows subdivision. The risk of entrapment is low. Many roads are looped and there are no designated safety zones. Neighborhoods are most at risk from a wind driven fire burning through the forest to the southwest.

7.2 Risk Evaluation Summary

| <u>Asset</u> | <u>Rating</u> |
|-----------------------|---------------|
| Structures | |
| 2. Lodge Area | Low |
| 3. East Meadows | Medium |
| Business | |
| 1. Lodge Area | Low |
| Infrastructure | |
| 1. KMPUD | Medium |
| 4. Powerhouse | Medium |
| 4. Power Lines | Medium |
| 5. Evacuation Routes | Medium |
| Recreation | |
| 1. Recreation Center | Medium |
| 2. Tennis courts | Medium |

| | |
|-----------------------------|----------------|
| 3. USFS Campgrounds | Medium |
| | |
| Fishing | |
| 1. American River | Medium |
| | |
| Wildlife Habitat | Medium |
| | |
| Endangered Species | Medium |
| | |
| Watersheds | Medium to High |
| | |
| Historical Resources | Medium |
| | |
| Cultural Resources | Medium to High |

7.3 Fire Hazard Assessment by Location

1. Lodge Area

Rating: Low

Fuels: The Lodge Area is surrounded by Fuel Models 2 (grasses), and 5 (brush). Red Fir, Lodgepole Pine, and grasses are the primary vegetation types. The fuels are sparse and broken up by the parking lots, roads, buildings and other development. While there are enough fuels to burn, there is not a contiguous enough fuel bed to carry a wildfire.



Weather: Summer weather is typical for the west slope of the Sierras with afternoon winds from the southwest. Temperatures rarely exceed 85 degrees, but humidity can drop to as low as 10%.

Topography: Slopes are low in the neighborhood, slightly north facing at the end of the valley.

Human Sources of Ignition: A number of sources of human ignitions exist in and near the Lodge Area. Structure fires can easily spread to the wildland if they occur during wildland season. Power is supplied through overhead lines adjacent to roads. Lines have been knocked down during storm events and traffic accidents. The large influx of tourists during the summer, particularly on weekends, increases the number of potential ignition sources, from recreation fire use and from vehicle accidents.

Community Preparedness: Due to the relatively low risk of a fire, the community is reasonably prepared for a wildland fire event. Building construction is generally good, with metal roofs and stucco type siding materials common in commercial tourist buildings. Many structures have adequate defensible space. The road has large parking area components so there is plenty of space for effective ingress and egress. Fuels along these access ways are mostly non-existent as the roads follow next to the buildings. Power lines are underground. Entrapment is unlikely, however the single paved road in and out of the area could become congested with emergency vehicles during a fire event. The community services building, the main lodge and Red Cliffs lodge are easily large enough to be evacuation centers if necessary.

Fire Protection Resources: The Kirkwood Fire Department is located within ¼ mile of the neighborhood and can respond engines in less than 5 minutes. Water supply comes from the hydrant system. Mutual aid fire resources come from Eastern Alpine Fire and Rescue, Lake Valley Fire Protection District, CALFIRE, and USFS with a 20 to 30-minute response time.



Figure 46: Kirkwood Lodge Area Neighborhood

Land Ownership (Non-Private)

- Alpine County
- State Property
- BIA
- USFS
- BLM
- Utility
- Alpine County Line

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2. East Meadows**Rating: Medium**

Fuels: The East Meadows lies in Fuel Models 2 (grasses) and 5 (brush), with moderate fuel densities. Buildings and landscaping break up wildland fuels, but tree density is high and ladder fuels are present. Lodgepole Pine and Red Fir predominate with a grass understory.



Weather and Topography: Summer weather is the primary concern with afternoon winds from the southwest. Slopes are moderate to steep in the neighborhood. The subdivision is primarily west facing.

Human Sources of Ignition: Many sources of human ignitions exist in the neighborhood of the East Meadows. Some of the residences use wood heating, leading to potential for chimney fires and burning embers. Structure fires can easily spread to the wildland if they occur during wildland season. A large summer influx of tourists increases possible ignitions from barbeques, vehicles, cigarette butts etc.

Community Preparedness: The neighborhood is moderately prepared for a wildland fire. Most construction is very recent with new building materials, non-combustible siding, decks, and roofing material. Most structures do not have adequate defensible space. Structure density and landscaping preclude most wildland fuels in the understory, but pine needles on the ground and tree density remain as hazards. Access and egress on wide, paved roads eliminates entrapment concerns. A gated exit at the north end of the neighborhood allows for egress should the primary southern route become blocked. The Recreation Center and Red Cliff lodge can serve as shelters.

Fire Protection Resources: The Kirkwood Fire Department is located at the with ½ mile and can respond engines in less than 5 minutes. A hydrant system provides sufficient water supply. Mutual aid comes from Eastern Alpine Fire and Rescue, Lake Valley Fire Protection District, CALFIRE, and USFS with a 20 to 30-minute response time.

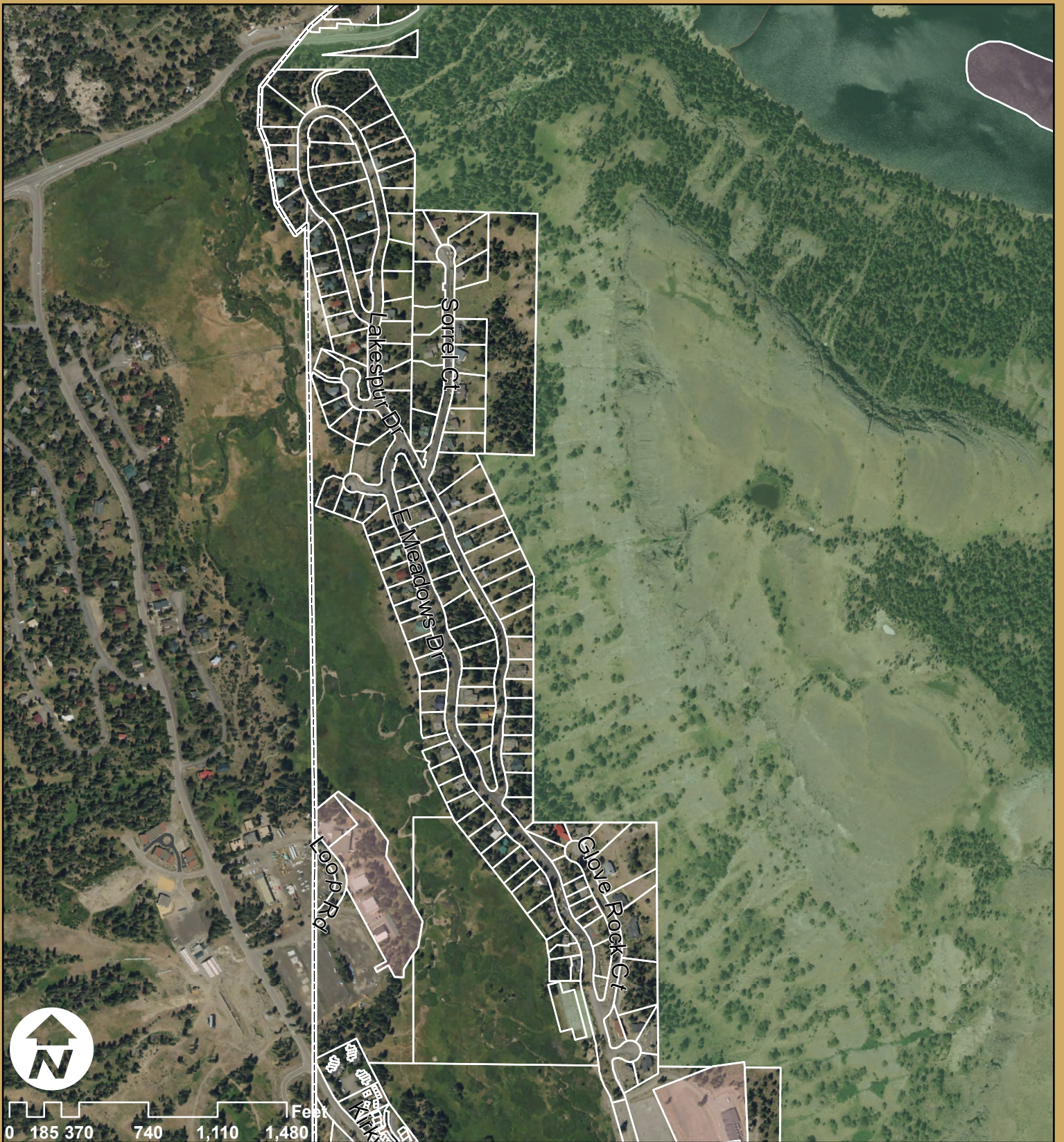









Figure 47: Kirkwood East Meadows Neighborhood

Land Ownership (Non-Private)

- | | | | |
|--|---------------|---|--------------------|
|  | Alpine County |  | State Property |
|  | BIA |  | USFS |
|  | BLM |  | Utility |
| | |  | Alpine County Line |

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8D. Action Plan – Kirkwood

8.1 Desired Future Conditions

1. Reduced threat to residents and their property from wildfires.
2. Increased community preparedness for wildfire.

8.2 Mitigation Goals and Responsibilities

Goals:

Initiate long term planning for vegetation: species types and density for the Kirkwood Planning Area.

Objectives:

Determine strategies for vegetation management, prescriptions, fuels reduction, and maintenance.

Responsibilities:

Homeowners:

For the entire Kirkwood Planning Area

- 1. Replace flammable roofing, siding, and decking materials with fire-resistant materials.**
2. Provide a minimum 100' defensible space around all structures.
3. Support the Kirkwood Fire Department in the actions listed below.

For the Lodge Area neighborhood

- 1. Discuss evacuation and fire operation activities with local fire departments and emergency response agencies. Preplan with Vail resorts to ensure clarity in facility needs and evacuation operations.**

For the East Meadows neighborhood:

- 1. Continue efforts to create defensible space and remove ladder fuels.**
2. Continue fuels treatment along the road right of ways.

Kirkwood Fire Department:

- 1. Develop a community evacuation plan and conduct an evacuation drill with the community, Alpine County Sheriff's Office, Amador County Sheriff's Office, Eastern Alpine Fire / Rescue and the USFS.**
2. Participate in a pre-fire season tabletop exercise with the Alpine County Sheriff's Office, Eastern Alpine Fire Rescue, Lake Valley Fire Protection District, CALFIRE, USFS, and Vail Resorts to develop a coordinated agency response to a wildfire incident.
3. Increase the number of trained volunteers.

4. Continue to purchase wildland firefighting equipment and train volunteers to the “red card” certification system.
5. Pursue upgrading wildland apparatus.

Alpine County Sheriff’s Office:

1. **Develop a community evacuation plan and conduct an evacuation drill with the community. Include relevant partner agencies that might be involved in a major wildfire event.**
2. Participate in a pre-fire season tabletop exercise with Vail Resorts, the Kirkwood Fire Department, Eastern Alpine Fire / Rescue, Lake Valley Fire Protection District, CALFIRE, Amador County Sheriff’s Office and USFS to develop a coordinated agency response to a wildfire incident.

Alpine County Board of Supervisors:

1. **Ensure the emergency services agencies are addressing the public safety issues outlined in this plan.**
2. Enforce legislation, ordinances, or other codes to eliminate wildland fuel hazards within the communities.
3. Lobby federal agencies to implement fuels reduction projects on public lands surrounding communities.
4. Continue fuels treatments on County owned land within communities.

Kirkwood Public Utility District:

1. **Continue Community Chipper Program to provide a solution for homeowners to create and maintain defensible space around their structures.**
2. Continue to provide defensible space around KMPUD Buildings, (Community Center, Fire Department, Powerhouse.)
3. Continue the annual brush treatment along roadways to reduce the ignition risk and to make the road passable during a fire event.

Alpine Fire Safe Council:

1. **Actively support the efforts of the local fire department and other emergency services in mitigating wildfire risk.**
2. Collaborate with Amador Fire Safe Council as needed to secure funding and support for Kirkwood projects.
3. Continue to provide public education information on defensible space at County buildings, and through mailings.
4. Assist the Alpine County Board of Supervisors as requested with development of fuels reduction solutions.

8.3 Mitigation Projects

No Mitigation Projects have been identified for the Kirkwood Planning Area.

Appendices

APPENDIX 1: BIOMASS OPPORTUNITIES

Economic Opportunities

Disposing of the biomass created through fuel reduction projects is always a challenge. The most effective and long-term solution to disposal is to create a marketable product from the biomass. No available markets currently exist that will purchase this material. The following section is intended to demonstrate the types and rough amounts of material generated in Alpine County. It should be used as background information in pursuing biomass utilization solutions.

Product Types

Alpine County has traditionally provided commercial forest products. Historically, much of the area was logged for fuelwood in the local and surrounding mining communities. Resource extraction has continued to present day, though not in the volumes of the turn of the century. Today, small commercial timber sales, usually associated with development, occur on private land. The USFS and BLM continue to sell firewood and Christmas tree permits, though not in great numbers. The relatively small amount of material removed is due to the lack of commercially viable options for resource removal. Fuels loading is likely worse than it has ever been, due to fire suppression and the unmanaged approach to forest health.

Timber- There is some opportunity for timber removal in fuels reduction projects in Alpine County. As thinning is the primary fuels reduction treatment for timber, the timber is typically small diameter. Occasionally a large tree will be removed due to hazard or disease, but this would not constitute enough material for a single truckload to the mill.

Communities around Markleeville and Woodfords have this type of material. Some commercial timber could be removed in these areas, but to make the operation economically feasible, a number of small landowners would have to cooperate to provide enough sawlogs or firewood.

Slash, Pine Needles, and Woody Brush (Biomass)- Much of the fuels reduction efforts by private landowners result in limbs, sticks, twigs, pine needles and some brush. Removing ladder fuels on trees, raking pine needles, and removing flammable material next to the house comprise this material. A good example of this material is in the “burn pile” hosted by Alpine County every April and October at Turtle Rock Park.



The pile is the effort of many landowners bringing a few truckloads of material to the site for disposal. The site is supervised to eliminate those who would throw trash, construction waste, and other inappropriate materials into the pile. Many landowners also simply burn piles on their land to remove the material. The volume of material removed through private burning is likely not much more than visible in this photo.

Some large piles of this material are created when a landowner is clearing a site for their home. Currently, this material is not eligible to be dumped at the community burn pile.

Sagebrush, Bitterbrush, and other Biomass- North of Woodfords, much of the fuel reduction efforts focuses on sagebrush. Some of this material ends up in the community burn pile. Also, the county road department creates a large pile in the process of their summer road / ditch maintenance activities. This pile is behind the Community Development yard. Again, piles like this are created by landowners clearing lots for homes, an increasing common occurrence north of Woodfords.



County Community Development pile



Private Landowner (Lot Clearing for Home)

Uses

Traditional forest product users, such as lumber mills, are no longer in operation near this area. The closest forest mill is in Sonora, California, meaning that logs must be of a large size to be profitable to haul. Fire wood distributors or compost operations appear to be the only local wood product producers.

Typically, compost operators charge to take biomass. The material is inconsistent, a mix of everything from slash to sagebrush to pine needles. Making a valuable wood product from this material, such as residential stove pellets, is difficult.

Other areas in California have experimented with cogeneration plants, power plants that use biomass, and other wood product buyers for using local forest products. It appears there are mixed results, as some of these plants have closed. An effort is underway to bring a biomass products plant to Carson City, which would produce everything from stove pellets to soil treatments.

Volumes

Relatively, Alpine County produces small amounts of the above materials. If all the material pictured above were in one pile, it would only take an operator a few days to chip and remove. This is not enough biomass to create a sustainable market. Including the burn pile, the Community Development pile, lot clearing and other private sources, the total estimate of biomass would be around 120 tons annually.

Solutions

There are a variety of different solution providers for fuels reduction activities on private and public land. As the product types are varied in products and volume, there is overlap between what each solution provides. It takes some research into each specific situation to determine which solution is right.

One constant appears to remain. There is little local market for materials right now, so whatever the solution it will likely cost the landowner. Costs can be kept down by increasing the volume of material removed, so working together as a community we can lessen the costs to the small landowners.

APPENDIX 2: CONTRACTOR DIRECTORY

DISCLAIMER: The following contractors, individuals and consultants are available to help you reduce the risk associated with catastrophic wild land fires. The Alpine Fire Safe Council does not guarantee their performance or suitability for any specific job, and strongly recommends that you satisfy yourself as to their suitability prior to engaging them to work on your property.



Alpine Fire Safe Council

DEFENSIBLE SPACE Clean up

The Alpine Fire Safe Council tries to bring to Eastern Alpine County residents and property owners methods to maintain your Defensible Space and assistance to abate your greens waste, and forest fuels.

To this end, we offer a contact list of Defensible Space/fuels reduction Contractors, and individuals that can perform this work. We have also included locations that you can haul and deposit your greens waste; our Curbside Chipping Program phone number; and the Alpine County Fall burn pile dates, all for assistance of abatement of greens waste.

This list is offered without preference. If you contract with any of the listed contractors or individuals, all financial arrangements, scheduling, task assignment(s), completion, etc., between the property owner and the contractor or individual is solely between the two parties.

Whatever your experience, with any of the listed, AFSC would like to know. Thereafter, we will be able to continue to list contractors/individuals in future years, for the benefit of Eastern Alpine County residents and property owners. Please call 694-1879 to let us know.

Defensible Space Contractors

Joe Benigno Tree Service

Contact Jacie (775)265-9665

This is a licensed Contractor, performing all types of private property fuels reduction work, tree & brush removal, mastication, chipping, fire and fuels abatement, etc, in both Calif. and Nevada

Sierra Fire Fuels LLC

sierrafirefuels@gmail.com

Defensible Space cleaning and Maintenance Type B LTO

Washoe Tribe/ Woodfords Community Members

Contact Irvin Jim (775)400-6122

The Washoe tribe offers fuels abatement services to Eastern Alpine County residents and businesses. The number of crew members and needed equipment is determined by the Crew Foreman. The crew performs all types of brush & downed fuels abatement as well as tree felling and cut up.

Individuals

Duane Boucher

Contact Duane at (530) 401-1240 by email: duaneboucher@yahoo.com

Duane performs yard maintenance in **Markleeville ONLY**, fuels reduction, pine needles, pine cones, brush cutting, raking, etc.; all on site work, no hauling.

Alpine County Summer/Fall burn pile

Where: Turtle Rock Park Hwy 89

When: As Announced

Greens Waste Collection Locations

Bentley Agriculture 1089 Stockyard Rd, Minden, NV (775)782-4513

Douglas Waste Transfer Station Greens waste dump, Pine Nut Road, Douglas Co., NV
(775) 782-5711

APPENDIX 3: WILDLAND FIRE EVACUATION RECOMMENDATIONS

Markleevillage - Thornburg Subdivision - Shay Creek - Markleeville

Pre-fire preparation

- Have adequate clearance around structures of all flammable material: minimum of 30 feet. Greater distance may be required based on slope.
- Do NOT have wood piles against house, under porch or deck, or within 30-foot clearance area.
- Clear pine needles and leaves from gutters and roof. Trim back overhanging branches at least 10 feet from chimney.
- Replace roofing and siding with nonflammable or fire-resistant materials. No wood roofs.
- Cover all attic and basement or crawl space openings with mesh metal screen 3/8 inch or smaller.
- Reduce or remove flammable vegetation, including landscape plants, and replace with less flammable ones. Manzanita and juniper are particularly flammable.
- Maintain greenbelt modification around developed areas.
- Have a means of transporting pets readily available.
- Make a list of valuables, medications and other personal items which would be important to take with you in case evacuation is ordered. Show location of items on the list. (Think in terms of things which cannot be replaced such as photograph albums, personal recipe books, important papers, insurance information, purse or wallet, etc.)
- Contact your local volunteer fire department, the Sheriff's Department, or a Fire Safe Council member for more pre-fire preparedness information and materials.

What to do if a wildfire is approaching

CONSERVE WATER. WATER SYSTEMS IN BOTH AREAS NEED WATER FOR FIRE FIGHTING. DO NOT FILL BATHTUBS OR OTHER CONTAINERS.

- Park your vehicle facing out. Put your valuables in the car and roll up windows. Place car keys where you can find them or keep them on your person. Close garage door but leave it unlocked. If applicable, disconnect the electric garage door opener so that door can be opened manually.
- Secure pets and prepare them to be transported.
- Close doors, windows, shutters and heavy drapes.

- Remove lightweight curtains and/or non-fire-resistant curtains and move other combustible materials from around windows.
- Place combustible patio furniture in house or garage.
- Do NOT lock doors.
- Place garden hoses around house and attach them to faucets.
- Leave your electricity on and turn some inside lights and porch light on.
- If you have an emergency generator TURN IT OFF
- Close damper in fireplace.
- Turn off gas at propane tank and turn off all pilot lights.
- Place ladder against house on side away from approaching fire and away from power line.
- Cover all exterior vents.
- Wear long pants, long sleeved shirt or jacket (cotton is best), and boots or walking shoes (not sandals). Carry goggles, a bandanna to cover your face, and water to drink.

What would happen in the case of an evacuation

- The Incident Command will initially decide the areas to be evacuated. This decision will be based on factors such as weather, current and expected fire behavior, access, evacuation timeframes, and most importantly life safety of the public and firefighters.
- The Alpine County Sheriff's Office (ACSO) is responsible for carrying out the evacuation. The ACSO will use deputies, Search and Rescue, and volunteers and will go door to door notifying residents. The ACSO is responsible for the security of the areas that are evacuated. They will also ensure that disabled or non-ambulatory people are looked after.
- Emergency personnel will select a Safety Zone and will direct you to the selected zone during the evacuation process.
- California Highway Patrol (CHP) and the ACSO will control traffic flow and maintain access for emergency equipment.

Evacuation advisories

- **Precautionary**
Areas under a "Precautionary Evacuation" are in the influence zone of the fire. While not immediately in danger, changes in weather and/or fire conditions could rapidly cause a threatening situation to occur. (Only residents with proper identification will be allowed in the affected area.)
- **Immediate threat**
An "Immediate Threat Evacuation" would be issued when the fire is moving towards an area and there is an immediate threat to life and property.

Whenever an area is under “Immediate Threat”, all roads in the area will be closed to incoming, non-emergency traffic.

- **Lifting of Evacuation Advisories**

Precautionary evacuation advisories may stay in effect for several days. However, “Immediate Threat” advisories should be rescinded when it is determined that the immediate threat is over. Road closures will be opened to residents with identification only if a precautionary evacuation advisory still exists.

- **Area Closures**

Whenever an area is under “Immediate Threat”, roads in the area will be closed by the CHP or the ACSO. Only residents with proper identification will be allowed to enter the affected area.

Sheltering Options

- **Shelter in place**

This would be for a low intensity fire where the structures have a good clearance and are made of fire resistant materials and the fire department feels it is safe to stay.

- **Safety zones**

Temporary holding areas, for smaller groups of people, that provide a safe haven until shelter locations can be established. These locations are distributed throughout the community to provide safe areas that are relatively short distance from their homes. Not all safety zones may be available based on the location of the fire. If a safety zone is to be used, direction will be provided by the agencies coordinating evacuation during the event.

- **Shelters**

Red Cross establishes shelters for the immediate and short-term housing and care of evacuated residents.

- **Alternative locations**

Residents who do not wish to use Red Cross shelters should consider determining in advance alternative housing locations such as family or friends. If you choose not to go to a Red Cross shelter, you are advised to contact the Red Cross to provide information about your location in the event family or friends are trying to find you.

- **Planning your escape route**

The direction of your escape will be dictated by the location of the fire in relation to your home and the direction and speed it is spreading. The concepts that follow will help you determine the safest travel route.

Primary travel routes

- Know the primary travel routes to get out of the area or to safety zones.
- Be prepared to be directed by law enforcement or traffic control personnel. You must follow their directions.
- Drive the routes in advance so that you will be prepared for the confusion of an actual emergency.

During evacuation

- Have a checklist and map ready with all the actions you will take prior to and during evacuation.
- If you become trapped by fire while evacuation to your car, park in an area clear of vegetation, close all vehicle windows and vents, cover yourself with a blanket or jacket and lie on the floor.
- If you are trapped by fire while evacuating on foot, select an area clear of vegetation or lie face down in a ditch.
- If you are unable to evacuate when a fire approaches stay inside your house away from outside walls.
- Keep all doors closed but leave them unlocked.
- Keep your entire family together and REMAIN CALM! Remember if it gets hot in the house, it is four to five times hotter and more dangerous outside.

After the fire passes

- Check the exterior and roof immediately and extinguish all sparks and embers. If you must climb on the roof, use caution.
- Check inside the attic and in the basement or crawl space for hidden burning embers.
- Check your yard for burning woodpiles, trees, fence posts or other materials.

Where to keep this plan

- Refrigerator door
- Home bulletin board
- Wherever it is readily available

For more information contact:

Alpine County Sheriff's Office: 694-2231
Eastern Alpine Fire and Rescue: 694-2223
U.S. Forest Service: 694-2142
Alpine Fire Safe Council: 694-2791

APPENDIX 4: GENERAL PLAN

Board of Supervisors
Resolution No. R2007-02
Exhibit A

Revision to the Safety Element of the Alpine County General Plan
Safety Element

A. Fire

Wildland Fire

Wildland fire protection on private lands in California outside of local fire district jurisdictions is typically provided by the California Department of Forestry and Fire Protection (commonly referred to as "CAL FIRE"). The CAL FIRE does not maintain a physical presence (fire station or firefighting equipment) in Alpine County. As a result, the CAL FIRE responsibility for fire protection has been delegated to federal agencies (U.S. Forest Service "USFS" and Bureau of Land Management "BLM") by virtue of an intergovernmental agreement referred to as the "Five Party Agreement." The goal of this agreement is to efficiently allocate fire suppression resources among federal jurisdiction areas and private lands.

The Sierra Front Interagency Fire Dispatch Center is currently located at the Minden Tahoe Regional Airport in Douglas County Nevada, approximately 18 miles north of Woodfords. This facility has the capability to dispatch wildland fire suppression resources (equipment and manpower) from the Nevada Division of Forestry, BLM, USFS and Bureau of Indian Affairs. Aerial attack resources are also based at this location.

Seasonal wildland firefighting crews have also been stationed at USFS facilities located in Markleeville, west of Kirkwood at the USFS Lumberyard facility in Amador County and west of Bear Valley in the Arnold area of Calaveras County. Early initial attack of wildland fire by ground and aerial attack resources is probably the most effective means of controlling the spread of wildland fire in the County. These resources, available locally and through the Sierra Front Interagency Fire Dispatch Center, are critical to wildland fire protection efforts in Alpine County. However, it is recognized that the first response to wildland fire protection on both private and public lands is often provided by the local fire department(s), many of whose members are trained and certified to fight wildland fires.

Wildland fires within the "wildland urban interface" where development is interspersed with wild lands pose the greatest threat to lives and property. There have been three major wildfires in Alpine County since 1981. In 1984, the "Indian Creek Fire" burned approximately 6000 acres of forest in Alpine County (17,000 acres total) near Indian Creek on the East Slope. In 1986, a fire burned 2000-3000 acres of wildland plus 2 structures near Fredericksburg and in 1987 the "Acorn Fire" burned 6,000 acres and 26 structures near Woodfords. Fortunately, none of these fires resulted in loss of life.

Structural Fire

Response to structural fires and other non-wildland fires (vehicle fires, etc.) is the primary responsibility of local fire departments. There are three fire departments in Alpine County - Bear Valley, Kirkwood, Eastern Alpine Fire and Rescue. Of these, only

Bear Valley and Kirkwood have paid staff. All the departments rely heavily on volunteer fire fighters. Additionally, response may also be provided by fire departments in adjoining communities outside of Alpine County. These include the East Fork Fire Protection District located in Douglas County Nevada, the Lake Valley Fire Protection District located in the Myers area in El Dorado County and the Ebbetts Pass Fire Protection District located west of Bear Valley in Calaveras County.

The Insurance Services Office of California provides ratings of the capabilities of local fire departments to respond and fight fires. These “ISO” ratings are reviewed periodically. The ratings are used by insurance companies to help determine rates for the fire protection component of homeowners insurance premiums. A lower ISO rating means a greater capability and thus, potentially lowers insurance premiums. The rating scale is 1-10 and may vary within a fire department’s response area. Areas within Alpine County have ratings between 4 and 9. Lower rated areas have good resources including a readily available water supply and relatively short response times. The Kirkwood area has an ISO rating of 4. Most of the Bear Valley area is rated 5. Areas rated 8 and 9 (eastern Alpine County) have significant deficiencies such as very limited or lack of water sources available for suppression and longer response times.

Note to the reader: The text that follows refers in general to “Fire Safe Councils.” As used in this section, the Fire Safe Councils refers to the existing organizations and is intended to refer to any organization that would replace the councils or perform the same functions.

ELEMENT II - SECTION A

G.P. GOAL NO. 20: MINIMIZE THE THREAT TO LIVES AND PROPERTY POSED BY THE POSSIBILITY OF WILDLAND AND STRUCTURAL FIRES WITHIN THE WILDLAND URBAN INTERFACE IN THE COUNTY.

20a. Fuels Reduction

Background: The National Fire Danger Rating System and the CAL FIRE Fire Hazard Severity Classification System are used to identify the level of wildland fire hazard in local areas. These ratings are generally based on vegetation type, terrain and local weather conditions. Most areas within Alpine County are classified as high or very high hazard for wildland fire. Fuels reduction is the most effective way of reducing hazards. The Alpine Fire Safe Council, Bear Valley Residents Incorporated, U.S. Forest Service and Bureau of Land Management have all either facilitated or implemented fuels reduction projects within the County.

Objective No. 20a: Reduce fuel loading to a low risk level within the wildland urban interface.

Implementation:

20a-1: The County shall coordinate with the Fire Safe councils to distribute informational materials for homeowners regarding wildland fire hazards, defensible space requirements and other measures that can be done by homeowners to reduce wildland fire hazard and fuel loading on individual lots and within existing neighborhoods. These materials should be included in the building permit packet and made available to the general public at county libraries, other public offices within the County and on the County’s web site.

20a-2: The County shall work with the California Department of Forestry and Fire Protection to assertively implement the defensible space requirements of Public

Resources Code 4291. This includes implementation of the requirements for individual lots and a periodic inspection program to monitor compliance and correct deficiencies.

20a-3: The County and/or Fire Safe councils shall pursue public and private funding, where available, to assist private landowners in implementing fuels reduction and defensible space measures in order to achieve a low risk condition.

20a-4: The County shall require vegetation management plans for all new development that, at a minimum, include provisions for implementation and maintenance of fuels reduction and defensible space; and which meet the minimum clearance standards pursuant to Public Resources Code 4290 (14 CCR 1270). Consideration should be given to maintaining healthy vegetation, minimizing the potential spread of noxious weeds, habitat for wildlife and visual impacts in formulating these vegetation management plans. For purposes of this policy, new development includes parcel maps and subdivisions that create new lots or building sites, planned developments and conditional use permits that entitle new structures. Requirements for ongoing maintenance of vegetation management plans shall be addressed in conditions of approval and/or CC&Rs for the development. A mechanism for enforcement of the maintenance requirements shall also be implemented.

20a-5: The County shall work with public land management agencies to pursue fuel modification and reduction in addition to prescribed burning projects to reduce risks on public lands in areas both within and surrounding existing communities. Priority areas for this type of project are identified in the Alpine Community Fire Plan.

20b. Water Supply

Background: The availability of water supply for fire suppression varies among communities within Alpine County. Bear Valley and Kirkwood have developed water supply systems with hydrants capable of delivering substantial amounts of water for suppression. Water supplies are more limited or nonexistent on the east slope of the County. The Markleeville area and the Alpine Village subdivision in Woodfords have small water systems designed for domestic use only. Fire hydrants have been connected to the South Tahoe Public Utility District effluent disposal pipeline that extends through the Woodfords area. However, there are restrictions on the ability to use this water for fire suppression. Other water sources for wildland fire include rivers and lakes found in various locations throughout the County.

Both the National Fire Protection Association (NFPA) and CAL FIRE have adopted water supply standards for fire suppression. Additionally, Alpine County Code (Section 13.04) sets forth requirements for water systems in new subdivisions. Since this code section was adopted in 1981, only the Morrison Subdivision (AKA “Carson Ridge”) subdivision near Markleeville has been required to install a water system designed for fire suppression. Two other subdivisions in the Mesa Vista area approved in the 1990s were granted exemptions from the water system requirement.

In summary, outside of Bear Valley, Kirkwood and the Morrison Subdivision, developed areas in the County do not have adequate water supplies for fire suppression. The Alpine Fire Safe Council has identified the need for water sources in the Mesa Vista and River Ranch areas. Most recently, the Council had a consultant complete the “Mesa Vista/River Ranch Scoping Study” that evaluates alternatives for providing water supplies for fire suppression in these areas.

Objective 20b: Improve water supplies for fire protection in developed areas within the wildland urban interface.

Implementation:

20b-1: The County shall work in conjunction with the Fire Safe councils, CAL FIRE, fire departments and other agencies with responsibility for fire protection to establish uniform minimum water supply standards for new development. The standards shall meet or exceed the requirements of Public Resources Code 4290. These standards shall be officially adopted by the County. Variances, waivers and/or exceptions to the minimum standards shall only be allowed when an alternative that can be documented to provide an equivalent or better level of protection is required. When compliance with the water supply standards specified in Public Resources Code 4290 is not possible, mitigation measures or alternatives shall be included to achieve fire safe goals as an exception in accordance with 14 CCR 1270.03.

20b-2: The County shall encourage long range planning for improved water supplies for fire protection throughout the County. This planning process should involve the Fire Safe councils, local area residents, fire departments, CAL FIRE and other agencies with responsibility for fire protection.

20b-3: The County and/or Fire Safe councils shall pursue public and private funding to improve water supply for fire protection throughout the County.

20c. Access Requirements

Background: Providing adequate and safe access to communities and developed areas is key to reducing the risk of injury or loss of life, and to facilitating access for fire suppression resources. Road design standards are addressed in the Alpine County Code, the “Alpine County Improvement Standards for Subdivisions, Parcel Maps and Site Improvements” adopted by a resolution of the Board of Supervisors, in regulations administered by CAL FIRE and in the National Fire Protection Association (NFPA) standards. The Alpine County Community Development Department has recently initiated work on revising the County’s standards in an effort to clarify requirements and eliminate conflicts among the various standards.

Objective 20c: All new development in Alpine County shall be provided with adequate access for emergency response vehicles and an emergency egress route for evacuation.

Implementation:

20c-1: The County shall work in conjunction with the Fire Safe councils, CAL FIRE, fire departments and other agencies with responsibility for fire protection to establish uniform minimum access standards for new development. The access standards shall meet or exceed the requirements of Public Resources Code 4290, except as specifically provided in Item 20c-2, 20c-3 and 20c-4. These standards shall address driveways and roads and shall include minimum standards for the number of access points into and out of the development area, driving lane width, grade, curve and cul de sac radius, dead end roads, turn arounds, emergency access/escape routes, home addressing and signing. These standards shall be officially adopted by the County. Variances, waivers and/or exceptions to the minimum standards shall only be allowed when an alternative that can be documented to provide an equivalent or better level of protection is required.

20c-2: Where through roads or dual access to new development is not feasible or desirable due to significant environmental constraints or legal access rights, mitigation measures shall be required. Possible mitigation measures could include, but not be limited to, increased road width, more frequent turn outs and/or turn around locations,

increased water supply requirements for fire protection and sprinkler requirements for structures.

20c-3: The standards established through implementation of 20c-1 should include special consideration for land uses that customarily rely on remote locations and existing parcels in remote locations that do not have road access or are served by roads that may not meet minimum standards. Examples of these land uses that rely on remote locations include, but are not limited to, backcountry ski huts, pack stations, dispersed recreation sites and campgrounds. Some examples of existing parcels in remote locations with roads that do not meet minimum standards include, but are not limited to, private lands in the Poor Boy Road, Wolf Creek, Willow Creek, Forestdale Road, Blue Lakes and Leviathan Mine areas.

20c-4: When compliance with the access standards specified in Public Resources Code 4290 is not possible, mitigation measures or alternatives shall be included to achieve fire safe goals as an exception in accordance with 14 CCR 1270.03.

20d. Fire Protection Planning and Capability

Background: Recent efforts in fire protection planning include the “Alpine County Community Fire Plan” prepared in 2004 under the direction of the Alpine Fire Safe Council, the “Eastern Alpine Fire Services Plan” prepared in 2005 by an ad hoc committee of the Alpine County Board of Supervisors and the Alpine Fire Safe Council, and the “Bear Valley Community Fire Plan to Reduce Wildfire Risk and Improve Forest Health” completed by the community in Bear Valley. Additionally, in 2005 the Alpine County Board of Supervisors adopted the “Alpine County Natural Hazard Mitigation Plan” that addresses a variety of hazards including wildland fire. Taken together, these plans outline strategies and priorities for reducing the risk of fire and improving fire protection capability. Additionally, each of the fire protection districts within the County undertakes planning for capital needs and other necessary resources.

Objective 20d: Obtain the best possible level of fire protection and emergency response services for all communities in Alpine County.

Implementation:

20d-1: The Board of Supervisors should continue to contribute stable funding from the County general fund at recent historical levels for fire protection and emergency services.

20d-2: The County shall support efforts by each fire department within the County to obtain lower ISO ratings for structure fires within all fire protection areas.

20d-3: To the extent allowable by law, the County shall support efforts to implement the recommendations of the Eastern Alpine Fire Services Plan in a timely manner. Further, and also to the extent allowable by law, the County should consider providing funding for completing preliminary studies and other documentation necessary to place a measure on the ballot regarding Option 9 as described in the Eastern Alpine Fire Services Plan and endorsed by the Board of Supervisors.

20d-4: The County shall support efforts to utilize the Alpine County Airport as a base of operations for the Bureau of Land Management SEAT planes and associated fire suppression equipment.

20d-5: No new development shall be approved unless the County can make a finding that the development can be provided with adequate fire protection and emergency services. For purposes of this policy, new development includes parcel maps and subdivisions that

create new lots or building sites, planned developments and conditional use permits that entitle new structures.

20d-6: To the extent possible by law, the County shall require all new parcel maps, subdivisions and planned developments to participate in any prospective or existing benefit assessment district or other similar organization or entity that will develop and improve water supply or other fire protection capabilities in the area where the new development is proposed.

20d-7: The County shall work in conjunction with the Fire Safe councils, CAL FIRE, fire departments, and other agencies with responsibility for public safety and fire protection to establish designated safe emergency evacuation routes and early warning systems.

20d-8: The Community Fire Plan should be completed, adopted and updated on a regular basis.

20d-9: The Alpine County Natural Hazard Mitigation Plan should be reviewed on a regular basis and updated if necessary as provided for in the plan.

20d-10: The County shall support completion of a Master Fire Protection Plan to identify long term capital facility and operational needs for fire protection services in all areas of Alpine County. This plan should include minimum fire protection service standards based on NFPA (National Fire Protection Association) criteria.

20d-11: The County Board of Supervisors should evaluate available options and consider establishing the functions of a Fire Marshal within all areas of Alpine County.

20d-12: The County shall support the continued location of the Sierra Front Interagency Fire Dispatch Center and associated firefighting resources at the Minden-Tahoe Regional Airport.

20d-13: The County shall designate a suitable site between Woodfords and the Nevada state line for a future fire station and related facilities such as water storage, so that all existing residences and lots that have road access entirely within Alpine County and that are between Woodfords and the Nevada State line will be within five miles of either the Woodfords fire station or the designated site.

20d-14: The County shall evaluate the current and future transportation system and identify opportunities to incorporate fire infrastructure elements such as turn outs, heliports and safety zones.

20d-15: The County shall incorporate or reference the most current fire hazard mapping from CAL FIRE for both the SRA (State Responsibility Area and VHFHSZ (Very High Fire Hazard Severity Zones) in Local Responsibility Areas if applicable.

20d-16: The County shall encourage the local fire protection agencies to conduct pre wildfire attack planning that includes consideration of structures, fuel breaks, back fire areas and staging areas that will support safe fire suppression.

APPENDIX 5: COUNTY CODE

15.12.010

Chapter 15.12

FIRE SAFE REGULATIONS FOR STATE RESPONSIBILITY AREAS

Sections:

- 15.12.010 Adoption of regulations.
- 15.12.020 Amendments.

15.12.010 Adoption of regulations.

Alpine County adopts the Fire Safe Regulations for State Responsibility Areas, commencing with Section 1270.00 through 1276.04, Article 5.5, Chapter 7, Division 1.5, Title 14 California Code of Regulation (CCR 14). (Ord. 530 §1, 1991)

15.12.020 Amendments.

The Fire Safe Regulations for State Responsibility Areas are amended with the following additions, deletions and modifications, made to provide mitigation practices with the same practical effect as those regulations overall towards providing defensible space:

A. To Section 1273.09, amend to read in full:

1273.09 Dead-End Roads

All dead end roads shall be constructed to provide a minimum of two paved 10' traffic lanes, with a minimum of 4' improved shoulders adjacent to each traffic lane. Each dead-end road will have a turnaround of a minimum of 100' constructed at its terminus or an equivalent approved by County.

On all roads determined by the County to be collectors, all such dead end roads shall be constructed to provide a minimum of two 12' traffic lanes, with a minimum of 8' shoulders adjacent to each traffic lane. Each such dead-end

road will have a turnaround of a minimum of 100' constructed at its terminus or an equivalent approved by County. In addition, all such dead end collector roads may be required to provide turn-outs at such junctures as is approved by County dependent upon such variables as length of road, configuration of terrain and limitations to vision.

B. To Section 1275.01, amend to read in full:

1275.01 Application

The provisions of this article shall apply to all new parcels and to all new building construction intended for human occupancy approved by the County effective January 1, 1992, which are not connected to a private, public, or mutual water system providing adequate water supplies to meet the emergency water supply system standards set by these regulations.

To Section 1275.10, add as a new subsection:

Static water systems shall provide a minimum of 2,500 gallons of water in either buried or above ground systems. Buried systems shall be covered to sufficient depth to insure that freezing does not occur. Above ground systems, including reservoirs, ponds and tanks, will provide freeze protection of a natural or artificial nature. All static water systems will be adequately maintained to assure access to, and availability of, the required water gallonage and will be signed as provided by these regulations.

In lieu of the provision of a static water system, each new qualifying building construction project may opt to provide a monetary fee to a trust fund estab-

15.12.020

lished for the purchase of fire agency mobile water equipment. The monetary fee for this option will be set by the Board of Supervisors by resolution and may be modified from time to time to reflect an adequate and fair portion of funding for the acquisition of such equipment, with consideration of development growth in response areas, equipment cost and availability of on-line equipment. This fee will be collected prior to the issuance of any building permit and will be refunded should a static water system, meeting the requirements, be installed prior to the issuance of the notice of occupancy for the unit.

(Ord. 530 §2, 1991)

**APPENDIX 7: EXTRACT – CALAVERAS FIRE SAFE COUNCIL
CWPP**

Building Standards and Materials for Building Code Chapter 7A, 2007 California Building Code (CBC) as well as the January 2009 supplement.

The California Building Commission adopted the Wildland-Urban Interface (WUI) codes in late 2005. The majority of the new requirements took effect in 2008. These new codes include provisions for ignition resistant construction standards in the wildland urban interface. The updated fire hazard severity zones will be used by building officials to determine appropriate construction materials for new buildings in the wildland urban interface. The updated zones will also be used by property owners to comply with natural hazards disclosure requirements at time of property sale. It is likely that the fire hazard severity zones will be used by local government as they update the safety element of general plans.

The new building standard for the Fire Hazard Severity Zones will be enforced by the Building Official as projects go through the plan checking process.

The Wildland Urban Interface Building Codes page of the Wildland Hazards and Building Codes at:

http://www.fire.ca.gov/fire_prevention/fire_prevention_wildland_codes.php

For your convenience these documents are also included in the homeowner information section of this document.

The SFM listing service provides building authorities, architectural and engineering communities, contractors, and the fire service with a reliable and readily available source of information. Since the materials under Wildland Urban Interface Building Codes (except roof wood shakes and shingles) are not required by law to be listed by the SFM, the listings for these products are strictly voluntary. Materials not listed by the SFM may still qualify for use provided they met all the requirements under Chapter 7A. If not listed on the SFM site, all documentation and testing certificates showing compliance must be submitted to the building official having jurisdiction for final approval.

W.U.I. Products Handbook

In an effort to provide home owners, industries, designers, local fire and building officials a readily available list of “compliant W.U.I. products”, the State Fire Marshal (SFM) published a “W.U.I. Products Handbook”. All products published within the handbook have been reviewed and verified for their compliance in accordance with the new 2007 California Building Code (CBC) as well as the January 2009 supplement, by State Fire marshal staff. All products published in the book are “approved” by the SFM. They are not “listed” unless a SFM listing number is attached. It should be noted that products that are not in the handbook may still comply with the standards since it is not a requirement for any products to be in the handbook.

The handbook is categorized into five main sections:

1. Exterior Wall Siding and Sheathing (SFM Standard 12-7A-1)
2. Exterior Windows (SFM Standard 12-7A-2)
3. Under Eave (SFM Standard 12-7A-3)
4. Decking (SFM Standard 12-7A-4)
5. Ignition Resistant Material (ASTM E84 for 30 Minutes with Accelerated Weather Testing)

To aid homeowners and agencies interested in the WUI Products Handbook we have added it in the homeowner information section at the end of this plan.

Fire prevention efforts cannot be the responsibility of firefighting professionals alone; homeowners must consider the possibility that their home may have to stand in the face of a wildland fire without immediate firefighter protection. In order for a home to survive such an emergency, it must be able to avoid ignition. There are a variety of strategies to reduce the risk of structural ignition. Depending on the county and agency jurisdiction, these strategies may be requirements and/or recommendations:

1. Construction methods and materials
2. Education
3. Defensible Space including fire safe landscaping

Construction Methods

While it is always recommended that homeowners build with fire resistant building materials, the State or Local Fire Marshal should be contacted to determine laws and

regulations fire resistant construction. In an effort to provide home owners, industries, designers, local fire and building officials a list of “Compliance W.U.I. products”, the State Fire Marshal (SFM) has published a “W.U.I. Products Handbook”.

<http://osfm.fire.ca.gov/strucfireengineer/pdf/bml/W.U.I.products.pdf>

All products published in the handbook have been reviewed and verified for their compliance in accordance with the 2007 California Building Code (CBC) by SFM staff. All products published in the book are “approved” by the SFM. They are not “listed” unless a SFM Listing number is attached. It should be noted that not all approved products are listed in the handbook; there may be other building materials that comply with the standards since it is not a requirement for a product to be in this handbook.

This handbook covers five main building product categories:

• Exterior Wall Siding and Sheathing • Exterior Windows • Under Eave • Decking • Ignition Resistant Material

Structural Ignitability Recommendations

Windows

In this section we will discuss the performance of windows. This would include the framing material and glass.

Windows: Potential Problems

If the glass in a window breaks during a wildfire the fire can easily enter your home. Similarly, if your window frame ignites, it is possible that the fire could burn through the frame material, and ignite other material inside your home. Both of these scenarios could easily result in the loss of your home. Therefore, windows must be able to resist the following wildfire exposures:

1. A radiant exposure severe enough to break the glass in your window or ignite the exterior siding directly below. Burning vegetation could also ignite combustible siding.
2. A flame impingement exposure that would result from embers igniting vegetation and/or exterior cladding that burns up to your window.
3. The impact from burning embers on the glass. Remember that during a wildfire, your home can be subjected to exposure from thousands of embers for hours before and after the relatively short time (minutes) it takes for the wildfire to actually pass by your home. Embers could also land on the window sill and ignite debris that has accumulated.



In this laboratory test, window failure occurred as a result of glass breakage. The exposure was flame impingement from a propane gas burner located 2 feet below the window. The burner simulated a medium-sized plant on fire.

Glass breakage in a window occurred as a result of temperature differences between the edge of the glass protected by the frame, and the glass exposed to the flame (the part of the glass you can see). These temperature differences cause the heated glass to expand at different rates. Minor flaws at the edge of the glass start to grow, and if the temperature differences are large enough, the glass will crack, grow, and potentially break out.



In this laboratory test, window failure occurred as a result of the ignition of the frame material, with subsequent burn-through into what would be the living space in the house. Note that in this case, flame penetration occurred at the horizontal separator in a hung window. The exposure was flame impingement from a propane gas burner located 2-feet below the window. The burner simulated a medium-sized plant on fire.

Results from one study showed that for vinyl window frames, the horizontal separator shown in the photos above can be vulnerable to radiant heat exposures. At fairly low radiant exposures, the frame deformed, and the glass fell out. Results from testing done at

the University of California Forest Products Laboratory (UCFPL) did not show this effect. All of the double hung windows (i.e., windows where the upper and lower parts of the window can both move) were constructed with an aluminum bar in the separator. This aluminum reinforcement is usually present because it is needed to resist wind loads. The bottom line of the UCFPL research was that by far the important factor in determining the performance of windows under wildfire exposures is the glass, and not the frame material. This finding is also supported by research conducted in Australia.



Burning embers could land on a window sill, or as is shown in this photo, the sill at an entry door. The embers could then ignite debris, or ignite the decayed trim. Decayed wood ignites at a lower temperature than that required for sound wood.



Burning embers could ignite this plant, which would then result in a flame impingement exposure of the window.

Windows: Possible Solutions

Because of the importance of glass in the performance of a window in a wildfire, the most important thing you can do is install dual-pane windows. With dual pane windows, the outer pane often serves as a thermal shield and protects the inner pane. The inner pane is allowed to heat up more slowly, and uniformly, and therefore may not fail even though the outer pane does.



Above is a cut-away view of two panes of glass in an insulating glass unit (IGU). Because of energy code requirements, most windows in new construction consist of two or more pieces of glass in an IGU.

Tempered glass is stronger than 'regular' annealed glass, and will provide additional protection during a wildfire, but we think dual pane is the most important part of the equation. Tempered glass is also more expensive, and will add approximately \$1 per square foot to the cost of your window. Building Codes already require tempered glass in some locations, so some of your newer windows may already have tempered glass. For example, in newer construction, windows that come within 18 inches of the floor must have tempered glass. Sliding glass doors, and other doors with windows, and windows immediately adjacent to doors, will also have tempered glass.

A small white etching is often present in the corner of a piece of glass in a window if it is tempered. Since it is small, it may be hard to read.

| | |
|-----------------|-------|
| ACME | |
| TEMPERED SAFETY | |
| ANSI 297.1 | 1984 |
| 16 CFR 1291 | CII |
| SGCC 1494 | 1/4 U |

| | |
|-----------------------|--------|
| ABC GLASS | |
| TEMPERED SAFETY GLASS | |
| 16 CFR 1201 CAT.II | |
| ANSI | 1984 |
| SGCC 1494 | 3/16 U |

| | |
|----------------|------|
| A-1 Glass | |
| ANSI Z97.1 | 1984 |
| 16 CFR 1201 II | |

Low-E coatings have sometimes been discussed as a means of enhancing the wildfire performance of your windows. Low-E coatings are always on one of the inner surfaces of the IGU, either on the pane closest to the outside, or the one closest to the inside. If it's on the outer pane (i.e., the inner surface of the outside pane), it could reduce the performance of the glass because the exposed glass would heat up more quickly relative to the glass protected by the frame.

Insect Screens

Research has shown that insect screens improved the performance of glass under *radiant* exposures. Bronze, fiberglass (with polyvinyl chloride coating), and aluminum screens all improved glass performance (increased the time needed for edge cracks to develop). Results from this study showed that bronze screens were most effective, and aluminum the least effective. However, research at UCFPL has shown that screens do not provide added protection in a *flame impingement* exposure.

Unfortunately, in a severe firestorm, your windows will still be vulnerable. Both panes are likely to break and fall out. Glass that would perform better (e.g., tempered glass) is more expensive than regular (annealed) glass, but the performance has shown to be much better, and the price of this glass is coming down and therefore becoming more affordable for many homeowners.

For additional protection homeowners should consider taking additional precautions to protect your windows. These precautions include fabricating covers (for example, 3/4-inch plywood covers), cut to size and marked so that it can easily be installed over a window prior to evacuation. Shutters or other roll-down devices could also be installed. In this case,

you will have to make these items part of your routine inspection and maintenance program to make sure they operate properly. All of these have the disadvantage of requiring an action to implement.

Roofs, Chimneys and Gutters

In this section, we discuss the flat or sloped covering over your home. This would include the living space, garage (if covered), and deck (if covered).

Your roof and edge components (such as your gutters) are arguably the most important part of your home in terms of making it safer from wildfires. While your home may only be subjected to the flaming front of the wildfire for a few minutes, your roof (and the rest of your house) could be subjected to airborne glowing or burning embers for a few hours as the wildfire approaches and burns through the area where you live.

Roofs: Potential Problems

How well your roof performs during a wildfire will depend on a number of factors, including:

1. The roofing material used.
2. The age and condition of your roof.
3. The 'complexity' of your roof (that is, how many levels and wall/roof intersections you have, and how much debris can collect there).
4. Gutters and other 'edge of roof' factors.
5. Vents and other penetrations in your roof.

As you can tell from this list, how your roof performs will depend not only on the roof covering, but also on intersections where your roof connects to other materials. These connections are often at a horizontal to vertical intersection.

The fire rating of roof coverings is determined for all materials used in code-compliant housing, and will be classified as Class A, B, C, or 'unrated'. Class A provides the best fire resistance, so for the best protection for your home, you should have a 'Class A' fire-rated roof covering.

Every thirty years or so, you will have the opportunity to select a new roof covering. In the meantime, one of the most important jobs you have is inspecting your home and near-home vegetation, and performing needed maintenance. The standard tests to determine fire performance are conducted on new covering materials (the exception being fire retardant treated shakes that must also be evaluated after natural weathering). An older roof may not perform as well as a fire-resistance membrane. It will be up to you to make sure your roof covering is inspected and maintained, and replaced when needed.



When new, this asphalt composition roof covering has a Class A rating. The older and weathered roof may not provide the same protection from wildfire, and may also be more vulnerable to water leaks.

Another critical inspection and maintenance item for your roof will be to remove of debris (needles, leaves, and other combustible material) from collection points on your roof (for example, nooks and crannies), and from your gutters. Ignition of debris in these locations can ignite other roof components besides the roof covering -components that don't perform as well as your Class A roof. These components include the underside of the roof, and exterior siding. Debris that accumulates at the inlet to roof vents can also ignite during a wildfire and enter the attic, potentially igniting other combustible materials in your attic.



If ignited, the debris on this roof would expose the underside of the overhanging roof, or the exterior siding. Both of these components are potentially more vulnerable to flame and ember exposure than a Class A asphalt composition shingle roof covering.



Vertical walls adjacent to the roof can accumulate combustible debris, typically leaves and needles. The ignited debris can expose the exterior siding, in this case wood shingles, and potentially the underside of the roof.



If ignited, debris in this gutter would expose the roof edge, with flame and embers potentially getting under the roof covering.



Pine needles on this non-fire retardant treated wood shake roof can easily be ignited, with flame and embers entering the attic through this 'through-roof' vent.



A through-roof vent can provide a "backstop" that can serve to accumulate wind-blown debris. If ignited, the burning debris can easily enter your attic.



Wind-borne debris can accumulate in the ends of this clay tile barrel roof covering. If accessible, birds can also build nests in the space between the roof sheathing and the bottom of the tiles, also providing combustible debris that is easily ignited if embers are driven into this area (under the tiles).



The ends of this clay tile barrel roof were covered by a cut-to-shape metal strip, but it has become disconnected, or was never properly installed. Embers can easily enter these openings.

Skylights should be constructed with two layers of glazing. Another likely exposure for a skylight would from an impact of an ember, or other object lofted during the wildfire. For best performance, skylights should consist of two layers, with one of them consisting of tempered glass (for improved resistance to larger embers striking and breaking the glass).



The upper (domed) light in the photograph shown is plastic, and won't be able to withstand an 'A' brand exposure. To prevent entry of burning embers during a wildfire, this operable skylight should be closed.

Valleys

Many homes are constructed with roofs that contain 'valleys', the intersection where two sloping surfaces meet. These intersections can consist of metal flashing material, or in the case of asphalt composition shingles, the shingles themselves can be used. Since metal flashing can be made of aluminum, this region can be more vulnerable to wildfire exposures than the roof covering material.



Metal flashing was used on the valley of this roof. The roof covering consists of Class A asphalt composition shingles. The valley may also be 'Class A' construction, but it will depend on the underlying material.



Asphalt composition shingles are 'woven' together in this valley. The valley would have the same fire rating as the rest of the roof.

Roofs: Possible Solutions

Roof Covering and Accumulation of Debris

The importance of a Class A roof covering cannot be understated. If you don't have one, you should make an upgrade to a Class A roof covering a priority item. Lack of a Class A roof covering should immediately increase your attention and focus on near home vegetation, and inspection and clearing debris from your roof and gutters. Remove debris from your roof and gutters as often as required -inspect often at first until you determine how frequently debris accumulated. You shouldn't wait for water to overflow your gutters during a heavy rain to realize that your gutters are full of debris. Care should be taken during inspection -some roofs and gutters are easier to inspect than others. Consider hiring this job out if your roof and gutters are at a high elevation, or are otherwise inaccessible.

Bird stops

If you have a clay tile roof with a barrel design, install bird stops at the end at the roof edge, and make it one of the items you look at during your inspections to make sure they are still *in place*.



This is an example of a properly installed bird stop at the end of a barrel-style clay tile roof.

Gutters

Gutters play a very important role on a house in providing a means of collecting and directing rainwater from the roof into downspouts, and then away from the house. This helps reduce the amount of water in the soil that can enter the crawlspace or basement, and that may lead to problems from mold and decay fungi.

Gutters: Potential Problems

Flammable debris can build up in gutters, especially from nearby or overhanging trees. Second story gutters are even more problematic, since they are seldom cleaned on an

annual basis. If ignited, combustible debris in the gutter will expose the underside of the roof covering, and may be able to more easily enter the attic.



Another issue that has been seen in some houses is the use of barrel tiles to channel water from the upper gutter downspouts to the lower-story gutters, as shown below. In this case, there tends to be a buildup of debris at the transition point.



While metal gutters have been recommended over plastic ones in fire hazard areas, there doesn't appear to be any justification for this, other than the possibility that some plastics could burn. It seems advisable to avoid the unknown!

Gutter guards or covers can be installed over or in your gutters. When properly installed (and maintained), these can reduce the amount of vegetation litter and debris that accumulate in your gutter and therefore reduce the need to clean it. Some products can become dislodged over time, and they will have to be reinstalled when that happens. There are a number of commercially available products specifically intended for this purpose -just type 'gutter guard' in a web-browser search engine to get an idea of the options you have. It is possible that your home won't have gutters. Although this will eliminate any 'debris accumulation' issue, it will result with a heavy rain load around your home, and depending on drainage, may contribute to moisture related problems.



Note that some of the covers in the gutters on this roof have dislodged, and therefore no longer keep out debris. Gutter guards should be inspected, and reattached when necessary.

Since second story gutters are difficult to reach, it is advisable to have these cleaned and screens added to minimize the need for subsequent cleaning. One means of doing this more economically is to organize a community-wide effort with professional help.

Vents

Roof and crawlspace vents are required by most building codes, which specify the vent openings. The function of the vents is to remove excess moisture from those spaces. Moisture can enter the crawlspace from the soil or through the foundation wall from the surrounding landscape. It can also enter the attic space from roof leak or through the ceiling in the living space of the house. If too much moisture accumulates, then fungi can grow leading to mold or decay.

In crawlspaces, cross-ventilation is called for (meaning that ideally, vents will be present on all sides of the crawlspace), however, if your house is built on a concrete slab, or over a basement, you won't have crawlspace vents.

Attics will usually have both inlet and outlet vents. Inlet vents, such as in soffits (eaves) are usually located on the lower portion of the roof.



Crawlspace vents are positioned at different locations along the perimeter wall.

Several types of vents are used to ventilate attic spaces, including:

1. Soffit vents (there are different kinds of soffit vents, with the common feature being their location along the eave of the house)
2. Through-roof vents (also known as 'eye-brow' or 'dormer' vents)
3. Gable-end vents
4. Ridge vents

A 'strip vent,' which is commonly found in boxed-in eaves.



A through-roof vent, usually located near the ridge (or peak) of the roof.



A gable-end vent, usually located just below the ridge of the roof.





A ridge vent (as seen from the side of the roof) that is found along the entire ridge of the roof. Baffles along the front edges of the vent keep rain from entering and provide for a negative pressure region that helps pull air out of the attic.

Vents: Potential Problems

Evidence from recent wildfires in the West has shown that vents are an easy entry point for burning embers and (not surprising) flames. Embers can 'rain' on and around homes for hours before the wildfire flame-front reaches your house. Embers that enter your attic can ignite construction materials and other items you may have stored there. Flames can also enter if embers ignite near-home vegetation or debris that has accumulated on a deck or in a corner.

Entry of burning embers has been problematic for attic vents in general, and soffit vents in particular. Also, locally generated embers and flame can enter vents, as shown below.



This plant immediately under the vent (and next to a single pane window) could be a problem if it ignites.



Needles (debris) from near-by pine trees that have accumulated on the lower roof section could easily ignite from embers and subsequently exposure the gable-end vent to embers or flames.



This trellis vegetation could also expose the gable-end vent to embers or flames.



Ignited debris at the inlet to this through-roof vent could enter and ignite combustible materials in the attic.

Most vents incorporate a screen at the inlet. Most building codes stipulate a minimum mesh size of 1/4-inch to minimize plugging of vent holes and reduction in air movement. Smaller mesh screen is easier to plug up, whether by air borne debris, or as shown in the photograph below, being painted over during routine painting.



This fine-mesh screen is easily plugged by debris, or as shown in this photograph, by paint.

Vents: Possible Solutions

Your options regarding vents in *existing homes* are

1. Inspect and maintain vegetation in the vicinity of soffit vents. Remove highly combustible plants.
2. Clean vents on a regular basis to minimize buildup of debris in the mesh.
3. Remove debris that accumulates on roofs, and other areas that may expose vents if ignited. This includes grounds near crawlspace vents.
4. Prepare vent covers that can be temporarily installed when a wildfire approaches your home. Vent covers can be manufactured from plywood or other solid substance that would provide short term protection from embers and flame.

Because of code restrictions, 1/4-inch mesh screen is commonly used in vents. This points to conflict for building and fire code officials. While it is clear that 1/4-inch mesh cannot prevent entry of embers and flame during wildfires, if smaller screens become plugged, vents cannot operate as intended to remove excessive moisture. Smaller mesh screens might improve fire performance, but it is hard to say how much.

In some *new construction*, soffit vents are often being eliminated. In those cases, the inlet vent function is being performed by through-roof vents located in the lower region of the roof, or by placing a strip vent on the vertically oriented fascia, as shown in the photographs below. If you select these courses of action, make sure the total vent area meets code requirements.



In this case, the soffit vent has been replaced by a through-roof vent located near the eave line of the roof.



In this case, the soffit vent has been replaced by a strip vent, located above the vertical fascia board, and immediately below the gutter.

The new California Building Code that will affect new construction in designated wildland urban interface areas specifies that vents should resist the entry of embers. With time, vents that are designed to resist the entry of embers during wildfires, while still maintaining adequate air flow under normal wind conditions, will be commercially available. Standard test procedures are currently being developed that will provide a consistent way to evaluate the performance of these types of vents.

New home that incorporate unvented attic spaces into the design are currently available, and are being built in some locations. This construction option may be more widely available in the future, but shouldn't arbitrarily be implemented in existing homes because of moisture-related durability problems that would develop.

Garages

When houses are surveyed for wildfire vulnerabilities, quite often the garage is not considered even though it could be the most hazardous aspect of the house.



Attached Garages: Potential Problems

Garages are typically not well sealed since they are generally not heated or cooled. Gaps at the top, bottom and edges of doors can let glowing embers enter, and we all know that garages are full of flammable materials. Garages usually have vents at various locations, especially if they contain gas furnaces or hot water heaters. These vents are easy entry points for embers. These photos show a full-size roll-up garage door that has not been properly adjusted, creating a gap at the right bottom where embers could easily enter.

Small embers can easily enter through the door gaps. Sliding doors (that are hung at the top edge) have a special problem in that one side is offset, leaving a large gap at the top edge. In addition, many garage doors have glass in the top sections plus personnel entry doors that have single pane glass that (although it is tempered in newer construction) can easily be broken from heat or flying debris.

This garage car door has glass panels that could break during wildfire exposure, including vertical flame spread up the combustible door. Some current door manufacturers advertise that their glass panels are tempered.





The window in this particular door is tempered glass, but is also single pane which does not offer a great amount of wildfire protection.

An even greater concern is attached carports or any type of garage that does not have doors. These types of garages would typically have an extreme number of combustibles and many nooks and crannies for embers to lodge.

Attached Garages: Possible Solutions

For garages with roll-up doors, the top and bottom can be weather-stripped (quite often the bottom is sealed to prevent water entry). The roll-up mechanism should be adjusted to obtain a good seal at the top. Tilt-type doors have similar solutions, although sealing at all edges is easier.

For attached carports, as a first step, combustibles should be minimized. However, this would still present the greatest hazard to your home, and some serious thought should be given to have the garage properly enclosed.

Car-entry garage doors with glass panels can either have the panels replaced with fire-rated glass or simply filled in.

Personal entry doors with windows can also have the windows replaced with fire-rated material or the window could be replaced with paneling. Another solution is to consider a

steel-clad door as shown below, which provides both fire resistance and security from break-ins.



Decks and Balconies

Decks are highly combustible structures and are built perfectly to burn. All the components of a deck; joists, Decking and railings are made of only 2-inch-thick (on average) wood with a high surface-to-volume ratio. When fire approaches, the wood quickly dries out and heats up. Ignition can occur very easily from either radiant energy from the fire or burning embers. Decks pose a hazard from both above and below the horizontal structural plane. If a burning ember lands on the top of a deck, which is the largest horizontal surface on a structure (outside of a flat roof), there is a good chance it will find a receptive fuel to ignite and burn. The receptive fuel could be a pile of pine needles, a stack of firewood, or plastic lawn furniture. They are the ultimate heat traps due to their shape that traps hot gasses from an approaching fire from below. Decks often face downhill towards a fire's most likely approach.

The safest deck is one that is fully enclosed. Unfortunately, very few exist within the county. Any opening under a house or porch will allow burning debris a point of entry under the structure. Openings under stairs, decks, and porches usually allow organic material such as pine needles, leaves, and small limbs to collect under the home. Once burning debris blows under the house or porch, it is likely the home will burn down. Several homes have lattice covering the lower portion of the house or deck. This will not stop firebrands from blowing through the holes in the material.

To compound the problem, lattice is usually made of 1/4-1/2-inch wood that readily ignites.

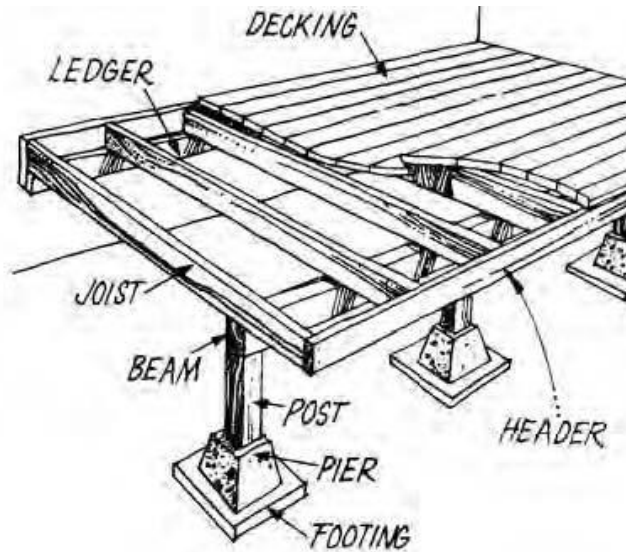
By reducing the chances for decks and balconies to ignite, you can reduce the chances of your home igniting. By boxing in the undersides of decks and balconies, especially with fire resistant materials, the chances of ignition are reduced. You can further reduce chances of ignition by removing flammable materials from balconies and decks. Decks

By decks, we are including all types of horizontal walkways, including landings, porches, and patios that are directly connected or very close to a house. Decks are described by the surface that you walk on (called the deck covering). There are two basic kinds of decks – those that use deck boards as the deck covering, and those that have a solid surface deck covering. The deck boards are almost always made from combustible materials (wood or one of the wood fiber – plastic composite or 100% plastic deck board products). Solid surface deck coverings are usually made from noncombustible materials, and include light-weight concrete or stone. They are built over occupied (living) space. Occasionally an open frame deck will be installed over a water-proof membrane, again built over occupied space. As with normal decks, this open-frame deck will also be vulnerable to accumulation of debris, and ignition by burning embers.



The figure above shows wood deck, built on wood 2x6 'sleepers' on a solid surface deck (above a garage).

The most important features of decks are deck boards, ledgers, access to the underside, under-deck drainage systems (for raised decks to shelter the lower level), and adjacent doors and windows. This drawing shows some of the important deck elements:



Decks: Potential Problems

There are two major problems that decks present. First, they are a great source of fuel and an ignited deck will also certainly endanger many portions of a structure. Second, nearly all decks are adjacent to large windows or glass sliders. The heat from the deck fire can cause the glass to fail and permit the fire to enter the house, where entry means certain destruction.

In general, the thicker the deck boards (about 1.5 inches thick), the better. Thin boards (about 1 inch or less thick) release heat much faster and are a higher hazard. You may have noticed how much easier it is for thin materials to burn in a fireplace.

One of the greatest risks to structures is a "thin-board" wooden deck (about 1 inch thick). In general, the thicker the deck boards, the better. You may have noticed how much easier it is for thin materials to burn in a fireplace. Thicker materials tend to release heat much more slowly and are a lower hazard.

Deck board gaps (which are there for drainage and ventilation) can permit embers to lodge and cause ignition. In this ground-level deck (or patio), you can see literally tens of char marks from embers. Although this deck survived, a very similar one next door did not and the townhouse was lost:



The deck above also suffered from having debris in the deck board gaps, and possibly decay at some of the joints, such as where the stairs met the deck.

Raised decks offer another problem -storage of combustibles underneath. This photo may be an extreme case, but consider what would happen if even a single ember got in the stack of wood!



Also, some raised decks have drain systems to permit rainwater to drain away from the deck area. While this can offer a nice dry area, it also encourages storage of combustibles. The drain system can accumulate debris, such as tree needles or leaves that can go through the deck board openings:



Looking at the last two photos, consider the consequences of the next deck that ignited from below, permitting fire entry through the windows (even though the siding was non-combustible).



Quite often, decks that are raised, including those not being used for storage are open to flames or embers, especially those on slopes.



The deck above illustrates another problem — the growth of vegetation under the deck, that when dry, can be a fire hazard.

Ledger boards, used to attach the deck to the house, are often recommended to be installed with a gap for drainage of rain from the siding so that it doesn't pour onto the deck. However, this is a very good trap for burning embers. The ledger board attachment detail is an example of a conflict between moisture and fire regarding 'good' design. In order to maintain adequate performance, this joint must be inspected and maintained. Debris must be cleared. Durable materials should be used to minimize the potential for fungal decay.

Fascia boards are often used as decorative edges on decks, but often cause decay to develop between the fascia and deck. This deck corner ignited in a decayed area at the deck corner.



Deck surface materials must be carefully considered. In tests conducted at the UC Forest Products Laboratory starting in the late 1990s, many wood-plastic and plastic decks were found deficient in behavior. This information is posted on the following web page:

<http://nature.berkeley.edu/~fbeall/WDDeckIntro.htm>

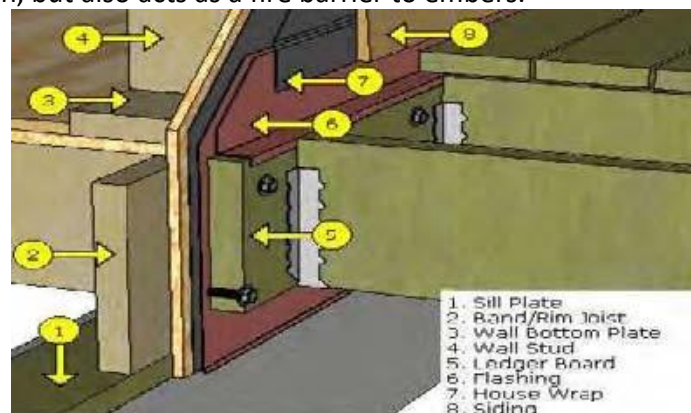
As a rule of thumb, the thicker the wooden decking material, the better the fire performance. That does not mean that such decks will survive a wildfire, but they will not contribute enough heat release to endanger the house.

Decks that are just above ground level should be screened to prevent combustible debris from entering. This also keeps out animals, such as skunks! Also, note the stones being used to minimize growth of vegetation.



The gaps between deck boards (about 3/16 in.) are there for drainage and ventilation. Keeping the gaps clean also protects the deck boards and joists from decay. The best advice is to keep these clean of debris, especially before and during the fire season.

The problem with gaps between the deck and the house (such as offset ledger board construction) are probably best handled by covering the gaps with screening having about 1/8 in. openings to prevent lodging of debris and embers. Ledger boards that are attached without gaps should be flashed (see below) --this not only provides protection against water penetration, but also acts as a fire barrier to embers.



Replacement of deck boards is obviously expensive, but could be one of the best investments you can make. For replacements, consider any material (plastic, plastic lumber, fire-retardant treated lumber for exterior use, or lumber) that passes the standard posted on the web page of the Office of the State Fire Marshal:

http://www.fire.ca.gov/fire_prevention/fire_prevention_wildland_codes.php#testingstandards

Then click on 'Testing Standards CA SFM12.7A-4 Decking'

This and other testing procedures listed on this site have been approved for use by the Office of the State Fire Marshal, and have been incorporated into the new California Building Code for new construction in designated wildland urban interface areas. You should check with your local building and fire officials to find out what products are acceptable in your area. In the tests done by the UC Forest Products Laboratory, all-heart 1 1/2-inch-thick redwood (2 x 6s), a widely used decking, and some (but not all) plastic-fiber composite decking products, performed acceptably. Note the information in bold; redwood sapwood was not tested in that study, so its performance was not determined. Also, because any sapwood will readily decay, it wouldn't be the most appropriate choice. Thinner material could be risky (for mechanical failure as well as fire).

They found that certain types of wood-plastic board profiles (hollow and channeled) did not perform well:



Addressing

Prominent and visible addressing aids firefighters in locating your home. Maintain adequate and visible address numbers on structures and driveways. Typically, 3 inch, contrasting lettering on a reflective surface is preferred. Finding an address during a wildland urban interface fire in a timely manner can make the drastic difference between structure protection and structure loss.

Fences

Fences (and walls) are both decorative and functional (for security and privacy) and come in many materials and configurations. While we have no laboratory fire test data on fences, there are a number of observations that indicate fences--like plants--are a much greater hazard close to a house. Fences and gates can also be an access problem for fire crews trying to enter your yard, so it is advisable to get an inspection from your local fire department.

Fences: Potential Problems

The fence shown below was responsible for substantial damage to both adjacent houses that were saved only through quick intervention by firefighters.



The house on the right had a gate attached to the front corner of the garage. The gate was totally consumed as were most of two 8-foot sections of fence. The geometry and combustibility of this arrangement was an invitation to burn in this type of "zero-lot-line" construction. There are several reasons for fences to be of concern. For one, a combustible fence or gate attached to a structure is an obvious threat if it catches on fire. The fire can arise in a number of ways. One is that debris (leaves, trash, etc.) often collect at the bottom.

Another problem is that many wooden fence boards are in contact with soil at the bottom and will eventually decay at that point (see the Glossary for more information on decay).



Combined with combustible debris, fences can be an excellent fuel source. Also, fence boards usually have small vertical openings where brands can lodge and even cause the fence boards to ignite directly. In all cases, the thinner the fence boards, the greater the risk!

A number of homeowners have found their fences to be convenient places to store firewood, not realizing that what burns well in the fireplace can also spread embers throughout the neighborhood. The photo below is an example of an accident waiting to happen!

Fences: Possible Solutions

1. Any fences or gates that are attached to houses should be designed to reduce the fire hazard. Metal gates and heavy wooden fence sections can minimize this problem. Below is a combination of wooden framing with wire mesh, which minimizes the amount of combustible material in the fence.



2. For fences in "zero-lot-line" situations, consider using a non-combustible material, fire-resistant lumber (fire retardant treated for exterior exposure), or thicker dimension lumber

(1 1/2 inch). Another option is to use a chain-link fence with climbing vines to provide privacy. Of course, the vines must be maintained so that they do not become a fire hazard!

3. Keep the bottom of fence boards clear of debris (leaves, trash, etc.) and make sure that they are not in or touching soil. A good rule of thumb is to create about a one-inch gap at the bottom.

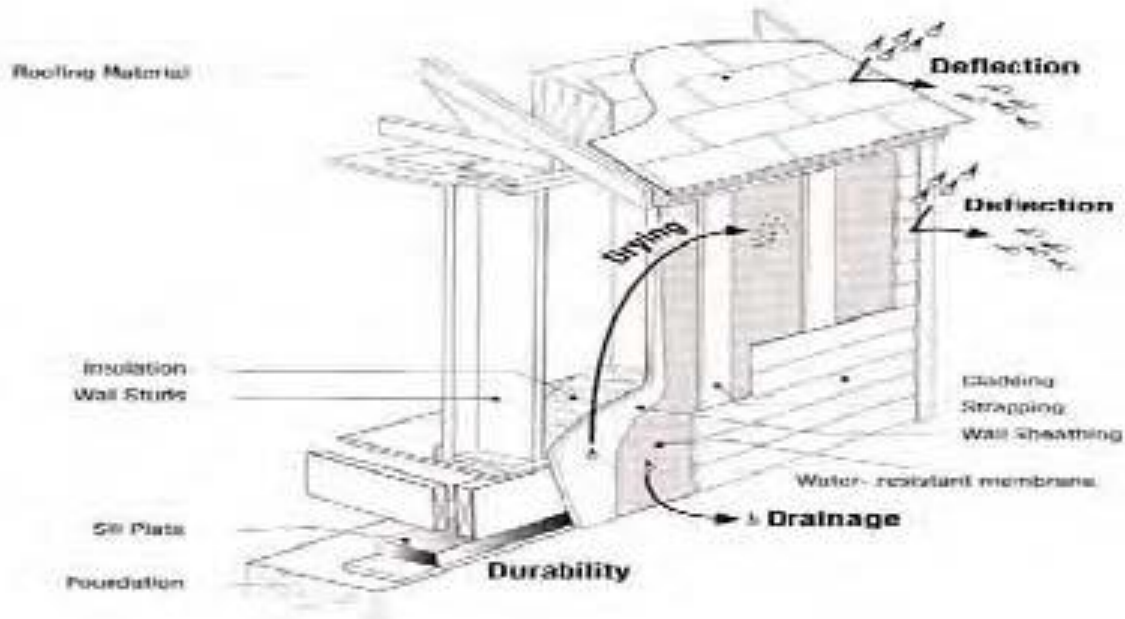


4. Do not store combustibles (such as firewood) against fences.

Siding

The best siding material from a fire perspective is one that will not burn. This can be stucco, cement, or stone. The next best siding would be homes built of logs. Even though logs are combustible, the low surface to volume ratio causes it to burn very slowly, which makes it very appropriate for medium and high fire risk situations. The most common siding throughout the community is wood panels such as T1-11 plywood. Wood panels and boards are the most common and economical forms of siding, but they are readily combustible. This siding is usually not very thick, 1/2 inch to 3/4 inch, and will burn through to the structure behind it in less than 10 minutes.

Siding (cladding) is an important esthetic attribute for houses, but it also has a key role as part of a protective enclosure to help shed rain, while permitting excessive vapor to move through and out of the house, as shown in the photo below.



Siding: Possible Problems

Combustible siding provides a rapid vertical path for flames to reach vulnerable portions of a house such as the eaves or windows.

In a fire test, burn-through (through siding and sheathing) did not occur for the shingle siding below, but the fire spread vertically and quickly penetrated the soffit, which was 1/4-inch plywood. Even 1-inch solid wood is inadequate as a soffit material because of the edge gaps, unless it is tongue and groove.



Keep in mind that combustible siding needs a source of ignition. In many cases that will be caused by plants near the house, or from other combustibles, such as firewood.

Some plastic siding deforms with heat and can expose the sheathing or the wall cavity to fire.



Tests conducted by the University of California Forest Products Laboratory have shown that siding without sheathing (both combustible and non-combustible) ultimately fails by burning through laps or conduction of heat to the studs. However, the presence of sheathing (plywood or OSB) largely prevents failure. The type of lap is also very important; the plain bevel siding (on the left below) failed in just over one minute, but the rabbit bevel siding (on the right) lasted over 21 minutes.

The relationship observed with horizontal lap siding would also apply to vertically lapped products, such as T1-11-type panel products and board-and-batten siding. A more complicated joint is preferable from a flame entry perspective. Panel products can have a butt-joint covered with a sealant, or with 'batten' cover, or have a more complicated joint. Board-and-batten consist of a number of wood-to-wood joints similar to plain bevel, and so flame penetration into the stud cavity would occur more easily in these cases.



Siding: Potential Solutions

All lapped wood siding should have an interlocking type of lap (such as the rabbet bevel shown above) to prevent flame penetration. If you have combustible siding, carefully inspect it annually for gaps and make sure that they are filled with a high-quality caulk.

A possible solution to the soffit problem (with boxed eaves) is to replace it with cement board that is properly filled with fire-resistant material at all joints

For buildings that are 2-story, there is a real opportunity to break up the vertical combustion path with a non-combustible first-story.



If you do replace your siding, consider several other options to improve your fire, seismic, and durability performance.

Add structural sheathing (plywood or OSB) to improve both your fire and earthquake resistance. To find the earthquake hazard rating for your area, go to [:http://www.consrv.ca.gov/cgs/rghm/ap/index.htm](http://www.consrv.ca.gov/cgs/rghm/ap/index.htm).

Have your sill plates (the lumber that is fastened to the foundation) inspected to see if they need upgraded hold-downs (again for seismic protection).

If you reinstall your windows, make sure that they are properly flashed to prevent leaking and subsequent decay. Also, think about potential upgrades for more fire-resistant windows (see the section on Windows for more information).

Limbs

Trim tree limbs that are within 10 feet of chimneys and/or stove pipes and trim and remove all dead limbs hanging over the house. “Limb up” your trees and maintain a clearance of 3 times the height of the lower fuel layer from the ground to the bottom. Clear flammable vegetation and “limb up” trees within 10 feet of the road to reduce fire spread and provide a safer escape route.

Propane Tanks

Keep Liquid Petroleum Gas (LPG) tanks or other flammable materials at least 30 feet from structures, fences, and other combustible materials

Homes with plastic tarps next to the home or under a deck

Tarps are used to cover firewood or vehicles such as snowmobiles. Tarps are made of plastic, a material high in very flammable hydrocarbons. Once ignited, they burn similar to another hydrocarbon known as gasoline.

Firefighter Access

Firefighter access is based on how easy it would be to find and back a fire engine into a driveway. When fire engines perform structure protection, they back into a driveway so if fire conditions worsen, they can quickly escape. Access in general is very poor due to the extremely narrow roads; the roads are too narrow for a Type 1 or municipal fire engine. During a serious wildland fire, it is probable that road congestion will occur, especially on a weekend when visitation is high. This very dangerous condition can lead to injury and/or death.

Education to reduce structural ignitability

State and local fire agencies having jurisdiction within the W.U.I. continually provide wildland fire prevention education to those living in the W.U.I., including recommendations to reduce the chances of structure ignition. This is accomplished through face to face

contact involving home inspections, representation at public events such as county fairs, visits to the fire station. Publications such as “Are You Prepared” and “Living with Fire – -A guide for Homeowners” have been distributed at public functions. These publications are typically provided to residents and provide numerous recommendations on improving the defensibility of one’s home, including a six-step process on creating defensible space. Also included in this plan in the Homeowner Information Section are copies of publications such as, fire-safe plants recommended for use in landscaping, Before During and After a Wildfire, Power Line Safety, Homeowner Checklist, Safe Equipment Use, and personal and Animal Evacuation guides.

Defensible Space

Property owners living in State Responsibility Areas (SRA) are required by Public Resource Code (PRC) 4291 to maintain clearance of flammable vegetation around their property. A property owner's clearance responsibility is limited to 100 feet from his or her structure(s) or to the property line, whichever is closer, and is limited to their lands. However, coordination with adjacent landowners to achieve maximum defensible space is encouraged. Similar constraints have been developed for areas outside the SRA, within and adjacent to the W.U.I.

Wildland fires can spread out of control and destroy everything in their path, especially when structures and roadways are overgrown with vegetation. This can cause homes to ignite and prevent access by firefighters and fire protection equipment. Overgrown roads delay response time and obstruct efforts to extinguish the fire and create unsafe conditions for firefighters and evacuating residents. Many homes can be saved during a wildland fire provided there is adequate defensible space near the structure and roads. Throughout the W.U.I., state and local fire departments are available to conduct home defensible space inspections. Depending on the policy of the individual department, these inspections are made automatically, when requested, or by complaint. When making an inspection, fire officers evaluate at a variety of factors including surrounding vegetation, topography, aspect and location of the structure, type of structure, and roadway access.

Recommendations are then provided to the homeowner to reduce the potential of structural ignition and allow improved ability for firefighters to successfully defend a home or structure.

A summary of common practices for creating and maintaining defensible space are provided below. Because this C.W.P.P. covers a large and varied landscape, it is beyond the scope of this plan to provide in-depth discussion of possible modifications that should be made to these general guidelines according to site specific conditions (fuel type, terrain, access, weather patterns, etc.). Additionally, this summary is not intended to supersede any state, county, or local codes or regulations in regards to defensible space and vegetation removal. Homeowners are advised to seek guidance in making appropriate, site-specific modifications that conform to all applicable rules and regulations.

Maintain a firebreak by removing and clearing away all flammable vegetation within 30 feet of each structure. Single specimens of trees or other vegetation may be retained provided they are well-spaced and well-pruned, in order to avoid spread of fire to other vegetation or to the structure. In the area from 30 to 100 feet from the structure, dead and dying woody surface fuels and aerial fuels should be removed. Downed logs, when embedded in the soil may be retained. In the area from 30 to 100 feet, create clearance between fuels both horizontally and vertically.

Residents may consider the removal of large trees when addressing the defensibility of their homes. Before a large tree is removed, the appropriate professionals should be contacted to evaluate the feasibility of removing the tree. CAL FIRE receives numerous timber harvest permits for thinning of redwood and Douglas-fir for fire hazard reduction. Many consider the retention of large trees as a good defense against wildfire, considering the fire resistant nature of local large conifers. Although there is no such thing as a fire resistant forest, a good defense against wildfire is a healthy and resilient one. There are instances where management of the surrounding forest (thinning, removal, and pruning) is appropriate. There are also situations where retention of larger trees, while managing the ground fuels is the best option.

Closed canopy forests void of a large buildup of dead fuel, reduces the amount light hitting the forest floor, maintain ground moisture and limit growth of understory species which may reduce the risk of a surface fire transitioning to the canopy. However, when a fire enters and becomes established in the canopy, control is very difficult.

The Calaveras County C.W.P.P. has added brochures for defensible space in the section titled "Useful Homeowner Documents and Resources".

Pertinent websites related to recommendations to reduce structural ignitibility

<http://www.fire.ca.gov/>

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

Plants

While plants close to a building can be a major fire hazard, those farther away can also serve as buffers against radiation and convective heat, and fire brands. Trees, in particular, can block many of these hazards by diverting wind flow away from the house.

These townhouses in a rim location were protected by the trees at the rim edge.



Plants: Potential Problems

Plants against combustible siding present the greatest hazard since their flames make direct contact with the siding and can cause vertical flame spread.

As the separation from plants to building increases, then we are concerned about the radiant energy from combustion (like the heat generated from a fireplace). There is a very large difference in the amount of radiant energy felt by the siding as the distance increases, for example, the same plant 4 feet away as compared to 1 foot would only have about 10% of the radiant effect on the siding.

All plants within the "home zone" should be assessed using the four key criteria: size, location, structure, and condition.

Size and location: These effects go together. A small plant (about 2-feet high) against combustible siding under a window or at an inside corner is a real threat. A plant just under or next to a window is a primary concern. A typical window will last about 1 to 3 minutes when exposed to fire.



Another bad place is an inside corner of a building, which can be ignited much more easily than simply the side of a house.

Structure: Plants with a lot of fine materials, such as junipers or cedars ignite easily and can release a lot of heat in a short period of time. For example, the 1-foot juniper below generated 10-foot flames, which in many cases can reach up to the eaves.



Condition: Dead material in or under plants can add substantially to the dry fuel, which in the fire season can be a formula for disaster.

Plants: Possible Solutions

Size and location: The smaller the better, especially close to combustible siding, under a window, or at an inside corner. Better still; consider using ground cover wherever possible next to combustible siding or near windows for any type of siding.

Structure: Look for "leggy" plants with succulent leaves. For example, plants similar to oleander are a good choice, as are roses.



Condition: Any plants near a house should be pruned, regularly watered (preferably dripped) and any dead material removed, including at the soil level. Along with these precautions, don't use bark or other combustible natural materials as plant bedding. Embers can land in this, smolder, and later go into flaming combustion.

The burned cedars in these photos had all of the wrong characteristics!



The picture shows one green cedar (far right) and one scorched (center).



This picture is over to the right of the same side of the house where the scorching of the area around the window is evident from a cedar just below the window. A fire crew arrived just in time.

Fire Resistive Plants

When landscaping around a home, most homeowners are interested in creating a landscape

that is aesthetically pleasing, complements their home, and has variations in color, texture, flowers, and foliage.

Another important aspect of home landscaping is safety. While planning your landscape, you must consider fire safety in general, and plants flammability in particular.

Remember that flammable plants in your landscape will increase fire risks around your home as they can act as fuel and contribute to the intensity of a fire.

There are many fire prevention techniques, applicable to your backyard and outdoors area as describes in the article Prevent Fire Damage in the Outdoors. However, planting fire resistant or fire resistive plants is one of the best techniques you can use to promote fire safety.

What Are Fire Resistant Plants?

Fire resistant plants are plants that have a higher capacity to withstand heat associated with fire and are therefore less likely to be ignited by flame or other ignition sources.

Fire resistant plants' foliage and stems will not contribute significantly to the fire's intensity.

Keep in mind that fire resistant plants are not fire proof and can be damaged by fire. In general, fire-resistive plant characteristics include:

- Supple and moist leaves
- Water-like sap (usually the sap will not have a strong scent)
- Thicker bark
- High moisture content
- Low resin content

Where to Plant Fire Resistant Plants?

Surrounding your home with fire resistant plants won't guarantee your home's safety but it will decrease the risk. Another advantage is the fact that a garden filled with fire resistant plants will grow back looking good even should the worst happen.

Good placement of fire resistant plants will help protect your home by blocking intense heat.

Plant the most drought tolerant and fire resistant plants closes to the house within about three feet.

There is a wide array of plants and trees to choose for your landscape that are both attractive and fire resistant.

Grasses, groundcovers, vines, perennials and annuals

African daisy, Black-eyed Susan, Iris, Ivy, Thyme, Yucca, Poppy, Lavender, Red hot poker, Clematis, Coral bells.

Trees & Shrubs

Oleander, Lilac, Jasmine, Poplar, Oak, Plum, Peach, Maple, Elm, Ash, Birch, Cherry
Included in the Homeowner Information Section you will find a pamphlet on fire resistive landscaping from Firewise as well as fire safe landscaping brochures for the California Firesafe Council for three different landscapes; Timberland, Brushland and Grasslands.

General recommendations

One of the goals of the C.W.P.P. is to prioritize fuel reduction projects. This plan identifies “high priority” areas, where fuel reduction projects should take precedence. When individual projects are implemented, site specific guidelines shall be developed by the persons/agency responsible for project development. Any proposed project shall conform to all applicable local, county, and state regulations concerning fuel modification projects. The following general recommendations are not intended to be site specific, but rather a tool to aid in the development of appropriate prescriptions.

Reduction of fuels adjacent to roads

Overgrown vegetation on or adjacent to the traveled road surface makes access difficult for fire fighters and equipment. Additionally, roadside vegetation, including tree limbs, brush, and grass is responsible for numerous fire starts each year. This is a problem adjacent to all types of roads in the County. There are many narrow, one-lane roads that often make it difficult for emergency vehicles to access a fire area while residents are simultaneously leaving. During a wildland fire, ingress/egress may be obstructed by roadside vegetation.

Vegetation impeding and growing into the road right of way should be reduced to a level allowing greater ease of access for emergency response personnel and equipment, and to reduce the number of roadside fire starts. This vegetation removal is also used for the safety of fire suppression personnel using roads as fire control lines. County Public Works and Caltrans routinely conduct roadside clearing for access, visibility and fire safety. Historically, this work was accomplished through a combination of chemical and mechanical means. In recent years, there has been increasing public pressure to eliminate the use of chemicals as a roadside treatment. Most of the work has been completed with mechanical mowers, hand crews and masticators.

Strategically placed fuel breaks (including shaded fuel breaks)

The primary goal of a fuel break or shaded fuel break project is to change the behavior of a fire entering the fuel-altered zone. To reduce large flame lengths and high energy output, fuels should be modified to reduce flame length and decrease energy output. Changing fire behavior may be the key to allowing fire crews to protect people and property from wildland fire.

Effective fuel breaks may:

- Act as an anchor point for indirect attack on wildland fires.
- Allow for fire fighter to use fire as operational tool (firing out).
- Support safer ingress/egress for emergency responders.

With reduced fuel adjacent to roadways and structures, flame lengths, fire activity, and heat production will be reduced, making it safer for firefighters to access the area and protect structures in the community. A fuel break typically refers to the removal of all or the majority of vegetation in a specific strategic area. A shaded fuel break refers to “thinning” of vegetation in a specific area with the remaining vegetation shading the ground. Non-shaded fuel breaks are typically used in non-residential, less visible areas. For the purposes of large scale wildland firefighting, these types of fuel breaks are preferable to shaded fuel breaks because they make little to no fuel available combustion. However, shaded fuel breaks are often preferred because they are less invasive to sensitive resources on the landscape and often have more support from adjacent property owners.

The type and size of fuel reduction projects should be determined on a project by project basis. The widths of roadside shaded fuel breaks generally range from 10 feet up to 50 feet, and in certain instances may even be wider. Strategic fuel breaks can be as wide as 400 feet.

The responsible fire agency as well as the community should collaboratively develop projects that meet the needs of the stakeholders.

Shaded fuel breaks can be placed around individual structures, a community or neighborhood identified to be at risk. For example, after a community has developed defensible space out to 100 feet from structures, they may wish to augment that with an extended fuel break.

Depending on the topographical location of the community, an extended fuel break around the residences may be of strategic importance. There is no specific prescription for this type of project. It should be developed in collaboration with the community and responsible fire agency, and be adapted to local environmental constraints.

Roadside Fuel Break

There are many communities and neighborhoods identified as priority areas in this document where a roadside fuel break would be beneficial. Stakeholders in both counties consistently agreed, reducing fuel loading adjacent to roads is one of the most important and highest priority projects. There is no standard distance recommended from the roads edge, other than more is often better. Extended fuel reduction projects may be reduced in some areas with continued maintenance and treatment of roadside grass and continued trimming of vegetation. Roadside fuel breaks are typically between 10 and 40 feet wide. The exact distance should be based on fuel type, slope, aspect, and be environmentally feasible.

Other general recommendations include maintaining defensible space around the home. This is discussed in the “Reducing Structural Ignitability” section of this plan. There are a variety of methods used to create a fuel break or shaded fuel break, however, the primary method is manual labor using chainsaws. Locally, many fuel reduction projects are completed by CALFIRE inmate fire crews, residents, and private contractors. Although chainsaws are the primary vegetation removal tool, other methods may include livestock, mowing, or other mechanical means such as a masticator. Treatment of the removed vegetation can be accomplished by a variety of methods, listed below.

Chipping

The CFFSC routinely secures funding for Door-to-Door Chipper programs within the County.

Independent contractors with chippers are also available for hire in the county. When a fuels reduction project requires use of a chipper, vegetation to be treated should be placed in a location easily accessible to a chipping crew arranged in a manner to allow for efficient chipping. Such specifications are determined in project planning according to the size of the chipper. Depending on the location and project goals, the chips will be either left on site, or be taken away for proper disposal.

Debris burning

Though this is a very effective means of fuel treatment, vegetation piles can become an increased fire hazard if left untreated. Other factors to consider are the risk of escape and smoke management and air quality restrictions. The agency having jurisdictional authority should be contacted prior to burning for information on all applicable fire and air quality rules and regulations.

APPENDIX 8: FIRE BEHAVIOR FUEL MODEL DESCRIPTIONS

| <i>Fuel Model</i> | <i>Fuel Model Category</i> | <i>Description</i> | <i>Communities Prevalent</i> |
|-------------------|--|---|--|
| 1 | Short Grass | very little shrub or timber overstory, both annual and perennial grasses | Present but not prevalent in all communities |
| 2 | Grass with Timber/Shrub Overstory | open shrub lands or pine/oak/dry Douglas-fir stands that cover 1/3-2/3 of area | Prevalent in all communities |
| 3 | Tall Grass | tall stands (≥ 3 ft), $>1/3$ is dead or cured | Not present |
| 4 | Mature Brush/Chaparral | stands of mature shrubs, ≥ 6 ft tall, flammable foliage and significant dead component, may have deep litter | Present in Bear Valley and Woodfords |
| 5 | Young Brush | shrubs are short and almost totally cover the area; young, green stands up to 6ft high | Prevalent in Woodfords, Kirkwood, and Markleeville; present in Bear Valley |
| 6 | Intermediate Brush | shrubs are older than model 5, less fuel and shorter than 4 | Prevalent in all communities |
| 7 | Southern Rough | shrubs are 2-6ft tall, palmetto-pine combination is typical | Not present |
| 8 | Closed, Short Needle Timber Litter | closed canopy stands of short-needle conifers or hardwoods, litter layer is needles, leaves, and twigs | Prevalent in all communities |
| 9 | Hardwood or Long Needle Pine Timber Litter | closed stands of both long-needle conifer and hardwood stands, dead-down woody material | Prevalent in all communities |
| 10 | Mature/Overmature Timber and Understory | large load of dead material on forest floor | Prevalent in Markleeville and Bear Valley; present in Woodfords |
| 11 | Light Slash | moderate downfall of limbs and boles, partial cuts or thinning | Not present |
| 12 | Medium Slash | heavily thinned, clearcuts, and medium or heavy partial cuts | Not present |
| 13 | Heavy Slash | clear cuts and heavy partial cuts; slash load is dominated by > 3 in. diameter materials | Not present |

Anderson, Hal E.; *Aids to Determining Fuels Models for Estimating Fire Behavior*. Gen. Tech. Rep. INT-122. USDA Forest Service, Intermountain Forest and Range Experiment Station, Ogden, UT. 22 p. 1982.