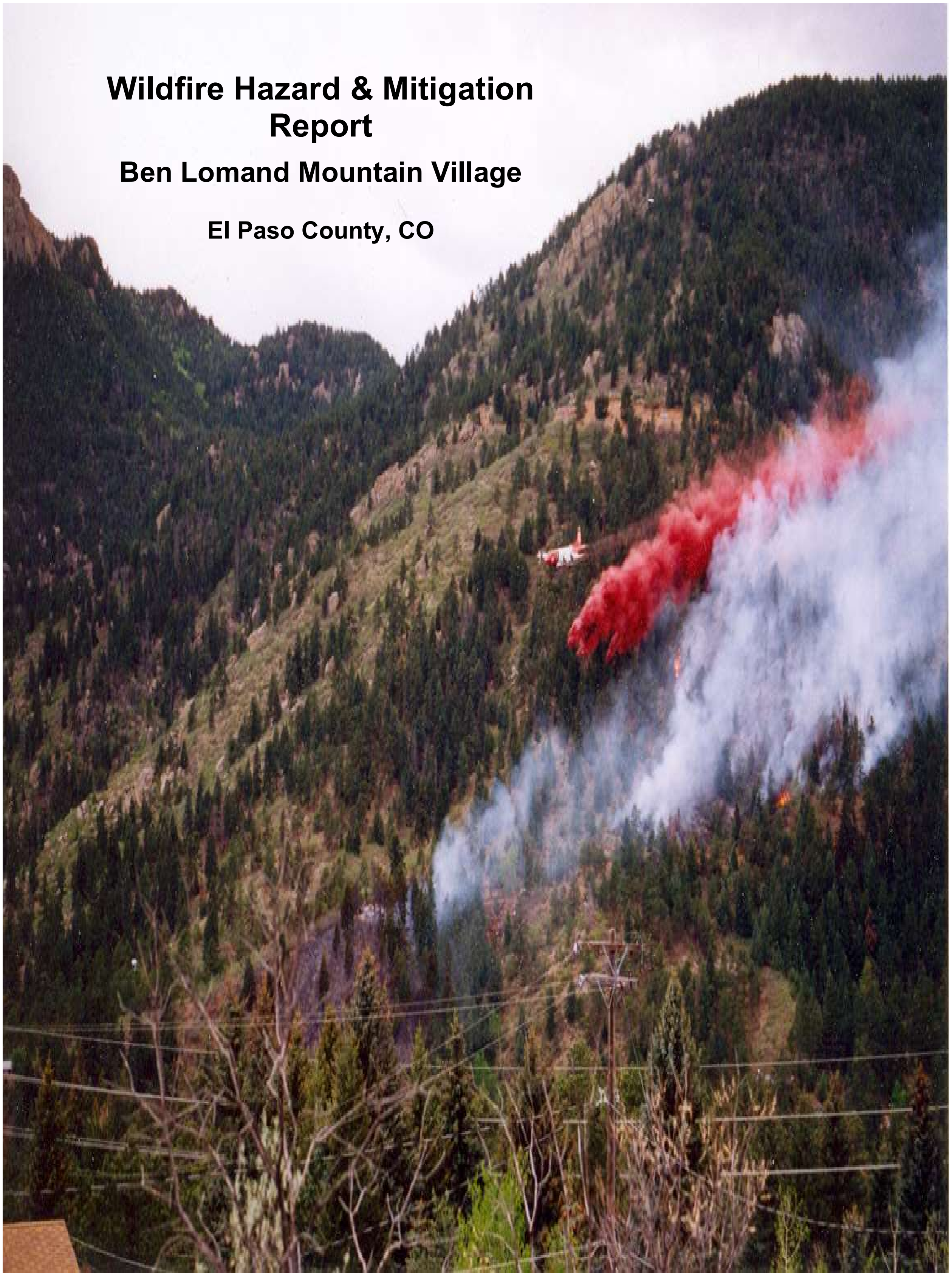
Wildfire Hazard & Mitigation Report

Ben Lomand Mountain Village

El Paso County, CO



Wildfire Hazard Evaluation Report

For the

Ben Lomand Mountain Village

El Paso County, CO

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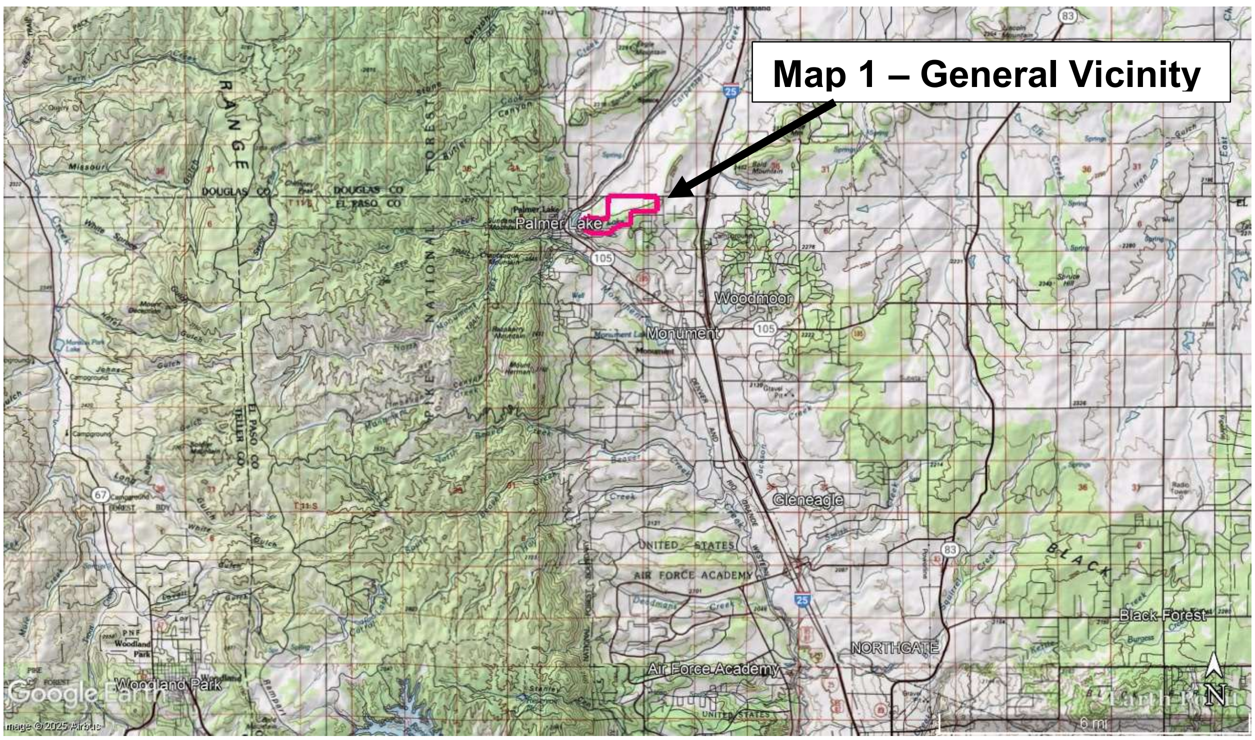
Warning and Disclaimer: The degree of protection from wildfire hazards intended to be provided by this plan is considered reasonable for planning purposes. It is based on accepted forestry and fire science methodology. This plan is intended to aid the Ben Lomand Mountain Village subdivision in minimizing the dangers and impacts from wildfire hazards. Fire is a natural force and an 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.

May 7, 2025

General Description

The Ben Lomand Mountain Village (BLMV) subdivision is a private residential development planned for the Palmer Lake area in unincorporated northern El Paso County, Colorado. The development plan proposes the subdivision of approximately 331.36 acres, of which 112.57 acres is dedicated to open space. The remaining acreage is proposed to be divided into 78 parcels. The proposed parcels are to be 2.5 acres in size.

The property is located south of County Line Road and borders Douglas County to the north. The parcels included under this report are identified with the El Paso County Assessor's Schedule Numbers as 7100420000012 (141.93 ac.), 7105424044 (14.4 ac.), 7104000002 (34.29 ac.), 71004000001 (49.84 ac.), 7104001010 (46.62 ac.) and 7103000028 (44.28 ac.).

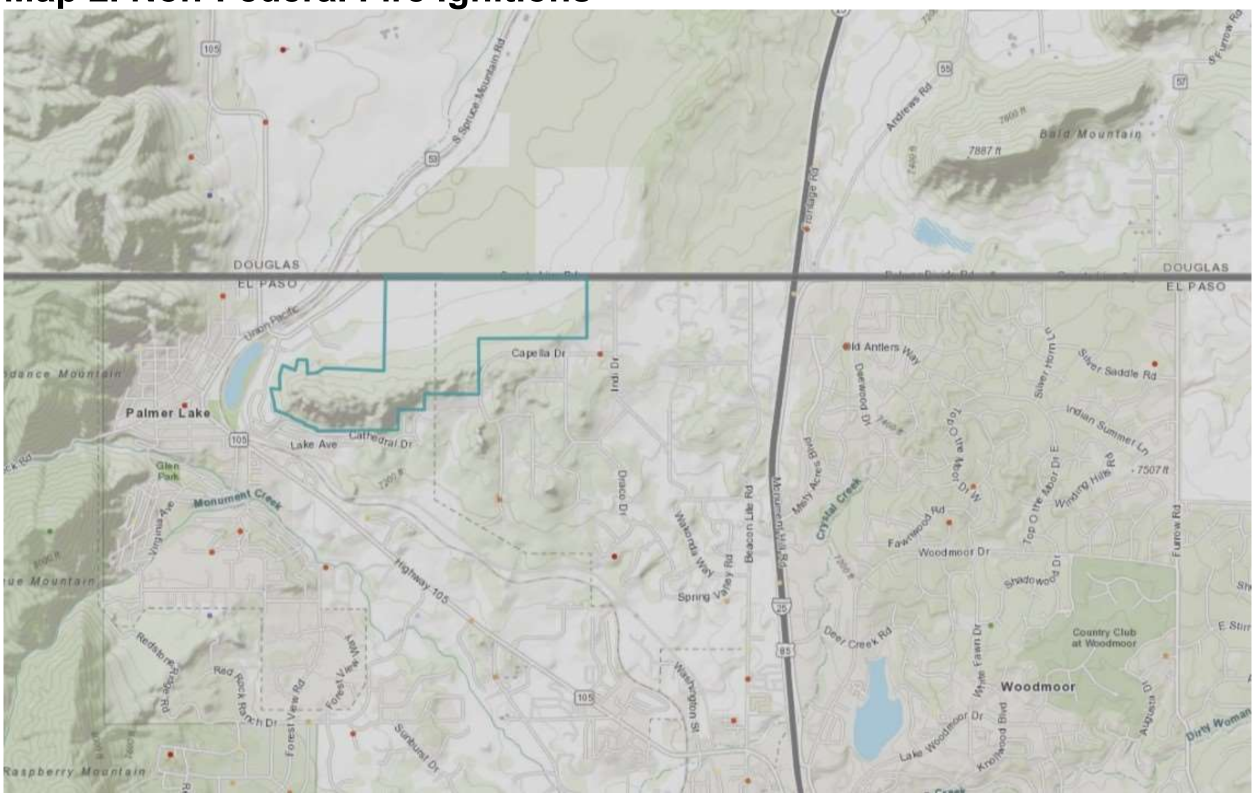


The Greenland Open Space borders the property to the north. The Colorado Estates, Subdivision 3 lies to the east. This encompasses the residential tracts on Capell Drive. On the west, the property is bordered by multiple residential subdivisions, the main being the Lomand Subdivision. The south boundary is bordered by Lakeview Heights, which appears to contain no residential structures.

The northern portion of El Paso County area does have a wildfire history. Most notably, the Black Forest Fire burned in June of 2013. It was the most destructive fire in Colorado history until the Marshall Fire in Boulder County in 2021. Over 14,000 acres burned, and 509 structures were destroyed.

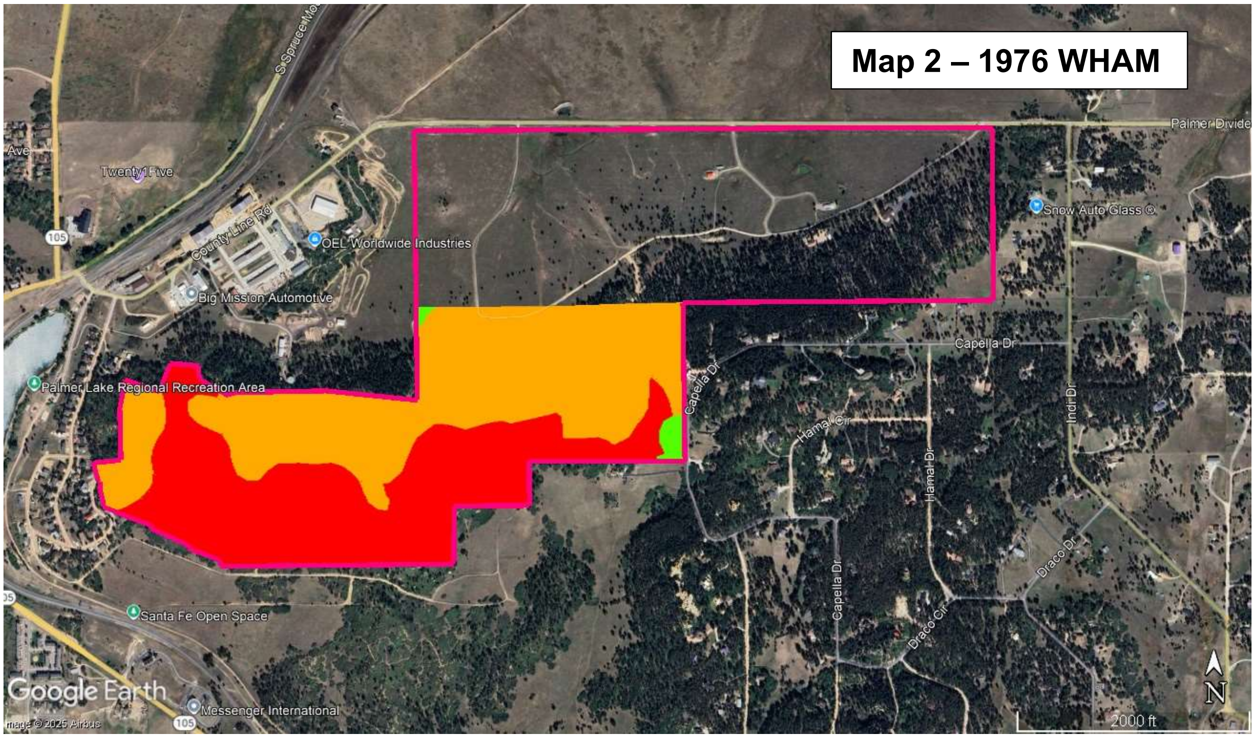
Prior to the Black Forest Fire, in 1989, wildfire ignited below Mount Herman which was referred to as the Berry Fire. In April of 2022, a wildfire fire was suppressed in the same vicinity. Ignitions are not uncommon in the area, with fires occurring along Interstate 25. A small ignition resulted from a downed power line along Highway 115. Map 2 identifies locations of fire ignitions from approximately the last five years.

Map 2. Non-Federal Fire Ignitions



Wildfire Hazard

Based upon the Wildfire Hazard Area Map (WHAM) developed by the Colorado State Forest Service (CSFS) in 1976, the proposed development of the BLMV subdivision contains a severe hazard for brush (see Map 2). Note that the upper half of the property falls in the Larkspur WHAM which is unavailable.

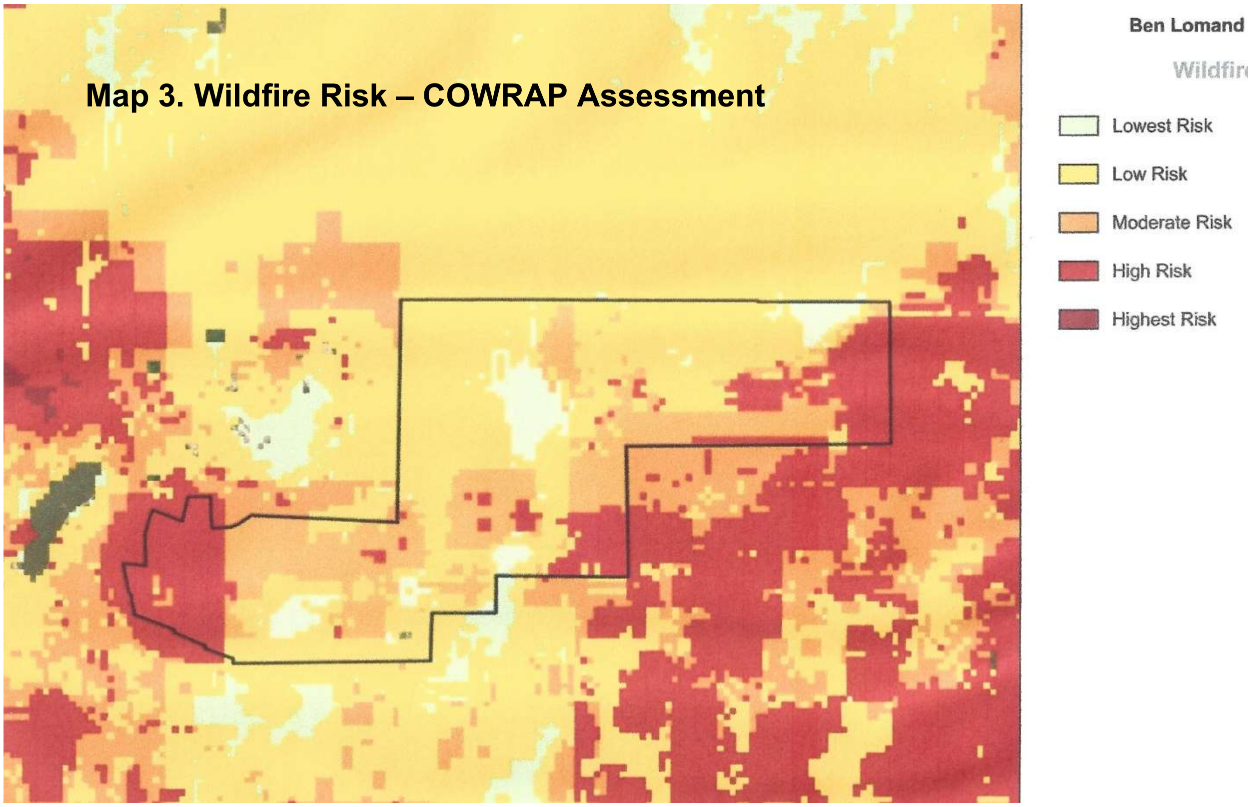


Legend: Green = Low Hazard) Orange = Severe Hazard Red = Severe Hazard (Brush)

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, Wildfire Risk to the property ranges from lowest to high. 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 (see Map 3).

The Burn Probability is the annual probability of any location becoming subjected to a wildfire event. The assessment gives the proposed development a high ranking in this regard. This is not unexpected due to the number of ignitions locally on private and Federal lands with the Waldo Canyon Fire of 2012, Black Forest Fire (2013) and Marshall Fire in 2021, amongst others, weighing on the assessment output.



Map 3. Wildfire Risk – COWRAP Assessment

One distinction that can be drawn from the assessment is the selection of the fuel models used in determining the wildfire hazard. The WHAM (Map 2) uses a simplistic approach and delineates between grass, shrub and tree fuel beds.

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 is described incorporating these variations.

A field inspection was performed on May 2 & 3, 2025, to determine if any change should be made to the original wildfire hazard area map conclusions or the CO-WRAP assessment. Based upon the field inspection, **the wildfire risk was confirmed as moderate to high in the forested areas, particularly on the west end of the property. The wildfire risk is low to moderate in the grassland and Ben Lomand summit area.**

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 'BLMV' development plan.

Fuels

The area was field checked, and the results of the WHAM and COWRAP Assessment were confirmed 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. This translates to which fuel type will carry wildfire to other locations. 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.

The grassland is broadly considered as Fuel Model 1 where wildfire spread is governed by fine, very porous and continuous herbaceous fuels that have cured or nearly cured. This grassland fuel can further be refined in description as GR2, Low Load, Dry Climate Grass, and GR3, Low Load, Very Coarse, Humid Climate Grass (see Photo 1).

Photo 1. An example of Fuel Model 1. It is difficult to discern between the two grass models.

Both grass fuel models will exhibit a rapid rate of spread anywhere from 13 feet per minute up to 67 feet per minute. In wetter seasons, grass growth may produce flame lengths in the range of 10 – 12 feet in the moderate load grass (GR4).The differentiation between the two refined models may be attributable to the spread of the rhizomatous grass species, probably smooth brome, dominating the naïve bunch grasses.

While Gambel oak is present on the property, it is found as small pockets scattered among the ponderosa pine and on the south side of the property below the rimrock of Ben Lomand. It is not predicted to be a substantial factor to wildfire spread.

The ponderosa pine forest can best be described under Fuel Model 9 (see Appendix A). "Fires run through the surface litter faster than Model 8and have longer flame height. Concentrations of dead-down woody material will contribute to possible torching out of trees, spotting or crowning." Dried or frost killed leaves still attached to the Gambel oak in the understory could support this type of wildfire behavior as well.

Fuel Model 9 can be further refined to TU1, Low Load Dry Climate Timber-Grass Shrub (see Appendix A). This fuel model was developed by Scott & Brogan in 2005. The primary carrier of a fire is low load of grass or shrub with litter. For the most part this fuel type is found in areas that have had some level of forest management treatment bordering the grasslands (see Photo 2). The litter can include chipped or masticated slash. This fuel type encompasses over 15% of the area.

Photo 2. An example of Fuel Model TU1, exhibiting grass as the understory component.

As depicted in Photo 2, the grass will carry wildfire through this area. The pine and Douglas-fir canopy should have a low probability of ignition and carrying the fire. This is due to the low amount of heat that will be radiated from the burning grass. As a grass fire would spread rapidly, the risk of sustained radiant heat is low. In addition, there is a conspicuous absence of ladder fuels to allow a fire to leave the ground.

The assessment includes Fuel Model TLML1. This model was developed by Techno Sylva and is titled Timber Litter ML. Based on the location of this fuel model it would seem to describe areas having had forest management treatment with the resulting slash either chipped and spread or masticated (see Photo 3).

Photo 3. An example of Fuel Model TLML1. Note the lack of fine ground fuels such as grass or shrubs.

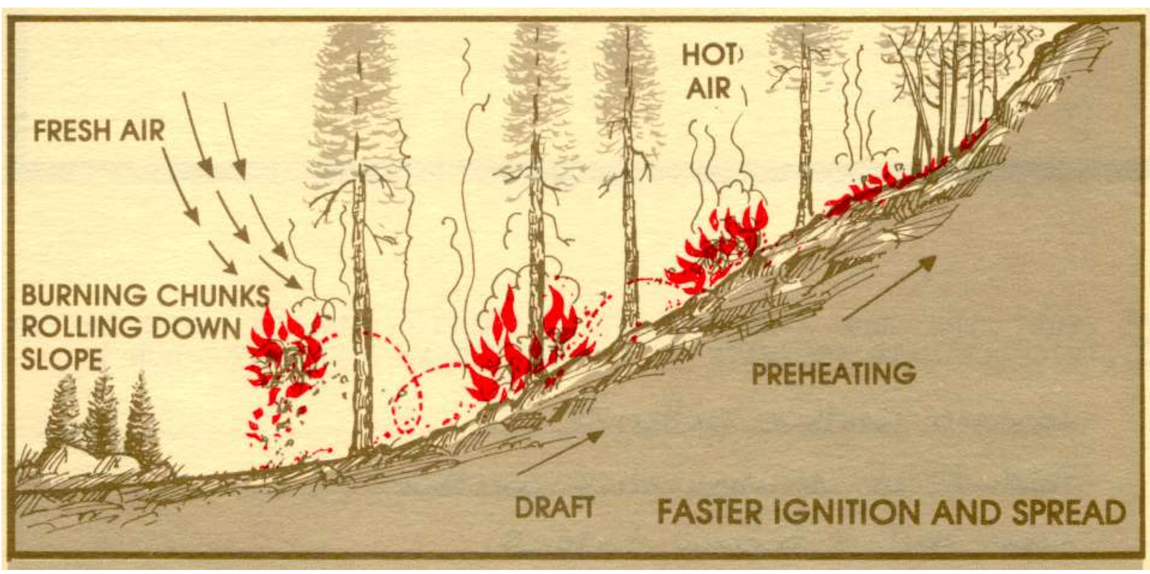
This would be where thinning activities occurred, with the treated slash scattered and left in place. This can result in a thick and compact fuel bed. This fuel bed condition would be resistant to a rapid fire spread and flame lengths would be very low.

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.

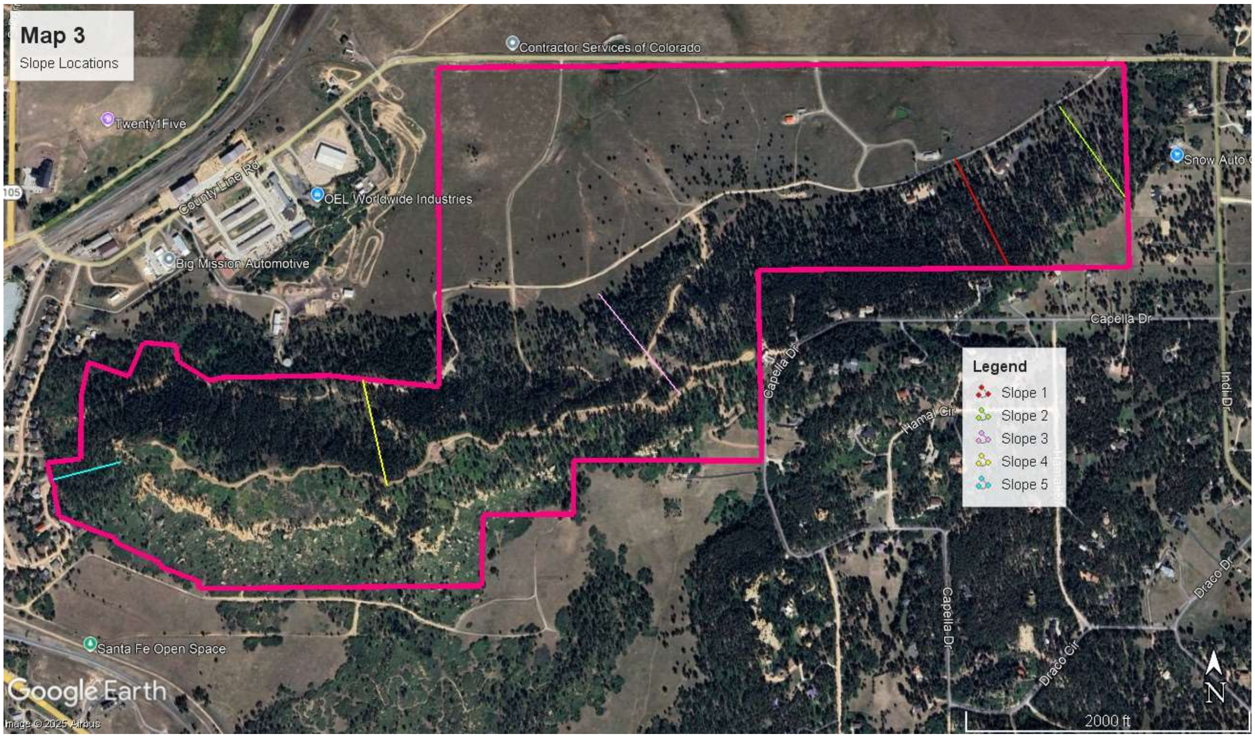
In this instance, one of the most important attributes of topography is the percent of slope on which the development is proposed. As the percentage of slope increases, the rate of fire spread by convection increases. In other words, wildfire burns faster moving uphill (see Figure 1).

Figure 1. Slope Affects Fire Spread



The specific topography of the slopes is steep over relatively short distances. The slopes range in steepness from 13 - 21% from the center of the property towards the east border (see 1 & 2). From the center moving west, the slopes can range from 19 – 24% (see 3 & 4). Slopes greater than 25% are considered extreme in their effect on wildfire behavior (see Map 3 & Photo 4). The far west boundary has slopes higher than 30%.

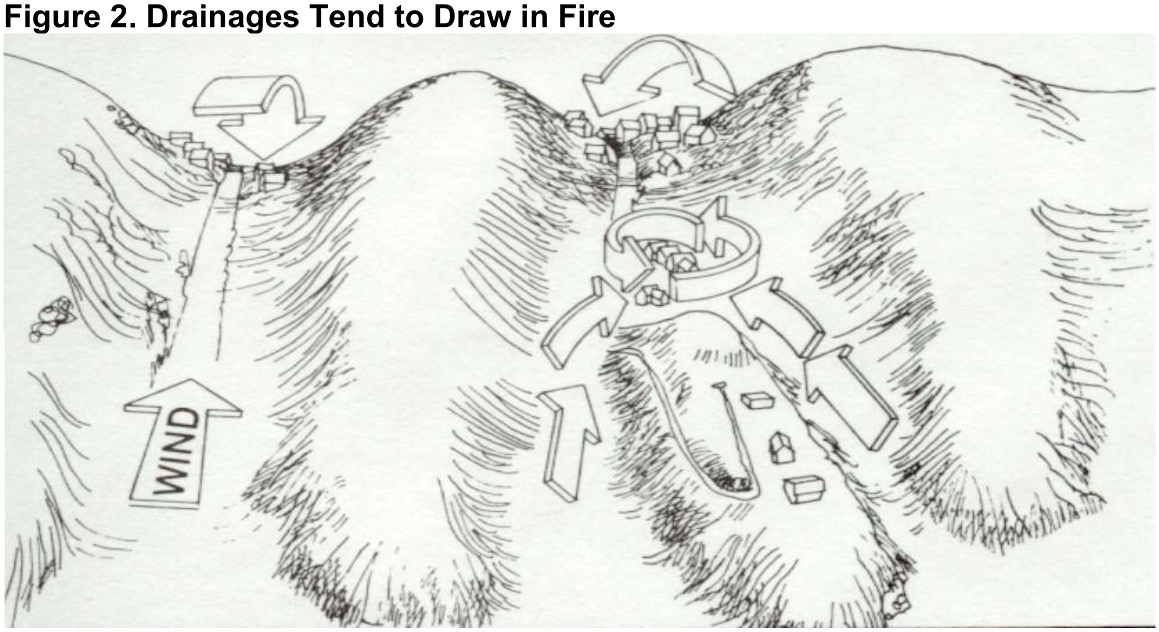
Conversely, the slope profile within the meadow or grassland is around 8 - 10%.



Map 3. The area located west of Slope 4 is mostly in the Open space where no lots are planned.

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


Photo 4. A view of the slope condition above Palmer Lake (Slope 5). There are a number of boulders beneath the forest canopy which should temper wildfire spread.

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, is described as one-hour time lag fuel. Time lag is a measure of the rate at which a given dead fuel gains or loses moisture. Hence the grass tends 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 in the winter of December of 2021 during the Marshall Fire in Boulder County. This fire grew to over 6,200 acres and destroyed 1,084 homes. The wind gusts up to 115 miles per hour where reported. The wildfire reached the town of Superior, three miles away, in just one hour.

In regard to the Marshall Wildfire, a similar condition could affect the BLMV subdivision. To the north of the property, there is a wide saddle that could accelerate wind spread across the Greenland Open Space towards the subdivision (see Photo 5).

Photo 5. Potential topographic effect on windspeed from wide saddle on a ridge in the Greenland Open Space.

The hazard could occur from the passage of a cold front from the north in late fall or early winter. A fire ignition could grow rapidly into grass wildfire and be pushed south towards the subdivision. This would represent approximately one and a half miles of a continuous grass fuel. If this event were to follow a wet and cool growing season, this could result in a fast but intense wildfire that could easily jump County Line Road and be potentially damaging.

It should be noted that this level of high wind activity is not uncommon along the foothills where the proposed subdivision is located. This wind effect was just exhibited on Sunday, October 23, 2022. A high wind event, coupled with a Red Flag weather warning, snapped multiple power lines which sparked a grass fire. The fire was located just to the northwest of Highway 105 and Red Rock Ranch Drive. The fire was just over one-half mile southeast of the property.

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 6.6 feet per hour with a flame length of one-tenth of a foot or a couple of 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 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 would exceed 13 feet. The rate of spread blows up over 12,000 feet per hour or 200 feet per minute.

The probability of fuels igniting in advance of the fire front is 88%. In the fifteen minutes 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 3,000 feet or over one-half mile from its ignition point.

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 wildfire to or from adjacent land can never be eliminated. In the Spaatz Fire, west of 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 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 the ease of 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 the proposed development. However, it is not practical to remove these types of fuels from the entire property.

During the construction phase of any residential 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 residential structures. This will reduce the amount of small, flashy fuel in proximity to the structure. It will also retard the spread of a fire towards adjacent property and provide suppression forces additional time to contain a fire quickly.

Once a residential structure is built, a wildfire safety zone should be established. Wildfire safety zones are intended to slow a fire down so that it may be controlled and extinguished. There are three zones that comprise a wildfire safety zone.

The first zone is the one that contains the most opportunity for modification. The minimum width recommended is thirty feet and is divided into three segments.

As these zones may be unique for each lot that is developed, it is difficult to make specific recommendations here. However, it is recommended that each lot be treated prior to completion of the structure and the issuance of the occupancy certificate.

Specific information on the development of wildfire safety zones is available through the Colorado State Forest Service in the Quick Guide Series Fire 2012-1, *Creating Wildfire-Defensible Zones* at the following link:
https://static.colostate.edu/client-files/csfs/pdfs/FIRE2012_1_DspaceQuickGuide.pdf

Photo 6. The grass could be mowed to a shorter height which will retard a wildfire's rate of spread and intensity.

If residential structures are built in the meadow area, the grass should be mowed regularly to reduce the overall height of the grass. This in turn should mimic a compressed fuel bed which does not burn readily.

In the coniferous forest, tree thinning treatments should continue as has been practiced in the past. This resulted in a compressed fuel bed of chips with scattered patches of grass and forbs. The absence of ladder fuels is due to the natural pruning of limbs due to the initial high tree density.

Photo 4. The chipped slash has left behind a compressed fuel bed in which to burn. Ladder fuels are mostly absent due to the high density of the trees.

- **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 grass fuel model are continuous. They extend from the north along County Line Road to and through the tree line on the south. If structures are built on the lower half of the slopes, where grass is present (see Photo 2) there should be thirty (30) feet of mowed space below the structure This should reduce the risk of any flame touching the structure.

• **Availability**

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

As was mentioned earlier, the availability of the grass fuel type should be considered a year-round hazard and not limited to the summer months.

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-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.

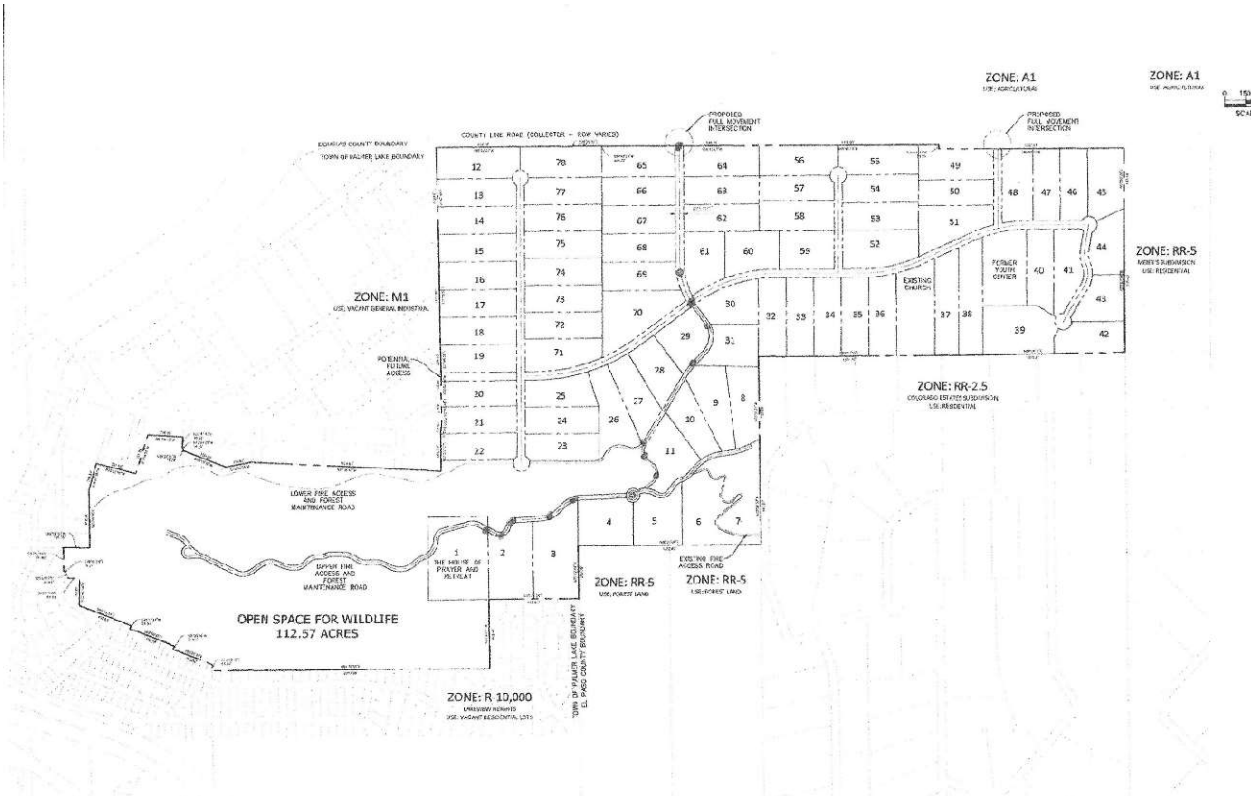
Currently, fire-safe construction is the recommended protocol for fire brand risk reduction by the professional wildfire community.

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 to emergency equipment and evacuation of residents. At least 13 feet 6 inches of vertical clearance should be provided and maintained

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.

Dead end roads should not exceed 600 feet in length when the area is classified as having an extreme wildfire hazard. All dead-end roads should have a turnaround at the closed end (cul-de-sac) of at least 100 feet in diameter.



The dead-end road bordering Lots 12 – 19 exceeds 1,200 feet in length. Per NFPA 1141, Section A.5.1.4, this road should have an intermediate turnaround. This can be placed midway down the road between Lot 16 & Lot 74.

There currently exists a service road that would cross proposed Lot 45. It is suggested here that the road be utilized as an emergency exit in the event of wildfire. This could help to alleviate congestion during an evacuation if an event occurs in the western half of the property.

The concept plan indicates an “existing fire access road” between Lots 6 & 7.It is not clear if there is permission to use this road once it leaves the property. Further examination will be required to ultimately determine if this is a feasible use.

The road grade uphill from lot 30 should not exceed 10%. This can be steeper than 10% if the appropriate mitigation has been conducted on either side of the road. Based on field inspection, this appears to have been accomplished (see Photo 3). The AHJ should make the final determination.

From a detailed wildfire hazard assessment performed in a local subdivision, a common discrepancy found was inadequate or poor visibility of individual residential address numbers. Letters and numbers indicating specific street addresses should be a minimum of 4 inches in height with a ½" stroke. The numbers or letters should be strongly contrasting with the background color to readily visible from the main access road.

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 of damage and subsequent loss. **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.**

If a native landscape is retained, the use of periodic irrigation helps keep landscapes lush and green, thereby lowering their ability to ignite. There are many irrigation techniques available that can keep plants less susceptible to burning while still adhering to water conservation principles.

Another 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 should prevent flame lengths from reaching the building.

In areas of extreme wildfire hazard or where lots have a slope exceeding 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

As the fuel in this subdivision is grass, needles and other small woody debris, predictable sources of fuel that will burn and allow entry of a wildfire into the structure will be such debris that is trapped under or next to the building or accumulation in the roof gutters. Porch, foundation, roof and attic 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.

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.

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.

Due to the limit of water capacity carried by initial attack resources and availability on site, wood fences should be prohibited.

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 locations of a high wildfire risk exist, such as in this subdivision, the wildfire intensity can ignite combustible siding material

In addition, the slope of the development increases combustibility due to the preheating effect. These slopes range from as low as 10% upwards to 35%. Slopes greater than 15% are considered steep and could play a role in spreading and intensity of wildfire.

It is recommended that where slopes exceed 15% in areas where the wildfire hazard is considered moderate, 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.

Water Supply

The property lies within the unincorporated land of El Paso County. At the present time, there is no readily available water supply for ground suppression fire resources. The local fire department will depend on hauled-in water for initial wildfire attacks.

It is assumed that the Palmer Lake Fire Department would be the primary resource for an initial attack during a wildfire. The department has a complement of four full-time staff along with seven part-time staff and fifteen volunteers. Due to their location, just under two miles to the west of the property, this may be the first resource to respond.

The Palmer Lake Fire Department has 4 apparatus available for initial attacks. There are two brush trucks and 2 structure engines. Total water capacity would be 2,450 gallons.

The Tri-Lakes Monument FPD, now referred to as the Monument Fire District, would be the first mutual aid resource expected to respond to and support for an initial attack on wildfire. Station 1 is located at 18650 Highway 105, approximately four and one-half miles away.

The district has 3 engines available, 1 tower ladder, 3 brush trucks, and 2 water tenders at any given time. These resources are further boosted by the Donald Westcott FPD, which is in the process of consolidating with the Tri-Lakes Monument FPD.

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It has been indicated that each residential lot will have its own well to provide water to the residence. This will obviously not be a reliable nor sufficient source of water for wildfire suppression. In this instance, a cistern will be required to for adequate supply.

A cistern should conform to NFPA 1142, *Standard on Water Supplies for Suburban & Rural Firefighting.* Refer to Annex B, Section B.4 on using Cisterns or Underground Storage Tanks. The bullet point here is that the minimum capacity for storage is 30,000 gallons. It is suggested here that this quantity be split between two locations. The rationale being during a wildfire, one location may not be safely accessed for resupply, particularly in the grass fuel type. Providing two locations could ensure that one supply point would be safely accessible.

Due to the lower depth to bedrock as the slope increases, it is suggested that the underground water supply be placed near County Line Road. The authority having jurisdiction (AHJ) in locating these water sources is the Tri Lakes Monument Fire Protection District. They should be consulted as to the location of any water storage for fire protection.

Homeowners Association

The Homeowner's Association (HOA) will be responsible for some or all the implementation and annual inspection of the wildfire mitigation activity, particularly in regard to fuel availability. Specific activities should be developed through a Community Wildfire Protection (CWPP). This effort is supported by the National Fire Protection Association (NFPA) through its Firewise Communities and Fire Adapted Communities Programs. Additional information can be obtained at the website through the link.

It is suggested here, at a minimum, that the HOA schedule cleanup days in the spring and in the fall after needle drop or when grasses have died back. This will provide an opportunity for the community to work together to improve and maintain their wildfire safety. The Association should budget for the removal and disposal of the material that is collected.

In the event of a wildfire incident, evacuation becomes a major factor in the response efficiency of the fire suppression forces. Once the construction of residences within the development occurs, an evacuation plan should be developed in cooperation with the local fire protection district. This plan should result in the appropriate evacuation routes being designated and signage placed along those routes.

The HOA, at the very minimum, should develop an educational plan to help keep the threat from wildfire foremost in the community's mind. This may include articles in the HOA newsletter, presentations at meetings and even posting the wildfire hazard daily at the entrances to the BLMV community.

Forest Management

A detailed forest management plan was completed in 2011 and revised in 2021. This plan is currently being adhered to previous photographs have depicted.

The dwarf mistletoe infection and its potential control remains priority for the forest on the property. Dwarf mistletoe is a parasitic plant which feeds off its host plant. In this instance, ponderosa pine is infected with this parasite.

Dwarf mistletoe does not directly kill the affected trees. It reduces their health as the mistletoe competes for water and nutrients. With the recent severe drought, this added stress does start to kill trees. In addition, this makes the tree susceptible to insects such as bark beetles. These insects attack and complete the process the mistletoe started.

Photo 7. The dwarf mistletoe infection in Douglas-fir. Note the witch's brooms on many of the limbs (red arrows).

In 1977, Frank Hawksworth developed a 6-class rating system for dwarf mistletoe. By dividing the crown of a tree into thirds, a numerical number was assigned to the level of infection in each third. Zero if no infection was observed, one if it was lightly infected and two if the tree had a heavy infection in that third. The three numbers are added together to achieve the overall infection rating.

The best course of action would be to remove all infected trees whose numerical rating is four (4) or above with a long-term goal of complete eradication. Any remaining smaller trees under the main canopy that have an infection rating over 1, would be removed as well. This would also reduce the wildfire risk.

It should be noted that there is no quick cure to the dwarf mistletoe infection. This parasitic plant moves very slowly from tree to tree. This infection has been progressing for decades. To achieve adequate control, it will take repeated entry for management treatments.

A copy of the original forest management plan is included under separate copy.

Appendix A

Fuel Model Descriptions

Fuel Model 6 Summary Page
Fuel Model 9 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."

Low Load, Dry Climate Grass (GR2) Summary Page
Low Load, Very Course Humid Climate Grass (GR3) Summary Page
Low Load Dry Climate Timber-Grass- Shrub (TU1) 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."

FUEL MODEL DESCRIPTIONS
Grass Group

Fire Behavior Fuel Model 1

Fire spread is governed by the fine, very porous, and continuous herbaceous fuels that have cured or are nearly cured. Fires are surface fires that move rapidly through the cured grass and associated material. Very little shrub or timber is present, generally less than one-third of the area.

Grasslands and savanna are represented along with stubble, grass-tundra, and grass-shrub combinations that met the above area constraint. Annual and perennial grasses are included in this fuel model. Refer to photographs 1, 2, and 3 for illustrations.

This fuel model correlates to 1978 NFDRS fuel models A, L, and S.

Fuel model values for estimating fire behavior

Total fuel load, < 3-inch dead and live, tons/acre	0.74
Dead fuel load, ¼-inch, tons/acre	.74
Live fuel load, foliage, tons/acre	0
Fuel bed depth, feet	1.0

Photo 1. *Western annual grasses such as cheatgrass, medusahead ryegrass, and fescues.*

Photo 2. *Live oak savanna of the Southwest on the Coronado National Forest.*

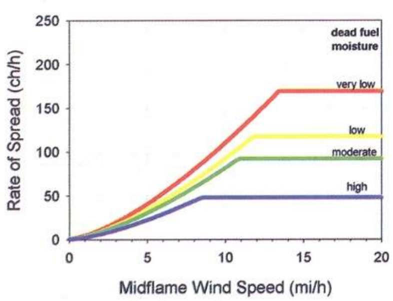
Photo 3: *Open pine—grasslands on the Lewis and Clark National Forest*

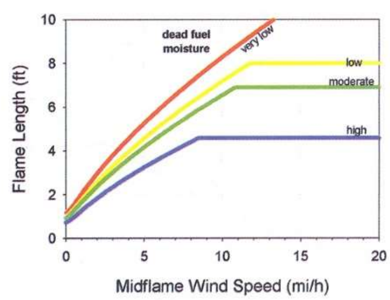
GR2 (102)

Low Load, Dry Climate Grass (Dynamic)

Description: The primary carrier of fire in GR2 is grass, though small amounts of fine dead fuel may be present. Load is greater than GR1, and fuelbed may be more continuous. Shrubs, if present, do not affect fire behavior.

Fine fuel load (t/ac)	1.10
Characteristic SAV (ft-1)	1820
Packing ratio (dimensionless)	0.00158
Extinction moisture content (percent)	15



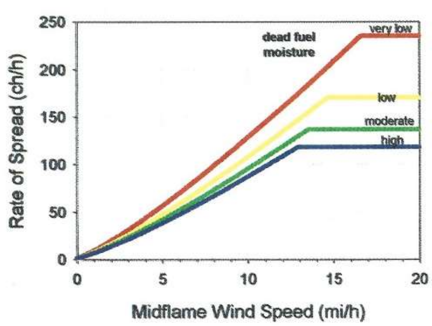


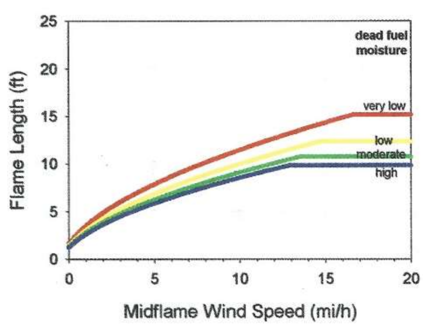
GR3 (103)

Low Load, Very Coarse, Humid Climate Grass (Dynamic)

Description: The primary carrier of fire in GR3 is continuous, coarse, humid-climate grass. Grass and herb fuel load is relatively light; fuelbed depth is about 2 feet. Shrubs are not present in significant quantity to affect fire behavior.

Fine fuel load (t/ac)	1.60
Characteristic SAV (ft-1)	1290
Packing ratio (dimensionless)	0.00143
Extinction moisture content (percent)	30





Fire Behavior Fuel Model 9

Fires run through the surface litter faster than model 8 and have longer flame height. Both long-needle conifer stands and hardwood stands, especially the oak-hickory types, are typical. Fall fires in hardwoods are predictable, but high winds will actually cause higher rates of spread than predicted because of spotting caused by rolling and blowing leaves. Closed stands of long-needled pine like ponderosa, Jeffrey, and red pines, or southern pine plantations are grouped in this model. Concentrations of dead-down woody material will contribute to possible torching out of trees, spotting, and crowning.

NFDRS fuel models E, P, and U are represented by this model. It is also a second choice for models C and S. Some of the possible field situations fitting this model are shown in photographs 25, 26, and 27.

Fuel model values for estimating fire behavior

Total fuel load, < 3-inch dead and live, tons/acre	3.5
Dead fuel load, ¼-inch, tons/acre	2.9
Live fuel load, foliage, tons/acre	0
Fuel bed depth, feet	0.2

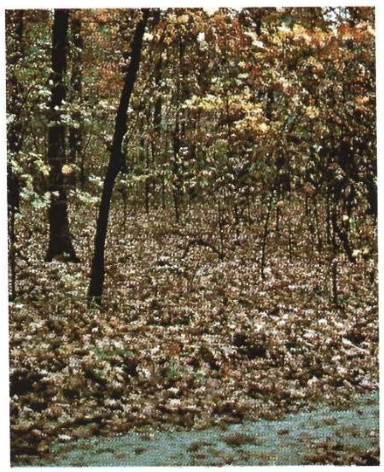


Photo 25. Western Oregon white oak fall litter; wind tumbled leaves may cause short-range spotting that may increase ROS above the predicted value.

Photo 26. Loose hardwood litter under stands of oak, hickory, maple and other hardwood species of the East.

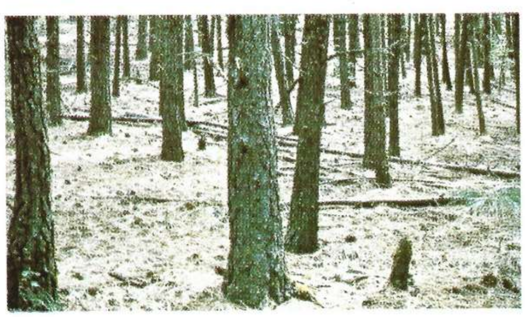


Photo 27. Long-needle forest floor litter in ponderosa pine stand near Alberton, Mont.

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