Wildfire Risk Assessment

Prepared Exclusively for:

HILLCAMP

Brad Wilkin

Brookfield Residential Land

303-790-6354

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Prepared By:

Colten Hardy

High Prairie Tree and Turf

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Section 1: Wildfire Risk Assessment Location

The proposed Hillcamp by Brookfield Residential Land is a 392.2-acre parcel geographically located approximately 1.1 miles due Southwest of the intersection of Ridgegate Parkway and I-25 at N 39.5114004, W104.884235.

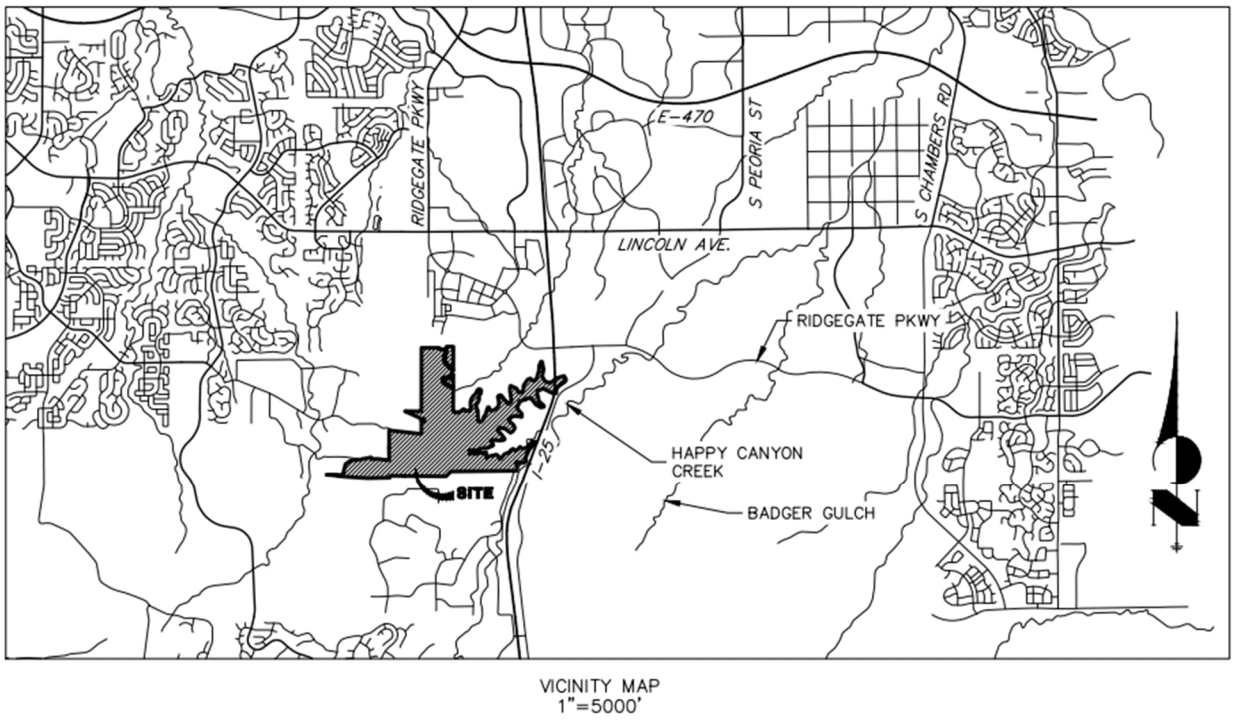

Figure 1 Vicinity Map

The property is bounded on the North by Residential City lots, open space and a commercial district. On the Northwest, the open high desert plains lands of Ridgegate Open Space and Bluffs Regional Park create a soft boundary line tying into Hillcamp. A local trail meanders through the open spaces and on to Hillcamp's Northern boundary. On the East, Hillcamp ties into Lone Tree Open Space, characterized by deep Gambel oak brush ravines and erosion channels running on to grass plains consistent with the area. I-25 runs North and South along the Eastern border of those Open Space tracts. To the South and West, Hillcamp is bordered by residential lots typically in excess of 4-acres. The large residential lots of Surrey Ridge to the South share the typical Gambel oak and native plains grass flora as Hillcamp with more variation in topography, turning into rolling hills and deeper ravines with denser fuel loads. West, the McArthur Ranches subdivision exhibits homes tied tightly to their Gambel oak surroundings. These homes back up into the ravines splitting off from the Hillcamp mesa and are typically surrounded, at least on the border of Hillcamp by dense, contiguous oak and steep ridges.

McArthur Ranches and Surrey Ridge near Hillcamp are both served by Rural Local type III and IV roads. These roads are designed to handle up to 400 vehicles daily that currently dead-end South of the proposed Hillcamp. Plan design incorporates an urban collector from the North, connecting to Ridgegate Parkway, an urban major arterial capable of 35,000+ vehicles per day. The site is conveniently situated near I-25, an 8-lane interstate highway. For wildfire risk assessment, pre-buildout, it is to be assumed that all fire apparatus would have to enter via McArthur Dr. or N. Heather Rd.

It is important to note due to site vicinity, the proximity of three major urban components. The first is the site's proximity to a nearby Level II Trauma and Acute care hospital, Skyridge. Skyridge serves the South metro area and is quickly accessed from Hillcamp. The second is the proximity to and influence from the nearby Class Delta airport, Centennial. Both provide benefits to the site plan, though it is important to note particular fire risks related to the location of the airport and its flight approach and departure lanes. Lastly, the third is the large high voltage transmission lines and easement along the Southern border.

Section 2: Flora and Fauna

Hillcamp is an exceptionally unique property in the sense that it is almost entirely based upon the mesa tops rising South of the metro area and creating a break between the Denver metro and its Southern neighbor, Castle Rock. This geographical phenomenon is home to prairie dogs, elk, coyotes, turkeys, mule deer, pronghorn, red-tailed hawks, numerous small mammals and multiple migrators. The grasslands themselves are comprised of common native cold and warm weather species such as patchy Indian grass, Switchgrass, Cheatgrass, Boueteloua and various Wheatgrasses that are tailored to hard winters with severe temperature drops and low precipitation totals.

Much of the grass has been eaten down due to overgrazing and drought, combined with the effects of local prairie dog populations and an elk herd of 40-50 head. Yuccas are scattered throughout the property where the prairie dog populations have not yet touched and Gambel oak spatters across the ridge lines where it then grows thick and contiguous, down into the neighboring properties. Most of the oak is situated on the fringes of the property lines, flowing down to McArthur Ranches and Surrey Ridge. Few patches of Mountain Mahogany crest the ridges of the property in various areas, making its last stand against the driven winds. Much of the Mahogany is dead due to girdling from small mammals and drought.

Figure 2 Overgrazed grasses with interspersed yucca and mahogany in the background.

The vast majority of the property is covered in scenes similar to Figure 2, dry grasses pressed down by the few snows of the winter interspersed with yucca and mahogany. The grasses towards the North end of the property are in better shape than those along the Southern border which have largely been eaten down by Prairie Dog activity. Much of the Southern portion of the property would be considered barren due to drought and Prairie Dog activity. The remainder of the property, particularly in the ravines flowing out to nearby properties are a mix of Oak Shrubland, Grassland, Developed and Riparian areas.

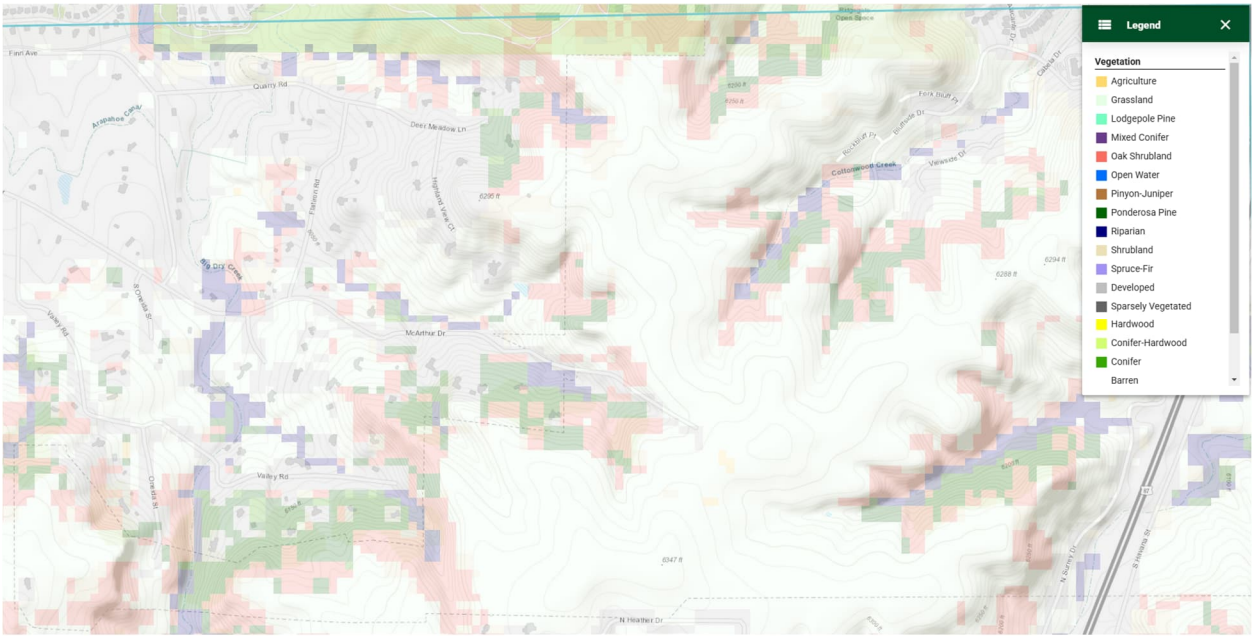

Figure 3 Vegetation Characteristics of Hillcamp and neighboring properties.

Figure 4 Barren ground due to overgrazing and Prairie Dog activity. Elk herd in background.

Section 3: Climate

Hillcamp, being a part of Lone Tree's corridor of the Southern Metro, experiences a semi-arid climate typical of the Colorado front range at roughly 6,300ft. This area typically enjoys 4 distinct seasons but can experience severe weather opposite of expected in almost all seasons due to its proximity to the foothills of the Rocky's. This close proximity can bring about rapid temperature swings, severe weather, especially in spring and Summer, and at times locally heavy snowfall. Total precipitation amounts for the area are typically near 15-18" with some years being closer to half of that. Latest trends in the past two years have seen extreme weather in May bringing about locally heavy rain and hail totals of up to 20-30" over the course of a few days. Evidence of these heavy rains can be seen in the drainage flows from the mesa. These flows will play a role in deciding the best practices for mitigation prescriptions.

- **Winter**: Winters are cold and typically dry, with average low temperatures ranging from 10°F to 20°F in December and January. Snowfall is moderate, averaging around 30

inches per year, though snowstorms can occasionally bring about locally heavier accumulations due to the topographical effects of the bluffs.

- **Spring**: Spring in this area is typically marked by a gradual warming, with daytime temperatures ranging from the mid-40s°F in early March to the mid-70s°F by late May. Rainfall increases during this period, particularly in May, with occasional thunderstorms bringing brief, heavy showers. Spring and Fall are the highest chances for extreme weather.
- **Summer**: Summers are warm to hot, with daytime highs typically ranging from the mid-80s°F to low 90s°F though most summers will see a week or two over 100°F. Summer thunderstorms can occur, particularly in the afternoons, bringing brief rainfall and cooler temperatures. These storms are often short-lived but typically carry strong winds and hail. Summers are typically characterized by low humidity and frequent "Red Flag Days." These days occur when strong, driven winds couple with low humidity.
- **Fall**: Fall sees temperatures gradually cooling from the mid-80s°F in September to the 40s°F in November. Lone Tree experiences the occasional rain or snowfall during this time, with October being the driest month of the year. Fall foliage in the area is particularly vibrant, as the local oak and deciduous trees around the area transition into exciting autumn colors.

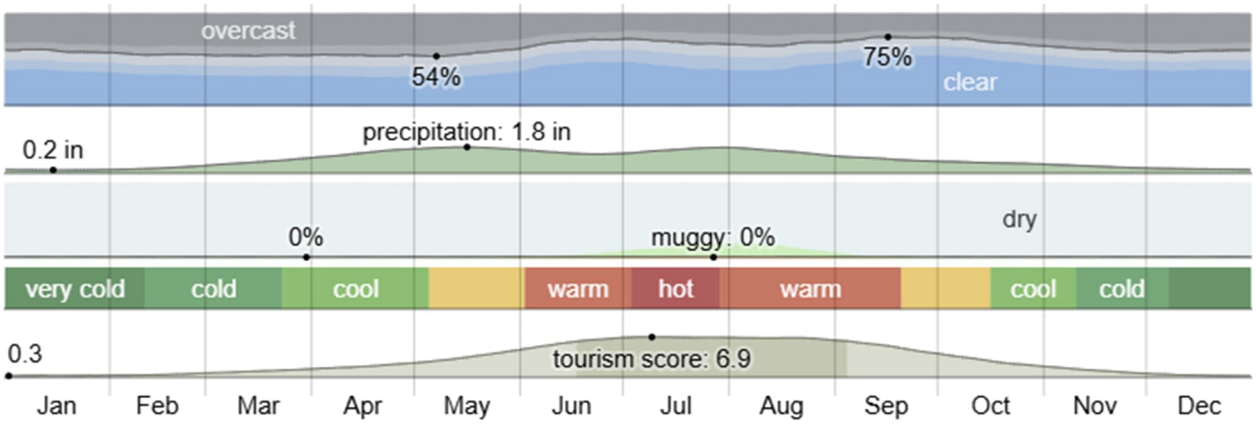

Figure 5 Weatherspark graph displaying monthly averages.

Section 4: Wildfire Risk Assessment

With recent trends in growth, particularly in this urban corridor of Colorado, the risk of wildfire is significantly higher than in the past. To understand how “risk” is calculated and the impacts of its varying ingredients, we must first define risk in a scientific context. Risk is not just the possibility of a wildland fire breakout in the WUI or wildland urban interface, but an assessment of the hazards, exposure and vulnerabilities that compile to define risk. A once in a lifetime fire in the middle of an island may damage the local physical environment, but if there is no damage to infrastructure, loss of life, resource destruction or chance of spread to areas with more vulnerabilities, there is little “risk.” However, the same fire on the same island with a large subdivision, water treatment plant and resource rich forest now becomes elevated risk.

Risk Assessment

A risk assessment was compiled based on the current environment present at Hillcamp with input from the climate, vegetation, surrounding risk and topography. Currently in this WUI, based on threat to infrastructure, buildings, watershed, environment and fire types, intensity and burn probability, the overall risk is “low” but that can be misleading dependent upon interpretation.

WUI Risk Index

The Wildland-Urban Interface is an index created with scientific backing and AI-driven algorithms to estimate fire damage at varying intensities to determine the greatest risk to homes and people. The WUI index measures housing density based on national standards and compiles them for millions of simulations. Understanding where people live in these areas is important for assessing wildfire risks, particularly to homes and communities. The WUI Risk Index helps predict wildfire impacts by using a modeling approach that considers how different fire intensities, like flame length, fire intensity and type of fire affect homes and other assets. These models are then run to compile data on the WUI Risk, creating the WUI Index. The WUI index takes into account the risk associated with nearby properties and developments as well, to create a broader picture for the end user. In the WUI Risk Figure below, you will see there is no risk associated with much of the Hillcamp proposed development right now, as for reasons mentioned above, the risk overall is nil when accounting for infrastructure, buildings, etc., as there are none. However, in the developed areas West and South of Hillcamp, many areas in McArthur Ranch and Surrey Ridge are in the most extreme risk rating due to the housing density and dense fuel types leading to high intensity fires. Portions of Hillcamp to the Southwest reflect a higher risk probability due to neighboring properties. It is important to note this is a broad scheme picture to understand risk and its interpretation and thus does not show property lines. The rectangular polygon is roughly centered over Hillcamp.

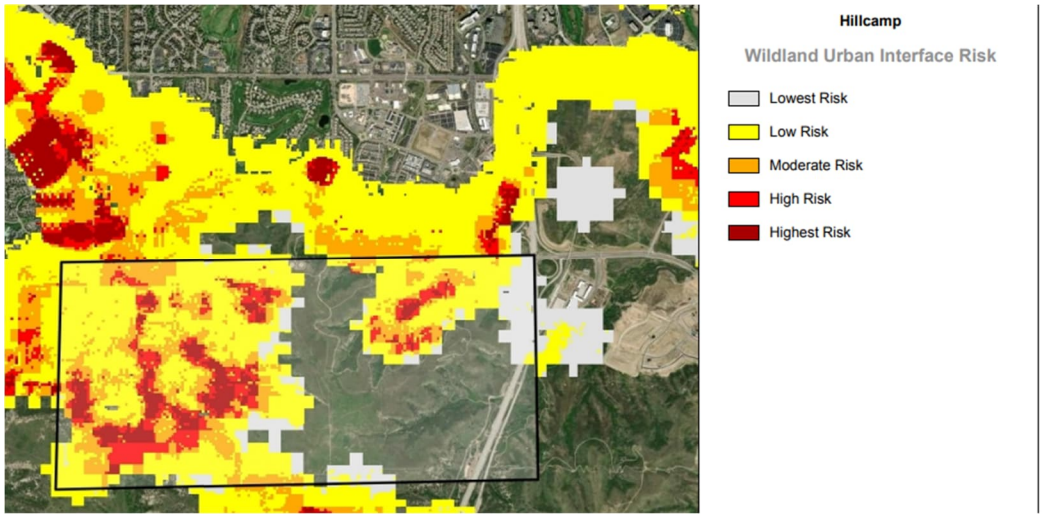

Figure 6 WUI Risk Index. Hillcamp is predominantly shown as the area in Lowest to No Risk.

One of the major factors leading to a WUI Risk index rating is wildfire risk to assets. As there are no physical assets on the property currently, the largest portion of risk is to the bike trail, fences and neighboring properties. Fences and trails are considered low to no risk in this index.

Burn Probability

Burn Probability (BP) represents the likelihood of a specific location burning due to a wildfire for any given year given current factors. Using the same simulations, 2 million fires were simulated within the state. Because the majority of fires occur during severe fire conditions, only high and extreme weather scenarios were used in the simulations. These simulations were then adjusted for historical fire data based on occurrences and outside influence from human and natural factors. Unfortunately, Hillcamp and its neighboring properties, given current conditions, are “Moderately High” to “High” on the BP index. Part of this is due in part to the “Highest” BP that the neighbors to the South experience. It is realistic to shoot the probability higher as well due to the proximity of a state highway and the human influence that it brings, along with the influence from local airport traffic and the high voltage power lines. Again, this being a broad picture analysis of the risk for Hillcamp, we must include outside influence. The rectangular polygon sits roughly centered over Hillcamp. Note the BP to the South of Hillcamp.

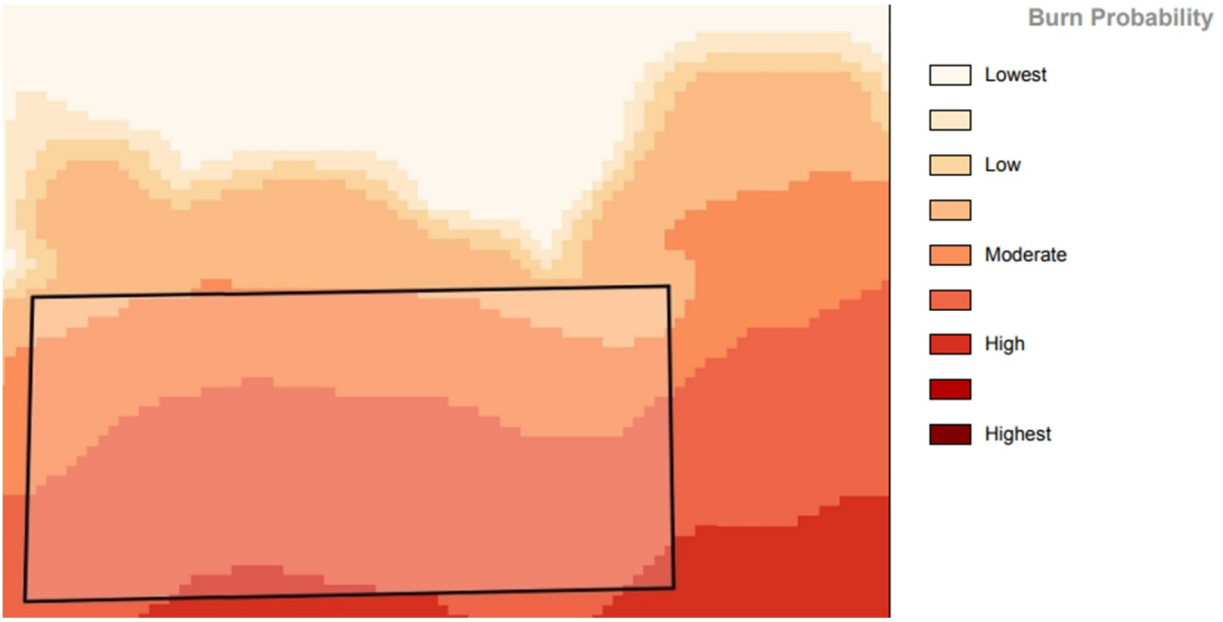

Figure 7 Burn Probability in and around Hillcamp.

Fire Intensity

Burn Probability and Fire Intensity are designed to complement each other when assessing wildfire risk. Unlike Burn Probability, the Fire Intensity Scale does not consider historical fire occurrences. Instead, it focuses purely on potential fire behavior based on fuels, weather, and topography, regardless of whether fires have previously occurred in an area. Fire intensity is largely driven by, and defines, the flame length and spotting chances and distances of any given fire. In the simulations used to create the Fire Intensity Scale, weather is changed and averaged to best reflect actual conditions. These averages are then computed with other factors such as fire spread rates and method, such as with, against or sideways from a wind.

Fire intensity for much of Hillcamp is currently low to moderate, due to the light, patchy fuel loads leading to surface fire with short flame lengths. These short, dry, low moisture-density grasses however *do* have a high rate of spread due to their fast heat transfer and combustion due to the "fine fuel" nature inherent to dry grasses. Couple that with their lightness and wind throw possibilities and you have a fast-moving fire of 12-40 chains per hour (or feet per minute) in the grasslands and a higher rate of 40-60+ chains/hr in the steep ravines filled with Gambel oak. With most fires occurring during periods of extreme weather, and given Hillcamp's topography, being on a bluff above most of the surrounding area, it is imperative to understand a fire here will likely be driven by strong winds.

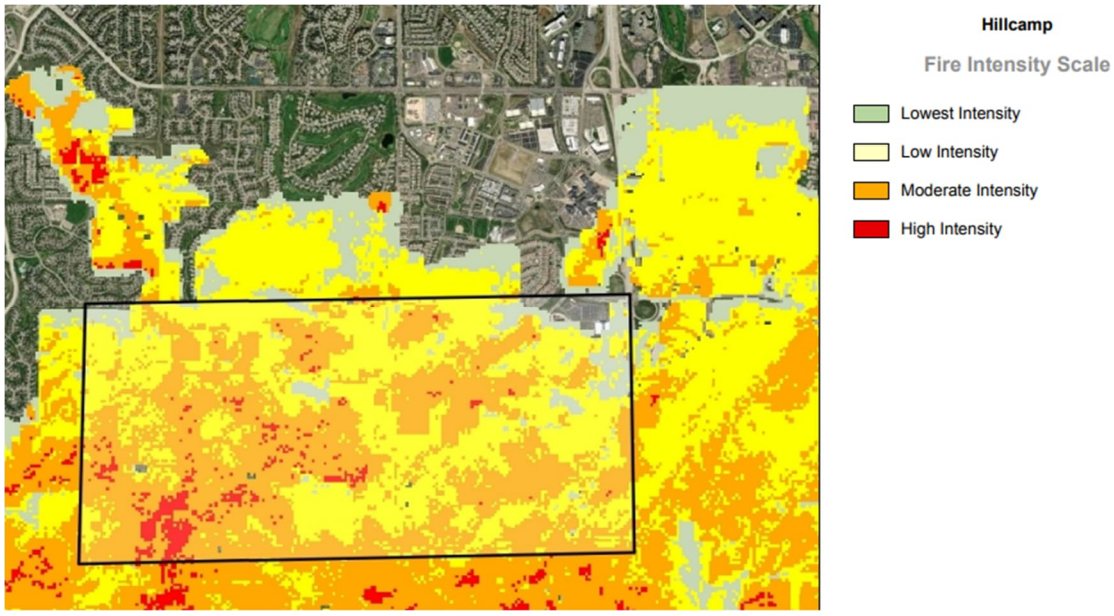

Figure 8 Fire Intensity Scale. Note the High intensity areas especially in neighboring ravines.

Watershed and Environmental Risks

Fires serve in nature as a critical tool to rejuvenate overgrown areas and help with repopulation of native environments. However, when high-severity fires run through an area, as is common in the post-modern WUI due to human impact, they can have a detrimental impact on environmental resources. High-severity wildfires typically destroy nearly all vegetation from trees and shrubs to the ground litter underneath, all of which are critical to protecting the soil layers and preventing erosion and severe run-off. The loss of vegetation leaves forested slopes vulnerable to serious soil erosion and flooding when heavy rains follow, as is common in Colorado's climate, and prevents soil from absorbing water as it is held by the grasses and roots and slowly percolates through the soil layers. These risks can jeopardize the safety, health, and integrity of downstream communities and natural resources. The likelihood of these issues in Colorado is higher due to the presence of highly erodible soils in certain areas and frequent weather patterns that bring heavy rainfall shortly after fire season. Much of Hillcamp, due to its relatively flat nature across the top of the mesa, is low risk. However, particularly in the ravines that shed water off the mesa, the risk jumps significantly. The following figure is made with a relatively opaque layer to show the topography and see how the slope affects the Watershed Risk. Note that most areas of moderate to high risk are specifically in steep terrain. The highest risk areas are East of Hillcamp, along the Lone Tree Open Space property.

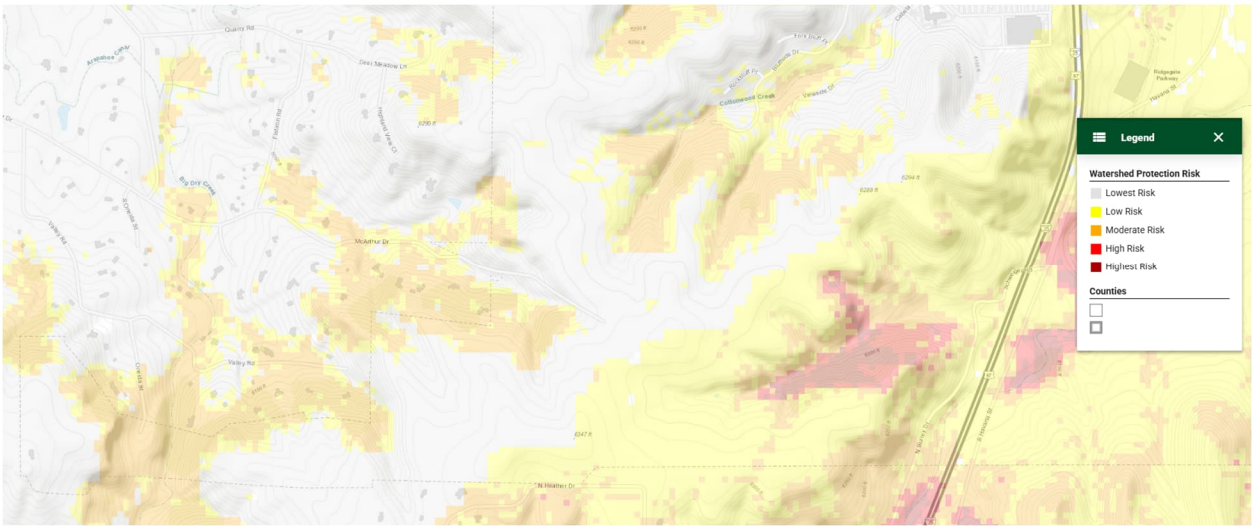

Figure 9 Watershed Risk

Other Considerations

As this WRA is made prior to plat and buildout, it is critical to understand the current risks to see how future risks will be affected and mitigated. Not shown in this Assessment are the risks to Forest Assets, Riparian Areas and most importantly Building risk. This is due to the fact there are currently no building assets, forested areas or riparian areas on the site. There are a series of powerlines that feed across the center of the property, North to South, that tie into the overhead high voltage lines with plans at build out to place these lines underground. Typical power line risk lies in their ability to spark a fire, which is typically driven by wind throw and branches of trees or other material creating a fault on the lines, called direct conduction. This is not the case on the property, as there are no trees near the power lines. Other cases are driven by electrical discharge, common with high voltage lines, however not a worry in this case either due to lack of proximity issues. There is always the possibility of a bird or random debris being caught in the lines and sparking or an incident with a small plane as occurred back in June of 2021. A small plane on approach to Centennial, and a pilot new to the area, were caught in the high voltage lines on approach, creating a crash and a small fire just East of the proposed plat. It was quickly doused but bears mention due to the proximity of Centennial to the proposed plat. As the plat is developed, risk will grow significantly with the addition of homes, infrastructure and life.

Off-site Amendments

Included in the original study area but brought to further attention, the Cabela Dr. plat will be an off-site built improvement providing access to Hillcamp. This plat includes a proposed road extension through the lower valley and ravine areas, surrounded by GS2, SH7 and GR1 fuel loads. As is common in this area, the GR1 short and patchy grasses make up the valley floor. These fuel loads experience moderate spread with a low flame length. As the terrain begins to

steepen into the ravine mouth, we see a common mix of GS2 fuels of patchy grass interspersed with 1-3ft clumped mahogany expanding and creating a marriage of fuels with the SH7 heavy shrub oak. This is common for the area and helps reinforce the steep and rocky terrain, preventing erosion. Spotting chances in this particular plat range from low to moderate, with low to high flame length and similar chain rates based on the diverse fuel types. Most of this plat is split in thirds with regards to fuel type and load because of the study area layout. In this particular area due to foot traffic and proximity to nearby existing homes and roadways, we see a higher likelihood of accidental ignition based on human interaction. The elevated risk of this particular area still falls within the lower sub-urban risk ratings given to the rest of the property based off of historical data. Due to the adjacency of nearby homes, risk to life and buildings is higher than the currently unbuilt Hillcamp. Home and building risk is still lower than nearby urban WUI, but overall WUI risk will rise with construction. The addition of a hard surfaced fuel break will decrease the associated risk values and increase the egress capabilities. Ingress/Egress traffic will experience a higher vulnerability here at buildout due to the increased traffic load from Hillcamp, as more vehicles are put on the road in event of mass ingress/egress.

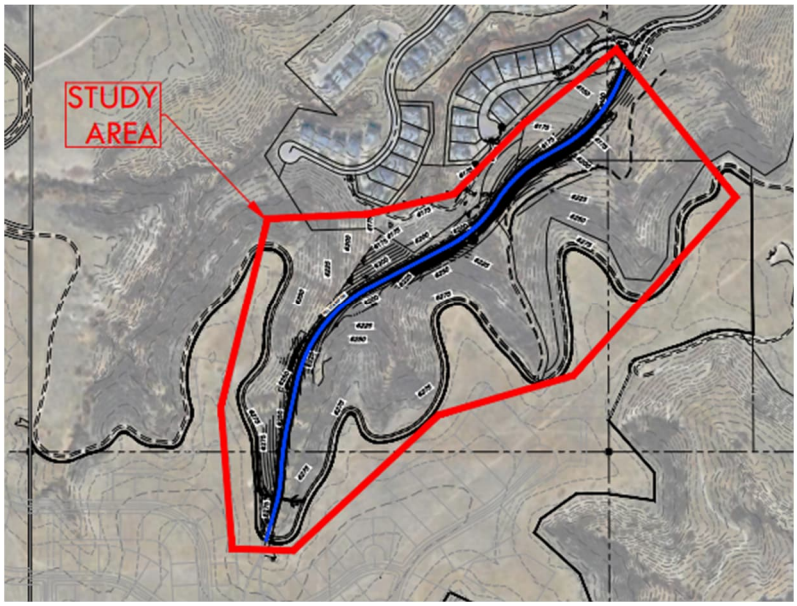

Figure 10 Cabela Dr. Study Area

Fuel Loads

Fuel loads are defined by the Fire Behavior Fuel Model System and are used to simulate fire effects, probability, intensity, etc.

GR1

GR1 is commonly known as short, sparse dry climate grass, usually less than 1ft tall. The fuel load is very light, but not quite barren. These fuel loads are fast drying, making them quick to ignite. The associated fire spread rate is low but can be fast during extreme conditions. These fuel loads are exceptionally common in grasslands of the area due to their semi-arid native growth. These grasses are often clumpy, or patchy and low density. GR1 Fuels typically have a slow to moderate spread rate due to their low density and continuity. Flames are typically 1-3Ft in length and are primarily driven by wind. GR1 fuels are often considered minimal risk. GR1 makes up roughly 30% of the site.

Figure 11 GR1 Fuel loads on site.

GR2

GR2 fuel loads are similar to GR1 in their composition but have a more contiguous grass cover and burn hotter and faster due to denser fuels as than GR1 commonly found in semi-arid, desert regions. These fuels consist of short to moderately tall grasses with more continuous coverage than GR1, meaning there is less bare ground between patches. The total fuel load is also slightly higher than GR1, providing more material for fire spread. Fire behavior in GR2 fuels is moderate, with a faster rate of spread and longer flame lengths than GR1, especially under windy conditions. Similar to GR1, the primary driver of fire in this fuel type is wind, which can push flames quickly through the grass. GR2 is commonly high deserts where grasses dominate but do not reach the heights or density of more intense grass fuel models like GR4 or GR6.

Figure 12 GR2 Fuels from Hillcamp in the foreground. GS2 visible near trail on right.

GS2

A GS2 fuel load represents a moderate load, dry-climate grass-shrub model, where grasses and shrubs are mixed but neither dominates entirely. The grasses provide a continuous, fine fuel bed, while the scattered shrubs add pockets of higher-intensity fuels with larger flames. The continuity of the grasses provide faster spread compared to a GR1 model. Fire spread is moderate to fast, and as is usual with other GR fuel types, is primarily driven by wind, but shrub components such as oak and mahogany can lead to localized flare-ups and increased flame lengths. The fuel load is more volatile than pure grass models like GR2 but less intense than heavier shrub-dominated models. GS2 is commonly found in high deserts where native drought tolerant grasses mix with scattered shrubs, allowing fire to move quickly through the grasses while igniting shrubs intermittently. See above figure for GS2 Fuel Loads.

SH7

An SH7 fuel load represents a very heavy load, dry-climate shrub model, characterized by dense, thick shrubs with minimal grass or fine fuels. These fuel types are consistent with many Gambel oak and mahogany fuels around the area. These shrubs typically range from 4 to 6 feet tall, creating a high-intensity fire environment with extreme flame lengths and rapid heat release. Fire spread is driven primarily by fuel continuity rather than wind, meaning the fire moves aggressively through the shrub canopy. The fuel load is very high, around 11.0 tons per acre, making SH7 one of the most intense shrub fuel models. These high fuel loads commonly have extreme amounts of associated ground litter, giving more fuel to the fire. It is commonly found in dry foothill shrublands, where fire behavior is dominated by crown fires, torching, and intense radiant heat, making suppression efforts extremely challenging. In Hillcamp, these fuel

loads are exclusively situated in the deep ravines. These deep ravines lead to other fire issues such as pre-heating and vortex creation. It is called the “chimney effect” when these fuels burn and pre-heat other higher elevation fuels, drying them out and increasing their exothermic reactions before the fire reaches and torches them. SH7 fuels in our area can be the most dangerous when driven by extreme weather.

Figure 13 SH7 Fuels in Hillcamp ravines. Note GR2 fuel models at tops of ridges.

Findings

At present, based on the scientifically backed WUI Risk index and our understanding of its key components, the overall risk for the Hillcamp proposed plat is currently low. This is primarily driven by the minimal impact to human life, infrastructure and building assets, and low environmental impact. These findings however show that the likelihood of a fire is high, and if one were to occur, it could sweep through the property quickly, then flowing in to neighboring properties with much denser and heavier fuel loads. It is important to note that while the risk for the property itself is low, the overall risk for surrounding properties is moderate to high, particularly to the South. Hillcamp plays only a small part of a larger picture and as such, is invested in making efforts to help reduce associated risks to neighboring properties. Hillcamp interfaces on the Southern edge of the urban metro which has a very low burn probability but an exponential risk to asset and life. Understanding how Hillcamp’s fuel loads, topography and burn probability incorporate into the larger WUI are critical for protecting itself, the environment and the community surrounding.

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