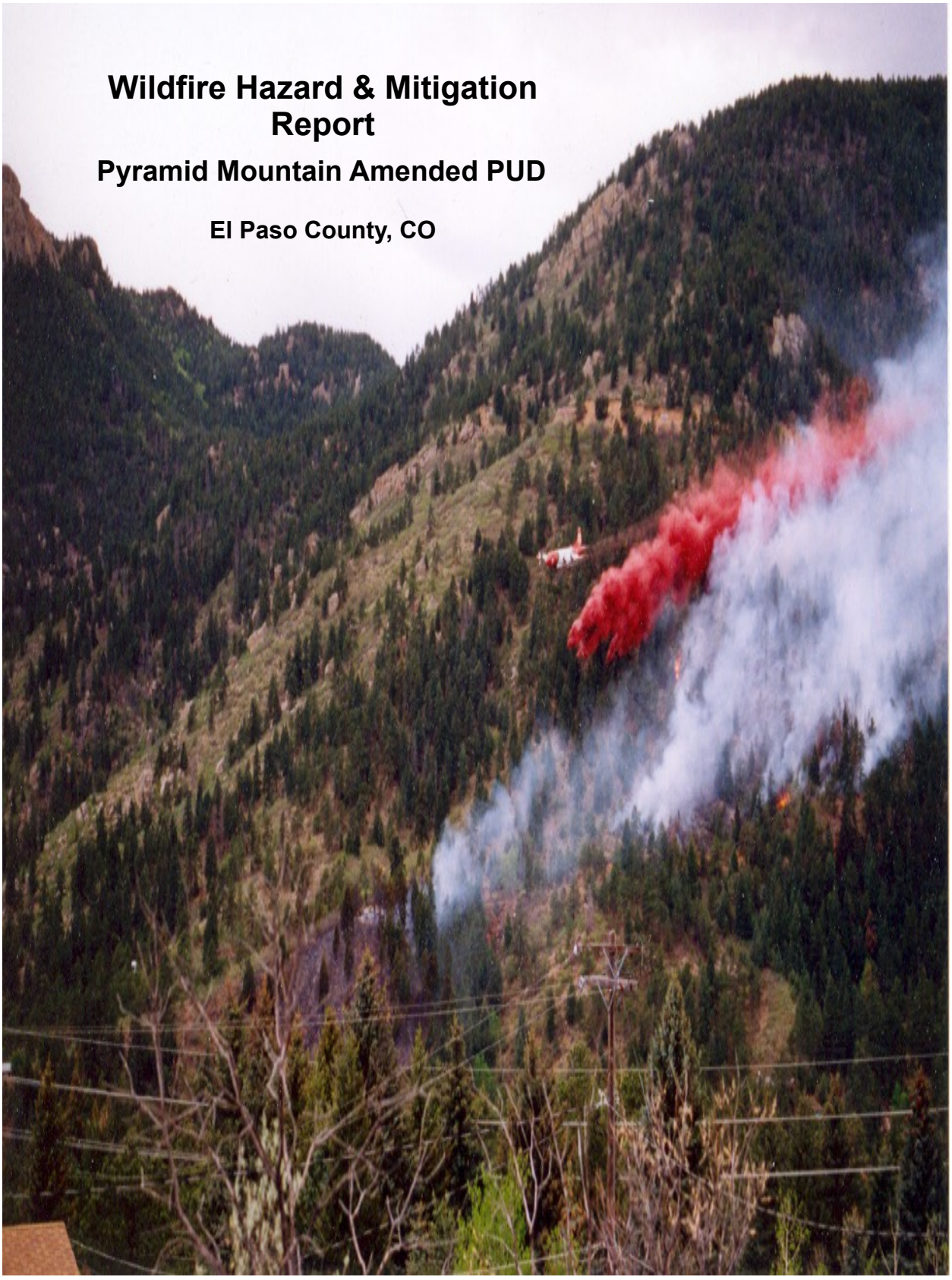
Wildfire Hazard & Mitigation Report

Pyramid Mountain Amended PUD

El Paso County, CO



Wildfire Hazard Evaluation Report

For the

Pyramid Mountain Amended PUD Development

El Paso County, CO

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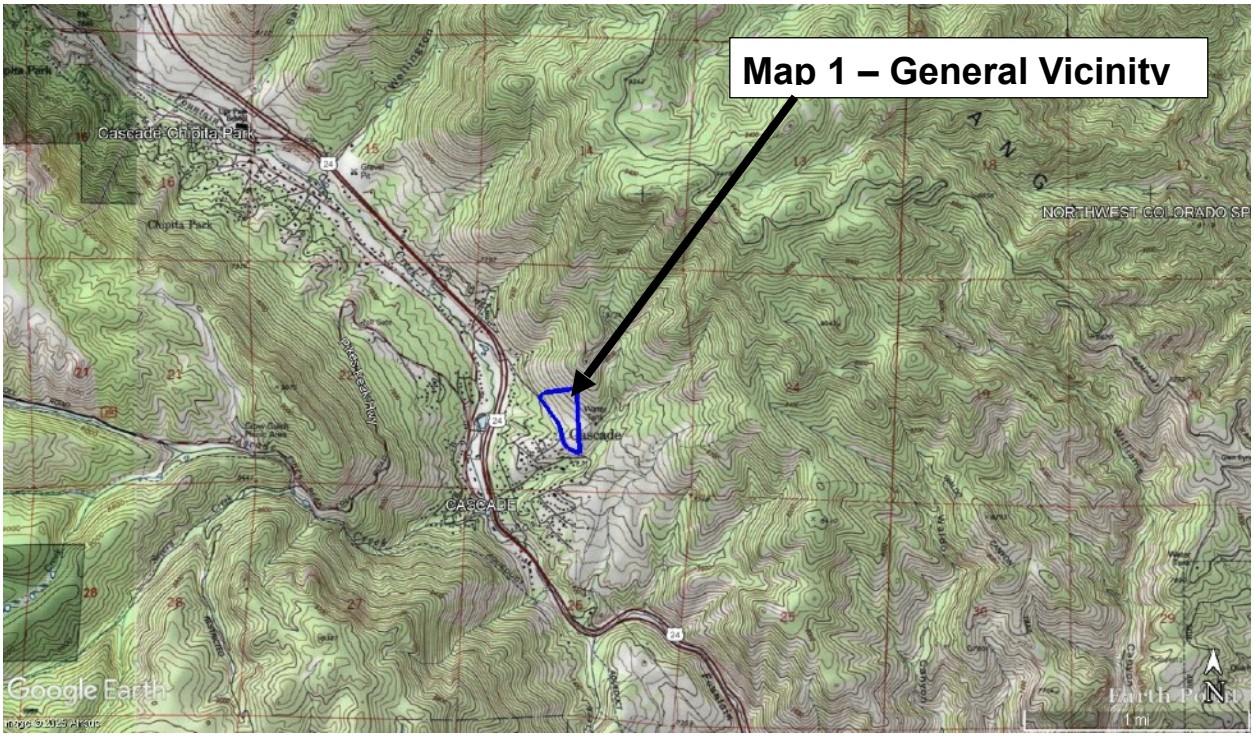
Warning and Disclaimer: The degree of protection from wildfire hazards intended to be provided by this plan is considered reasonable for planning purposes. It is based on accepted forestry and fire science methodology. This plan is intended to aid the Pyramid Mountain Amended PUD in minimizing the dangers and impacts from wildfire hazards. Fire is a natural force and a historical part of the ponderosa pine and native grassland ecosystems. Therefore, unforeseen or unknown wildfire conditions, natural or man-made changes in conditions such as climate, vegetation, fire breaks, fuel materials, fire suppression or protection devices, and ignition sources may contribute to future damages to structures and land uses even though properly permitted within designated wildfire hazard areas.

December 2025

General Description

The Pyramid Mountain development is in unincorporated El Paso County located within a community better known as Cascade. The property is located along Pyramid Mountain Road. The parcel listed under this report is identified with the El Paso County Assessor's Schedule Number 8323000026.

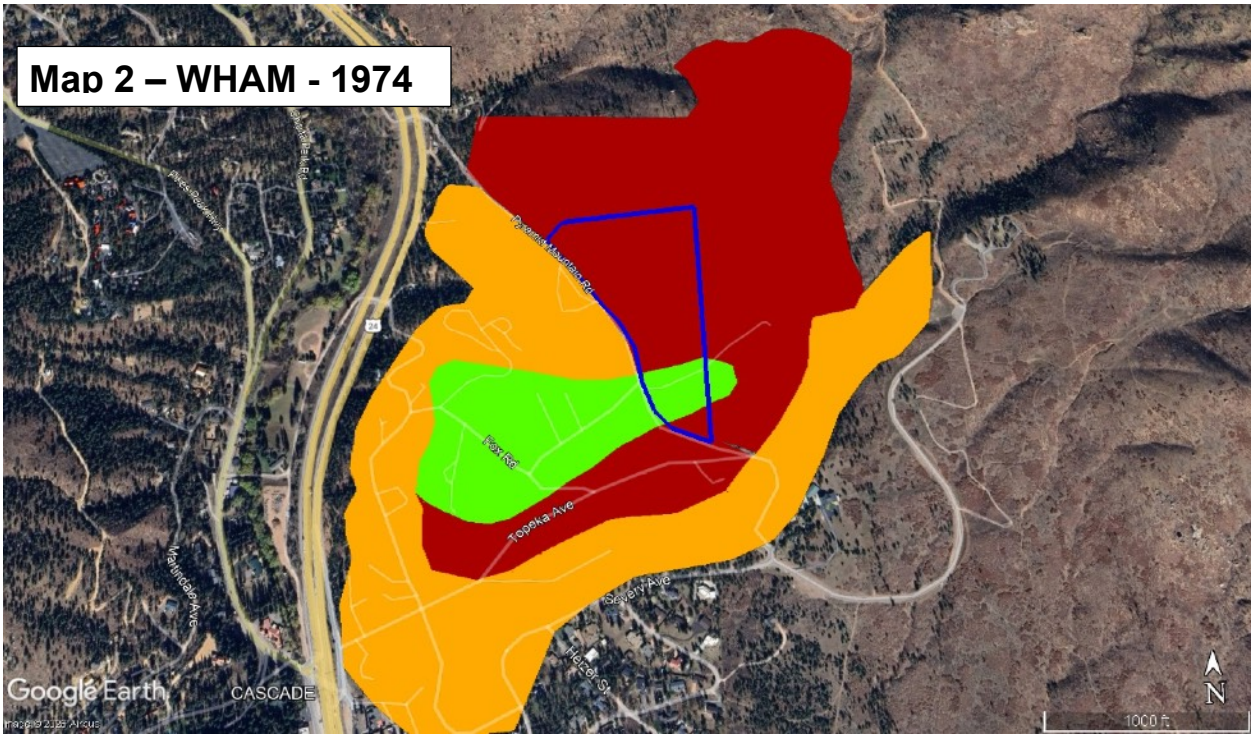


The subject property is bordered entirely by private land. Developed residential property lies to the west with minor development and undeveloped land along the rest of the parcel. The property is in proximity to the USDA – Forest Service, Pikes Peak Ranger District on the east.

The area does have a wildfire history. Most notably, the Waldo Canyon Fire burned in late June of 2012. It was the most destructive wildfire measured by the number of homes destroyed at that time. The fire burned across the subject property which experienced a forest stand replacement wildfire.

Wildfire Hazard

Based upon the Wildfire Hazard Area Map (WHAM) developed by the Colorado State Forest Service (CSFS) in 1974, the proposed development of the Pyramid Mountain Amended PUD contains a low hazard for trees-grass and a severe hazard for trees & brush (see Map 2).



Legend: Green – Low Hazard – Trees & Grass, Yellow – Severe Hazard Trees, Red – Severe Brush

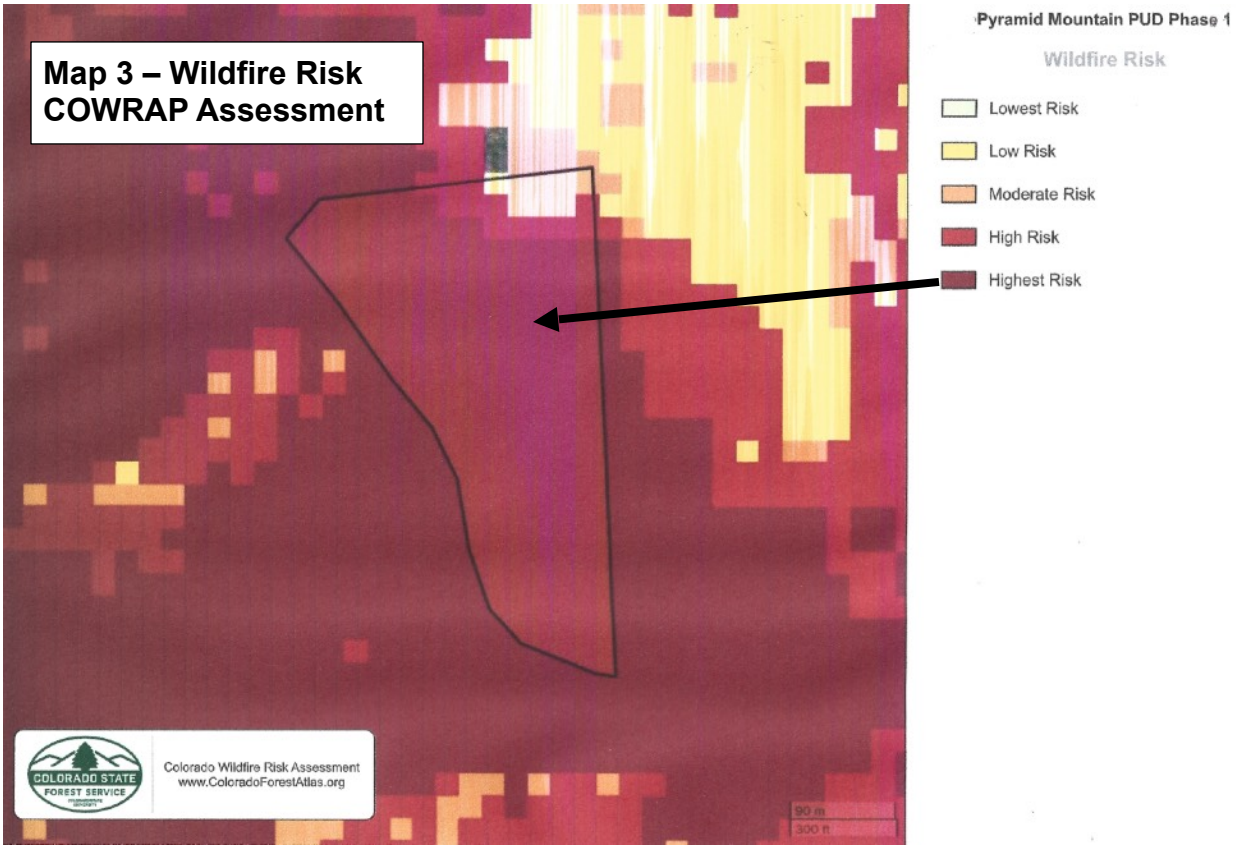
Since the publication of this hazard map series, the CSFS developed a wildfire risk assessment tool in 2012 referred to as the Colorado Wildfire Risk Assessment Web Portal (CO-WRAP). This assessment was recently updated to include wildfire events and acres mitigated up to 2017. A copy is attached to this report.

Within the assessment report, the Wildfire Risk to Assets within the property is considered the Highest (see Map 3). Wildfire risk is a composite rating which identifies the probability of loss or harm from a wildfire. Risk identifies the greatest impacts from a wildfire to a range of assets, such as the level of Wildland Urban Interface. Wildfire Risk is determined uniformly across the entire state.

The Highest Rating is a result of the proximity of residential development to the west just on the opposite side of Pyramid Mountain Road. The road was a significant control feature during the Waldo Canyon Fire

The Burn Probability is the annual probability of any location becoming subjected to a wildfire event. The assessment assigns a rating of high (see Appendix C). This is not

unexpected due to the number of ignitions historically on private and in the Waldo Canyon drainage within the Pikes Peak Ranger District. The Waldo Canyon Fire, with other fires in the region weigh heavily on this factor.



The CO-WRAP assessment uses a detailed and distinct series of fuel models. This is a more dynamic approach, but it does not delineate between smaller fuel beds but considers them uniform across large areas. So even though there may be clusters of shrubs or grasses present, a refined timber fuel model might be described incorporating these variations.

A field inspection was performed on December 21, 2025, and again on January 7th, 2026, to determine if any change should be made to the CO-WRAP assessment. This included a forest inventory to help determine any future silviculture activity.

The topography of the area influences the highest risk to the assets rating dramatically. When coupled with the proximity of extensive residential development adjacent to the property, it would appear to be the appropriate conclusion.

While neither condition can be influenced, there are two factors that may influence the rating. The first is the property was burned over during the Waldo Canyon Fire. The impact from the fire was limited to surface fuels with some torching of individual and closely spaced clusters of trees. This fuel load has been reduced.

Secondly, the spread of fire was influenced by the slope and the fuels present. During the Waldo Canyon Fire, the active fire crept downhill from the Rampart Range Road. As the fire reached the lower half of the subject property, exposed soil from social hiking trails, game trails and breaks in the fuel continuity that would normally present slowed or halted the fire's spread. This comes from personal observations made during and after the fire.

Conversely, any fire originating on the lower portion of the slope could burn rapidly uphill.

The Burn Probability of high is confirmed and cannot be lowered. The area around Rampart Range Road and Waldo Canyon has experienced small and large wildfire events over the years. With the high level of recreational use and thunderstorm activity, this results in a high probability of a fire ignition somewhere in the area.

Based upon the field inspection, **the wildfire risk was confirmed as the highest. If fuel mitigation is successfully completed, the risk could be lowered to high.**

Wildfire Behavior

This rating considers the role of the three major components that affect wildfire behavior: fuels, topography and weather. These three components will be examined in relation to the Lost Valley Ranch improvements.

Fuels

The area was field checked, and the results of the COWRAP Assessment were adjusted. based upon the observed fuel models on the property. The USDA – Forest Service Intermountain Forest and Range Experiment Station in Ogden, Utah, developed these fuel model descriptions. They are used as aids in estimating fire behavior (see Appendix A).

The criteria for choosing a fuel model reflects that wildfire will burn in that fuel type which best supports that fire to spread. There may be more than one fuel model represented on any given area of land. In addition, current and expected weather conditions will influence the condition of these fuels.

From the COWRAP assessment most of the property is considered as Low Load, Dry Climate Timber-Grass–Shrub (TU1). This fuel model is comprised of approximately 15 acres. The TU1 model describes ground fuels that would be composed of sparse grass along with conifer litter such as needles, small twigs and small amounts of larger branches (see Photo 1).

Photo 1. Typical view within the ponderosa pine stand. There is a varied mix of grass, oak shrub and compressed pine needles in the understory.

The assessment may be incorrect in calculating the acreage of this fuel model. Photo 2 shows a distinct break in this fuel model to a shrub model. Using Google Earth to delineate the vegetation types, the acreage should be adjusted to approximately 10 acres.

Photo 2. Note the distinct break from the pine forest to Gambel oak shrubland.

The Gambel Oak shrubland is described as GS3, Moderate Load, Dry Climate Grass-Shrub in the assessment. The primary carrier of fire would be the combination of the grass and shrubs combined. In the absence of a steep slope, this could be grass and shrub litter that carries a fire. This was observed in oak clumps found under the pine forest canopy.

Photo 3 (next page) depicts an example of this fuel model. This looking north across the upper one-third of the property. This clump of oak appears to retain its dead leaves increasing the fire hazard.

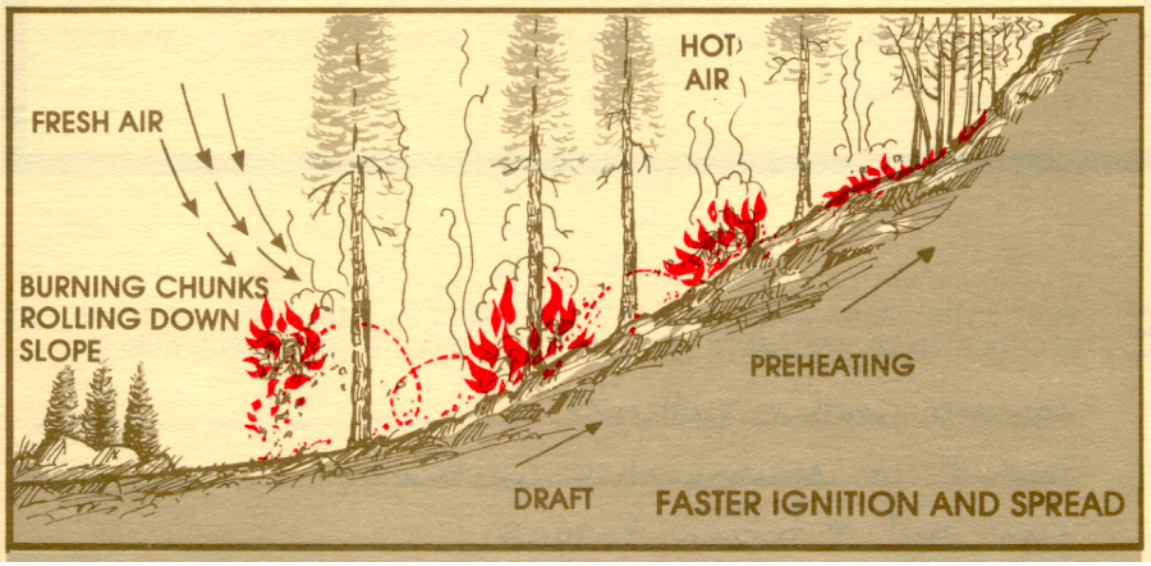
Photo 3. An example of Fuel Model GS3. The ponderosa pine will not be the fuel to carry a fire.

Topography

The topography of the site is one of the main factors that will influence the spread of fire. The aspect or compass direction that any slope faces influence the fuel type that exists and the amount of preheating these fuels receive by the sun. Aspect can also influence the effects of diurnal winds, as they move upslope during the daylight hours and down slope during the evening and early morning hours.

As the percentage of slope increases, the rate of fire spread by convection increases. In other words, wildfire burns faster moving uphill (see Figure 1).

Figure 1. Slope Affects Fire Spread



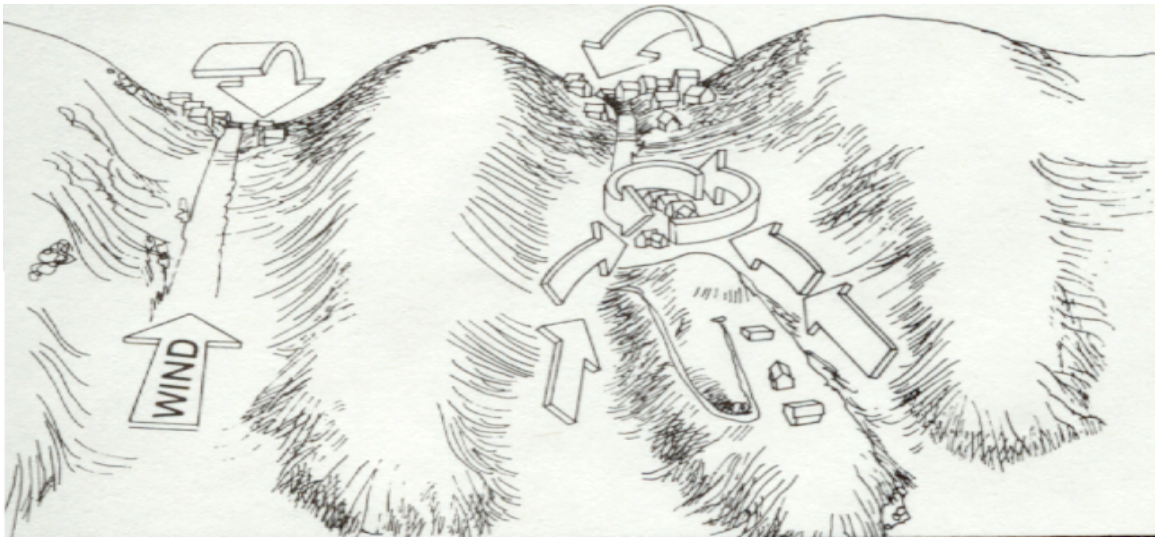
The slopes on the property range from 13% up to 30%. Slopes greater than 25% are considered extreme slopes in their effect on wildfire behavior (see Photo 4).

However, slope can have the opposite effect when burning downhill. This was observed during the Waldo Canyon fire in this area. The fire crept downhill relatively slowly and there were many instances of fire spread being halted by social and game trails.

Photo 4. The colored lines express the slope percentage across the property. The red line is 30%, The orange line is 18% and the yellow is 13%.

Figure 2 depicts the effect the drainages or box canyons have on a fire. These topography features tend to funnel a wildfire uphill within a narrow profile and the preheating effect tends to ignite the side slopes of the drainage. Structures placed at the mouth of the drainage are most at risk from wildfire. Placing residential structures at the top of the slopes on the ridgeline should be avoided, if possible.

Figure 2. Drainages Tend to Draw in Fire



Graphic Courtesy of Colorado Springs Fire Department

Weather

Weather is the most variable of all the factors. The accumulative effects of weather over time can influence vegetation curing and fuel moisture content.

Grass, for example, are described as being one-hour time lag fuels. Time lag is a measure of the rate at which a given dead fuel gains or loses moisture. Hence grasses tend to be influenced by the weather conditions on an hourly basis. Wood fuels that are three inches in diameter or larger are considered 1,000-hour time lag fuels. This type of fuel requires a long period of dry or wet weather to affect its combustibility.

Winds can influence the direction and rate of spread of wildfire. Of greater concern is the short spotting of the fire by embers transported by winds ahead of the main fire.

The effect of wind on a fire was on display most dramatically during the Marshall Fire in Boulder County (December - 2021) . This fire grew to over 6,200 acres and destroyed 1,084 homes. The wind gusts of up to 115 miles per hour where reported. The wildfire reached the town of Superior, three miles away, in just one hour.

Locally summer wind originates from the south and funnels up the Ute Pass. The Rampart Range tempers any wind that may flow from the east. Late season winds will come from the north and west.

It should be noted that this level of high wind activity is not uncommon along the foothills. Finally, it should not be assumed that the main periods of fire danger would be in the summer months. As history has shown, out of season fire events are much more common than might be expected by the public.

While the weather may contribute greatly to a wildfire event, it is immune to outside influences.

Predicted Fire Behavior

Using the USDA – Forest Service BehavePlus fuel modeling system 5.05, the following predictions can be made based upon an 80-degree temperature day with a relative humidity of 18% with little cloud cover at 1:00 p.m. in the month of July.

Using the inputs of the 1-hour dead moisture being 7%, the 10-hour and 100-hour dead fuels are both set at 10%; live herbaceous (grasses) and live woody stems are set at 200%. This would be an expectation of mid-summer growth. It could be a windy day, or the site is experiencing strong downdrafts from thunderstorms, so the windspeed is set at 20 mph. Slopes steepness is set at 20%.

Based on these inputs, wildfire would spread at a rate of 59 feet per hour with a flame length of one-half of a foot or up to 6 inches.

If the inputs are changes to reflect a growing season plagued by long term drought, the outcome is decidedly different. The 1-hour dead fuel moisture is lowered to 3%. The 10-hour and 100-hour dead fuels have dried to 5%. The live fuel moisture is 50%, reflecting with early dry growing season conditions. The live woody fuel moisture is composed of leaves and fine stems that have matured and are set at 100%, which would normally be a late growing season condition.

The wind speed of 20 mph and a slope of 20%, remain the same as in the previous example. With the drier conditions, flame lengths could reach 13 feet. The rate of spread accelerates up to 970 feet per hour or 16 feet per minute.

The probability of fuels igniting in advance of the fire front is 85%. In the time that it may take for the fire to be noticed, reported to the fire department’s dispatch office and for the arrival of the initial attack force, the fire could have traveled over 240 feet or over one-half mile from its ignition point. Spotting fires from torching trees may carry 0.7 miles.

It is predicted that local suppression forces will not be able to contain the initial fire outbreak with mobile engines and hand constructed control lines.

It should be noted that these predictions are based upon normal weather conditions prevailing over the course of a year. Weather conditions that were exhibited from the winter of 2022 through the present date have been outside of normal conditions resulting in the catastrophic losses experienced throughout the western United States this past fire season. Again, the Marshall Fire provides an insight into what fire behavior might occur even in the winter season.

If such conditions are present on or in the vicinity of the proposed development site, any wildfire event can be predicted to be more severe and resistant to initial control efforts.

Wildfire Mitigation

It should be noted here that the occurrence of a wildland fire on this property and any subsequent spread of a wildfire to adjacent land could never be eliminated. In the Spaatz Fire, near Monument, suppression forces were able to arrive on scene in approximately four minutes after the fire was reported. Even with this rapid response, the wildfire reached a size of 67 acres before it was controlled.

The potential for loss can be reduced, and the odds can be improved that initial response forces can be successful in keeping a wildfire to the smallest size possible and structure loss to a minimum. But even with the best efforts of suppression forces, there will always exist a level of risk of loss to wildfire.

The only way to reduce the risk of loss from wildfire is to modify the factors that influence fire behavior. Of the three factors discussed previously, the only factor that could be modified prior to a wildland fire is the fuels. The efforts in modifying fuels can be targeted to their arrangement, continuity and availability.

• Arrangement

The arrangement of fuel considers the size, shape and compactness of the fuel itself. Smaller fuel sizes have greater surface area exposure for preheating. If these smaller sized fuels are only lightly compacted in spacing this results in easier ignition and increased combustion.

Fuels that are tightly compacted and larger in size have lower surface areas. This reduces ignition and combustion.

One technique in reducing the readily ignitable fuel level would be to remove fuels, such as dead leaves, fallen limbs and other small organic debris, from any construction site. However, it is not practical to remove these types of fuels from the entire property.

During the construction phase of any structure, the most likely source of ignition will come from personnel and activities. These sources of ignition may come from flammable chemicals, improperly discarded cigarettes, shorts in electrical equipment, and other means.

It is suggested here that the reduction of the most ignitable fuel be done in areas that are within fifty feet of the pad of any proposed structure or improvement. This will reduce the amount of readily ignitable fuel in proximity to the structure. It will also retard the spread of a fire and provide suppression forces additional time to contain a fire quickly.

Once a structure is built, a Home Ignition Zone should be established. This should be given careful consideration as the proposed building sites are set in the Gambel oak

(shrub type (see Map 4). Home Ignition zones coupled with Defensible Space are intended to slow a fire down so that it may be controlled and extinguished. There are three zones that comprise a Home Ignition Zone. Detailed information these concepts can be found on the Colorado State Forest Service website at the following link: Protect Your Home & Property from Wildfire | Colorado State Forest Service | Colorado State University

The first zone is the one that contains the most opportunity for modification. This zone is designed to prevent fames from coming in direct contact with the structure and extends out for a minimum of five feet from any structure. A brief synopsis of the steps that can reduce the risk of ignition of a structure from a fire is found below.

Use non-flammable, hard surface materials in this zone, such as rock, gravel, sand, cement, bare earth or stone/concrete pavers. Remove all flammable vegetation, including shrubs, slash, mulch and other woody debris. Do not store firewood or other combustible materials inside this zone.

Prune tree branches hanging over the roof and remove all fuels within 10 feet of the chimney. Regularly remove all pine needles and other debris from the roof, deck and gutters. Rake and dispose of pine needles, dead leaves, mulch and other organic debris within 5 feet of all decks and structures. Do not use space under decks for storage.

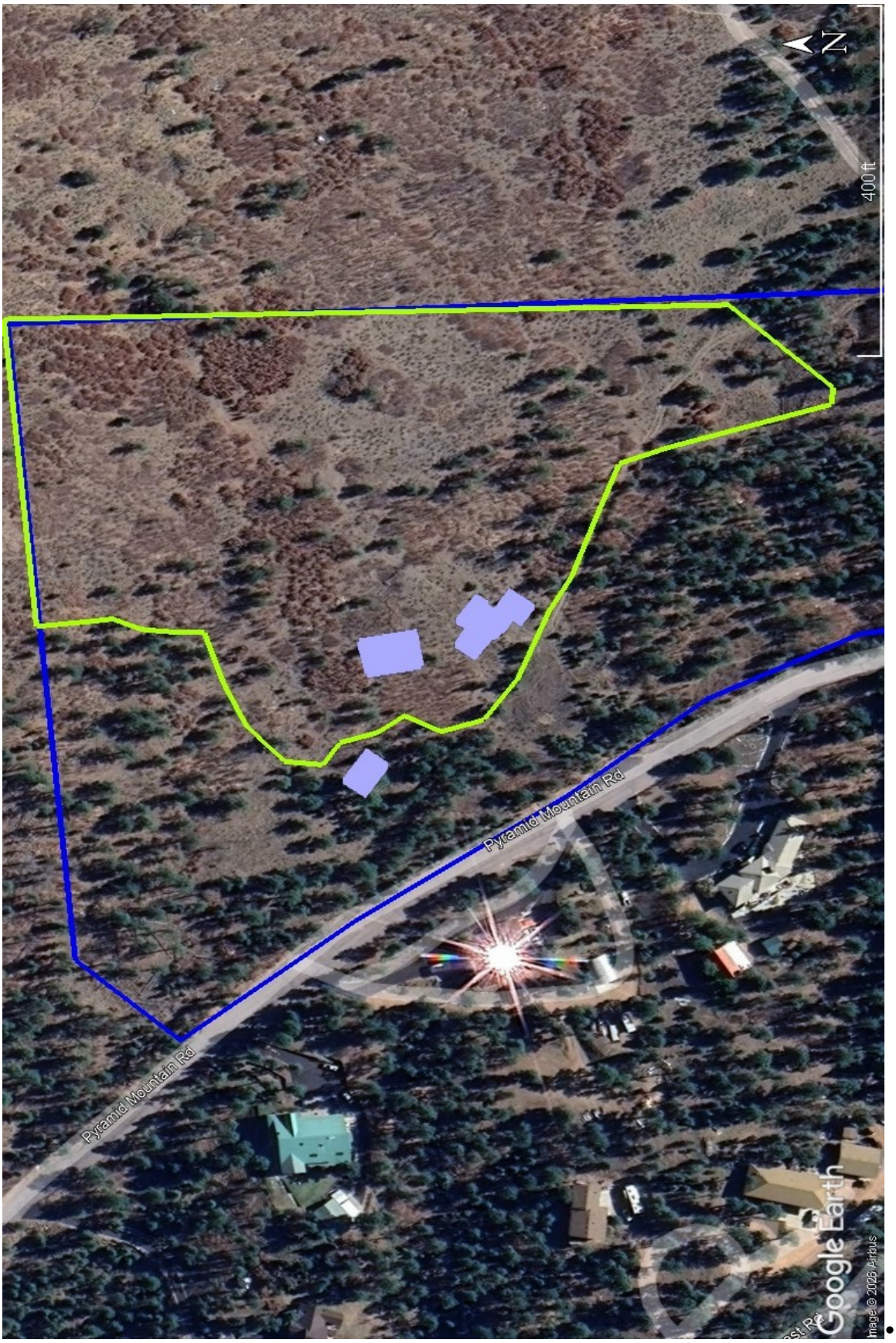
The second zone extends from 5 to 10 feet from any structure. To retard the spread of fire in Zone 2 may include all or some of the following steps described below.

Mow grasses to 4 inches tall or less where practical. Avoid large accumulations of surface fuels such as logs, branches, slash and mulch. Remove enough trees to create at least 10 feet of space between crowns. Measure from the outermost branch of one tree to the nearest branch on the next tree. Small groups of two or three trees may be left in some areas of Zone 2. Spacing of 30 feet should be maintained between remaining tree groups to ensure a fire does not jump from one group to another. Remove ladder fuels under remaining trees. Prune tree branches to a height of 6-10 feet from the ground or a third of the total height of the tree, whichever is less. Remove stressed, diseased, dead or dying trees and shrubs.

Zone 3 is mostly concerned with improving forest health. Any locations within this zone with excessive fuel load should receive treatments as described in Zone 2.

Additional information on the development of wildfire safety zones is available through the Colorado State Forest Service at the following link: 2021_CSFS_HIZGuide_Web.pdf Besides incorporating the mitigation steps described above, treat slash from any thinning activity by either removal from the site, chipping in place or lop and scattering any limbs.

Map 4 – Location of Proposed Structures in Gambel Oak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Pyramid Mountain Rd
Pyramid Mountain Rd
Google Earth

Continuity

The second factor affecting fuels that can be modified is their continuity. Is the fuel continuous or patchy in nature? Is the fuel layered in such a manner that it can leave the ground and spread into a vegetative canopy?

In this instance, the fuels in the shrub-grass fuel model are continuous. They extend west to east and up and down the slopes. If structures are built on the lower half of the slopes, there should be thirty (30) feet of open space between the structure and the nearest clump of oak brush. This should reduce the risk of any flame touching the structure.

Where the oak has a density so thick to make it difficult to walk through, it may be prudent to create openings between thickets. This should break the continuity of wildfire above the ground through the thickets and return it to the ground. This makes suppression efforts much more effective.

• **Availability**

The final consideration is the availability of the fuel to be physically burned. This factor is influenced by the weather on a daily or yearly basis and cannot be readily influenced.

The current weather patterns have contributed to a long-term drought situation that has influenced the availability of the fuels to burn. The trend of above average daytime temperatures and below normal precipitation levels have allowed fuels to reach a higher state of availability than might normally be the case, particularly during winter months. This may result in wildfire acting in a manner that might be more characteristic of mid-to-late summer burning conditions.

Other Considerations

Firebrands & Secondary Ignitions

It is becoming more apparent that structure loss is not occurring during the passage of a burning wildfire front but from ignition of the structure by firebrands and secondary ignitions. Firebrands are burning materials or embers that are lifted into the air by convective wind currents. Firebrands can be cast hundreds of feet in advance of the fire front.

Research and case studies in Australia have found that there is a 50% probability of loss of structures that are 100 – 200 feet from the fire front. This would seem to indicate that firebrands are a major contributing factor of structure loss.

In the U.S., studies indicate there is 90% probability that a structure with a non-flammable roof and that is at least 100 feet from the fuel bed will not be lost during a wildfire. However, this statistic may be misleading as the Cedar Fire (CA) in 2003 indicated that 60% -70% of the structures lost were ignited by firebrands. This would also infer that solely relying on 'defensible space' for structure protection may not be adequate.

In a professional paper by Scott (2005), the exposure of a structure to embers and firebrands is discussed. In an inference to fuel mitigation in the 'defensible space' zones, Scott states that "In no case is complete removal of the forest canopy required to mitigate crown fire potential near a structure." This infers that 'defensible space', while a good starting point, may not be the whole solution in preventing structure loss.

Currently, fire-safe construction is the recommended protocol for fire brand risk reduction by the professional wildfire community.

Roads and Driveways

Roads and driveways to individual lots should be constructed in accordance with NFPA 1141, *Fire Protection for Planned Building Groups*. Specifically, road widths should not be less than twenty-four feet to allow for simultaneous access of emergency equipment and evacuation of visitors.

Driveways should provide a minimum width of twelve feet and a minimum vertical clearance of fifteen feet. The grade of any driveway should not exceed 12%. The entrance to any driveway from public roads should not exceed a ninety-degree angle. A turnaround should be provided at all structure sites on driveways over three hundred feet in length. These turnarounds should be within fifty feet of any structure.

As the driveway is projected to be approximately 1,100 feet long, a turnout should be constructed to allow for passage of emergency vehicles. Turnouts should be at a minimum ten (10) feet wide and thirty feet long. These should can located in consultation with the Authority Having Jurisdiction (AHJ),

Due to the length of the driveway and slopes crossed, it may be prudent to improve emergency ingress and egress from the residence. This may necessitate a fuelbreak along both sides of the driveway, Additional information can be obtained thru the Colorado State Forest Service website at: fuelbreak_guidellines.pdf

Landscaping

The vegetation that is used in the landscaping of the structure should be fire resistant. For example, ornamental junipers can be very flammable and easily ignited by aerial firebrands. Planting these shrubs near the exterior walls of any residential structures provide a readily available fuel source that could threaten the structure and divert suppression forces to protect the building instead of controlling the wildfire.

From the historical fire record of the region, the ignition of ornamental junipers around structures is a major contributor to damage and subsequent loss (see Photo 6). **It is strongly recommended that the use of junipers and any other lowing growing ornamental conifer in the landscape be prohibited within thirty feet of a structure's foundation.**

It is assumed here that a native landscape is preferred condition. Grass should be mowed on a regular basis where it is within proximity to the planned residential structure and outbuildings. Gambel oak sprouts readily from the roots if cut. These sprouts should be cut and removed every two – three years.

An alternative to irrigated green space would be to line the footprint of the foundation of the structure with rock. If rock is used, it should be placed at a minimum width of five feet from the foundation. This will prevent flame lengths from reaching the building.

In areas of extreme wildfire hazard or where a slope exceeds 20%, it is strongly recommended that a five-foot width of stone be installed around the structure and that no plant material should be placed within this (or the first five feet of a larger) rock border.

There are many different sizes and types of rock available. It should be noted here that it would be necessary to remove leaves and other litter from within this rock fuel break on an annual basis.

Construction Considerations

Predictable sources of fuel that will burn and allow entry of wildfire into the structure will be debris that is trapped under or next to the building or accumulation in the roof gutters. Porch, foundation, roof and ventilation openings should be screened off or enclosed to keep debris from accumulating and burning underneath. This is particularly important where wooden decks are planned at ground level. This was a factor in the loss of structures in the Waldo Canyon Fire. These location concerns were also expressed in a joint publication by Green Builder Media and the NFPA. This recently released e-book, 'Design with Fire in Mind', can be downloaded using the link. Go to the Resources tab and click on e-books.

During the Waldo Canyon Fire, burning decks were removed to prevent the spread of the fire into the main residential structure. This was due to embers being blown underneath wooden decks. The flammable debris present under the deck ignited, resulting in the deck itself burning and subsequently damaging or destroying the main residential structure.

It is strongly recommended that all decks that are planned at ground level be required to be sealed off and enclosed to prevent the accumulation of flammable debris underneath them (see Photo 7).

The National Institute of Standards and Technology published results from experiments that examined how fire spread toward a structure is affected by combustible fences and mulch under conditions that may be encountered in a wildland-urban interface fire.

The study found that firebrands capable of igniting spot fires downwind were generated by nearly all combinations of fence and mulch tested. Mulch was placed under the fences to mimic debris that commonly accumulates under or around them. A target mulch bed at the base of a constructed structure tested the ability of firebrands produced by the burning fence and mulch (simulated debris) to ignite spot fires that threatened the structure.

The result was that all wood fences with mulch (simulated debris) at the base caused spot fires in the target mulch bed. In summary, fire spread is more likely with wood and wood-plastic composite fences than with fences made of vinyl or noncombustible materials such as stone, brick, or steel.

More details on this study can be found at Wind-Driven Fire Spread to a Structure from Fences and Mulch (nist.gov)

In a wildfire risk assessment in a local development, a significant entry point for fire into a house was through the eaves, overhangs or sofits. These locations can trap embers and combustible gas or heat, that can ignite the structure.

Based upon recommendations from FEMA, overhangs, if used, should be enclosed with a flat, horizontal sofit with a one-hour fire resistance rating. The fascia should be constructed of non-combustible material.

The combustibility of a roof is one of the most important factors in determining the risk of a structure to damage or loss from wildfire. The use of combustible materials such as wood shingles does not necessarily increase their susceptibility to fire. However, as a wood shingle roof ages and is influenced by the weather, individual shingles may start to warp, curl, and lose the tightness that was exhibited upon initial installation.

Siding materials, while not as critical as compared to roof, can help to lower the overall risk of a structure to damage from wildfire. Where a high wildfire risk exists, as in this instance , the wildfire intensity could ignite combustible siding material

Additionally, slope increases combustibility due to the preheating effect as hot, dry air moves uphill. The slopes on the east side of the canyon range from as low as 13% upwards to 30%. Slopes more than 15% are considered steep and can play a major role in a wildfire spread and intensity.

It is recommended that where slopes exceed 15% in areas where the wildfire hazard is considered high, non-combustible siding materials should be used in the construction of structures.

Due to the increased loss of structures to wildfire events nationwide, there is growing emphasis on 'hardening the structure.' A recent report published by Headwaters Economics discusses the costs of added protection during construction of a residential structure. A copy of the full report can be downloaded at: Construction Costs for a Wildfire Resistant Home, California Edition (headwaterseconomics.org)

The report lists several construction improvements that are relatively inexpensive to install.

As the residential structure is in a mountain setting, it is assumed here that there may be a wood burning fireplace constructed either inside or on an outside patio. If so, the location for storage of firewood needs to be considered.

It is strongly suggested that firewood storage be located at least fifteen (15) feet away from any structure.

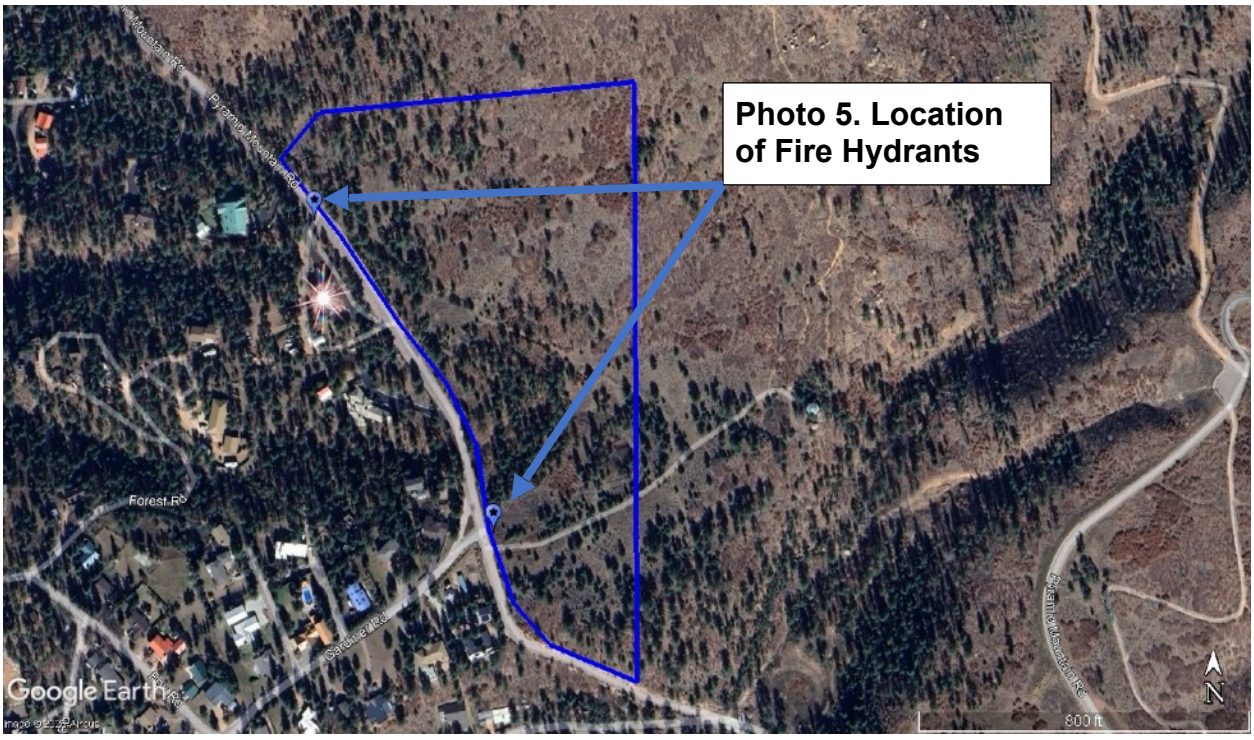
Water Supply

The property lies within the unincorporated land of El Paso County and within the Cascade Fire Protection District. At present, there are two active fire hydrants in proximity to the property (see Photo 5). These hydrants should be tested to determine their minimum flow.

The response to a wildfire event would be from the Cascade Volunteer Fire Department. The station is located at 8015 Severy Avenue and is approximately three-quarters (3/4) of a mile away from the property.

Fire apparatus available at the Cascade Fire Department consists of 2 – Type 2 Engines containing a total water capacity of 1,750 gallons. There is also 2 – Type 6 Brush Trucks with a combined capacity of 500 gallons. Additional suppression assistance and water supply could be supplied by the Green Mountain Falls Fire Department through a mutual aid agreement.

At present, there is no full-time staff. The fire department is manned entirely by volunteers. Therefore, any response time to a wildfire incident may vary.



Forest Management

Most of the existing forest was burned by ground fire during Waldo Canyon. This killed many smaller trees found under the main canopy. The focus of management should be on maintaining healthy and sustainable conditions.

An inventory of the forest was conducted in conjunction with the wildfire hazard review. A series of random plots were visited, and trees were measured for diameter, height and condition (see Appendix B).

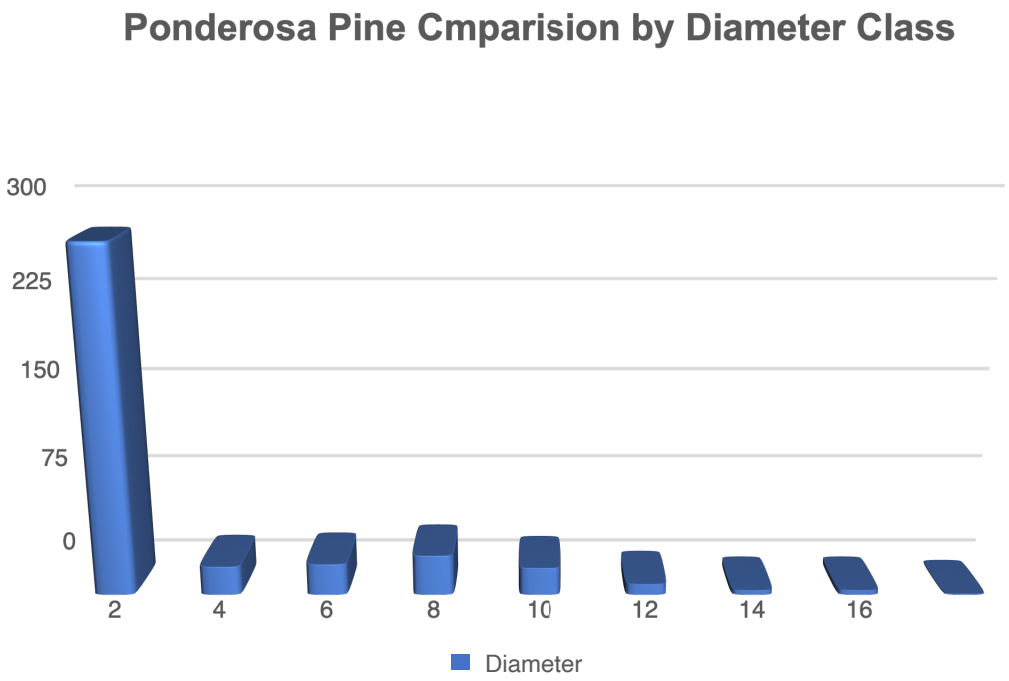
Based upon the inventory results, the average diameter is 10.4 inches with 397 trees per acre on average. And of those trees, 275 trees (75%) lie in the 2-4-inch diameter classes (see Chart 1). The composition of the forest stand is 100% ponderosa pine.

The high number of trees in 2-4-inch diameter classes could be attributed to plot location. If one plot tallies a number of these trees or successive plots do, this may skew the average upwards. There are a few small diameter thickets that require thinning, but this condition is not uniform across the entire forested area.

From a forest health standpoint, the forest does not need any intensive management at present. Mountain pine beetle activity is limited to random individual tree infestations. There is a low risk to an extensive outbreak of this insect. There were no dwarf mistletoe infections found during the inventory.

Management treatments should focus on removing any dead trees. These should be removed as they present a safety hazard and will also serve a role in wildfire mitigation. The thickets of small diameter trees should be thinned. Assuming an average diameter of three (3) inches, the trees should be spaced approximately 7-10 feet apart. The pines with a wider diameter at the base and taller height should be favored for retention.

Chart 1. Comparison of Ponderosa Pine by Diameter Classes



Finally, pine trees that have fallen and are dead should be removed. These dead trees provide heavy fuel to burn if wildfire were to occur. When feasible, these trees could be placed perpendicular to the slope in drainages to act as water bars. While the threat of soil erosion off the property is low, this may be a benefit in the event of heavy rainfall events.

Appendix A

Fuel Model Descriptions

Fuel Model 2 Summary Page
Fuel Model 10 Summary Page

Source: Anderson, Hal E. Aids to Determining Fuel Models for Estimating Fire Behavior, National Wildfire Coordinating Group, General Technical Report INT-122, April 1982.

"This report presents photographic examples, tabulations, and a similarity chart to assist fire behavior officers, fuel management specialists, and other field personnel in selecting a fuel model appropriate for a specific field situation. Proper selection of a fuel model is a critical step in mathematical modeling of fire behavior and fire danger rating.

Moderate Load, Humid Climate Grass-Shrub (GS3) Summary Page
Moderate Load Conifer Litter (TL3) Summary Page

Source: Scott, Joe H. & Burgan, Robert E. 2005. Standard fire behavior fuel models: a comprehensive set for use with Rothermel's (1972) surface fire spread model. Gen. Tech. Rep. RMRS-GTR-153, Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 72 p.

"This report describes a new set of standard fire behavior fuel models for use with Rothermel's surface fire spread model and the relationship of the new set to the original 13 fire behavior fuel models."

Fire Behavior Fuel Model 2

Fire spread is primarily through the fine herbaceous fuels, either curing or dead. These are surface fires where the herbaceous material, in addition to litter and dead-down stemwood from the open shrub or timber overstory, contribute to the fire intensity. Open shrub lands and pine stands or scrub oak stands that cover one-third to two-thirds of the area may generally fit this model; such stands may include clumps of fuels that generate higher intensities and that may produce firebrands. Some pinyon-juniper may be in this model. Photographs 4 and 5 illustrate possible field situations.

This fuel model correlates to 1978 NFDRS fuel models C and T.

Fuel model values for estimating fire behavior

Total fuel load, < 3-inch dead and live, tons/acre	4.0
Dead fuel load, ¼ inch, tons/acre	2.0
Live fuel load, foliage, tons/acre	0.5
Fuel bed depth, feet	1.0

Photo 4. Open ponderosa pine stand with annual grass understory.

Photo 5: Scattered sage within grasslands on the Payette National Forest.

Fire Behavior Fuel Model 10

The fires burn in the surface and ground fuels with greater fire intensity than the other timber litter models. Dead-down fuels include greater quantities of 3-inch (7.6-cm) or larger limbwood resulting from overmaturity or natural events that create a large load of dead material on the forest floor. Crowning out, spotting, and torching of individual trees are more frequent in this fuel situation, leading to potential fire control difficulties. Any forest type may be considered if heavy down material is present; examples are insect- or disease-ridden stands, windthrown stands, overmature situations with deadfall, and aged light thinning or partial-cut slash.

The 1978 NFDRS fuel model G is represented and is depicted in photographs 28, 29, and 30.

Fuel model values for estimating fire behavior

Total fuel load, < 3-inch dead and live, tons/acre	12.0
Dead fuel load, ¼-inch, tons/acre	3.0
Live fuel load, foliage, tons/acre	2.0
Fuel bed depth, feet	1.0

The fire intensities and spread rates of these timber litter fuel models are indicated by the following values when the dead fuel moisture content is 8 percent, live fuel moisture is 100 percent, and the effective windspeed at midflame height is 5 mi/h (8 km/h):

Model	Rate of spread *Chains/hour*	Flame length *Feet*
8	1.6	1.0
9	7.5	2.6
10	7.9	4.8

Fires such as above in model 10 are at the upper limit of control by direct attack. More wind or drier conditions could lead to an escaped fire.

Photo 28. Old-growth Douglas-fir with heavy ground fuels.

Photo 29. Mixed conifer stand with dead-down woody fuels.

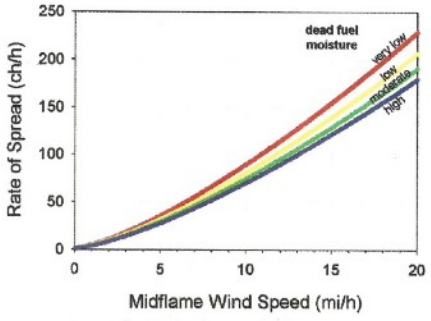
Photo 30. Spruce habitat type where succession or natural disturbance can produce a heavy downed fuel load.

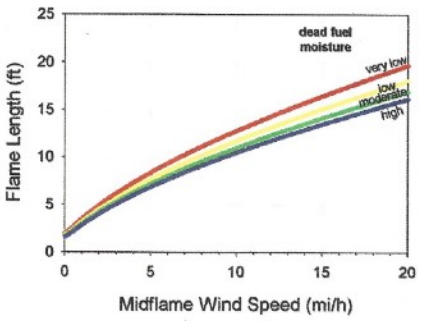
GS3 (123)

Moderate Load, Humid Climate Grass-Shrub (Dynamic)

Description: The primary carrier of fire in GS3 is grass and shrubs combined. Moderate grass/shrub load, average grass/shrub depth less than 2 feet. Spread rate is high; flame length moderate. Moisture of extinction is high.

Fine fuel load (t/ac)	3.0
Characteristic SAV (ft-1)	1614
Packing ratio (dimensionless)	0.00259
Extinction moisture content (percent)	40



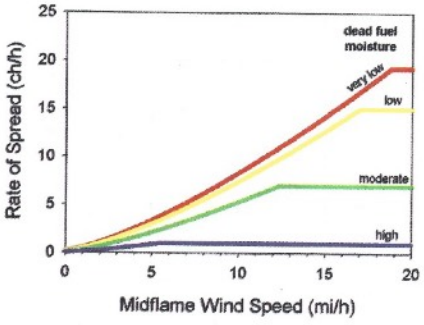


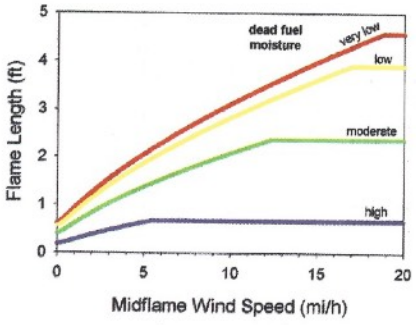
TU1 (161)

Low Load Dry Climate Timber-Grass-Shrub (Dynamic)

Description: The primary carrier of fire in TU1 is low load of grass and/or shrub with litter. Spread rate is low; flame length low.

Fine fuel load (t/ac)	1.3
Characteristic SAV (ft-1)	1606
Packing ratio (dimensionless)	0.00885
Extinction moisture content (percent)	20





Appendix B

Inventory Summary Sheet

NOTE: Volume data for the Lost Valley Ranch Inventory was obtained by performing a variable plot cruise. Detailed data was collected at each plot. Errors are inherent in any sampling process where only a portion of the population is measured. The minimum accuracy requirement for this inventory is at least +/- 20 percent standard error at one standard deviation.

Height measurements were obtained, when possible, using a Nikon Forestry Pro Laser Rangefinder/Hypsometer.

BioCruz Program 1/9/2026 9:58:31 AM
BAF:10 Points Sampled:5 Avg # Trees/Plot:6
Stand Name: Pyramid Stand Total Species:Front Range Ponderosa Living and Dead Trees
Limit of error at 1 Standard Deviation= 11%

	DBH	10	20	30	40	50	TOTAL
Stems	2	0	275	0	0	0	275
CUVOL	2	0	50	0	0	0	50
SCRIB	2	0	0	0	0	0	0
Stems	4	0	23	0	0	0	23
CUVOL	4	0	17	0	0	0	17
SCRIB	4	0	0	0	0	0	0
Stems	6	0	18	7	0	0	25
CUVOL	6	0	33	25	0	0	58
SCRIB	6	0	60	60	0	0	120
Stems	8	0	0	21	11	0	32
CUVOL	8	0	0	99	66	0	166
SCRIB	8	0	0	164	92	0	256
Stems	10	0	0	13	10	0	22
CUVOL	10	0	0	99	99	0	199
SCRIB	10	0	0	192	267	0	459
Stems	12	0	0	0	9	0	9
CUVOL	12	0	0	0	133	0	133
SCRIB	12	0	0	0	443	0	443
Stems	14	0	0	0	2	2	4
CUVOL	14	0	0	0	33	41	75
SCRIB	14	0	0	0	129	165	293
Stems	16	0	0	0	1	3	4
CUVOL	16	0	0	0	33	80	113
SCRIB	16	0	0	0	137	334	472
Stems	18	0	0	0	0	1	1
CUVOL	18	0	0	0	0	41	41
SCRIB	18	0	0	0	0	183	183
Stems	20	0	0	0	0	1	1
CUVOL	20	0	0	0	0	41	41
SCRIB	20	0	0	0	0	190	190
Stems	TOTAL	0	316	41	34	7	397
CUVOL	TOTAL	0	99	224	365	204	892
SCRIB	TOTAL	0	60	416	1067	872	2416

Appendix C

Supplemental Maps

Wildfire Risk Rating Map
Burn Probability Map
Fire Intensity Scale Map
FEMA Flood Hazard Map

Note: Maps courtesy of Bristlecone Ecology, Natural Features Report. Wildfire maps obtained through the Colorado Wildfire Assessment Portal

Figure 5: *Wildfire Risk to Assets*

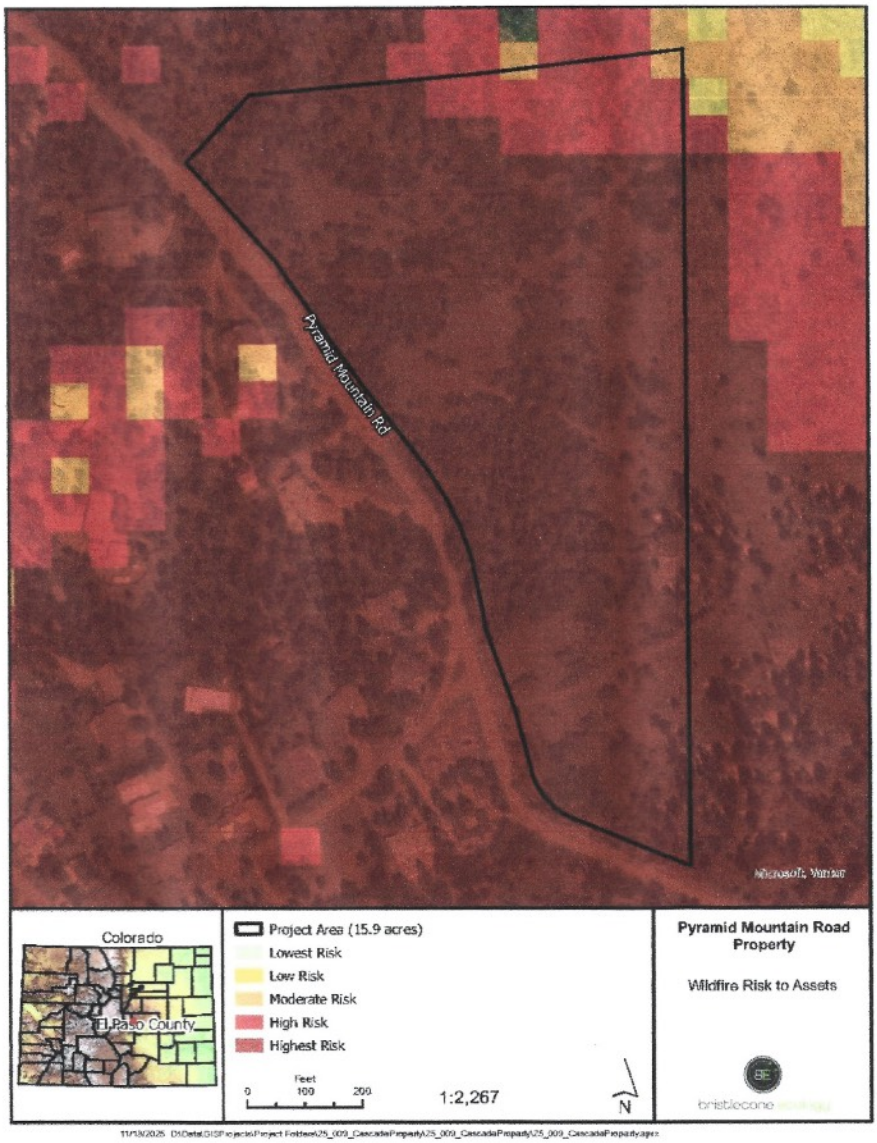


Figure 6: *Burn Probability*

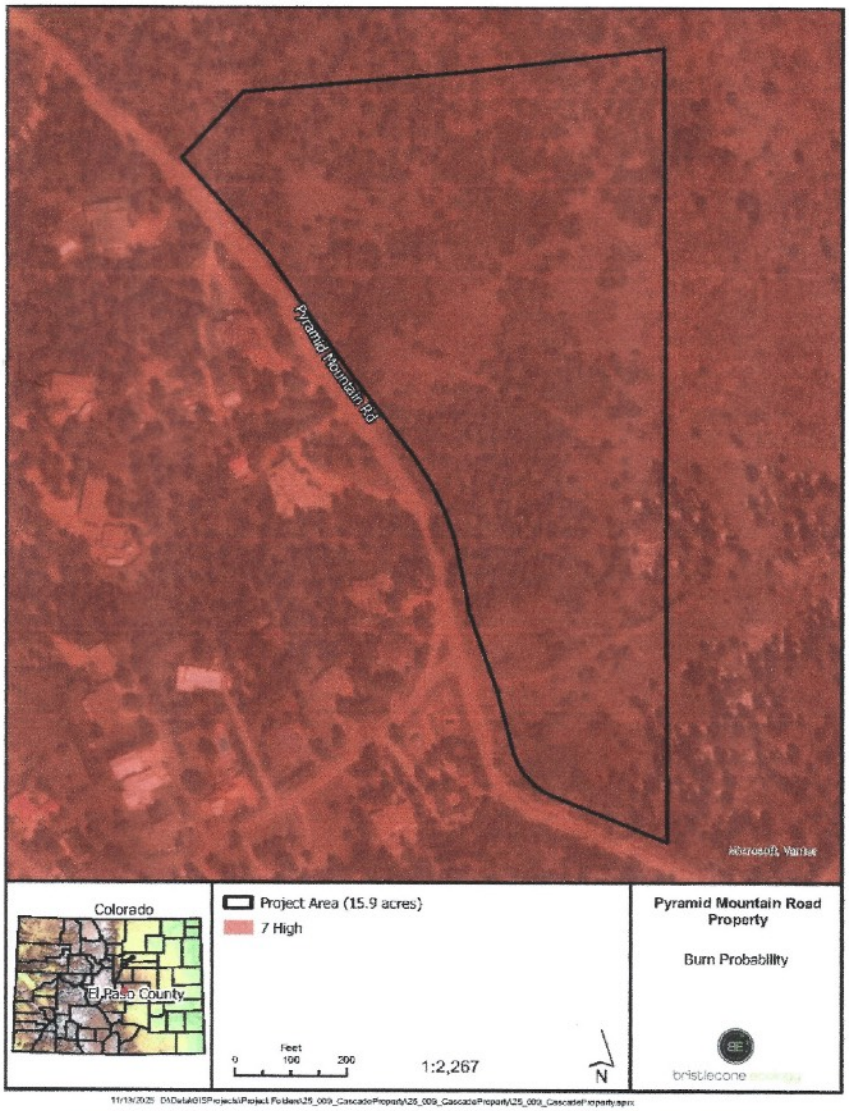


Figure 7: *Fire Intensity Scale*

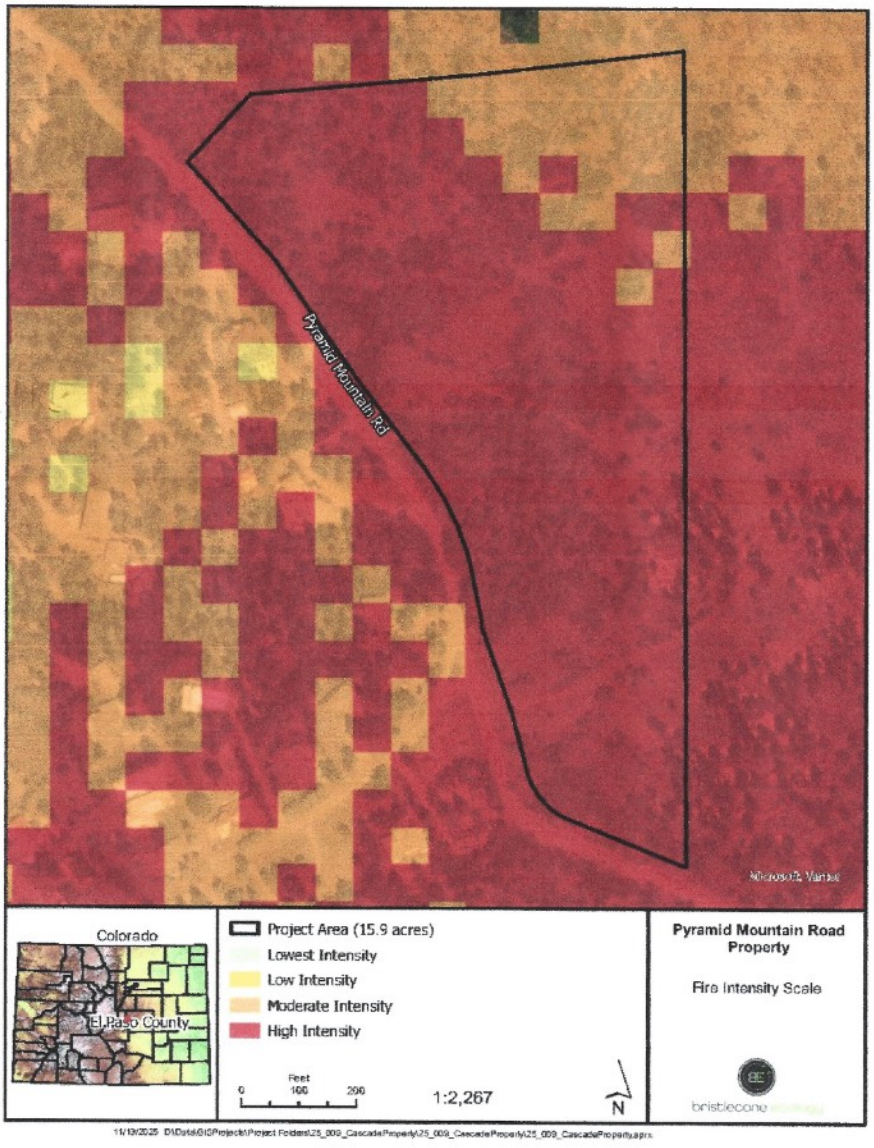


Figure 4: *FEMA National Flood Hazard Layer*