Community Wildfire Protection Plan

2016 Update

The Santa Fe Trail Ranch (SFTR) Community Wildfire Protection Plan was originally prepared by Land Stewardship Associates, LLC at the request of the Santa Fe Trail Ranch Property Owners Association in 2006. Significant work has been accomplished on Santa Fe Trail Ranch each year since the creation of the original CWPP in the form of fuel reduction both collectively and by individual property owners. In 2015, it was determined by the community that another release of the SFTR CWPP would be valuable showing all the activities that have been done, reprioritizing goals for the future and assessing all structures for survivability if a wild land fire were to occur. Jim Webb from Land Stewardship Associates was contracted to do structure assessments and provide guidance. The Forest Health Committee of SFTR prepared the updated document and presented it to all the collaborating parties in Las Animas County for concurrence and signatures.

Signatory Page

The following people have reviewed and approved the Santa Fe Trail Ranch Community Wildfire Plan. It is now ready for implementation.

Derek Sokoloski, State District Forester,
La Veta District, Colorado State Forest Service — Date: 4/26/17

Robert L. Scott, President, Board of Directors,
Santa Fe Trail Ranch Property Owners Association — Date: 5/6/17

Christopher Carlisle , President, Board of Directors,
Fisher's Peak Fire Protection District — Date: 5/20/17

R.C. Ghormley Chairman, Forest Health and
Wildfire Mitigation Committee SFTR POA — Date: 5/5/2017

Buddie Curro, Fire Chief, Fisher Peak Fire
Protection District — Date: 5/20/2017

James Casias, Las Animas County Sheriff — Date: 05/09/17

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I. COMMUNITY IDENTIFICATION & DESCRIPTION

The Santa Fe Trail Ranch (SFTR) community area is in Las Animas County, south of Trinidad Colorado, near the Colorado/New Mexico state line. It covers approximately 16,800 acres and ranges in elevation from 6,500 to 8,100 feet. Interstate Highway 25 provides primary access to the ranch. See the attached vicinity map for a comprehensive understanding of the ranch location.

SFTR contains four hundred and fifty-four (454), 35 acre parcels, two hundred and five (205) of which have structures on them. Approximately six to eight new homes are being built each year. Eighty-three (83) miles of reasonably good dirt and gravel roads provide year-round access.

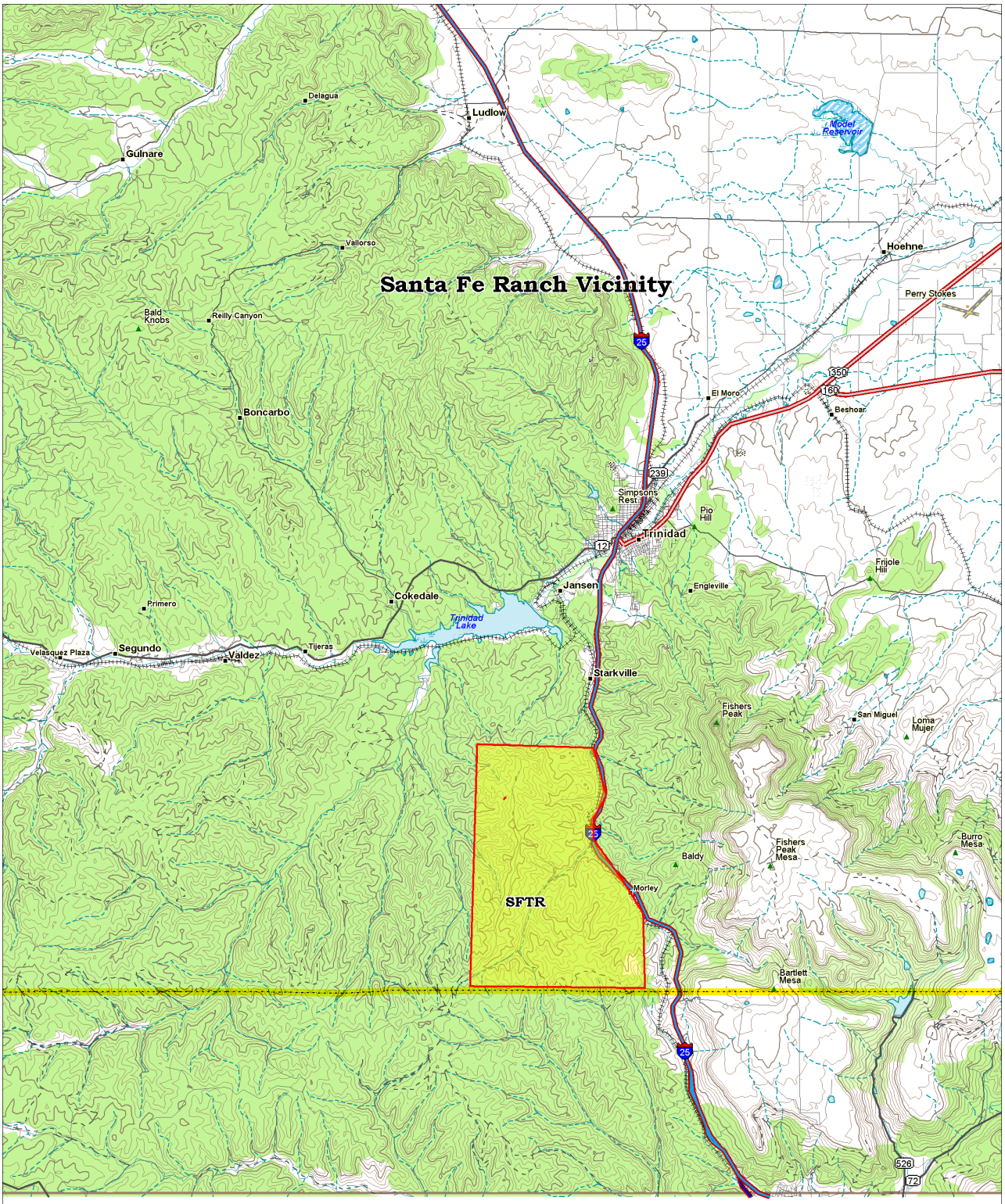
There is a very active property owner's association guiding many of the activities on the Ranch. Defensible space activities are wide spread as well as collaborated fuel reduction fuel breaks.

Previous fires in the area have created a vegetative tapestry of pinyon, juniper, ponderosa pine and Douglas fir in the overstory with a rich shrub understory composed of Gambel oak, New Mexican locust, mountain mahogany, skunk-bush and chokecherry. These vegetative blanket lays on a highly-dissected series of ridges, draws and canyons. Slopes range from ten to fifty percent with an average approximating thirty percent.

Large wildfires are not unusual in the area. The Morley fire burned 300 acres on the Ranch in 1978 and was followed by Morley fires 2 & 3 in 1979 & 1980. The fire season of 2002 provided a serious wake up call to Colorado residents living in forested/wooded environs. The Crazy French (300 acres), Spring (33,000 acres), Track Fire 2011 and James John (6,800 acres) fires were all in the Santa Fe Trail Ranch vicinity. These fires increased Ranch residence awareness of the hazards of living in a wildland setting.

Initial attack for all wildland and structure fires on Santa Fe Trail Ranch is provided by the Fisher's Peak Fire Protection District, Volunteer Fire Department.

Since the initial creation of the SFTR Community Wildfire Protection Plan (CWPP) in 2006 numerous meetings and input has been taken from the Colorado State Forest Service and incorporated into the SFTR CWPP.


Santa Fe Ranch Vicinity
Delagua
Ludlow
Model Reservoir
Gulnare
Vallorso
Hoehne
Perry Stokes
Bald Knobs
Reilly Canyon
Boncarbo
El Moro
Beshoar
Simpsons Rest
Pio Hill
Trinidad
Friole Hill
Jansen
Engleville
Cokedale
Primero
Trinidad Lake
Velasquez Plaza
Segundo
Valdez
Tijeras
Starkville
Fishers Peak
San Miguel
Loma Mujer
SFTR
Baldy
Fishers Peak Mesa
Burro Mesa
Morley
Bartlett Mesa
25
350
160
239
12
23
526
72
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II. COMMUNITY ASSESSMENT

The overall risk to the community from wildland fire was assessed as HIGH in 2006. Since 2006 considerable efforts on fuel breaks on the South and West Boundaries have been completed as well as internal fuel breaks and widespread mitigation by individual lot owners. The fire risk is still high at this time. This section will discuss the factors considered and contributing to the overall rating.

Fuel Hazards

Dense stands of conifer (ponderosa pine, pinyon pine, Douglas-fir and juniper) and brush (Gambel oak, New Mexican locust, mountain mahogany, and chokecherry) cover the Ranch. Fuel ladders are abundant and will lift ground fire into the crowns of the overstory. There are only a few small meadows scattered throughout the Ranch. Fire Behavior Fuel Models 1, 4, 6, 8, & 9 (Anderson 1982) are all found in various associations with one another. All but fuel models 8 & 9, have high rates of spread under relatively mild weather conditions. Table 1: Fuel Models Found in Santa Fe Trail Ranch provides a brief description of these five key fuel models.

All stands adjacent to structures with crown closures greater than forty percent are problematic. Continuous surface and crown fuel arrangement, both horizontal and vertical, render this area susceptible to torching, crown fire, and ignition by wind born embers, even under moderate weather conditions. The following Fire Hazard & Mitigation Map shows the severity of fire hazard for the Ranch with fully eighty five percent (85%) rated as high fire hazard.

Local topography further aggravates fire behavior and control. Slopes range from ten to fifty percent with most hillsides ranging from twenty to thirty percent.

Fuel Models

Fuel models are a means of describing a wide variety of combustible conditions found in a wildland environment. Thirteen (13) standardized fuel models are used in wildfire behavior prediction. Fuel size class, fuel loading in tons/acre, fuel bed depth, and fuel continuity across a landscape are all factors that are considered when assigning a fuel model to a specific tract of land. Since it is unrealistic to expect thirteen (13) descriptions to represent the wide continuum of fuel beds found in the wild, fuel models are often combined by the percentage of an area they cover. Table 1: Fuel Models found in Santa Fe Trail Ranch concisely describes fuel models in the development.

Table 1: Fuel Models Found in Santa Fe Trail Ranch

Fuel Model	Description
1	Grasslands generally less than 1 foot deep
4	Shrub stands > 6 feet tall
6	Shrub stands < 4 feet tall
8	Closed canopy stands with short-needle conifers or hardwoods that have leafed out support fire in the compact litter layer.
9	Closed stands of long needled pine or hardwood stand with freshly fallen leaves

Here are a few representative photos of fuel models found on SFTR

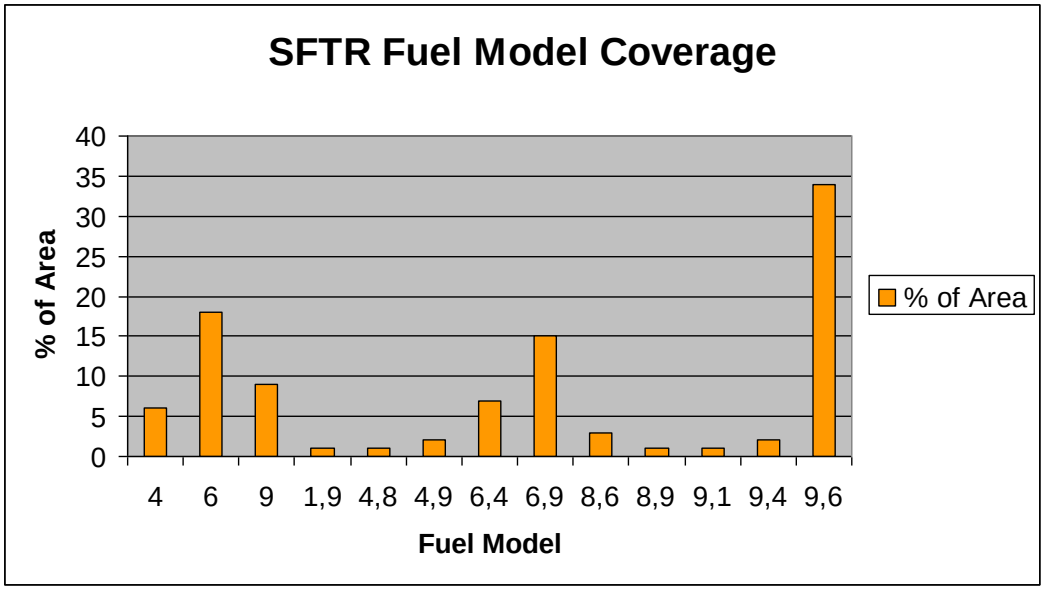
Fuel Model 1/9

Fuel Model 6

Fuel Model 9

Fuel Model 9/6

Chart 1: Fuel Model Coverage on Santa Fe Trail Ranch 2006 assessment



Risk of Ignition and Wildfire Occurrence

The robust vegetative mosaic found on the ranch is living testimony to fires role in ecosystem dynamics in the area. Most contemporary fires are lightning caused but human caused fires are expected to increase as more homes are built on the ranch. Surprisingly there are very few railroad fires along the tracks across Raton Pass. Fires are normally prevalent along steep railroad grades. The Burlington Northern & Santa Fe Railroad Company is doing a good job of wildfire prevention by keeping their right of way mowed and free of flammable vegetation.

The Morley fire of 1978, burned three hundred (300) acres on the Ranch. Normally two to three small fires occur on the Ranch each year. 2002 was a very active wildfire year. Three major blazes burned over forty thousand acres in the SFTR vicinity.

Low fuel moistures and low relative humidity are common in the area, as are periods of high winds. When dry and windy conditions coincide, the stage is set for large, troublesome wildfires.

Fires originating in or near the community are the most immediate concern, but fires starting well beyond the boundaries of the planning area can have profound effects upon the Ranch. Rapid rates of spread and long distance spotting (starting of new fire by wind blown embers) are the norms for fires in the vicinity. The Spring fire of 2002 started in New Mexico and made an eleven-mile run toward Colorado in just one afternoon. Table 2 below provides insight into potential fire behavior on a bad day at Santa Fe Trail Ranch.

Table 2: Santa Fe Trail Ranch Fire Behavior Prediction

Fuel model	Rate of Spread (miles/hr)	Flame length (feet)	1 hour fire size (acres)	1 hour Fire perimeter (miles)	Safety zone size (acres)
1/9	2.25	8	852	5.00	2
4	2.63	32	995	5.76	20
4/8	.17	35	373	3.71	25
4/9	2.00	35	514	4.36	26
6	1.45	11	271	3.16	3
6/4	2.54	35	825	5.51	26
6/9	.61	9	64	1.39	2
8/6	.46	9	37	1.05	2
8/9	.11	4	3	0.26	0.5
9	.17	4	6	0.40	0.5
9/4	1.51	32	337	3.35	21
9/6	.80	10	95	1.78	2.5

Note: Shaded zones are well beyond hand crews and engine suppression threshold.

Fire behavior predictions are based on the average weather conditions for the month of June 2002 recorded at the Bosque (a.k.a. Cuchara) Remote Automated Weather Station (RAWS) #56203. This RAWS sits at 8,174 feet elevation and is reasonably close to SFTR.

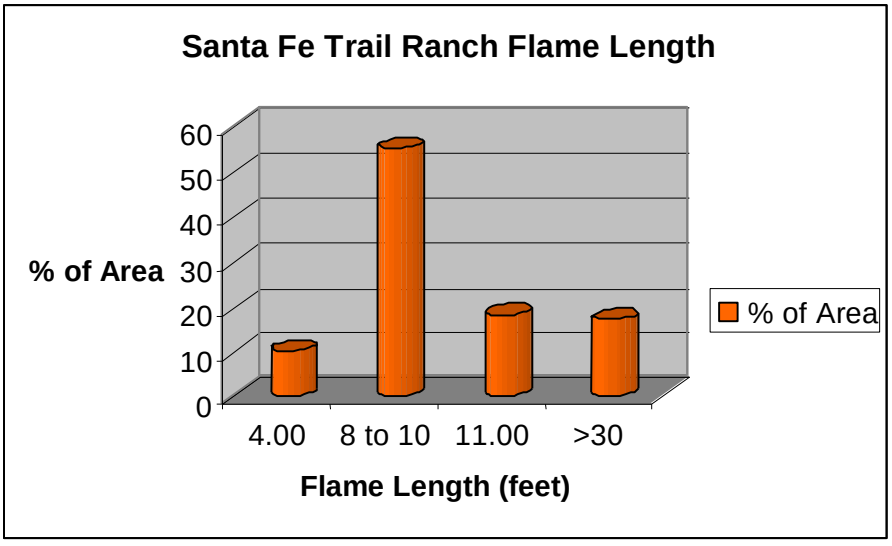
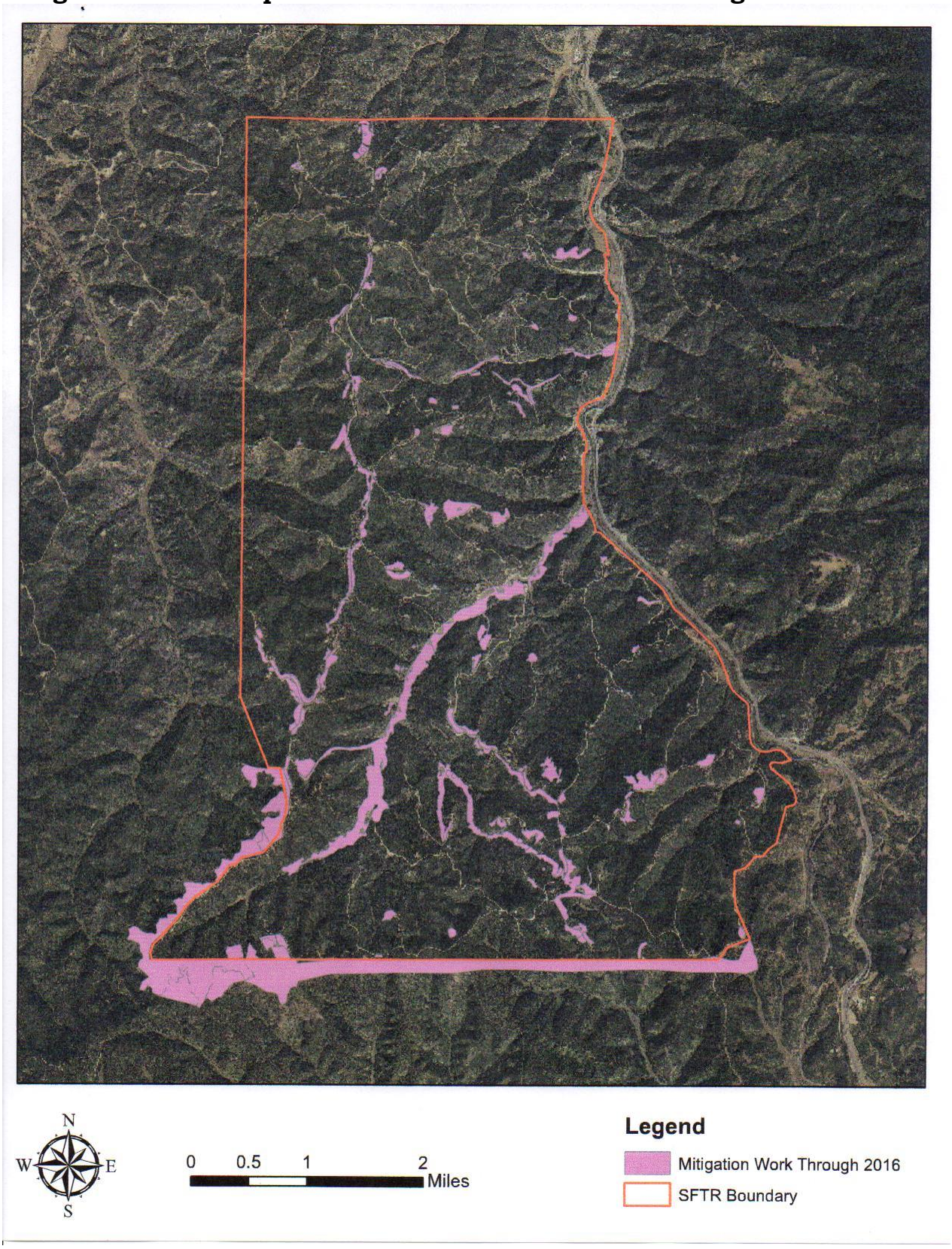


Chart 2: Flame lengths on Santa Fe Trail Ranch

Mitigation work completed on Santa Fe Trail Ranch through 2016



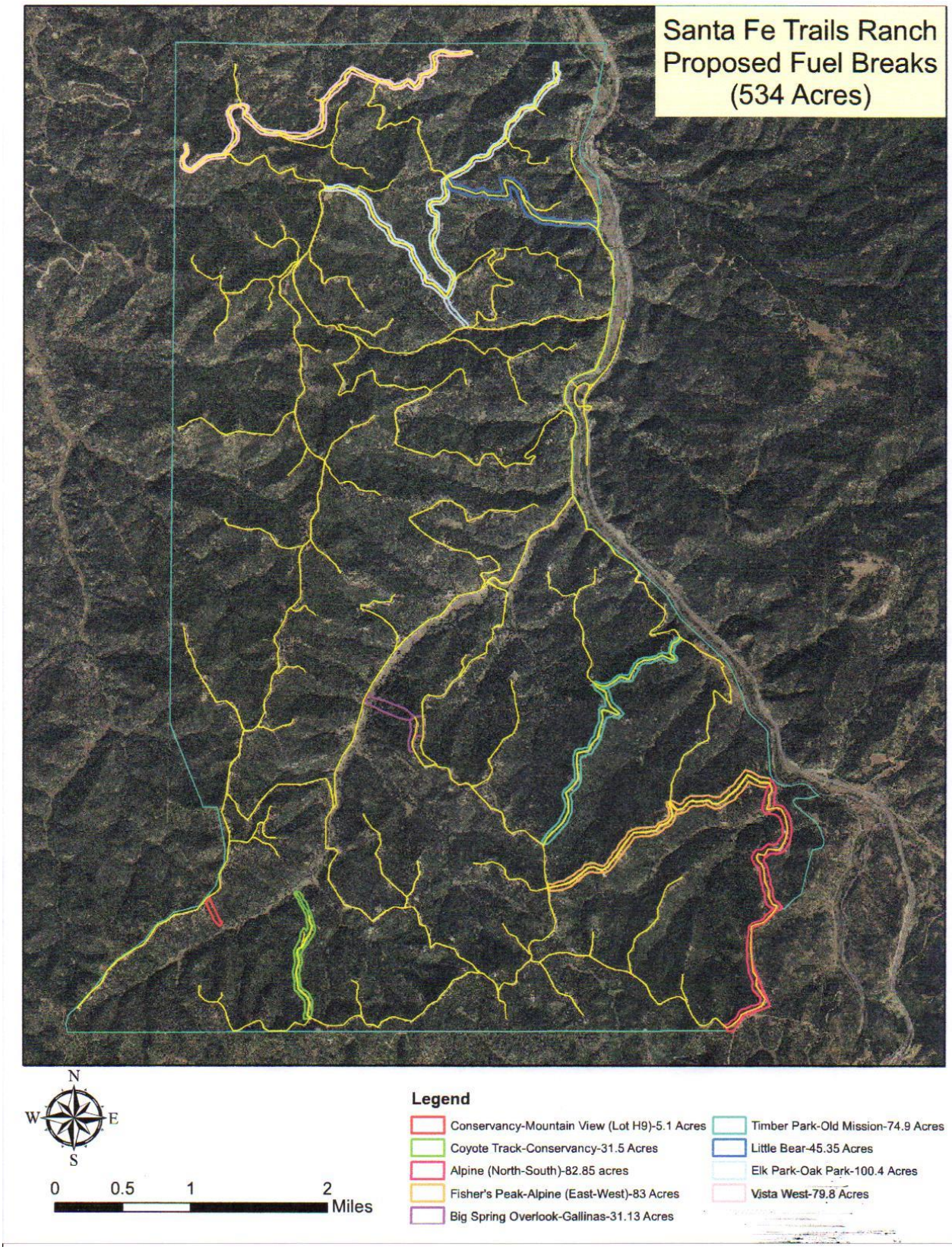

Santa Fe Trails Ranch
Proposed Fuel Breaks
(534 Acres)
N
W
E
S
0
0.5
1
2
Miles
Legend
Conservancy-Mountain View (Lot H9)-5.1 Acres
Coyote Track-Conservancy-31.5 Acres
Alpine (North-South)-82.85 acres
Fisher's Peak-Alpine (East-West)-83 Acres
Big Spring Overlook-Gallinas-31.13 Acres
Timber Park-Old Mission-74.9 Acres
Little Bear-45.35 Acres
Elk Park-Oak Park-100.4 Acres
Vista West-79.8 Acres

Table 3: Fire Hazard Based on Rate of Spread and Resistance to Control

Fuel Model	ROS	RTC	Hazard	% of Area
4	High	High	High	6
6	High	High	High	18
9	Moderate	Moderate	Moderate	9
1,9	High	Moderate	High	1
4,8	Moderate	High	High	1
4,9	High	High	High	2
6,4	High	High	High	7
6,9	High	High	High	15
8,6	High	High	High	3
8,9	Moderate	Moderate	Moderate	1
9,1	High	Moderate	High	1
9,4	High	High	High	2
9,6	Moderate	High	High	34

NOTE: ROS = Rate of Spread & RTC = Resistance to Control

Community Values at Risk & Hazard Assessment

Values: Two hundred five (205) of the four hundred fifty-four (454), or 45%, of the tracts on the Ranch have homes on them. Structures range from substantial permanent residences to tuff sheds, travel trailers and metal sheds. Approximately six to eight (6-8) new homes are being built each year. Sixty percent (60%) of the structures are occupied year long.

Ranch owners place a high premium on their natural surroundings and the visual quality of the landscape. Vast expanses of heavily burned, charred forest are objectionable whether structures burn or not. If the view is seriously eroded much of the intrinsic value of the home will also be lost.

A large, intense fire will also compromise watershed values and cause sediment and turbidity issues along Raton Creek and Trinidad Lake. Most of the ponds on the ranch which are impounded by earthen dams would be filled with sediment, compromising wildlife and livestock watering opportunities.

Access: Eighty-three (83) miles of gravel and dirt roads provide reasonably good access to the Ranch. All of the intersections are signed. Driveways have addresses posted.

In August of 2006 a universal addressing system was established at SFTR to clean up a confusing and inconsistent addressing system. Road grades often approach ten percent (10%) on the main arterials in the community. Driveways can be as much as fifteen percent (15%). All dead-end roads have “No Outlet” signs at the junction with the main road. Turnarounds and cul-de-sacs at the end of the roads are inadequate for large structure fire equipment.

Risk: Three kinds of risk are associated with wildland fire. The first concern is the risk to property owners trying to evacuate under less than optimal conditions. Second is the risk to firefighters attempting to protect property. Third is the risk to the property from wildfire. The concept of defensible space addresses both the second and third facets of risk under one umbrella.

Defensible space is an area around the structures where fuels and vegetation are treated, cleared or reduced to slow the spread of wildfire towards the structure and lower the intensity of the fire as it passes the developed area. It also reduces the chances of structure fire moving from the building to surrounding vegetation. Defensible space provides room for firefighters to do their jobs. A house is likely to withstand a wildfire if vegetation is managed to reduce a fire's intensity. Structure design and construction also influence its survivability when a wildfire passes through the neighborhood. Removing flammable materials such as fire wood, lumber and gasoline from the decks and base of structures will pay big dividends when the ember storm hits the home. The 2015 structure assessment indicates that 44% of SFTR structures have a high likelihood of survival in a wildfire occurrence with no human intervention.

Maps developed for this Community Wildfire Protection Plan identify structure location and survivability. The CWPP is an ever-evolving document and will be revised on a regular basis to reflect new information about structure survivability and other important fire control features on the Ranch.

Evacuation SFTR utilizes an automated phone call system for any emergency notifications required. This system allows for the sending of mass phone calls to all numbers listed on the property owner's website. SFTR also has a very robust website that residents use for information daily and in times of emergency SFTR also has a ranch hotline (719 846-2464).

Evacuation routes

There are several potential evacuations out of the Ranch. The main entrance road is the best alternative for threats from the south.

A gate off of the south end of Owen Baldwin Parkway onto a logging road on Vermejo Park Ranch provides an opportunity for residents in that area to exit the Ranch if a threat comes from the north or east. Vermejo Park Ranch personnel installed the gate to provide emergency ingress and egress for both SFTR and the Vermejo Park Ranch. Another exit portal exists off of Alpine Meadows Drive. It provides access to another good dirt road that connects to I-25 at Exit #2.

One other unimproved exit route exists. It is the primitive road that originates on lot G17 and goes under the railroad to the I-25 frontage road and on to exit #2.

Local Preparedness and Protection Capability

Fisher's Peak Fire Protection District (FPFPD), Volunteer Fire Department has a cadre of 20-22 firefighters. Dispatching is done by county emergency response dispatchers. The majority of the firefighters are capable of building fire line with hand tools for an extended period of time. Station 2 is located on SFTR.

Equipment located at SFTR Fire Station Two Includes:

- 2-2000 Military surplus 6x6 tender with 900 gallons.
- Engine 3 (500 gallon 1975 Ford Pumper)
- Bush 2 – type 6 200 gallon 2004 F250
- 1500-gallon portable water tank
- 2500-gallon portable water tank

Station 1 in Starkville is the primary station for Fishers Peak Fire Protection District and is the first back up for Station 2 at SFTR. Equipment at Station 1 includes the following:

- Engine 1 1750 gpm, 1000-gallon tank, 4wheel drive 1995 make 4guys
- Engine 2 1000 gpm, 750-gallon tank, 1979 Pierce Ford
- Engine 5 6x6 900-gallon tank, 1970 Kaiser
- Rescue 1 400-gallon tank equipped with extrication tools and also with tools for a type 6 brush, 2002 4-wheel drive
- Brush 3 480-gallon type 6 wildland, 2001 Ford 350 2 door 4-wheel drive
- Brush 4 200-gallon type 6 wildland, 2002 Ford 350 4 door 4-wheel drive
- Hazmat trailer

This compliment is at best twenty minutes from the SFTR entrance and as much as thirty minutes to the scene depending on the location on the Ranch.

Additional reinforcements from FPFPD and additional equipment and manpower from nearby departments (Hoehne, Stonewall, Cokedale, Spanish Peaks and Trinidad) that have mutual aid agreements with FPFPD are at least an hour out with availability dependent upon workload at the time of the request."

Water Supply: The SFTR Metro District gets its water from the City of Trinidad and pumps it to the community. Some residents haul water instead of paying the tap fees for the community water system. Each developed lot is expected to have at least 1,500 gallons of water storage on site for fire protection. Most of these tanks are underground. Some of the residents now hooked to the Metro District water system are currently by-passing their cisterns and should be encouraged to keep them full and available during fire season. The ranch Metro District water system contains three 110,000 gallon tanks and several pump stations. There are also sixty-four, two inch hydrants distributed around the Ranch. Many of these hydrants are located at the end of dead end roads.

Water pressure at the hydrants varies from 10 to 60 pounds per square inch, depending upon elevation of the hydrant relative to that of the storage tank or pressure relief valve. Water flow at the hydrants will range from 380 to 920 gallons per hour depending on water pressure at the hydrant. Hydrant and major storage tank locations are shown on the Fire Control Features Map.

In the event of an emergency, the Metro Water Board would take control of the system to preserve water in the tanks for firefighting needs. Residents should rely on the water in their cisterns only because water provided to their cisterns could be interrupted.

There are also several perennial ponds on the Ranch that are adjacent to roads and can be counted on for wildfire suppression purposes. Most of these ponds are filling up with silt and need to be dredged.

Grazing: SFTR is a working ranch with a cattle grazing lease. The grazing cattle help to keep the grasses and other fine fuels from accumulating in the open areas of the ranch. Without the cattle to keep these fine fuels under control a significant effort will be required to periodically keep the grasses and other fine fuels mowed throughout the growing season.

III. COMMUNITY MITIGATION PLAN

Defensible Space:

Effective defensible space is the landowners' most reliable means of providing wildfire protection for their structures. This is especially true on the Santa Fe Trail Ranch. Complex terrain, heavy fuels, and landownership patterns on the Ranch make landscape level fuel modification very difficult. The 2006 plan identified fuel breaks along strategic ridges and roads, many of which have now been completed. This new plan suggests a few new prioritized shaded fuel breaks that should be completed. ***The key to individual structure survival is Defensible Space and good "Fire Wise" practices.***

During periods of high to extreme fire danger a wildfire will rapidly exceed the suppression capability of the local fire suppression forces. Table 2: Santa Fe Ranch Fire Behavior Prediction displays the difficult position firefighters will face on a dry, windy day. Hand crews are effective when flame lengths are less than four feet. On a bad day only ten percent of the Ranch is expected to have fire of this intensity. The rest of the area will experience flame lengths from nine to thirty-five feet. The size of a fire within the first hour is also expected to grow beyond local initial attack capability over eighty-five percent (85%) of the ranch.

Homeowners should not expect much protection intervention if/when a large fire burns on or through the Ranch. The harsh realities of triage and coordinating attack with mutual aid forces will consume local fire forces for several hours. In 2015 professional forester Jim Webb evaluated the existing homes on SFTR for survivability without human intervention if a catastrophic fire occurred. See appendix D for home rating and Appendix L for evaluation criteria.
Fire Wise rated defensible space is the key to structures surviving on their own. Do it now and keep it maintained.

In many cases, sizeable effort has been spent developing defensible space around quality homes perched on the edge of a steep slope with heavy vegetation below the structure. Unfortunately, the trajectory of the flames will intersect the structure, exposing it to direct contact with the fire. During site visits for triage, several landowners acknowledged the paradox they have created with the location of their home. See chart 3.

Land owners should be encouraged to set new homes back from the edge of steep, brushy slopes using the guidelines provided in "Creating Wildfire Defensible Space Zones, Circular #6.302 (Dennis, 2003)

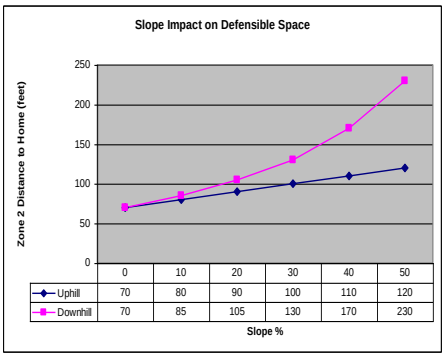


Chart 3: Slope Impact on Defensible Space

Education and Information:

The SFTR Forest Health/Wildfire Mitigation Committee (FH/WM) was formed in 2004. The Mission of the Committee is to actively promote mitigation of fire hazards and advance ecologically sound forest management practices by heightening awareness, fostering education, and mobilizing property owners to support goals and objectives which will promote a safer and healthier forest environment.

The committee has provided numerous educational events since committee formation: Many panel Discussions, presentations by Colorado State Forest Service and tours have been conducted since the initial CWPP. Further Education Events of this type are periodically planned to increase property owner awareness of Fire Wise Practices. Education events have taken place annually on SFTR at either the annual property owners meeting held each October or the annual property owners Summer picnic. SFTR has had their firewise certification renewed every year since 2006.

Fuel Hazard Reduction:

Since the initial CWPP in 2006, Vermejo Park Ranch has worked cooperatively with the Colorado State Forest Service and Santa Fe Trail Ranch to develop a shaded fuel break along its south and west boundaries with SFTR.

Since 2005 numerous grants have been applied for on both the State and Federal level. SFTR has received some of these grants and has meticulously administered them on fuel reduction efforts. Most of these grants have been match grants where residents have come up with the matching $ or completed in-kind work for the match. These efforts have resulted in fuel reduction for fuel breaks and significant mitigation around many of the homes on SFTR.

This photo shows the fence-line contrast along the boundary between SFTR and Vermejo Park Ranch on the south west corner of the Ranch. Vermejo Park Ranch has completed this shaded fuel break along the boundary.

Many roads on SFTR run along ridges and provide marginal opportunities to make a stand against an aggressive fast moving fire. Their utility as fire control features can be improved substantially by thinning both sides of the road. Road rights of ways (ROW) extend thirty (30) feet each side of the center line. A sixty (60) foot wide break is a start towards an adequate break in fuel continuity but is not sufficient to provide the kind of safety needed in the heavy fuels found on the Ranch. Thinning to get a three hundred (300) foot wide break requires negotiations with many landowners. It is critical that the fuelbreaks be continuous. Without wide spread individual landowner cooperation, creating effective fuelbreaks is not feasible.

Since the initial CWPP in 2006, fuel breaks have been completed on Gallinas Parkway, Mountain View (formerly Owen Baldwin), Tall Timber Trace (60% completed), Tall Oaks (70% completed), Big Springs/Fox Trail (formerly Old Mission) (80% complete)

Table 4: Santa Fe Trail Ranch Potential Shaded Fuelbreaks and the Recommended Fuel Treatment Map provide the detail for the recommended fuel treatments.

This is a greatly reduced shaded fuel break program from what was initially identified in 2006 due to the 10 years of work that has been accomplished. The fuel reduction that has been done improves fire control opportunities along strategic ridges and begins to break up the hazardous fuel continuity on the Ranch. SFTR has a good start but there is much work yet to do.

Table 4: Santa Fe Trail Ranch Potential Shaded Fuel breaks

Fuel break Name	Acres	Estimated cost ($)	Priority
Vista West Drive	79.8	65k	1
Alpine (North-South)	82.8	50k	2
Elk Park – Oak Park	100.4	70k	3
Little Bear	45.3	40k	4
Fishers Peak – Alpine(East-West)	83	60k	5
Big Springs Overlook - Gallinas	31.3	22k	6
Conservancy – Mountain View (lot H9)	5.1	3k	7
Coyote Track - Conservancy	31.5	19k	8
Timber Park – Old Mission	74.9	48k	9
Total	534	377k	-

An alternative would be to work within the sixty (60) foot total right of way along the roads. The entire eighty-three (83) miles of road in the Ranch could be thinned within the ROW for approximately $250,000. This will provide a good place for fire personnel to burn out or backfire as needed, but this approach does not afford much protection during more volatile fire conditions.

Fuelbreak Maintenance: Gambel oak and New Mexican locust are abundant understory species on the Ranch. They also sprout vigorously after they are cut. Keeping them under control following thinning will be a task. Two methods are effective to keep them in check. Mowing is effective but has to be done on an annual basis. Herbicide treatment is also effective but may be objectionable to some landowners. See Appendix E: Defensible Space Maintenance & Gambel Oak for a further discussion on herbicide control of Gambel oak.

It will be wise to have a maintenance option in mind prior to fuel break construction. The Santa Fe Trail Ranch BOD has an annual allocation for some Maintenance mowing on the Community acreage (primarily the Gallinas Parkway Fuel Break).

Treatment Costs: Treatment costs for defensible space and shaded fuelbreak work are highly variable depending on the amount of thinning and slash disposal to be done and the relative care involved in doing the work. Hand crews working next to structures and chipping the slash will cost from $1,000 to $2,000 per acre. Mechanical thinning with a hydro-ax type machine will normally cost from $400 to $700 per acre depending on tree density, slope and rockiness.

Wildfire Suppression Infrastructure:

Turnarounds: Space is lacking, to turn around fire equipment, at the end of most dead-end roads. In fact, in many cases the terminus is even tight for a full sized pickup truck. Hydrants are often located right at the end of the road and fire trucks will be shuttling water from these locations. See appendix K for additional details.

Accommodations for turning vehicles around near the end of the road are critical for fire suppression purposes. In some cases, there is little room to construct turnarounds at the end of the roads so locating a turnaround as near the end as possible is the only option. The most feasible turnarounds for narrow dead end roads is to create a pistol drive where a larger vehicle could drive down and have a short drive to back in and then complete the turn. Thus, the large radius required for a cul-de-sac would not be needed. **This should be a high priority item.** Hopefully the SFTR POA can allocate funds to accomplish this over the next few years.

Fire Control Features/Triage Maps: The maps developed for this Community Wildfire Protection Plan provide invaluable information for wildland fire fighting. While the firefighters from Station 3 may know the Ranch like the back of their hand, reinforcements and mutual aid folks will struggle with the road layout and fire suppression opportunities. Communications can be enhanced by providing high quality maps that show important features.

SFTR Forest Health Committee will provide a set of laminated maps and orthophotos to dispatchers, first responders, the Sheriff's department and Colorado State Forest Service. They will also have a few reserved to distribute during the inevitable emergency and softcopy maps will be available as needed.

The three 110,000-gallon water tanks had hydrants at the tank locations installed in Summer 2016 in order to expedite filling of pumper trucks.

Utilizing Pond Water for Wildfires: Several ponds on the Ranch are adjacent to good roads. Getting fire equipment close enough to draft and fill the tanks may be problematic due to elevation and drafting capability of individual pieces of equipment. The most reliable method to fill tanks is with mechanical high-volume or high pressure pumps. The most flexible system to transfer pond water to fire trucks is the "Floto-Pump". This light weight pump can be carried by one person and is simple to operate. You merely connect a hose to the pump, place it in the pond and start it. The pump floats on the pond and primes itself. The pump can also be placed in a large folding tank to provide high pressure water while an engine shuttles water from the closest hydrant. The ponds are silting up and need to be dredged. **This is becoming a high priority item**.

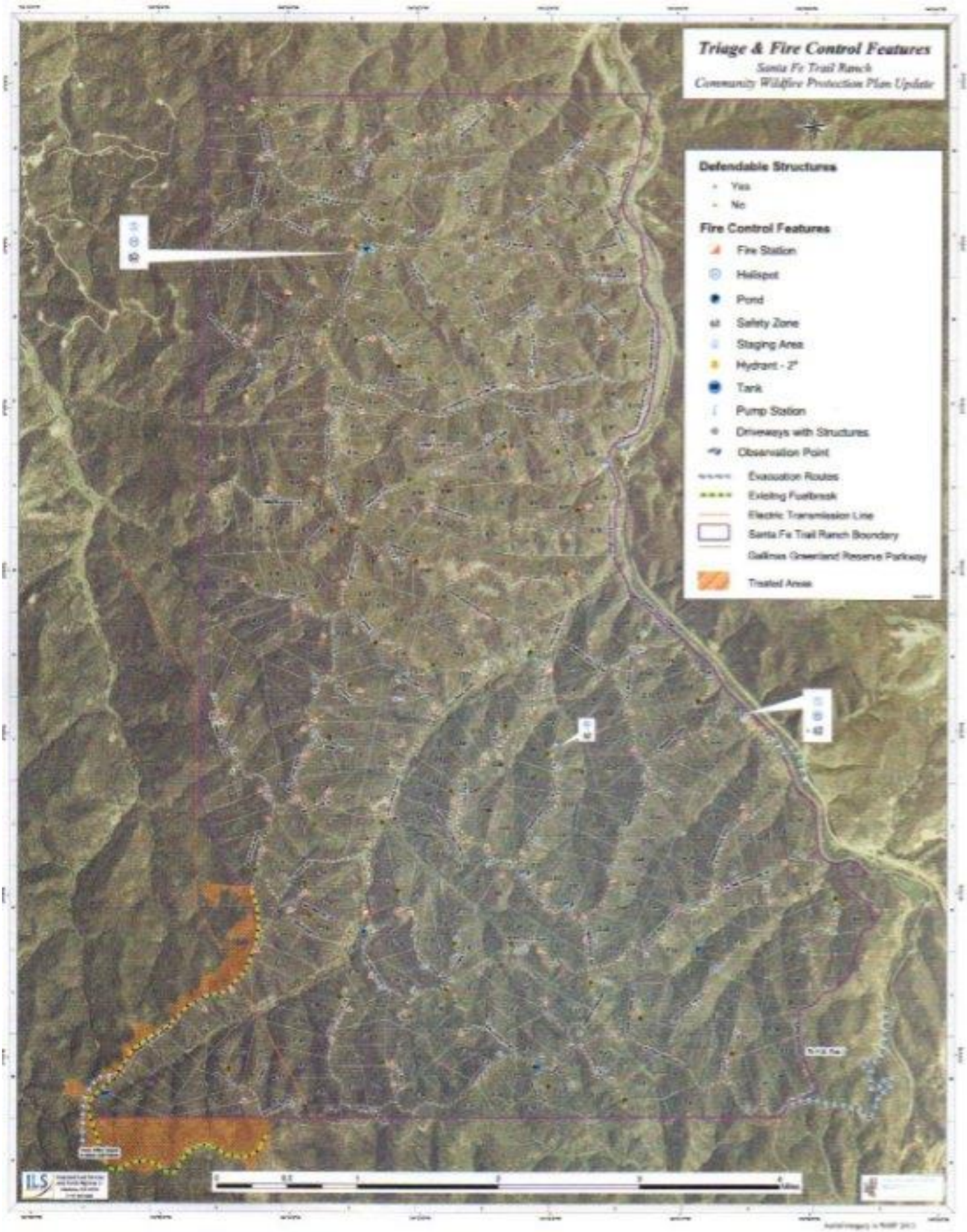
Table 5: Implementation Items Priority & Cost

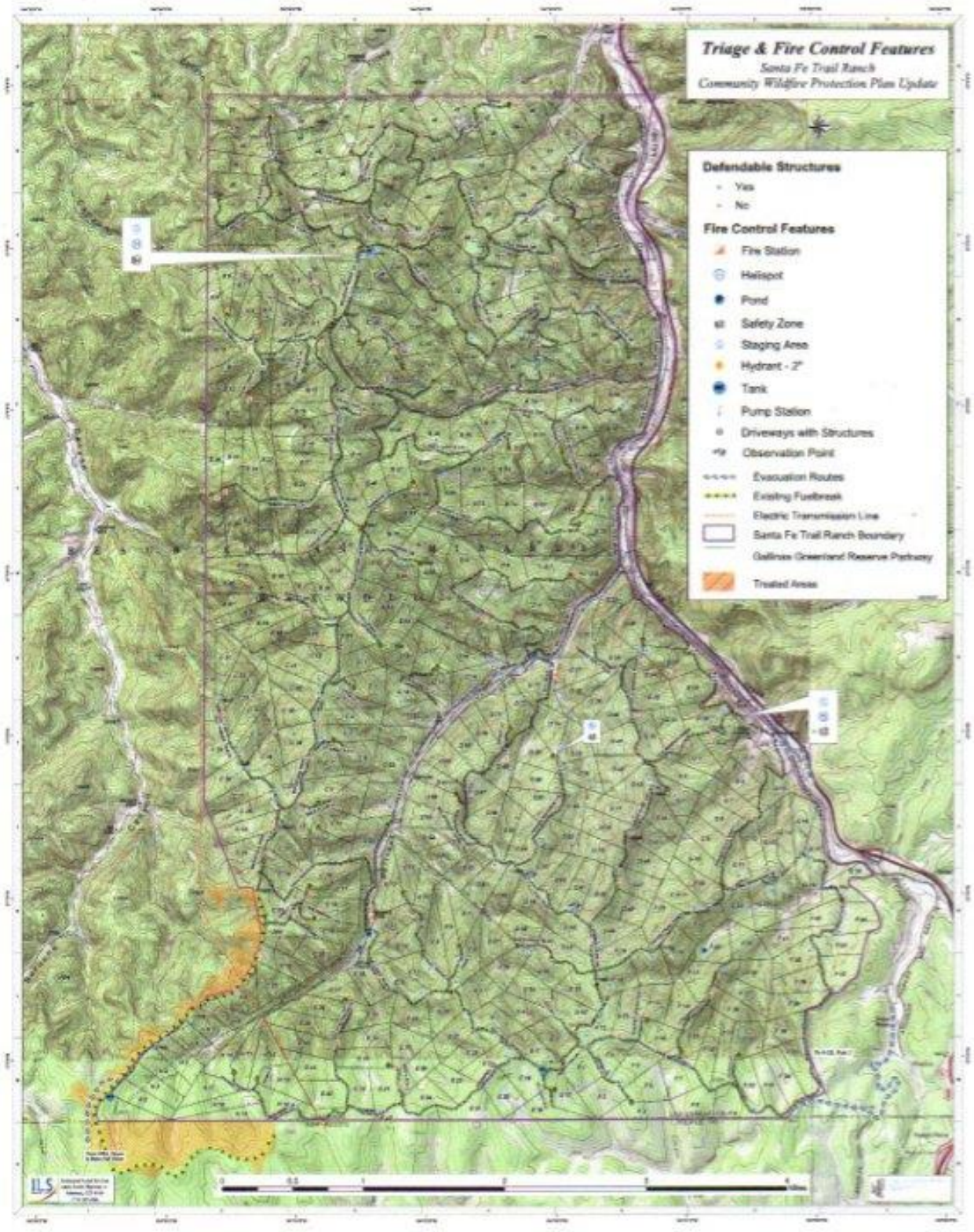
Implementation Item	Priority	estimated Cost ($s)
Updated Laminated triage maps (20 sets)	1	1000
Defensible space around all structures	1	
Prioritize and construct turnarounds on dead end roads	2	40,000
Dredge Ponds	3	30,000
Vista West Fuel Break	4	65,000
Alpine (North-South)	5	50,000
Elk Park – Oak Park	6	70,000
Little Bear	7	40,000
Fishers Peak – Alpine (East -West)	8	60,000
Big Springs Overlook Gallinas	9	22,000
Conservancy – Mountain View (lot H9)	10	3,000
Coyote Track -Conservancy	11	19,000
Timber Park – Old Mission	12	48,000
Total		**$448,000**

Table 6: Action Plan for Completing the Santa Fe Trail Ranch CWPP

Action	Target Date	Assigned to
Laminated triage maps updated and distributed	2/1/2017	Tony Riley
Prioritize and construct turnarounds on dead ends	2021	Road Committee POA
Dredge Ponds	2019	POA
Prioritized Fuel Breaks	2017-2022	FH/WM
Individual Home defensible space	ongoing	Home Owners

FH/WM = Forest Health/Wildfire Mitigation Committee


Triage & Fire Control Features
Santa Fe Trail Ranch
Community Wildfire Protection Plan Update
Defendable Structures
Yes
No
Fire Control Features
Fire Station
Helispot
Pond
Safety Zone
Staging Area
Hydrant - 2"
Tank
Pump Station
Driveways with Structures
Observation Point
Evacuation Routes
Existing Fuelbreak
Electric Transmission Line
Santa Fe Trail Ranch Boundary
Gallinas Greenland Reserve Parkway
Treated Areas


Triage & Fire Control Features
Santa Fe Trail Ranch
Community Wildfire Protection Plan Update
Defendable Structures
Yes
No
Fire Control Features
Fire Station
Helispot
Pond
Safety Zone
Staging Area
Hydrant - 2"
Tank
Pump Station
Driveways with Structures
Observation Point
Evacuation Routes
Existing Fuelbreak
Electric Transmission Line
Santa Fe Trail Ranch Boundary
Gallinas Greenland Reserve Pathway
Treated Areas

Appendix C Structure Survivability Spreadsheet

LATITUDE	LONGITUDE	ID_2015	Survival	Triage Codes (see page 47)	Notes
37.08602	-104.53311	10a	N	A,B	Based on Google Earth
37.08190	-104.53292	13a	N	A,B,I	
37.07756	-104.53097	14a	N	A,B,I	
37.07700	-104.52847	15a	Y		
37.07647	-104.52494	16a	Y		
37.07378	-104.52663	20a	N	A,B,I	
37.07628	-104.53200	22a	N	A,B	
37.06989	-104.53380	23a	N	A,B,J	
37.07622	-104.53465	24a	Y		
37.08177	-104.53653	27a	N	A,B,I	
37.08821	-104.53580	29a	N	A,B	Based on Google Earth
37.09488	-104.52620	2a	N	A,B,I,J	
37.09097	-104.53398	30a	Y		
37.09105	-104.53305	31a	N	A,B,I	
37.09360	-104.52912	32a	Y		
37.09461	-104.52824	33a	N	A,B	
37.09121	-104.54236	35a	Y		
37.09448	-104.54996	36a	N	A,B,I	
37.09517	-104.54391	37a	N	A,B,I	
37.09749	-104.53738	40a	N	A,B	Based on Google Earth
37.09833	-104.53839	40a	N	A,B,I	
37.09640	-104.54500	41a	Y		
37.09566	-104.54669	42a	N	A,B,I	
37.09646	-104.55399	43a	N	A,B,I	
37.09424	-104.55658	44a	N	A,B,I	
37.09363	-104.55886	45a	Y		
37.07824	-104.55789	47a	Y		
37.09127	-104.53053	4a	N	A,B,I	Based on Google Earth
37.09832	-104.57115	51a	N	A,B	Based on Google Earth
37.09744	-104.57269	52a	N	A,B	Based on Google Earth
37.09283	-104.56942	54a	Y		
37.09226	-104.57019	55a	N	A,B,I	
37.09170	-104.55679	61a	N	A,B,I	
37.08385	-104.54337	68a	Y		
37.07395	-104.54369	73a	Y		Garage no
37.07970	-104.56349	76a	N	A,B	
37.08312	-104.55866	78a	N	A,B	

37.07017	-104.53559	80a	Y		
37.07460	-104.53751	81a	Y		
37.07346	-104.57208	B11a	N	J	
37.06778	-104.57217	B13a	N	A,B,I	Thin slope
37.07097	-104.57050	B14a	Y		
37.06671	-104.56178	B18a	N	A,B	2 spruce near deck
37.06434	-104.56132	B19a	Y		
37.05941	-104.56358	B22a	N	A,B	
37.05844	-104.56932	B23a	N	A,B	Based on Google Earth
37.05762	-104.57637	B27a	N	A,B,I	
37.05831	-104.57537	B28a	N	A,B	Junipers close to deck
37.05822	-104.56178	B33a	N	A,B,1	Tree next to deck
37.04869	-104.55970	B35a	N	A,B,I	Needs more thinning on slope
37.04597	-104.56387	B37a	N	A,B,I	
37.04750	-104.56788	B38a	N	A,B,I	
37.07852	-104.56679	B3a	N	A,B,I	
37.04908	-104.57251	B40a	N	A,B,I	Based on Google Earth
37.07357	-104.56287	B41a	N	A,B	Shrubs next to deck
37.06632	-104.55734	B42a	N	A,B,I	
37.06582	-104.56046	B43a	Y		
37.05521	-104.55838	B45a	N	A,B,I	NW side
37.06438	-104.55181	B48a	N	A,B,I	
37.06355	-104.54823	B49a	Y		Based on Google Earth
37.06370	-104.54111	B51a	Y		
37.06233	-104.53818	B52a	N	A,B,I	
37.06417	-104.53481	B53a	Y		
37.06618	-104.53162	B55a	Y		
37.06699	-104.52446	B56a	Y		
37.06550	-104.53058	B59a	Y		
37.05565	-104.53430	B63a	N	A,B	
37.05996	-104.54740	B66a	Y		
37.05655	-104.55471	B69a	N	A,B,I	Thin slope
37.07487	-104.57110	B6a	N	A,B,I	
37.05619	-104.54876	B72a	N	A,B	
37.05353	-104.53098	B77a	N	A,B,I	
37.05664	-104.52834	B79a	N	A,B	Based on Google Earth
37.05097	-104.55285	B81a	Y		
37.05125	-104.55495	B82a	N	A,B,I	Firewood
37.04267	-104.55415	B85a	Y		
37.04390	-104.55820	B86a	N	A,B,I	Based on Google Earth
37.04330	-104.56232	B87a	N	A,B,I	
37.04618	-104.56609	B89a	N	A,B,I	

37.02139	-104.57018	C14a	N	A,B	Big tree to close
37.01699	-104.56477	C16a	N	A,B,I	Thin slope
37.01515	-104.56660	C19a	N	A,B,C,J	
37.01094	-104.57082	C22a	N	A,B	
37.02449	-104.56946	C25a	N	C,I	
37.02681	-104.56961	C26a	Y		
37.02744	-104.57050	C27a	N	A,B	
37.02939	-104.57401	C28a	Y		
37.03757	-104.55763	C2a	N	A,B	
37.03428	-104.57628	C30a	N	A,B,I	
37.03706	-104.57623	C31a	Y		
37.03554	-104.57579	C32a	N	A,B	
37.03451	-104.57555	C33a	Y		
37.03168	-104.57365	C35a	Y		
37.03020	-104.56585	C37a	N	A,B,I	
37.03385	-104.56489	C38a	N	A,B,I	Thin north side of house
37.03762	-104.56352	C40a	Y		Guest house = N (A,B,I)
37.03908	-104.56338	C41a	Y		
37.08297	-104.55604	C45a	Y		Aux bldg. No = A,B,J
37.03460	-104.56335	C4a	N	A,B,I,J	Firewood
37.07268	-104.55374	C50a	N	A,B,I	
37.07378	-104.55591	C55a	N	A,B,I	
37.07147	-104.54098	C57a	Y		Based on Google Earth
37.03308	-104.56311	C5a	Y		
37.03109	-104.56448	C7a	N	A,B	
37.02661	-104.56571	C8a	N	A,B	Based on Google Earth
37.02737	-104.56158	C8a	N	A,B,I	Thin slope
37.04406	-104.54427	D11a	N	B	
37.04525	-104.54234	D12a	N	A, B	
37.04355	-104.53717	D13a	Y		
37.04029	-104.54114	D14a	Y		
37.03599	-104.54807	D15a	N	A, B, C	Slope below
37.03674	-104.55298	D19a	Y		Based on Google Earth
37.03216	-104.55199	D21a	N	A,B	Based on Google Earth
37.02551	-104.55577	D23a	N	B	Conifers against foundat
37.04284	-104.52814	D25	Y		
37.04195	-104.52272	D26a	Y		
37.04340	-104.52127	D27a	Y		
37.04180	-104.52147	D28a	Y		
37.04593	-104.54131	D2a	N	A, B, C	
37.03547	-104.51145	D30-Ea	Y		
37.03449	-104.51326	D30-Wa	Y		
37.03526	-104.52273	D32a	N	A,B	

37.03163	-104.52251	D32a	N	A,B	
37.04054	-104.52170	D34a	N	A, B	
37.03865	-104.52768	D38a	Y		
37.02863	-104.52131	D43a	Y		
37.01814	-104.52517	D47a	N	A,B	
37.01196	-104.52771	D49a	Y		
37.01197	-104.52865	D50a	N	A,B	Between house & road
37.00579	-104.53397	D54a	N	A,B	
37.01094	-104.53471	D55a	N	A,B,J	
37.01109	-104.53641	D56a	Y		
37.01108	-104.53748	D56a	Y		
37.01860	-104.53944	D60a	N	B	
37.01995	-104.54110	D61a	Y		
37.02609	-104.54566	D66a	N	A,B	
37.04973	-104.53040	D6a	N	J,A,B	
37.04022	-104.53390	D73a	Y		Fire Station
37.02969	-104.53225	D76a	Y		
37.01448	-104.52900	D80a	N	A,B	
37.01532	-104.53112	D81a	Y		
37.01746	-104.53400	D82a	N	A,B	
37.01863	-104.53663	D83a	Y		
37.02098	-104.53681	D84a	N	B	
37.03076	-104.53954	D88a	N	A,B	
37.04897	-104.53684	D8a	N	A,B,C,I	
37.02230	-104.53516	D93a	Y		
37.05010	-104.54417	D9a	N	B,C	
37.01516	-104.55264	E13a	N	A,B	Primary
37.01483	-104.55108	E13a	N	A,B,D	Secondary
37.00928	-104.54948	E15a	Y		Auxiliary bldg N A,B
37.00687	-104.55061	E16a	Y		
37.00026	-104.53439	E1a	Y		
37.00035	-104.53976	E22a	Y		
36.99728	-104.55326	E26a	N	B,C	
37.00243	-104.54467	E27a	N	A,B,D	
37.00464	-104.55206	E29a	N	A,B	
36.99926	-104.55367	E30a	N	B,C	
37.00181	-104.56129	E34a	N	A,B	
37.00497	-104.55902	E35a	N	A,B	
37.00828	-104.55631	E36a	N	A,B,C	
37.00689	-104.55966	E37a	N	J,A,B	
37.00364	-104.54121	E3a	Y		
37.00797	-104.54607	E6a	Y		
37.01212	-104.54525	E7a	Y		

37.01015	-104.54576	E8a	Y		Clean up kindling
37.00237	-104.52957	F11a	Y		
37.00239	-104.52519	F12a	Y		
37.00461	-104.52212	F13a	N	J	
37.01199	-104.51890	F16a	N	J,B	Trees on lower side
37.01038	-104.52100	F17a	Y		
37.00759	-104.52640	F18a	Y		
36.99723	-104.53056	F1a	Y		No on Shed = A,B,J
37.01545	-104.51559	F21a	Y		
37.01582	-104.51372	F22a	Y		No on shed = J
37.00905	-104.51184	F26a	Y		
37.00695	-104.51312	F28a	N	A,B,J	
36.99470	-104.50801	F32a	Y		
37.00247	-104.50949	F37a	Y		
37.00695	-104.50003	F39a	Y		
37.01093	-104.50075	F40a	Y		
37.01284	-104.49693	F44a	Y		
37.01482	-104.49681	F45a	Y		
36.99868	-104.52656	F4a	Y		
36.99765	-104.52534	F5a	Y		
37.01869	-104.50986	G11a	Y		
37.01913	-104.50523	G13a	Y		
37.01984	-104.50313	G14a	N	A,B,J	
37.02058	-104.50069	G17a	Y		
37.01913	-104.50178	G19a	N	A,B	
37.02696	-104.51797	G1a	Y		
37.01714	-104.50557	G21a	Y		
37.03218	-104.51646	G3a	N	A,B	
37.03301	-104.51331	G4a	N	A,B	
37.02564	-104.50862	G7a	N	A,B	
37.02475	-104.50841	G8a	N	A,B,C	
36.99537	-104.56642	H14a	Y		No on garage = J
36.99558	-104.57267	H16a	Y		
37.00502	-104.57761	H8a	N	A,B,C	
37.00695	-104.57404	H9a	N	A,B	
37.08841	-104.52429	J2a	Y		
37.06046	-104.52799	J3a	N	A,B	Based on Google Earth
37.03912	-104.51283	J4a	Y		

Appendix D: Defensible Space Maintenance & Gambel Oak

In general, residents in the Santa Fe Trails Ranch have made significant efforts to reduce fuels around their structures. They have and are continuing to thin trees, removing the lower limbs (ladder fuels) and attempting to clear the Gamble oak. The heavy woody material has been cut and stacked for firewood and the lighter material has been chipped and spread on the ground. While their efforts in reducing fuels provided by pinyon, juniper and ponderosa pine have produced a more defendable space around their homes, clearings in the Gambel oak are more troublesome. Residents we talked to complained about the aggressive sprouting that occurs after clearing the oak and the continual clearing process that is necessary to hold the oak brush in check.

Gambel oak is a native plant that is naturally associated with pinyon-juniper and ponderosa pine forests in southern Colorado. It is a deciduous shrub that is quite adaptable and easily finds a niche in the under story of these forest types as well as in relatively pure stands. It thrives on steep slopes as well as more moderate sites and on a variety of coarse and medium textured soils. Gamble oak grows in clumps that are interconnected by an extensive root system that is characterized by both shallow rhizomes and deep-feeding roots. These rhizomes send up numerous sprouts when the mature stems are removed or when injury occurs.

Eradication of Gambel oak is rare by any method and without complete kill prolific sprouting may occur from roots, rhizomes and basal stems. Treated areas usually assume a □thicket□ like appearance several years after the initial work (1). Numerous chemicals and combinations of chemicals have been used with limited success to control Gambel oak. Mechanical treatment, such as cutting stems and burning, are common methods of removing oak brush but it usually results in aggressive sprouting. Biological control of sprouts with repeated browsing by goats has proven to be an effective means of near elimination of oak sprouts, however, browsing by goats is not considered to be practical in all situations. Goats prefer Gambel oak leaves for forage and after several years of repeatedly defoliating the oak during the period before the oak leaves reach full growth most of the sprouts are killed (1).

On the Santa Fe Trail Ranch where Gambel oak has been cut and sprouting is occurring, the most likely treatment is one that repeatedly defoliates the oak during mid-summer. The positive effect of this repeated defoliation has been demonstrated using herbicides (1),

prescribed burning (2), and browsing by goats (1). Defoliation may be accomplished by:

- **mowing or chopping sprouts during mid-summer**
- **using goats to browse the leaves and young shoots during mid summer**
- **using an approved herbicide following instructions on the label kill or defoliate the sprouts during mid-summer which coincides with the time when leaf growth is reaching maximum. Some herbicides are restricted and require an Applicator□s License to use. It is suggested that the Las Animas County Weed Specialist be contacted for local advice and guidance prior to using a herbicide (719-846-4468).**

New Mexico State University Cooperative Extension Service Circular 597 contains a list of herbicides for controlling Gambel oak and other undesirable brush species (3). Table 1 contains an excerpt from Circular 597.

Table 1. Herbicides for controlling Gambel oak (5)

Trade name and product rate/acre	Herbicide common name and active ingredients	Spray volume per acre or individual plant	Time of application	Remarks
Spike 20P ¼ oz per 22 sq ft when treating clump or thicket. p	Tebuthiuron	Individual plant treatment. Anytime of year	Optimum is prior to rainy season	Distribute uniformly under canopy. Do not apply to frozen or snow covered ground
OR Spike 20P 3 ¾ to 7 ½ lbs. pellets	OR Tebuthiuron ¾ to 1 ½ lb.	Aerial broadcast	Anytime during the year. Optimum is prior to rainy season.	Distribute uniformly under canopy. Do not apply to frozen or snow covered ground
OR Velpar L 2-4 ml per 33 sq ft of canopy diameter	OR Hexazinone	Individual plant treatment. Anytime during year	Optimum is prior to growing season	Apply undiluted Velpar L to soil within 3 ft of stem base. Use exact delivery handgun applicator. Do not apply to frozen ground. Do not use on clay soil.
OR Arsenal 1 gal per 100 gal water	OR Imazapyr 2 lb per 100 gal water with 0.25% surfactant	Individual plant treatment or ground application	Anytime during growing season when growing conditions are good.	Spray to wet.

Bibliography

(1) Engle, D.M., C.D. Bonham, and L.E. Bartel. 1983. Ecological characteristics and control of Gambel oak. J. Range Manage 36(3)

(2) Harrington, M.E. 1989. Gambel oak root carbohydrates in roots of Gambel oak sprouts following herbicide treatment. J. Range Manage 42(6)

(3) Duncan, K.W., K.C. McDaniel and M.J. Renz. 2005. Chemical weed and brush control for New Mexico rangelands. New Mexico State University Cooperative Extension Service Circular 597. 18p

APPENDIX E - Fuel Hazard Reduction Guidelines

MINIMUM TREE SPACING - RULE OF THUMB

Strive to reduce crown density to 40% or less.

<u>Ponderosa Pine/Douglas Fir:</u> Convert stem diameter from inches to feet and add 7 more feet.

Example: A Ponderosa Pine 8" in diameter at DBH will have a spacing of 8 feet plus 7 feet for a total of 15 feet to the next tree.

Tree spacing does not necessarily need to be even. In fact, the fuel treatment area will look more natural if the spacing varies and small clearings are intermingled with small groups of trees. The important focus should be on breaking up fuel continuity - both horizontally and vertically.

If trees are very tall in relationship to their diameters, implement the thinning work over a long enough time to allow the standing trees to develop their wind firmness and resistance to snow bend. Thinning when trees are small helps reduce prevent these vulnerabilities. Thinning in patches and designing the thinning to minimize wind effect can be done depending on location. All of these can be used but can best be accomplished with the assistance of an experienced forester.

An important part of fuel hazard reduction is removal of the ladder fuels; particularly when adequate thinning cannot be accomplished. Therefore, the following is important to do within a timber canopy.

- **Prune trees to 6 or 10 feet above the ground, depending on slope, leaving at least 1/3 live tree crown**
- **Remove tree reproduction from under the canopies of remaining trees**
- **Remove sagebrush, oak or any other flammable brush from under the canopies of remaining trees. Reduce the size and height of remaining clumps of brush**
- **Remove all dead forest debris within defensible space and Fuel break areas.**
- **Reduce concentrations of dead forest debris within other areas**
- **Remove trees recently killed by mountain pine beetle* or other**

disturbances within defensible space and fuel break areas.

- **Reduce numbers of trees recently killed by mountain pine beetle* or other disturbances in other areas. Only 1 to 3 dead trees per acre are needed for wildlife habitat purposes.**

Note: Proper slash disposal procedures should be implemented to avoid attracting Mountain Pine or other bark beetles to the project area

Appendix F Driveway Coordinates

ID_2015	LATITUDE	LONGITUDE
10b	37.08730	-104.53538
13b	37.08244	-104.53326
14b	37.07724	-104.53098
15b	37.07646	-104.52909
16b	37.07603	-104.52674
20b	37.07589	-104.52708
22b	37.07661	-104.53222
23b	37.06974	-104.53484
24b	37.07553	-104.53574
27b	37.08252	-104.53573
29b	37.08850	-104.53394
2b	37.09551	-104.52656
30b	37.09175	-104.53135
31b	37.09182	-104.53127
31b	37.09193	-104.53104
32b	37.09319	-104.52923
33b	37.09410	-104.52834
35b	37.09048	-104.54474
36b	37.09468	-104.55032
37b	37.09534	-104.54413
40b	37.09777	-104.53778
40b	37.09793	-104.53840
41b	37.09598	-104.54333
42b	37.09444	-104.54738
43b	37.09613	-104.55387
44b	37.09368	-104.55677
45b	37.09306	-104.55894
47b	37.07833	-104.55884
4b	37.09176	-104.53068
51b	37.09673	-104.56932
52b	37.09675	-104.56962
54b	37.09281	-104.56899
55b	37.09237	-104.56924
61b	37.09108	-104.55757
68b	37.08394	-104.54189
73b	37.07455	-104.54441
76b	37.07814	-104.56291
78b	37.08287	-104.55843
80b	37.06997	-104.53670
80b	37.07069	-104.53547
81b	37.07404	-104.53962

B11b	37.07341	-104.57189
B13b	37.06778	-104.57217
B14b	37.07097	-104.57050
B18b	37.06616	-104.56104
B19b	37.06511	-104.56092
B22b	37.05915	-104.56303
B23b	37.05772	-104.56853
B27b	37.05777	-104.57709
B28b	37.05808	-104.57623
B33b	37.05767	-104.56123
B35b	37.04819	-104.55961
B37b	37.04628	-104.56427
B38b	37.04732	-104.56829
B3b	37.07838	-104.56666
B40b	37.04834	-104.57119
B41b	37.07430	-104.56233
B42b	37.06614	-104.55795
B43b	37.06643	-104.56069
B45b	37.05524	-104.55905
B48b	37.06414	-104.55154
B49b	37.06263	-104.54864
B51b	37.06318	-104.54148
B52b	37.06246	-104.53878
B53b	37.06300	-104.53288
B55b	37.06611	-104.53094
B56b	37.06681	-104.52434
B59b	37.06545	-104.53200
B63b	37.05466	-104.53463
B66b	37.05971	-104.54804
B69b	37.05714	-104.55497
B6b	37.07432	-104.57149
B72b	37.05633	-104.54849
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C22b	37.01119	-104.57104
C25b	37.02364	-104.56923

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C27b	37.02753	-104.56936
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C2b	37.03822	-104.55904
C30b	37.03466	-104.57612
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C32b	37.03541	-104.57599
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C40b	37.03709	-104.56338
C41b	37.03886	-104.56235
C45b	37.08286	-104.55614
C4b	37.03435	-104.56371
C50b	37.07257	-104.55384
C55b	37.07372	-104.55668
C57b	37.07182	-104.54147
C5b	37.03245	-104.56370
C7b	37.03080	-104.56471
C8b	37.02629	-104.56628
C8b	37.02707	-104.56187
D11b	37.04572	-104.54302
D12b	37.04537	-104.54214
D13b	37.04387	-104.53771
D14b	37.03901	-104.54135
D15b	37.03616	-104.54817
D19b	37.03848	-104.55257
D21b	37.03095	-104.55136
D23b	37.02618	-104.55374
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D30-Wb	37.03353	-104.51368
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D34b	37.04117	-104.52225
D38b	37.04005	-104.52510
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D49b	37.01210	-104.52856

D50b	37.01197	-104.01197
D54b	37.00534	-104.53419
D55b	37.00998	-104.53377
D56b	37.01135	-104.53730
D60b	37.01971	-104.53843
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D66b	37.02578	-104.54575
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G4b	37.03327	-104.51363
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APPENDIX G – Definition of Terms

Community Wildfire Protection Plan- (CWPP) The Healthy Forest Restoration Act of 2003 establishes CWPPs as the means for communities in the wildland-urban interface to address their wildfire hazard concerns and decide how they wish to deal with them. CWPPs provide a common footing for setting priorities for the expenditure of local, state and federal funding. They are developed in a collaborative environment with all interested parties involved.

Crown Closure- An expression of how dense a forest is based on the amount of surface area covered by the crowns of trees. It is useful in many forest applications including wildfire hazard assessments. Research has shown the crown closure of forty percent or less are unlikely to support independent crown fires.

Defendability- A judgment of the likelihood that firefighters can safely protect a structure during the passing of an intense wildfire front. It is based on structure construction, expected fire behavior in the structure vicinity, open space for firefighters to operate in, escape routes, and availability of space to turn fire engines around.

Defensible Space- Area around a structure where fuels and vegetation are treated, cleared or reduced to slow the spread of wildfire towards the structure. It also reduces the chance of a structure fire moving from the building to surrounding forest. Defensible space provides room for firefighters to do their jobs.

Flame Length- The distance from the ground to the tip of a flame is an indication of fire intensity. Fires with flame lengths less than four feet are normally thought to be controllable with hand crews. Fires with flame lengths more than four feet are usually much more difficult to control and require heavy equipment to make much progress in suppression.

Fuel break- A linear zone of modified fuel conditions designed to reduce wildfire intensity that provides a safe place for firefighters to make a stand. They are most likely to be located on ridgelines. This zone has had the ground fuels cleaned up and the crown cover reduced to around forty percent.

Fuel Ladder- Is the fuel that creates a continuous path from the ground in to the crowns of trees o large shrubs. The more abundant fuel ladders are the more prone a forest is to crown fire. When the limbs of the over story trees and the understory vegetation intermix, there is a continuous fuel ladder.

Fuel Model- A means of describing various woody fuel arrangements in terms of fuel size, bulk density, fuel bed depth and tons per acre. The models are used in fire behavior prediction software**.**

Fuel Moisture- The amount of water in fuel per oven dry weight usually expressed in percent.

Fuel Treatment - Project to reduce or change fuel loading or type on a site. Can be accomplished by mechanical, manual, chemical, or fire use.

Initial Attack - An aggressive suppression action consistent with firefighter and public safety and values to be protected.

Insurance Services Office (ISO) Rating - An overall fire services rating developed for use in determining insurance premiums for residential and commercial property. Factors such as fire alarm systems, equipment, training, availability of water (hydrants), etc. are used to develop the rating. The rating is on a scale of class 1 to class 10, with 1 providing the best public protection and 10 providing the lowest public protection. See www.iso.com for more details.

Mitigation Actions - Those on-the-ground activities that will serve to increase the defensibility of an area; check, direct, or delay the spread of fire, and minimize threats to life, property, and resources. Mitigation actions may include mechanical and physical non-fire tasks, specific fire applications, and limited suppression actions. These actions will be used to construct fire lines, reduce excessive fuel concentrations, reduce vertical fuel, and create black lines.

Preparedness - Activities that lead to a safe, efficient, and cost-effective fire management program in support of land and owners' management objectives through appropriate planning and coordination.

Rate of Spread (ROS)- The forward rate that a fire will progress across a landscape usually expressed in chains (66ft) per hour. ROS has been converted to miles per hour in this report to be more meaningful to the intended audience.

Resistance to Control (ROS)- A means of describing how difficult it is to build and hold fire line in a particular area. It is a relatively subjective term based on fire line production rates, slope and fuel density. Usually described as high, moderate, or low.

Spotting- One method by which wildfires spread by means of airborne embers landing in receptive fuel beds. Spot fires can travel unusual distances and often compromise fire lines during periods of high fire danger.

Triage- A process of quickly setting priorities for action in emergency situations. It is particularly valuable when multiple structures are threatened and firefighting resources are limited.

TSI – Stands for “Timber Stand Improvement” thinning to stimulate growth and improve residual tree health

Wildfire - An unwanted wildland fire.

Appendix H – Structure Triage

Triage is the determination of priorities for action during an emergency. This describes a concise decision making process that will be used if/when a wildfire threatens multiple structures simultaneously. It will be done rapidly and on the move. *This is a thought process that does not require completion of any paperwork.*

Structure:
Roof Type? **Siding?**
Debris on Roof? **Fire Brand Traps?**
Propane Tank? **Flammable Clutter?**

Defensible Space:
Is There Any? **Adjacent Fuel Type?**
Water Supply? **Access/Turnaround?**

Current & Expected Fire Behavior?

Available Firefighting Resources?

Firefighter Safety:
Escape Routes? ***Safety Zones?***

Quickly determine the status of each threatened structure and make decisions!

Clearly communicate the priorities and firefighter evacuation criteria!

Be ready to live with your decisions, they will be second guessed after the threat is over.

Your first priority is to live to fight fire another day!!

Appendix I: References

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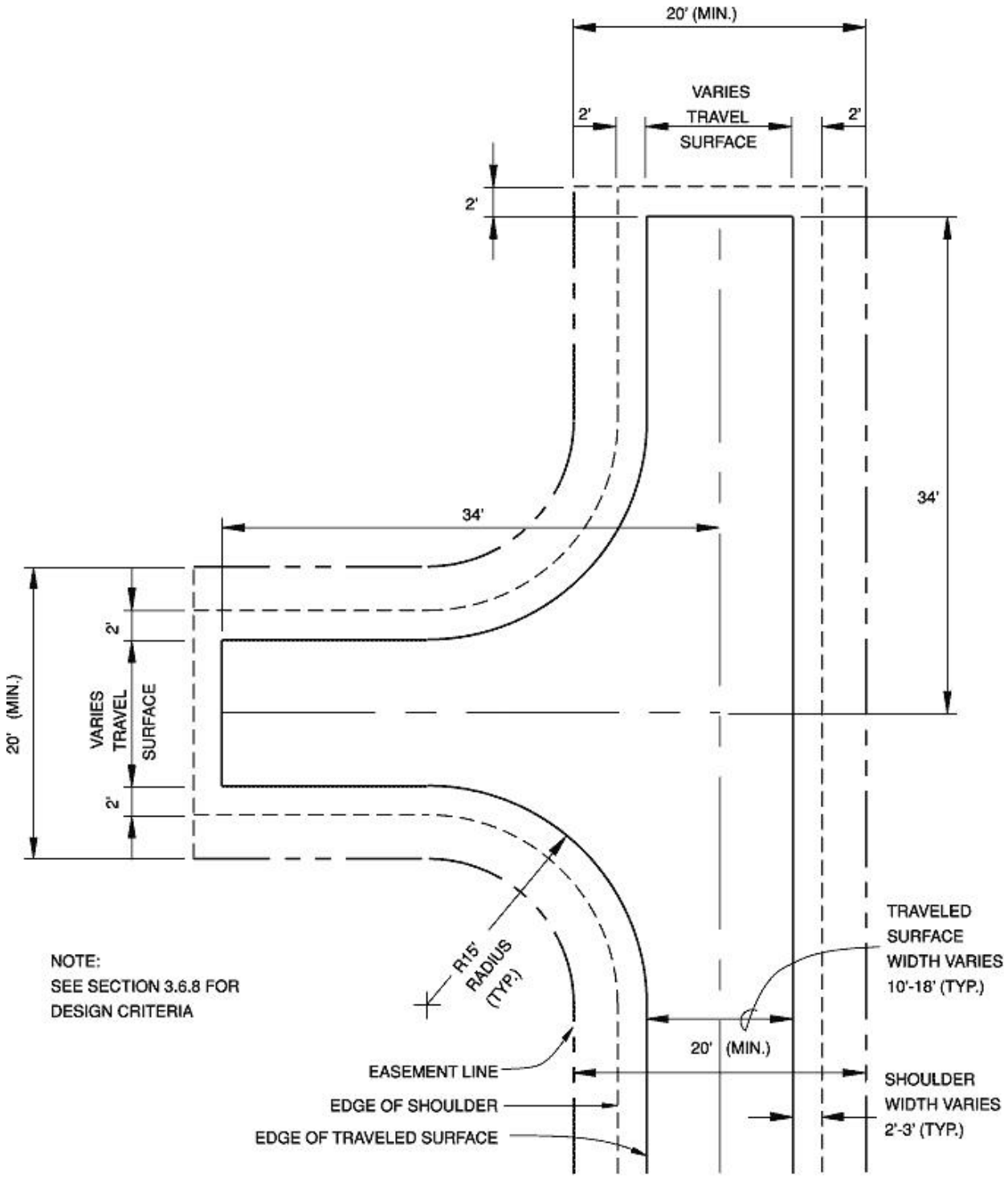
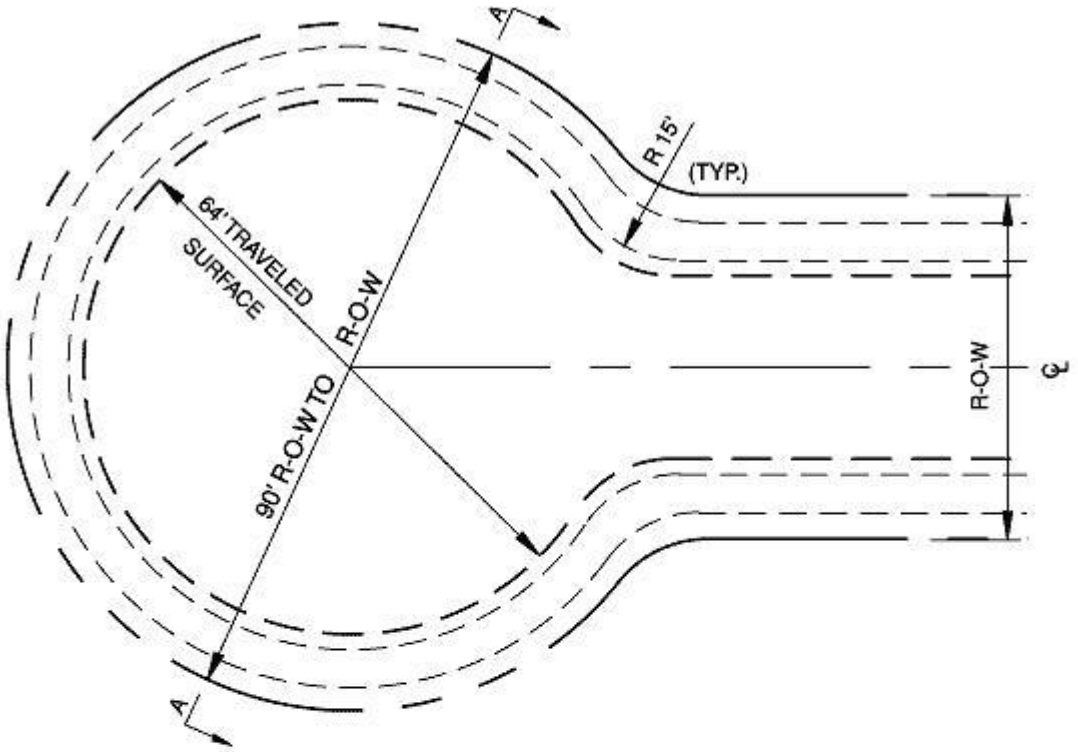
Helms, John. 1998. The Dictionary of Forestry. Society of American Foresters. International Urban-Wildland Interface Code. 2003. International Code Council, INC.

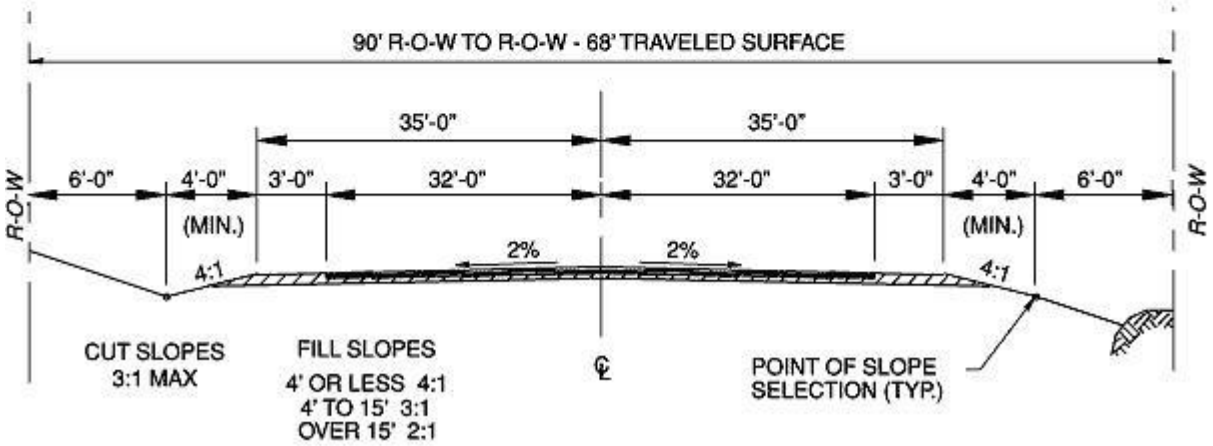
Appendix J: Sample Specifications for Turnarounds:

Hammer Head Turnaround:



Local Cul-de-Sac:





SECTION A - A

Appendix K - Fire Control Features Maps
&
Structure Triage

Fire Control Features and Structure Triage mapping for Santa Fe Trail Ranch.

Fire Control Features will include:

- ✓ **Aviation Hazards**
- ✓ **Helistops/ports**
- ✓ **Water sources/hydrants/cisterns**
- ✓ **Safety zones**
- ✓ **Staging areas**
- ✓ **Good overlook points**
- ✓ **Existing firebreaks**
- ✓ **"No Outlet" roads**
- ✓ **Notable hazardous materials concentrations**
- ✓ **Problematic bridges**
- ✓ **Roads with names**
- ✓ **Structure pod triage**
- ✓ **Neighborhood triage**
- ✓ **Other features that come to mind on a site visit.**

Maps will have a grid system along the sides to facilitate concise communications. They will be printed on plasticized paper and bound in some sort of tough binder. PDF copies of all maps will also be made for future incident use.

Mapping Process:

SLV GIS/GPS Authority will develop field work maps for the area. The maps will show the WUI boundary, roads, & improved lots.

Lat & Lon will be recorded for each structure pod. Each pod will be rated as either probable or unlikely survival.

All structure pods and their driveway intersections, will have their lat/long recorded and a number assigned to facilitate mapping later.

The North American Datum 83 will be used. Latitude and Longitude will be in decimal degrees, i.e. 106.3759.

Fire Control Features Abbreviations**:**

Feature	Abbreviation	Feature	Abbreviation
Aviation Hazard	**AH**	**Safety Zone**	**SZ**
Existing Fire Break	**FB**	**Staging Area**	**SA**
Hazardous Materials	**HM**	**Structure Triage (defendable)**	**T**
Heli-spot	**HS**	**Structure Triage (non-defendable)**	**TN**
Heliport	**HP**	**Water (cistern)**	**WC**
Overlook	**O**	**Water (hydrant)**	**WH**
"No Outlet" road	**NO**	**Water (pond)**	**WP**
Problem Bridge	**PB**	**Water (river/creek)**	**WR**

Notes can be kept on the field maps as long as they are clear.

A discussion of survivable space is included for the sake of clarity.

Structure Triage

Triage in the community wildfire protection plan context is the determination of priorities for action during a wildfire. The process historically has rated the likelihood that wildfire personnel can safely and successfully defend a structure while it is being threatened by a wildfire.

There is one serious flaw in this approach; it assumes that there will be adequate resources available to take some form of meaningful fire suppression action to defend the structure. When more than one structure is imperiled by a wildfire in a rural setting it is highly unlikely a local volunteer fire department will have sufficient apparatus and personnel to "protect" multiple structures simultaneously. Mutual aid in rural Colorado may take several hours to get to the fire ground.

Assigning a defensible rating to a structure can also lull homeowners into complacency if they think the local fire department will make Herculean efforts to save their home. In most instances the structure will have to survive on its own.

To avoid creating any false impressions about the ability of wildfire suppression personnel to protect every structure regardless the magnitude of the incident, a structure's chance of surviving a wildfire is rated as probable or not probable. This approach is much more realistic and should encourage property owners to look at their homes in a new light.

Many factors are considered when assigning a survivability rating to a structure. The triage process is highly subjective. Wildfire behavior and structure interactions are not well suited to a clear cut "yes" or "no" analysis. The table below describes criteria used to determine structure survivability. The factors have been extracted from the Wildfire Hazard & Risk

Assessment score sheet found in "Living on the Edge" (Troy & Kennedy 2007) and is based on NFPA 1144 standards.

It is important to understand that there are no guarantees a structure with a "probable" survival rating will be standing after an intense wildfire occurs. Similarly, occasionally structures with an "unlikely" survival assessment may endure a wildfire in spite of all rational analysis.

The survival rating is simply a reliable indicator of a probable outcome following a very dynamic, chaotic, unpredictable event. The rating has been assigned by an individual with over forty years of wildland fire experience considering the criteria below to make the prediction.

Survivability Criteria

PROBABLE	UNLIKELY	CODE
Vegetation light ~ Anderson fuel models 1 & 2	**Vegetation medium to heavy &/or slash. Anderson fuel models 8, 9, 10, 11,**	A
Survivable space >70 feet	**Survivable space <71 feet**	B
Slope <20%	**Slope >21%**	C
Topographic features minimize fire behavior	**Topographic features adversely affect fire behavior**	D
Area not exposed to unusually severe fire weather or strong dry winds	**Areas exposed to unusually severe fire weather or strong dry winds**	E
Separated from adjacent structures that can contribute to fire spread	**In close proximity to structures that can contribute to fire spread**	F
Class A & B roofing	**Class C or non-rated roofing**	G
Non-combustible/fire resistive siding, eaves & deck or combustible deck with no debris underneath	**Combustible siding and deck**	H
Building set back from slope appropriate distance	**Building close to or overhanging slope**	I
No fire wood and other combustible human plunder in close proximity to structure	**Fire wood and other combustible human plunder on deck or within close proximity to structure**	J
Hazardous materials appropriate distance away	**Hazardous materials close to structure**	K

Criteria shaded in light yellow automatically drop survivability to Unlikely. Non-shaded criteria often influence survivability and cumulatively may predispose a structure to Unlikely survivability status.

NOTE: You will find that access, escape routes, turnarounds, safety zones and water supply are not factored into the survivability rating. These items are important for firefighter safety but do

not influence structure survivability. Remember fire control personnel will most likely not be defending the structure; it will have to go it alone. Safety concerns and limited availability of firefighting resources preclude active intervention to protect structures.

Appendix L – Fire Adapted Communities

Communities in wildfire prone areas are learning what it takes to be fully prepared for wild land fire. A fire adapted community incorporates people, buildings, businesses, infrastructure, cultural resources, and natural areas into the effort to prepare for the effects of wild land fire. Community leaders and residents accept responsibility for living in an area with wildfire hazards. They have the knowledge and skills and have adopted tools and behaviors to prepare in advance for their community's resilience in a wildfire prone environment.

A Fire Adapted Community…… *(Source: Guide to Fire Adapted Communities)*

- ✓ Acknowledges and understands its wildfire risk
- ✓ Recognizes that it is in or near a fire prone ecosystem
- ✓ Has leaders and citizens with knowledge, skills, willingness and realistic expectations to properly prepare for and deal with wildland fire
- ✓ Communicates clearly with citizens about wildfire risks and specific methods for preparedness
- ✓ Has adequate local fire suppression training, equipment, and capacity to meet realistic community protections needs
- ✓ Creates and uses a Community Wildfire Protection Plan (CWPP)
- ✓ Reduces levels of flammable vegetation on lands near and inside the community
- ✓ Has local building, planning, zoning and fire prevention policies and codes that require ignition resistant buildings, building materials, and landscapes
- ✓ Has buildings and landscapes that are designed, constructed, retrofitted, and maintained in a manner that is resistant to ignition
- ✓ Creates safety features such as buffers between fuels and neighborhoods, designated evacuation routes, and internal neighborhood safety zones
- ✓ Makes sure fire adapted community features, activities, and behaviors are maintained over time
- ✓ Has leaders and residents who coordinate, plan and collaborate to leverage their resources to reduce wildfire risk while increasing community resiliency


Codes & ordinances
Defensible space and resilient structures -- Firewise principles
Public and responder awareness and preparedness -- Ready, Set, Go!
Safe evacuation routes or internal safety zones
Fuels management near communities -- fuels buffer
Local partnerships - - agreements
Prevention education
CWPP
Fire Adapted Communities
Local capacity

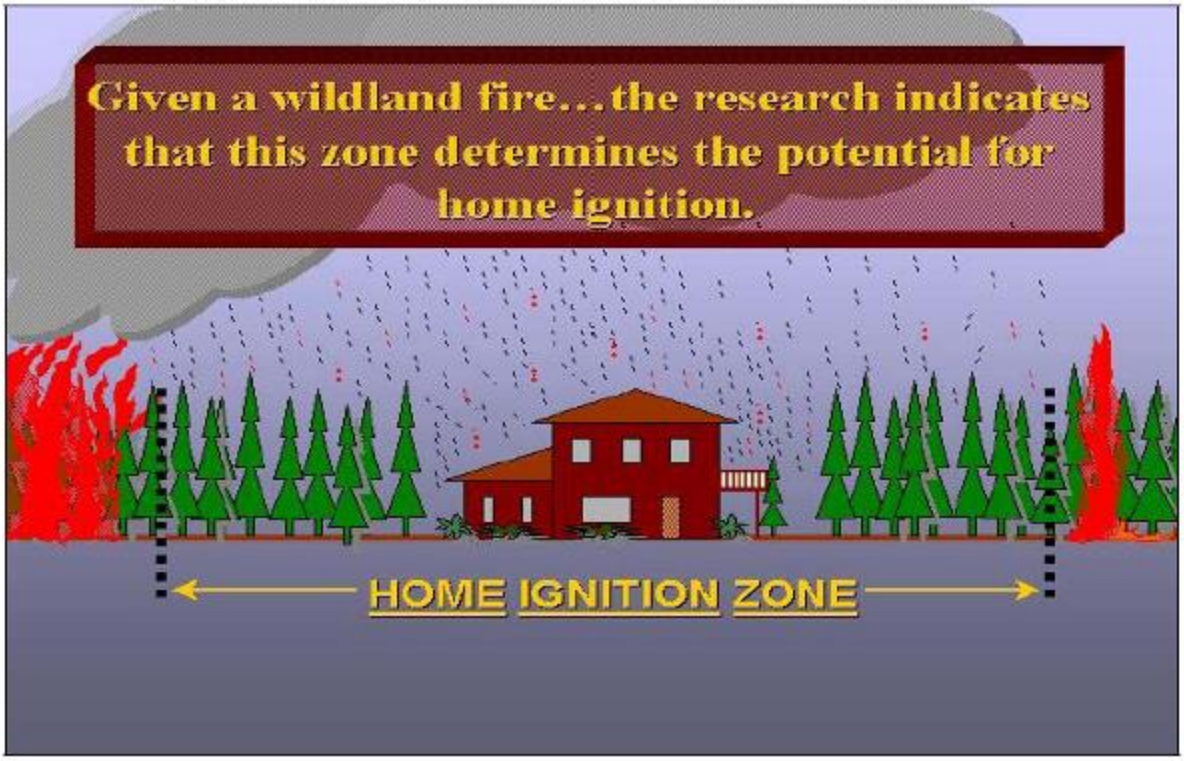
Appendix M - Home Ignition Zone

Although wildfire can threaten a building in three different ways (burning embers, direct flame contact, and radiant heat), ember exposure is the most significant cause of ignition. For example, windblown embers (firebrands) can directly ignite easily ignited materials such as a wood shake roof, lawn chairs, wood piles, mulch, pine needles, or debris that has accumulated in gutters, roof valleys, or around dormers. Other combustible building components, such as siding or a deck, would be vulnerable to the flames or radiant heat from these more easily ignited materials. Gable ends and open eave vents are also vulnerable to the entry of embers, which can then ignite combustible items in attic spaces. Because embers can travel a long distance when carried up by convection currents, a wildfire is still a threat even if it is miles away (IBHS 2011).

Research confirms that certain key characteristics determine which buildings burn and which buildings survive. Keeping property free of debris and maintaining fire resistant landscaping reduces the likelihood of building ignition.

Everyday preparedness actions are important, such as creating a fuel free (mulch free) zone within five feet of the building's foundation, moving firewood piles and propane tanks away from buildings, keeping roofs clean, keeping combustible landscape plants away from buildings, and disposing of landscape trimmings (IBHS 2011). These preparatory actions must be regularly performed *before* a wildfire occurs to improve the survivability of people and property.

Home Ignition Zone



A home with its immediate surroundings (about 100-150 feet from the structure) is the home ignition zone.

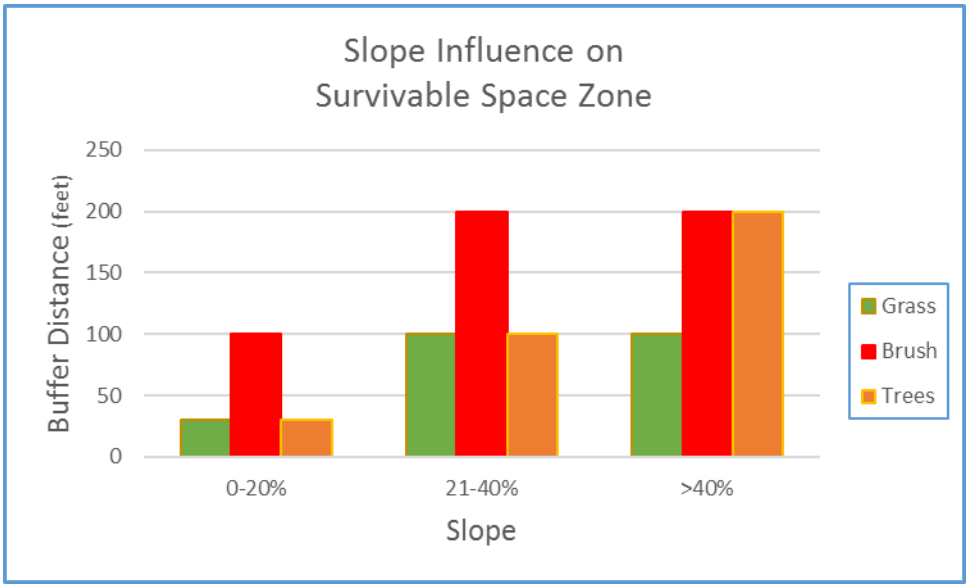
Recent research into the cause for loss of homes during wildfires indicates that home ignitability, rather than wildland fuels, is the principal cause of home losses during wildland/urban interface fires. Key items are flammable roofing materials (e.g. cedar shingles) and the presence of burnable vegetation (e.g. ornamental trees, shrubs, wood piles, and pine needle accumulation) immediately adjacent to homes (Cohen, 1999).

The home ignition zone includes a home and its immediate surroundings within 100 to 150 feet of the structure. Fuel conditions within this zone, to a large degree, will determine whether a home will survive a wildfire. High intensity fire behavior beyond the home ignition zone does not transfer enough energy directly from its flames to ignite a wooden structure. The fuels surrounding a home within the home ignition zone principally determine the potential for directly igniting the home. Firebrands lofted from extreme wildfires must directly ignite on a structure to be an effective ignition source. If firebrand ignitions occur in the fuels surrounding a home, then those fuels determine the home's ignition potential. Thus, regardless from how far firebrands travel a home's

exterior materials and design and fuels in the home ignition zone determine its ignition potential from firebrands.

The primary and ultimate responsibility for home wildfire protection lies with private homeowners, not public land management agencies (or taxpayers). It is critical that special attention be given to reducing fuels in the home ignition zone around structures to improve their chances of surviving a wildfire. This includes insuring that there are no combustible materials like concentrations of pine needles, dry grass, hay or straw, firewood, deck furniture, household trash, flammable materials such as gasoline, diesel or paint thinners, paper boxes, and fabrics near the structure or in the home ignition zone for firebrands to land on. In the past few years research has found that a significant number of homes destroyed in wildfires burned as the result of the presence of combustible materials within the home ignition zone. Some homes ignited as much as 8 hours after the fire front passed. Reducing places for embers to penetrate the home such as open windows and vents also improves structure survivability.

Chart 3: Slope Impact on Survivable Space



This chart indicates how far thinning needs to be done above and below a structure based on the slope it is on or adjacent to. It is also a good source to determine how far back from a slope to set a new structure.

Appendix N - State Tax Incentives for Wildfire Hazard Mitigation:

On April 4, 2013, the Governor signed House Bill 13-1012 that extend the deduction until January 1, 2025 to encourage more residents of the Wildland Urban Interface to mitigate wildfire hazards around their homes. House Bill 13-1012 extended tax incentives that allow landowners to deduct the actual costs of their wildfire mitigation, up to $2,500 from their taxable income. The program allows each landowner to get credit for fifty percent of the cost of wildfire mitigation up to a total of $2,500 per year. To get the full credit the total mitigation costs must be $5,000 or greater. The work must be done in accord with an existing Community Wildfire Protection Plan to qualify.

This is a good incentive for individual landowners to improve survivable space around their structures.