GOLD HILL SUNSHINE

BWWA

BOULDER WEST
WILDFIRE AUTHORITY

FOUR MILE SUGARLOAF

COMMUNITY WILDFIRE PROTECTION PLAN

2023

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INTRODUCTION TO THE DOCUMENT

The wildland urban interface (WUI) is commonly described as a zone where residential structures and other human development meet and intermingle with undeveloped wildland or vegetative fuels. This zone poses tremendous risks to life, property, and other values in associated communities and is one of the most dangerous and complicated situations firefighters face.[i]

In response to the Healthy Forest Restoration Act (HFRA) in 2003, Congress directed Wildland Urban Interface communities to prepare a Community Wildfire Protection Plan (CWPP).

The project of preparing the CWPP relies on a broad and varied group of collaborating entities and individuals, with expertise and valued perspectives relating to wildfire. The CWPP provides many tools to better understand wildfire risk in an area of study, and it recommends projects and other solutions to mitigate wildfire risk. Priorities are placed on solutions for communities and areas where risk is high, and values are most vulnerable.

The completed CWPP incorporates a comprehensive set of information relating to wildfire to be used by citizens, fire district personnel, land management professionals, and other interested parties. The main purpose of the CWPP is to empower all concerned parties to take timely and meaningful action to reduce wildfire risk to communities and associated values in the study area.

This CWPP represents a collaborative plan developed by four contiguous fire districts in Boulder County, Colorado: Four Mile Fire Protection District (FPD), Sunshine FPD, Gold Hill FPD and Sugarloaf FPD. The entirety of the CWPP Study Area is in the Wildland Urban Interface.

This project meets the requirements of the federal HFRA and the Colorado State Forest Service current standards for CWPPs.

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AUTHORSHIP

Representatives from each participating district were selected by their district for **the CWPP Core Team**, and they are the authors of this document.

Many additional fire district personnel, stakeholders, subject matter specialists and residents in the study area contributed to produce an accurate representation of wildfire risk, and a thoughtful collection of recommended solutions.

THE CWPP CORE TEAM

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COLLABORATIVE APPROACH

Gold Hill, Sunshine, Four Mile and Sugarloaf Fire Protection Districts collaborated to produce this Community Wildfire Protection Plan for the four-district study area.

This approach recognizes that wildfire risk reduction can be better accomplished collaboratively than separately. Reducing wildfire risk on a landscape scale must involve large-scale projects, which can only be effectively planned and implemented in a collaborative manner.

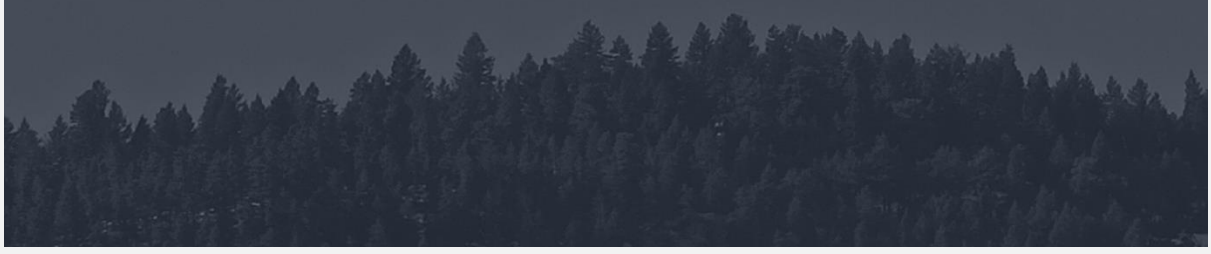
The collaborative approach also recognizes that the wildfire risk profile of all four districts is deeply interconnected. As will be shown throughout this document, the four districts share many common landscape and social features that relate to wildfire risk. The four districts respond to emergencies together, plan together, and implement wildfire risk reduction projects together.

Wildfire risk is an intrinsically multi-jurisdictional problem, and fire district boundaries become arbitrary when dealing with the potential impacts of uncontrolled wildfire.

The four districts' commonality and history of close partnership argued for creating a single plan to address wildfire risk reduction. The collaboration on this project has also led to the creation of the Boulder West Wildfire Authority (BWWA) which comprises the four districts.

The BWWA formalizes the districts' commitment to collaborative wildfire planning and risk reduction project implementation. It also signals a philosophical commitment to working collaboratively on a broader scale, with local and regional stakeholders and interested parties.

The BWWA also entails a written commitment to fulfill the recommendations of this document actively and continuously. Hereafter in this document, BWWA will be used to refer to the four districts collectively, and their combined geographic boundaries.



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UNDERSTANDING WILDFIRE

Landscape fires burning in vegetation are an integral part of our world. Fire is critical to the healthy functioning of ecosystems, and for millennia has been used as an effective land management tool.

Wildfire is defined as a landscape fire that has burned out of control.

Wildfire can be caused by nature, for example a lightning ignition, but most wildfires, and the most destructive wildfires[ii], are caused by human ignition, for example unattended campfires or faulty electrical lines. Like any fire, wildfire requires oxygen, heat, and fuel to sustain.

A variety of factors and influences determine the occurrence and extent of wildfire. The primary three factors are **fuels[1], weather, and topography**. A more complex array of factors determines the severity of wildfire, and wildfire impacts on values at risk.

Not all wildfires are catastrophic, in fact most are suppressed or extinguish naturally before growing to large, troublesome incidents. However, given a set of conditions conducive to fire spread, wildfire has immense catastrophic potential.

The potential harm wildfire poses to values at risk, such as life, property, the natural environment, and infrastructure, is the reason for this document. The Community Wildfire Protection Plan aims to define and understand wildfire risk in order to recommend solutions that reduce risk and promote healthy landscapes and safe communities.

This document assumes a baseline understanding of wildfire as a phenomenon. Throughout the document, and particularly in the resources section, various works and publications will be cited, which offer a deeper understanding of wildfire.

[1] Anything that can burn is fuel for a fire. During a wildfire all kinds of plant and manmade material can act as fuel.

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GOALS

THE GOALS OF THE **CWPP** INCLUDE THE FOLLOWING:

1. Enhance life safety for residents and first responders
2. Reduce wildfire risk to landscapes and communities, and mitigate undesirable fire outcomes to property, infrastructure, the environment, and quality of life
3. Promote community awareness of and engagement with wildfire risk
4. Expand the capacity of fire districts, residents, and other stakeholders to facilitate and prioritize appropriate wildfire risk reduction projects

TO ACCOMPLISH THESE GOALS, THE **CWPP:**

1. Considers values at risk in the Study Area
2. Assesses wildfire risk in the Study Area and at a community level
3. Develops and recommends specific actions that will reduce wildfire risk to values

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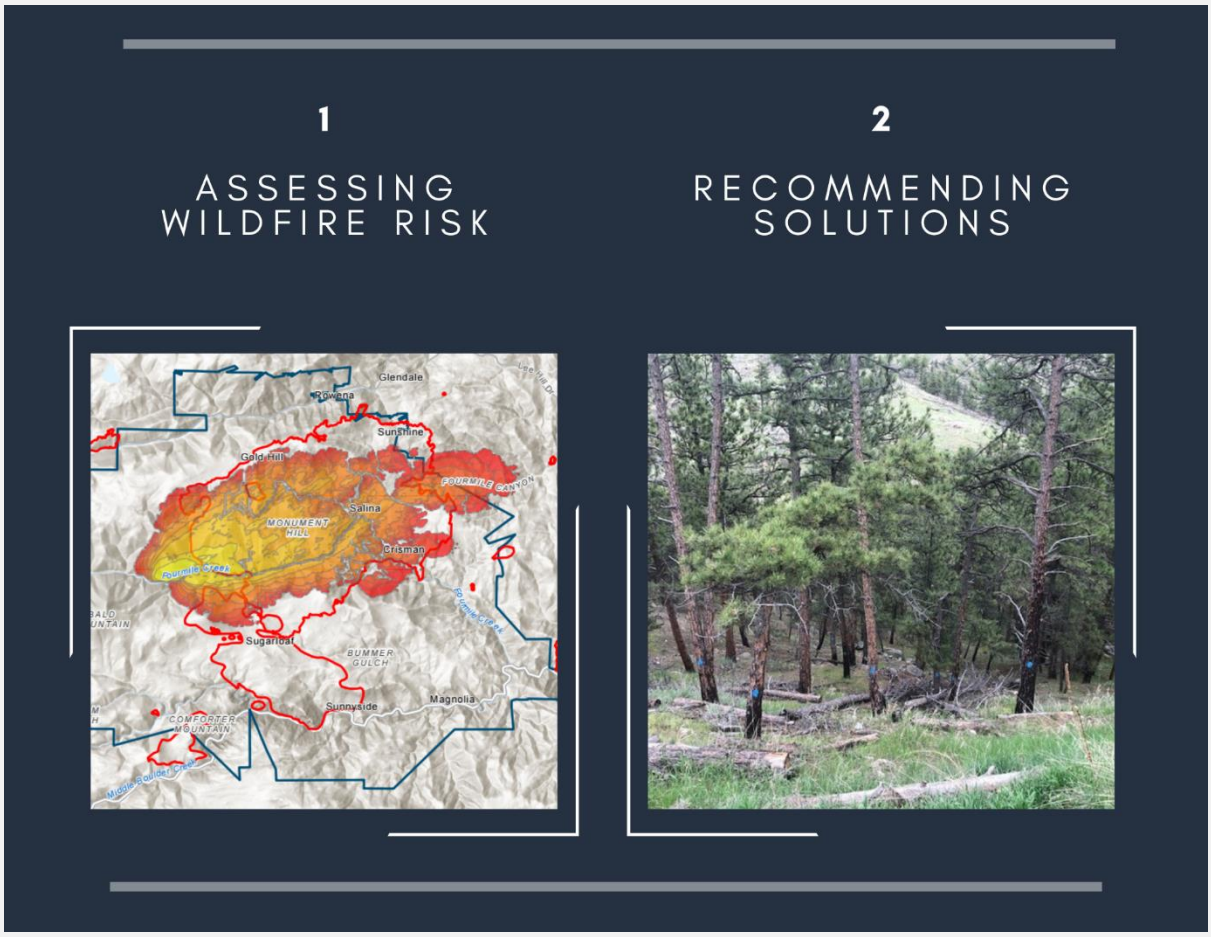
PROCESS

The creation of the CWPP began with the recognition that each of the participating district's existing CWPP's needed an update and revision.

The Core Team convened and agreed on a CWPP development process to produce an actionable, solutions-oriented product that would provide for wildfire risk reduction activities with broader scopes and greater impacts across a four-district Study Area.

The process is based on established best practices for CWPP development and conforms with state and national standards for CWPPs.

THE CWPP DEVELOPMENT PROCESS CONSISTS OF TWO OVERARCHING ELEMENTS



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Values at Risk

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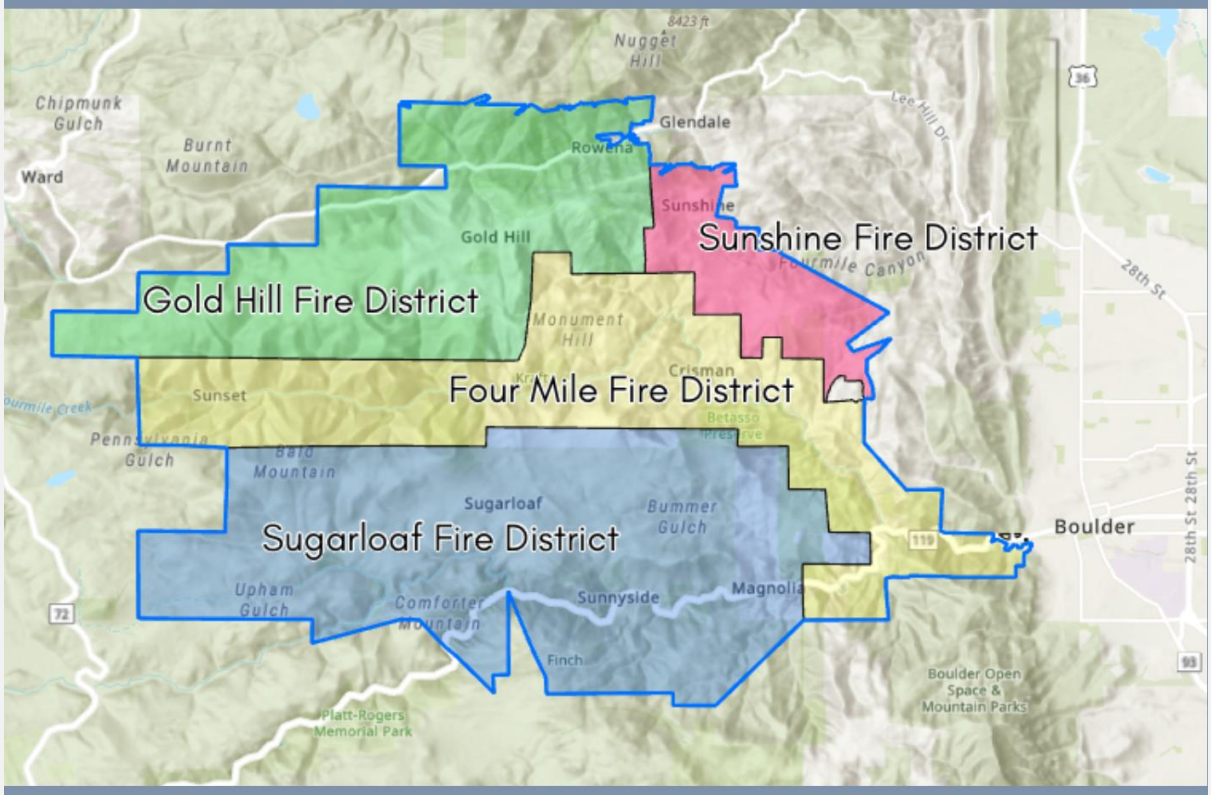
STUDY AREA OVERVIEW



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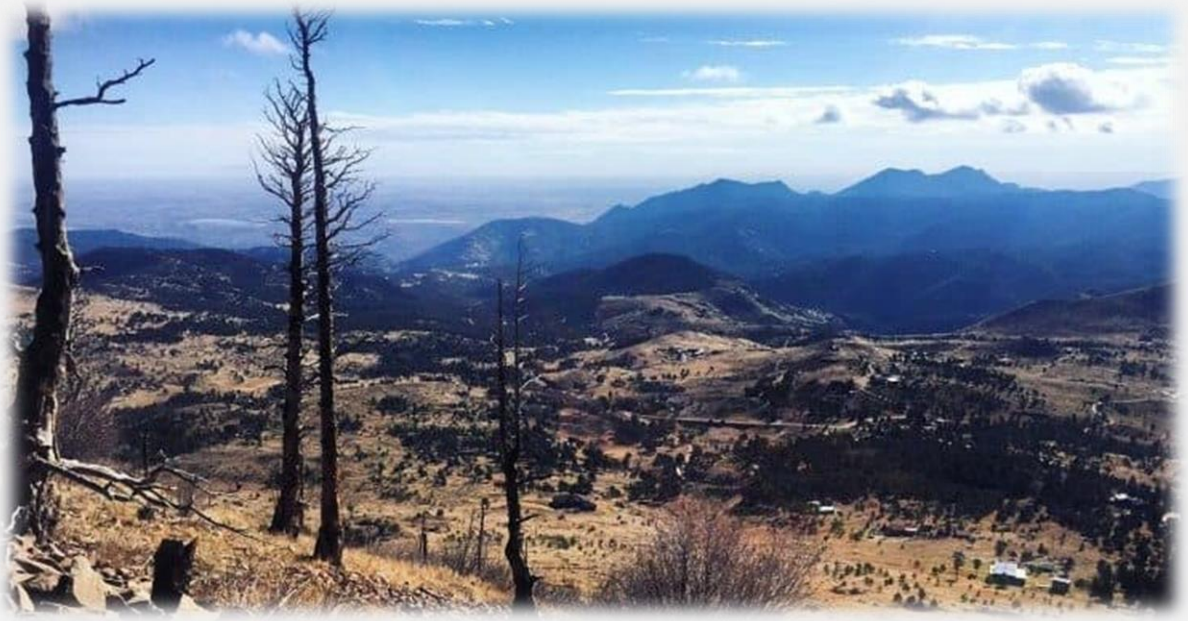
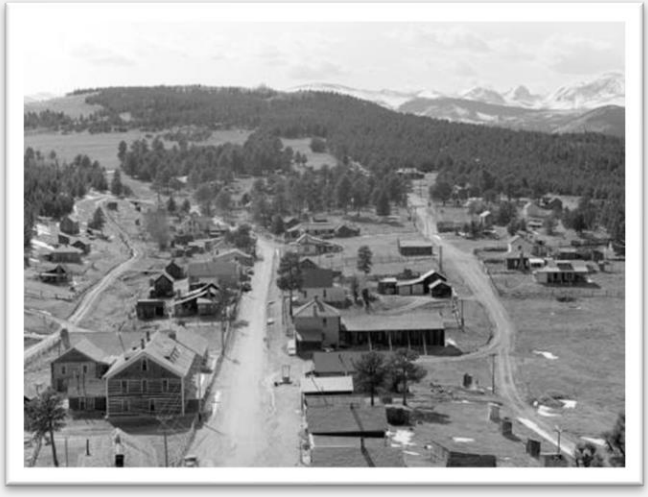
BOULDER WEST WILDFIRE AUTHORITY
AREA SUMMARY



The Boulder West Wildfire Authority (BWWA) comprises the Gold Hill, Sunshine, Four Mile and Sugarloaf Fire Protection Districts in unincorporated Boulder County, Colorado. The Study Area lies in the foothills immediately west of the City of Boulder. The area is a rapidly growing social, economic, and recreational destination and is regarded as a very desirable place to live and visit.[iii]



The earliest extant communities in the Study Area were mining communities that date back to the mid-1800s. The current town of Gold Hill grew out of a small mining camp that was established in 1859. There are many cherished cultural and historical sites and structures throughout the area.

Over the course of 200 years, the communities have evolved, and although there is a commercial element to the Study Area (namely hotels, restaurants, a summer camp, a general store, and other small businesses) the area is primarily residential and recreational, and the main values at risk present in the Study Area relate to life, property, the environment, and culture. There are several major sites of critical infrastructure in the Study Area, and a Boulder Valley School District elementary school operates in the historic schoolhouse in the town of Gold Hill.

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Approximately 4,200 residents live throughout the 47 square miles of the BWWA. Despite the large areas of undeveloped public lands, every portion of the Study Area entails wildlands interfacing with residences and other human development; **as such, the entirety of the BWWA is considered to be Wildland Urban Interface (WUI)**.

The Study Area is characterized by many small communities, and other areas of widely dispersed residential populations. The landscape features steep canyons and foothills, dense montane forests, large and small creeks with associated critical watersheds and drinking water sources, and a large wildfire burn scar from a devastating fire in 2010 that meets an earlier burn scar from a 1989 wildfire. The rugged and complex topography in the area is a major factor in the wildfire risk profile of the area.

Wildfire risk in the Study Area is a significant indirect threat to the City of Boulder, particularly the areas of WUI in west Boulder, but extending much farther east due to the potential of structure-to-structure wildfire spread if wildfire became established within the city limits.

Despite the presence of state highways, access and egress for the Study Area is very limited, with many "one-way-in-one-way-out" communities. In communities without dual-access roads, the single access roads are often steep, winding, narrow dirt roads.

Boulder Canyon Drive (State Highway 119) and Sunshine Canyon Drive are the main roadways providing access to and from the Study Area. Sugarloaf Road and Fourmile Canyon Drive are the primary roadways traversing Sugarloaf and Four Mile's districts.

Gold Hill can be accessed from Fourmile and Sunshine Canyon from the east (those access roads meet at the town of Gold Hill), Lickskillet and Lefthand Canyon Drive from the north, and Gold Hill Road from the west.

Gold Hill and Sugarloaf's districts extend to just east of Peak-to-Peak Highway (State Highway 72), marking the western extent of the Study Area, the north aspect of Boulder Canyon marks the southern extent, the city limits of Boulder mark the eastern extent, and Lefthand Canyon marks the northern extent.

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The area is in the Montane zone (6,000-10,000') of the eastern slope of the Northern Colorado Front Range. The predominant vegetation is Ponderosa Pine and Douglas Fir, with Lodgepole Pine and hardwood stands at higher elevations. The Four Mile Fire footprint is now largely vegetated with short grasses and shrubs, with standing dead trees and extensive deadfall.

In the mid-1800s, forests in the Study Area and throughout the Front Range were more open and between two and three times less dense than they are today. With the increased crowding of trees, forests in the Study Area are characterized by denser stands of smaller trees. This change in forest composition has increased vulnerability to fast-moving and destructive wildfires, in addition to disease and insect infestation.

The Study Area comprises four fire districts providing all-hazard emergency response services to their respective jurisdictions. The response capabilities of the four districts are generally alike, particularly with respect to wildfire suppression preparedness.

Each district is a volunteer agency, apart from the Four Mile Fire Protection District, which is mostly volunteer, but hosts a small paid firefighter program devoted to daytime emergency response and hazardous fuels reduction projects. The fire districts in the Study Area rely on mutual aid agreements, particularly when responding to escalating incidents such as wildfire.

Many landscape and manmade features in the Study Area pose significant challenges to wildfire response and suppression.

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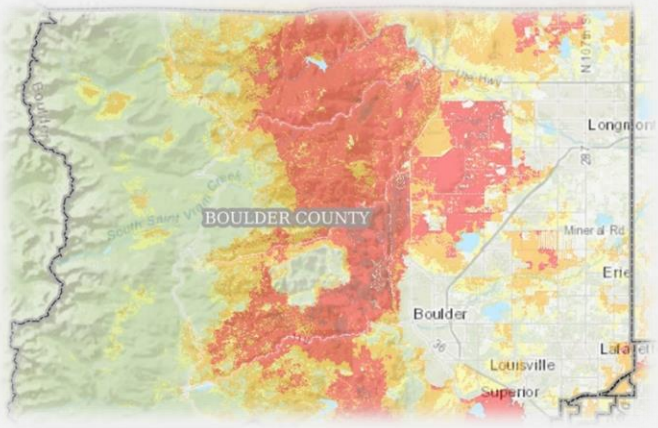
The Study Area is marked by a recent history of significant disasters.

The 2010 Fourmile Canyon Fire set the Colorado record for number of homes destroyed by a wildfire (a record that has been repeatedly eclipsed in the intervening years) and fundamentally altered the social and environmental landscapes of our Study Area, severely impacting all four of the districts involved in this CWPP.

The deadly 2013 Boulder County Flood heavily impacted the Study Area as well. That disaster was compounded by the landscape impact of the Fourmile Canyon Fire, as the dramatic reduction of vegetation resulting from the fire increased the landscape's susceptibility to landslides and flooding. The 2013 Flood illuminates the cascading undesirable impacts of uncontrolled wildfire.



According to the CSFS Wildfire Risk Assessment, the Study Area is mostly at high risk of wildfire, with some areas of highest risk. In the westernmost areas of the Study Area, larger zones of moderate risk exist.

The Fourmile Canyon Fire burn area is represented as lowest risk, due to the profound alteration of the vegetation type in that area. Despite the "lowest risk" classification in the burned area, internal fire modeling shows high spread potential in the short grasses that now grow where the forest was destroyed. The CSFS Wildfire Risk Assessment forms the baseline for the Study Area risk situation explored in this document, and is supplemented with additional, more granular analysis of local wildfire hazards and risk factors.

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VALUES AT RISK

VALUES AT RISK SUMMARY

Values are defined simply as elements of the human experience and the natural world that are valued by humans. Wildfire poses a fundamental risk to values in any area that is exposed to potential wildfire.

The CWPP is unequivocal in identifying human life as the most important value at risk in the Study Area, and the preservation of life as the main goal of the CWPP.

Many wildfire risk reduction projects are intended to protect and preserve many values across multiple value groups. Values in the Study Area should be viewed as parts of an interdependent system, and wildfire risk reduction is often the project of preserving value systems rather than protecting an individual value.

Given wildfire's destructive potential and the Study Area's direct exposure to intense wildfire, all values in the Study Area are at risk from wildfire.

Identifying and exploring values at risk in the Study Area enables the CWPP to develop and recommend wildfire risk reduction actions that offer protection to those values.

THE VALUES EXAMINED IN THE CWPP ARE GROUPED AS

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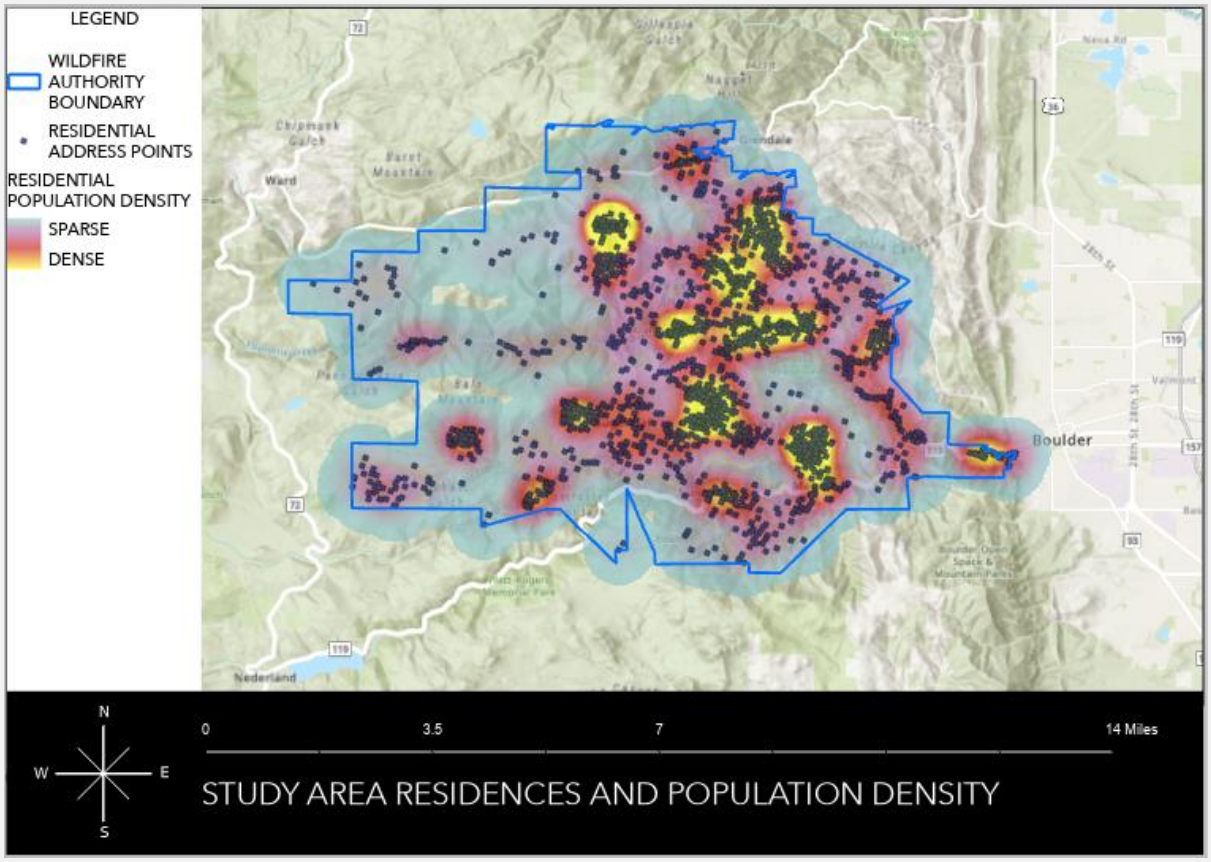
LIFE SAFETY AND RESIDENTIAL PROPERTY

The primary goal of the CWPP is the protection of human life from wildfire risk. This goal is self-evident and should require no elaborate explanation.

There are approximately 4,200 residents living in approximately 1,900 residential structures in the Study Area, in addition to a fluctuating population of visitors and recreationalists who are occasional inhabitants, and first responders who are at risk from wildfire during emergency response and wildfire suppression.



Recent destructive wildfires in Boulder County are characterized by very fast moving and intense fire behavior. This places the operational focus (especially during initial response to wildfires) on life safety threats—primarily, facilitating the safe evacuation of residents and visitors. A variety of recommended solutions in this plan will recognize and directly address this feature of local wildfire behavior, and the risk to life associated with expected future fire activity.

During fast-moving wildfires, it will be difficult for first responders to successfully protect life and property if pre-incident risk reduction has been absent or insufficient. Acknowledging the way in which local wildfire behavior forces responders to devote their time and attention to life safety preservation should encourage residents to protect their property by actively and continuously implementing Home Ignition Zone wildfire mitigation.

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The historically catastrophic and deadly 2021 Marshall Fire provides stark lessons on the challenges of simultaneously accomplishing life safety and property preservation objectives during wildfire response.

These lessons highlight that robust life safety risk reduction projects, combined with comprehensive Home Ignition Zone mitigation (defensible space and home hardening) is essential to protecting lives and property.

Lessons learned from the Four Mile Canyon Fire further emphasize the importance of Home Ignition Zone mitigation projects to reduce structural ignitability. Although that fire was characterized by extreme fire behavior, of the 168 homes that were destroyed, 83% were destroyed by low-intensity surface fire. This fact carries two recommendations:

(1) **Home Ignition Zone wildfire mitigation should be a high priority project for the entire Study Area.** As the entire Study Area is directly exposed to potential wildfire, every home should create and maintain comprehensive defensible space, regardless of the vegetation situation or expected fire behavior in the area immediately surrounding the home.
(2) **Even modest homeowner actions to reduce wildfire risk to their homes can be very effective**. As low-intensity surface fire is comparatively easy to mitigate.

Boulder County Wildfire Partners is a program that provides free Home Ignition Zone assessments, complete with a detailed PDF report of findings, for residents of Boulder County in the Wildland Urban Interface. The program often provides funding assistance to implement Home Ignition Zone mitigation.

All residents within the BWWA qualify for this service, and data show that approximately 25% of properties in the Study Area have received a formal Home Ignition Zone assessment through Wildfire Partners.

It is likely that more homeowners have taken mitigation measures to protect their private property than the data reflect, but it is a recommendation of this document to encourage all property owners to avail themselves of the formal Home Ignition Zone assessments and mitigation recommendations offered by Wildfire Partners. This will promote Home Ignition Zone mitigation in the study area that is consistent and comprehensive.

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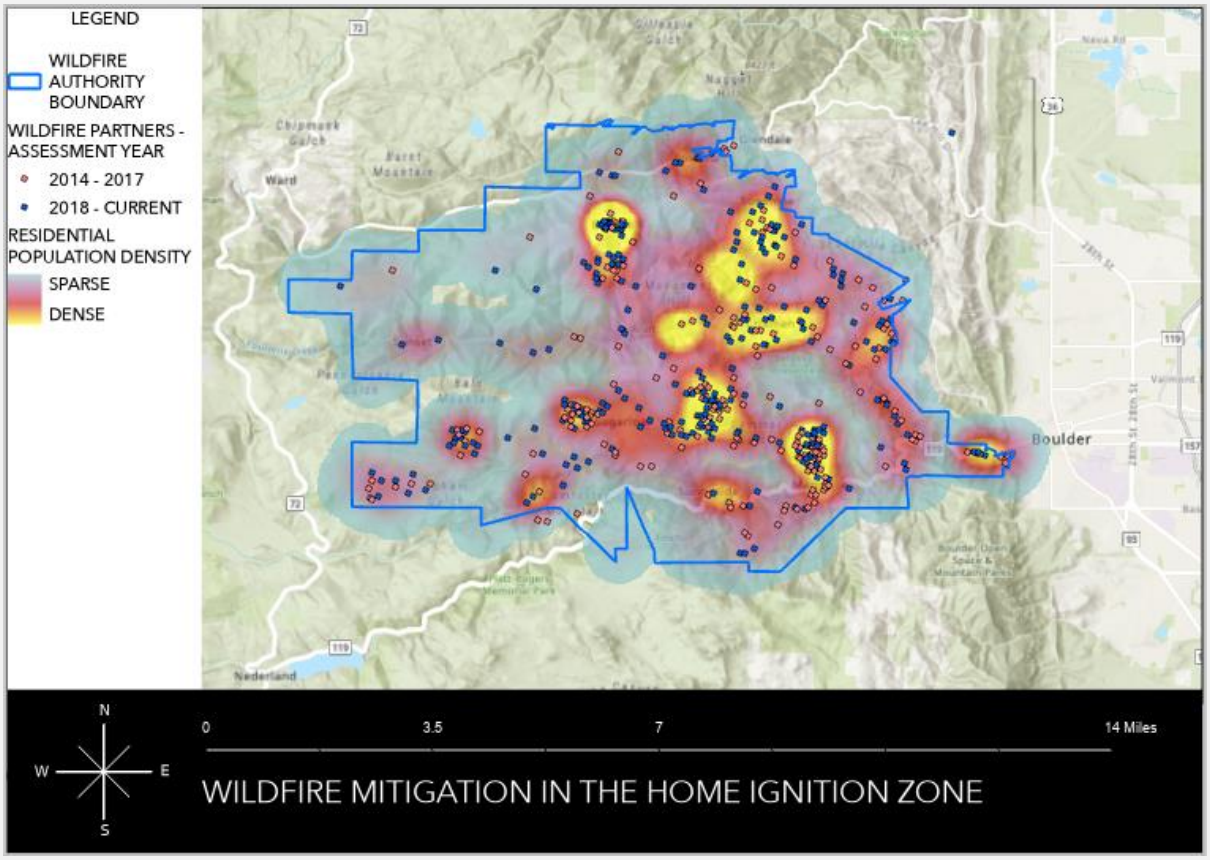

Structural ignition, in addition to representing a direct threat to a primary value at risk, also poses compounding wildfire hazards, including heightened fire intensity associated with burning structures, and unsafe air quality for residents and first responders.

Wildfires that result in large-scale property loss also pose significant post-fire social, economic, political, and logistical problems. These impacts burden many systems and resources, particularly in Boulder County, where the lack of affordable housing in and around the Study Area is often characterized as a crisis[iv].

Home Ignition Zone mitigation prescriptions and recommendations depend on a variety of considerations and will be explored in the Home Ignition Zone section of this document.

Population and human development are on the rise in the Study Area, and in Boulder County generally; so, life and property at risk from wildfire is only expected to increase in the Study Area.

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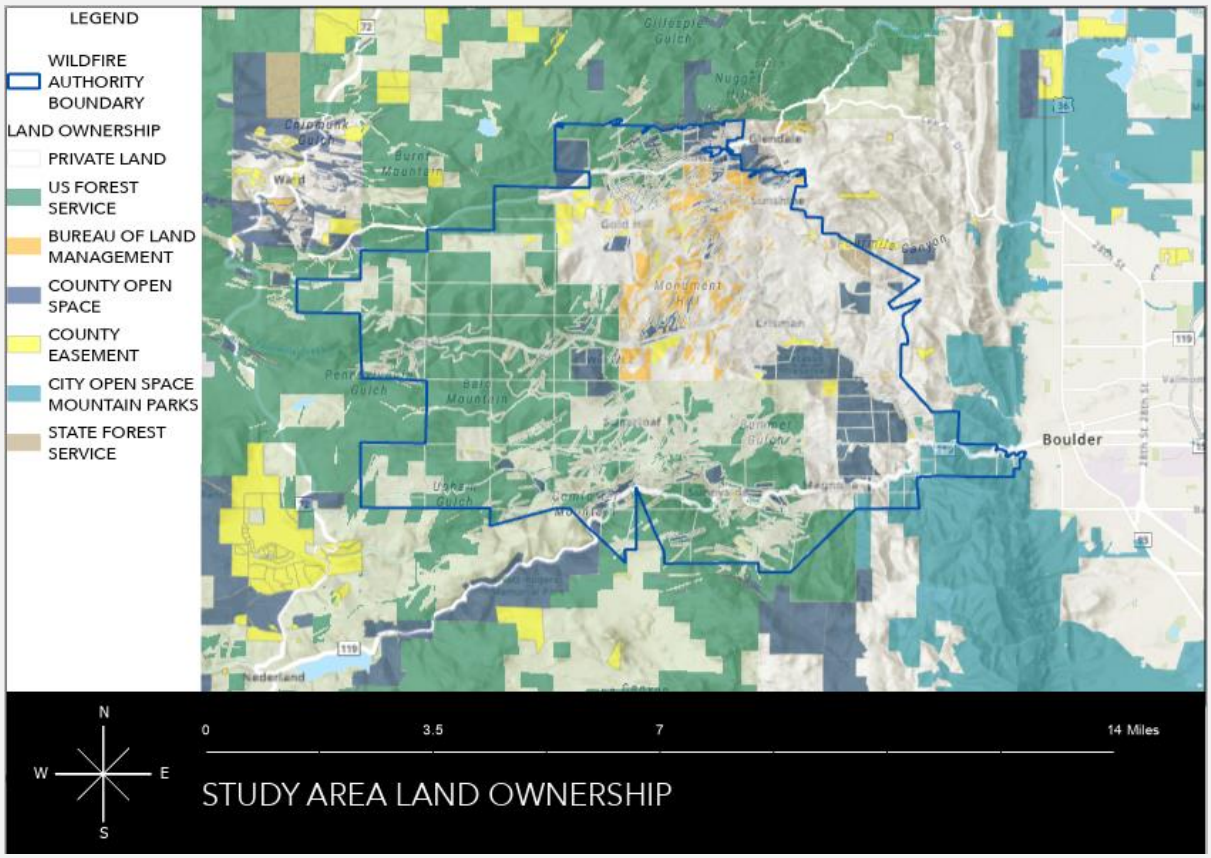
THE NATURAL ENVIRONMENT

The value of the natural environment is vast and fundamental. It provides the place and space for all other values to flourish. It is essential to life itself, and to the quality of life in the Study Area.



The Study Area comprises large swaths of public lands, roughly half of the Study Area's footprint, which are managed by the United States Forest Service, the Bureau of Land Management, the Colorado State Forest Service, Boulder County Open Space, and City of Boulder Open Space and Mountain Parks. The extent of public lands preserved from human development underlines the cultural emphasis placed on environmental preservation in the Study Area and throughout the county and state.

Given the extent of public and protected lands in the Study Area, and the dispersed populations and limited development on private lands, the entirety of the Study Area has the quality and character of a natural environment.

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Every component of complex and interdependent landscapes, watersheds, forests, and habitats that constitute the natural environment can be severely damaged and irrevocably altered by extreme wildfire.

The adverse effects of severe wildfire on ecological values are not dissimilar to the legacy of full suppression and fire exclusion policies[2]. Fire is an integral part of natural ecological processes, and the disruption to naturally occurring wildfire intervals has a direct, adverse impact on ecological systems. It also exacerbates the potential for severe wildfire to exact further damage and devastation to ecological systems and other values.

The policy of full suppression in the Study Area should not be reconsidered due to the unpredictability of landscape fire and the potential catastrophic outcomes of allowing a landscape fire to burn in the WUI, even if conditions are perceived to provide for moderate fire behavior that accomplishes an ecological benefit.

As such, the Core Team recommends that prescribed fire be explored. Prescribed fire is a land management tool that has been used in Boulder County and elsewhere to accomplish ecological goals and to mitigate extreme wildfire behavior and impacts.

[2] Fire exclusion is the effort of deliberately excluding or preventing fire in an area regardless of if the fire is natural or human caused

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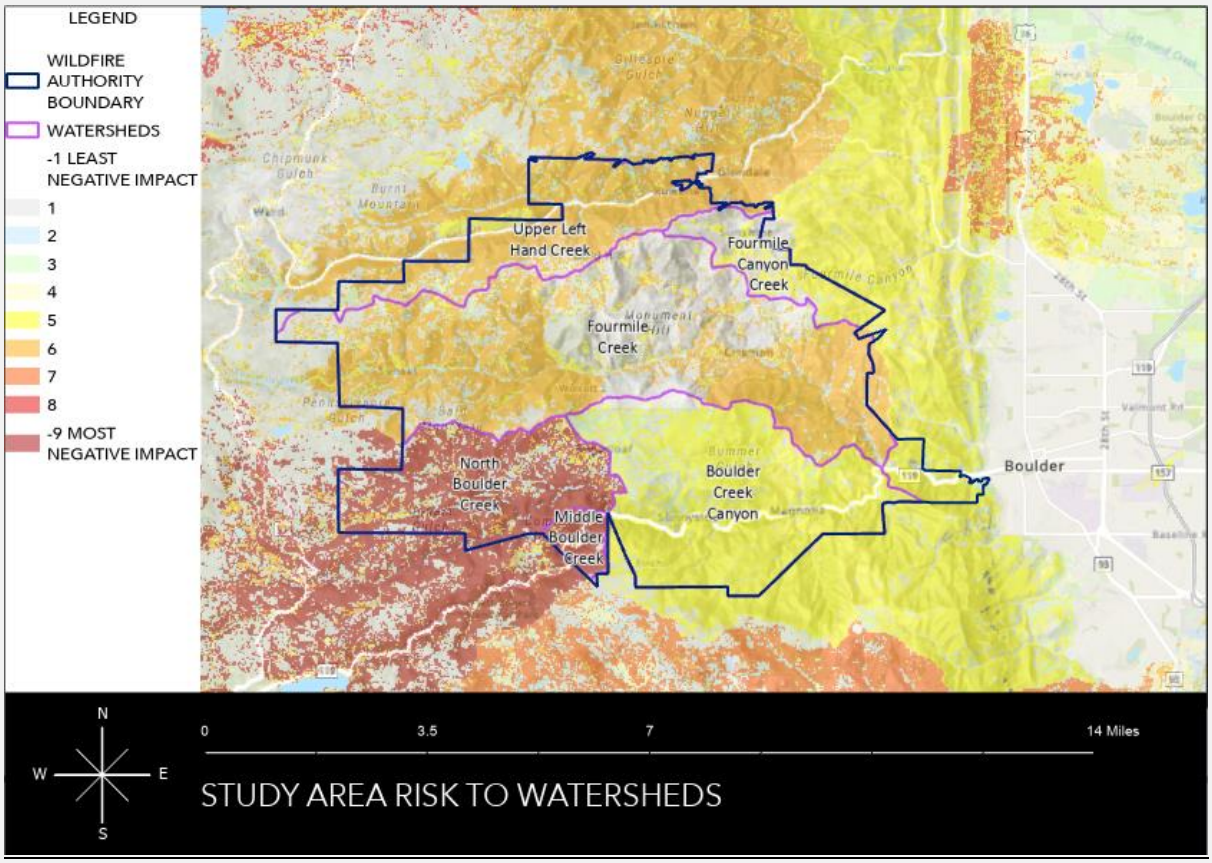
Watersheds[3] are represented in the CWPP both as an environmental value at risk, and as components of critical drinking water infrastructure.

The Study Area comprises four main watersheds, Boulder Creek, Fourmile Creek, Left Hand Creek, and Fourmile Canyon Creek.



Watersheds are vulnerable to adverse wildfire impacts, as high intensity fire eliminates vegetation and ground cover that protect forest soils. Severe wildfire can also alter soil composition, rendering soil resistant to moisture penetration. This phenomenon amplifies runoff rates and increases the risk of post-fire erosion and sediment delivery to waterways and can result in organic material and metals contaminating drinking water supplies for much of Boulder County.

Post-wildfire impacts on watersheds represent future risk to life-safety, property, infrastructure, and aquatic ecosystems, as post-fire runoff can lead to landslides, debris flows, and flooding.

A 2012 study of the water quality impacts of the Four Mile Canyon Fire (in the Study Area) showed post-rainfall water contaminants downstream of the burn area increased by 1 to 4 orders of magnitude.[v] The Four Mile Fire primarily impacted Pine Brook Water and required massive improvements to their treatment facilities. The 2013 Boulder

[3] A watershed is a land area that channels rainfall and snowmelt to creeks, streams, and rivers, and eventually to outflow points such as reservoirs, bays, and the ocean

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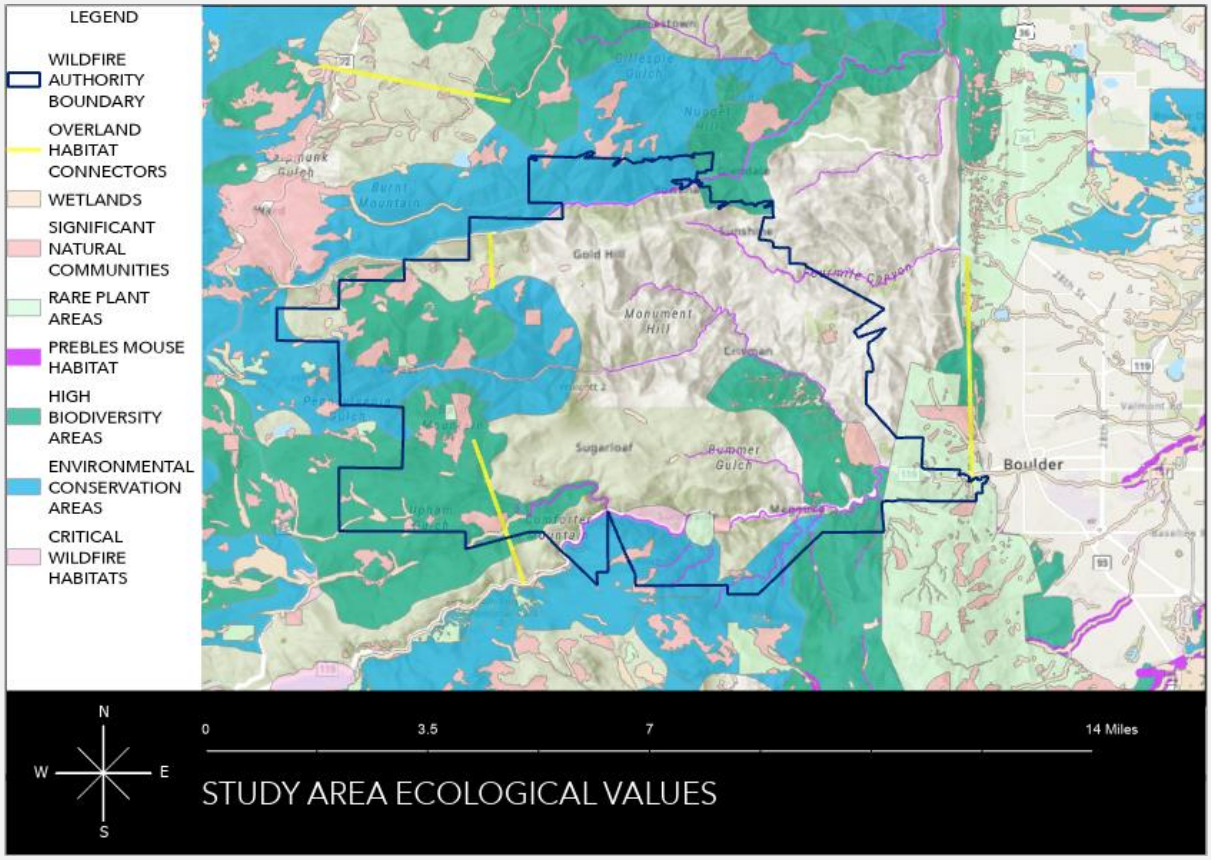
County Flood, which was intensified by the impacts of the Four Mile Canyon Fire, resulted in watershed damage that required nearly double the investment in water treatment improvements for Pine Brook Water District, a water utility that relies on the Fourmile Creek for most of its source water.[vi]

Strategic, landscape-scale forest health and wildfire mitigation projects to mitigate high-intensity fire on the landscape will accomplish watershed preservation goals. However, given the immense lands that constitute watersheds, accomplishing the scale of landscape treatments to adequately provide for watershed protection and preservation is an ambitious goal. Preserving watersheds from post-fire impacts should be complemented with other CWPP projects, such as improving wildfire suppression capacity.

The Boulder County Comprehensive Plan[vii] includes broad ecological goals, many of which involve the lands comprising the Study Area. The Core Team compiled relevant ecological values into a geospatial layer, which should be reviewed during landscape-scale project planning and implementation, to ensure that CWPP objectives consider countywide ecological values and objectives. Subject matter experts should be heavily involved in CWPP project planning to ensure that wildfire risk solutions align with and promote ecological goals.



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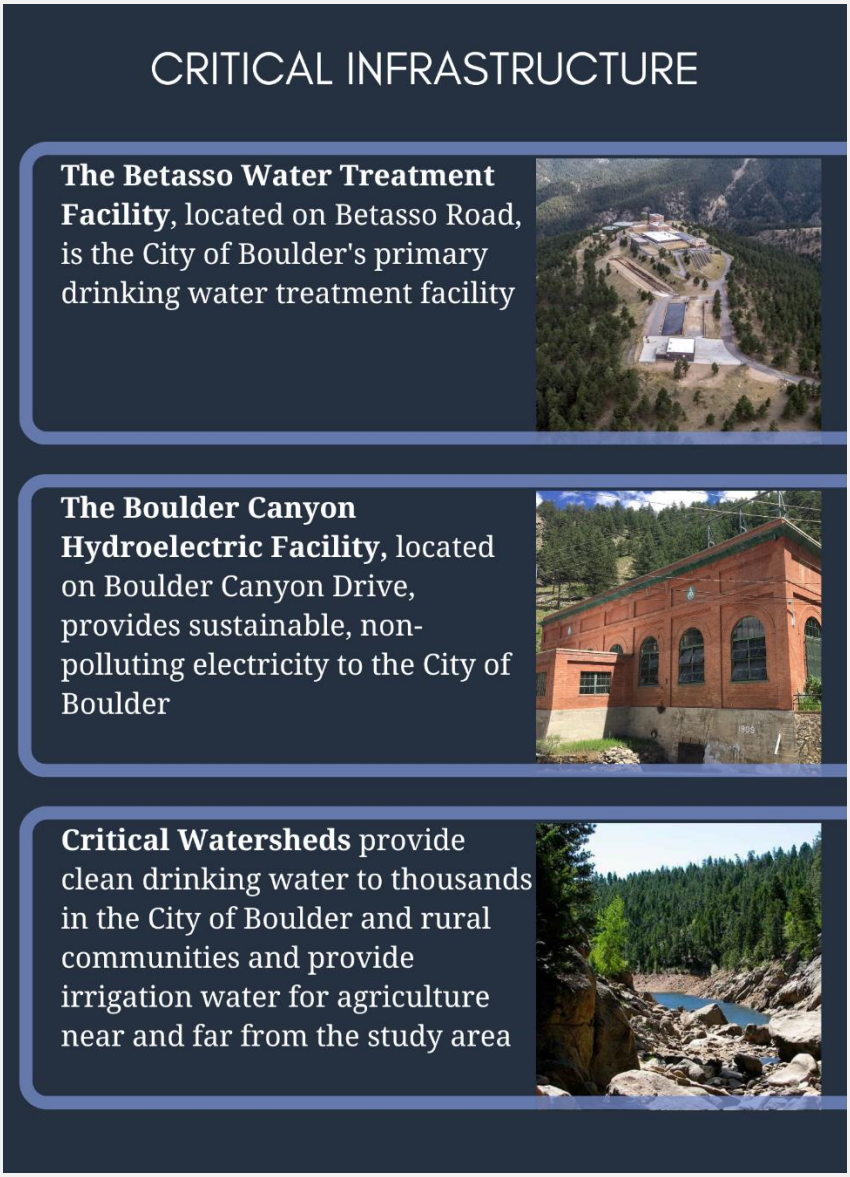
CRITICAL AND GENERAL INFRASTRUCTURE

The Study Area includes several sites of **critical infrastructure.**



BETASSO WATER TREATMENT FACILITY AND BOULDER CANYON HYDROELECTRIC FACILITY

The CWPP Core Team recommends exploring collaboration and partnership with the City of Boulder to carefully consider ways to best reduce wildfire risk to these two sites of critical infrastructure, and to understand special considerations for these facilities in the event of an active wildfire threatening the sites.

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CRITICAL WATERSHEDS AND DRINKING WATER

Watersheds have been discussed as an environmental value at risk, but they also represent irreplaceable components of critical drinking water infrastructure in and around the Study Area.

Water shortages have already resulted in unmeetable water demands for many communities in Colorado, and the trend in water scarcity is expected to worsen with rising population and climate change.[viii]

Watersheds in the Study Area provide clean drinking water to the City of Boulder, Lefthand Water District (which includes many areas of rural Boulder County and Weld County), Pine Brook Hills, and the City of Lafayette.

Watersheds should be considered among the highest priority values at risk, because of the centrality and connectedness of watersheds to all other values, including the preservation of human life.

GENERAL INFRASTRUCTURE

Many sites and stretches of general infrastructure are present throughout the Study Area, all of which are at risk of damage and disruption from wildfire. General infrastructure includes power and utility lines, state highways, county and private roads, fire stations, emergency coordinating radio towers, a Remote Area Weather Station (RAWS) and an elementary school.

The City of Boulder is directly and indirectly threatened by potential wildfire in the Study Area. General and critical infrastructure is widespread in Boulder and should be considered during CWPP project planning and implementation.

Remote Area Weather stations provide essential weather data used to understand trends in wildfire risk

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COMMERCE, CULTURE, AND LIFESTYLE

Commercial, cultural and lifestyle values are grouped together because they are fundamentally interconnected in the Study Area. Boulder County commerce in general is closely connected to the culture, lifestyle, and quality of life that the area affords, which is very much centered around the beauty of the natural landscapes and the activities associated with the outdoors. Landscape altering wildfire, therefore, would not only impact commercial, cultural, and lifestyle values in the Study Area, but could have a profound economic and social impact on the whole of Boulder County.

COMMERCE

Many small home-based companies and industries are present throughout the Study Area. When recommending wildfire risk solutions, these values are reflected in the CWPP as residential property, and the protection of these values can be accomplished through solutions that mitigate risk to residential property, such as home hardening, and defensible space.

Individual commercial sites at risk in the Study Area include the following

Lodging

Foot of the Mountain Hotel
200 Arapahoe Ave

Boulder Adventure Lodge
91 Fourmile Canyon Dr

Alps Boulder Canyon Inn
38619 Boulder Canyon Dr

Bluebird Lodge
401 Main St

Dining and Events

Gold Hill Inn
401 Main St

Gold Hill Store and Pub
531 Main St

Wedgewood Event Center
38470 Boulder Canyon Drive

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CULTURE AND LIFESTYLE

As has already been discussed, the culture and lifestyle of the Study Area and Boulder County emphasizes outdoor enjoyment, recreation, and environmental preservation. Culture and lifestyle values are also fundamentally connected to local commercial values.

There are many pedestrian paths, hiking and mountain biking trails, off-road vehicle roads, hunting and fishing areas, and many other sites and areas throughout the Study Area that are essential to the cultural and economic vitality of the area.

By virtue of the nature of outdoor enjoyment and recreation, these areas are widespread and varied, and should be considered during the development and implementation of landscape-scale wildfire risk reduction activities. Areas of outdoor recreation will also be given consideration when evaluating evacuation plans and other life safety risk reduction activities.

Other important cultural and historic sites are present throughout the Study Area. Many of these sites are connected to the area's history of mining camps and communities, and the historical structures associated with these activities. These include historical homes, an Assay Office, and historic churches and schoolhouses. Solutions and guidance for protecting residential property can be applied to the preservation of these sites.

The entire town of Gold Hill is a cherished cultural and historical area. It contains both dining establishments in the Study Area, a historic schoolhouse (that is still in operation as a Boulder Valley School District elementary school), several stores, and a museum, in addition to a comparatively densely populated area that is characterized by historic homes that are especially vulnerable to wildfire. Special consideration to the town of Gold Hill should be given when developing wildfire risk reduction projects and programs, due to the density, variety, and importance of values at risk within the town.

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Wildfire Risk Defined

Global Risk Situation

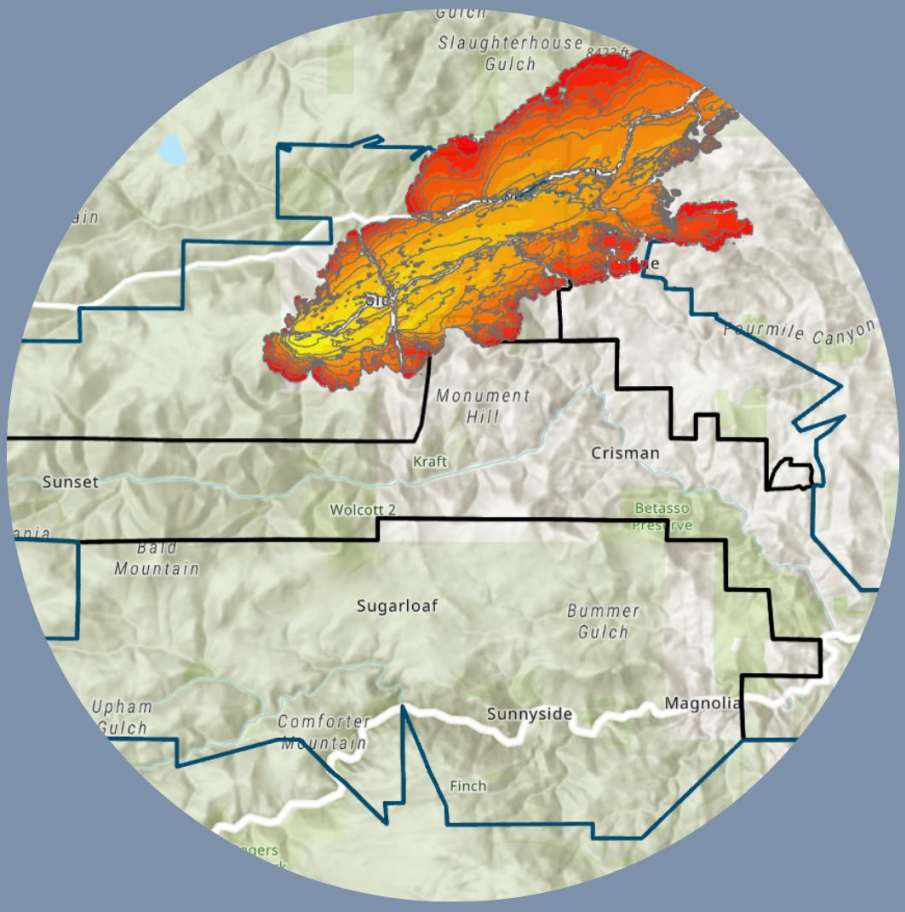
Regional Risk Situation

Study Area Risk Situation

Community Areas of Study with Risk Assessments

SECTION THREE

CURRENT WILDFIRE RISK SITUATION



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WILDFIRE RISK DEFINED

Wildfire Risk in the CWPP is defined as the sum of four factors: the likelihood of an area to experience wildfire, potential intensity of wildfire in an area, an area's exposure to wildfire, and the susceptibility of area values to wildfire.[ix]

A comprehensive understanding of wildfire risk in the Study Area is best achieved by considering risk in a series of increasingly granular contextual frames, beginning with general trends and patterns in the Global Risk Situation, and then exploring recent trends in Regional Risk at the state and county level.

Finally, the Study Area Risk Situation, which is nested within the broader (global and regional) frames, will be given the most detailed and focused attention, and each of the four wildfire risk factors closely examined. Study Area risk modeling, emergency response operational assessments, and field surveys in smaller Community Study Areas will produce a comprehensive measure and understanding of risk throughout the Study Area.

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GLOBAL RISK SITUATION

Aerial view of a wildfire in Siberia in 2021

There is not an established, expert consensus characterizing recent global trends in wildfire risk. Many studies suggest undesirable trends in wildfire activity, including increases in the length of wildfire seasons, wildfire frequency, and acres burned by wildfire.[x]

Other studies suggest that available data do not point to wildfire trends that substantially deviate from observed wildfire activity throughout recorded history.[xi]

A 2019 study on wildfire trends in California reported a fivefold increase in the state's annual wildfire extent from 1972-2018 and drew direct parallels between human-induced global warming and wildfire occurrence and extent during the 46-year period of study. The report also concludes that this trend is likely to continue in the coming decades. [xii]

Observed wildfire behavior from the **2021 wildfire season** points towards a global risk situation that is characterized by increases in the occurrence, extent, and severity of wildfire in many parts of the planet.

In **Siberia**, the coldest place inhabited on earth, wildfires burned 62,000 square miles; over five times the total acreage burned in the United States.

During the driest conditions in 35 years, firefighters in **Austria** battled the country's largest wildfire in recorded history.

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Lytton, **British Columbia** saw their hottest day in recorded history during the summer, and 90% of the village was destroyed by a wildfire within minutes, leaving two dead. Six months later, very low temperatures set a record for temperature variability of 135°F.

In **California**, over 6,000 acres of Giant Sequoia groves burned, destroying up to 5% of the world's population of this species. Giant Sequoia's, the most massive trees on Earth, were previously considered to be extraordinarily resilient to wildfire, and researchers believe that anthropogenic change is contributing the decreases in the species' resilience.[xiii]

The Core Team does not purport to make claims regarding whether these instances and patterns of unusual and adverse wildfire events will prove to be aberrations or whether they represent a worsening global trend. There is consensus, however, that human-caused climate change will lead to a profound exacerbation of wildfire severity and impacts, if it has not already.

In early 2022, the United Nations released a landmark report warning of a "global wildfire crisis," and forecasts that risk of devastating wildfires could increase by up to 57 percent by the end of the century.[xiv]

The Core Team concludes that the anticipated worsening of the global wildfire risk situation should be factored into risk management decisions on the local scale.

Users of the CWPP should make wildfire planning and risk reduction decisions based on the expectation that future wildfire risk conditions will be worse than they are today.

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REGIONAL RISK SITUATION

STATE OF COLORADO

Although global trends in wildfire are a subject of some ambiguity and controversy, statewide trends represent a pattern of increasing wildfire severity and impacts.

Statewide statistics show variability year-to-year in the number of reported wildfires in Colorado and the number of acres burned.

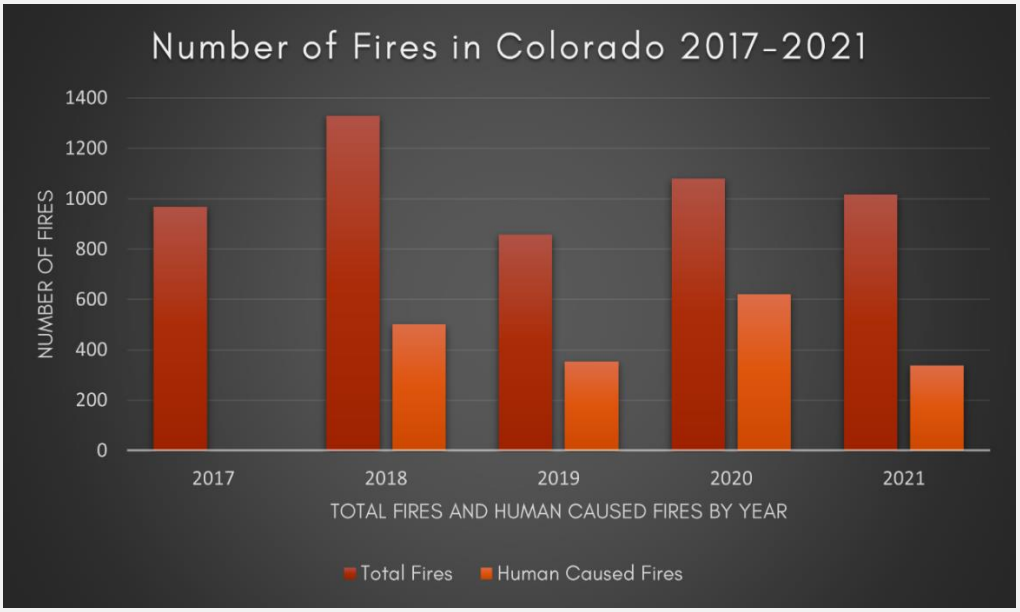

Figure 1 - Total Fires and Human Caused Fires in the State of Colorado 2017-2021. Statistics from the National Interagency Fire Center.
(No data for human-caused wildfires in 2017)

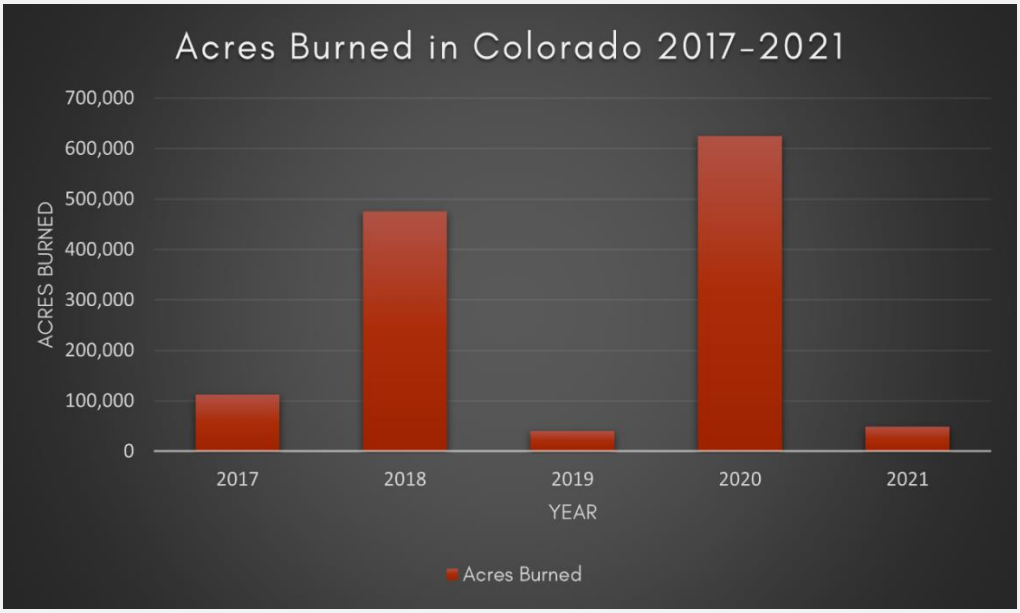

Figure 2 - Acres burned in the State of Colorado 2017-2021. Statistics from the National Interagency Fire Center.

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Variability in each year's total wildfire occurrence and extent in the state depends on short and long-term weather conditions, fuel dryness, ignitions, and other factors that vary widely over time and geographic area.

Although the recent wildfire statistics do not initially appear to represent a worsening trend, it is important to note that individual **wildfire incidents are increasing in their extent and destructive potential.**

Statistics from the Colorado Division of Fire Prevention and Control.

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In addition to the recent pattern of larger fires (in terms of acres burned), wildfires are increasingly destructive. **The five most destructive wildfires in Colorado state history have occurred within the past 10 years.**

Marshall Fire, 2021
Boulder County
1,084 homes destroyed

Black Forest Fire, 2013
El Paso County
498 homes destroyed

East Troublesome Fire, 2020
Grand County
366 homes destroyed

Waldo Canyon Fire, 2012
Colorado Springs
346 homes destroyed

High Park Fire, 2012
Fort Collins
259 homes destroyed

Statistics from the Colorado Division of Fire Prevention and Control.

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These recent patterns in wildfire risk inform and emphasize the previously stated Core Team's recommendation, that users of the CWPP, and wildfire management professionals in general, should approach wildfire risk with the understanding that wildfire risk is on the rise, globally and regionally.

Planning and implementing wildfire risk reduction activities on a pace and scale that recognizes the compounding wildfire risk situation is essential to fulfilling the goals specified in this document.

BOULDER COUNTY

The Global and Regional Risk situations have been discussed because they are informative in establishing a context for wildfire risk that encompasses the Study Area. This context is characterized by concerning trends and patterns in wildfire risk that recommend robust wildfire risk reduction activities, and the development of solutions that provide for a future of unprecedented wildfire severity.

Evaluating risk on a county-scale is best accomplished through an **overview of recent destructive wildfires in Boulder County**. This enables the Core Team to identify common factors in local wildfires, and to predictions relating to expected wildfire occurrence, behavior, and impacts in the Study Area. Lessons learned from past local wildfires are critical to developing sensible solutions to wildfire risk in the Study Area.

Historic property loss was among the terrible impacts of the 2021 Marshall Fire in Boulder County

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LESSONS FROM RECENT DESTRUCTIVE WILDFIRES

The Core Team evaluated four destructive wildfires in recent Boulder County history

The Four Mile Canyon Fire (2010)

Cold Springs Fire (2016)

Calwood Fire (2020)

Marshall Fire (2021).

The key lessons learned from these four incidents relate to **preventing ignitions, life safety**, **residential property, fuels,** and **wind.**

PREVENTING IGNITIONS

Human-caused fires account for most destructive fires, and virtually all destructive fires in Boulder County history.

Research shows a benefit-to-cost ratio of 35 to 1 in public outreach and education surrounding wildfire prevention and safety.[xv]

Preventing wildfire ignitions should be a major emphasis in wildfire risk reduction in the Study Area. Public engagement and education can also convey critical messaging surrounding other wildfire risk factors, such as how to plan for wildfire evacuations and how to create and maintain comprehensive defensible space.

Recent wildfires send a critical message about the importance of public engagement, education, and outreach. These activities should emphasize robust education surrounding wildfire ignitions and should involve engaging with a variety of stakeholders to reduce potential ignition sources, such as unsafe campfires and faulty power lines.

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LIFE SAFETY

The rapid rates of spread characteristic of most destructive wildfires in Boulder County, incidence of large-scale evacuations, and recent wildfire fatalities demonstrate that wildfire in Boulder County poses serious risk to human life. The four fires studied for this section resulted in the evacuations of a combined total of 40,000 residents.

The CWPP will heavily emphasize reducing life safety risk through evacuation planning, access and egress route improvement, education and outreach related to evacuation preparedness, and first responder training on facilitating evacuations and accomplishing life safety objectives during wildfires. The recommended solutions section of this document will reflect that life safety is the most important value at risk and will recognize that wildfire risk in Boulder County significantly threatens human life.

RESIDENTIAL PROPERTY

Residential property loss resulting from recent wildfires emphasizes that wildfire professionals must provide guidance and resources to enable property owners to mitigate wildfire risk to property.

Property owners bear the primary responsibilities of creating and maintaining defensible space and can take many actions to reduce structural ignitability.

Property loss studies following the Four Mile Fire showed that 83% of homes that burned were ignited by low-intensity surface fire.[xvi] This fact illustrates that simple and low-cost measures can defend homes against the most probable causes of structural ignition, damage, and destruction. However, comprehensive defensible space and home hardening offers much greater protection.

The Marshall Fire highlights that defensible space and home hardening is an essential element of wildfire risk reduction wherever structures are directly or indirectly exposed to wildfire, irrespective of the type, density and arrangement of flammable vegetation surrounding structures. Reducing residential property vulnerability is a

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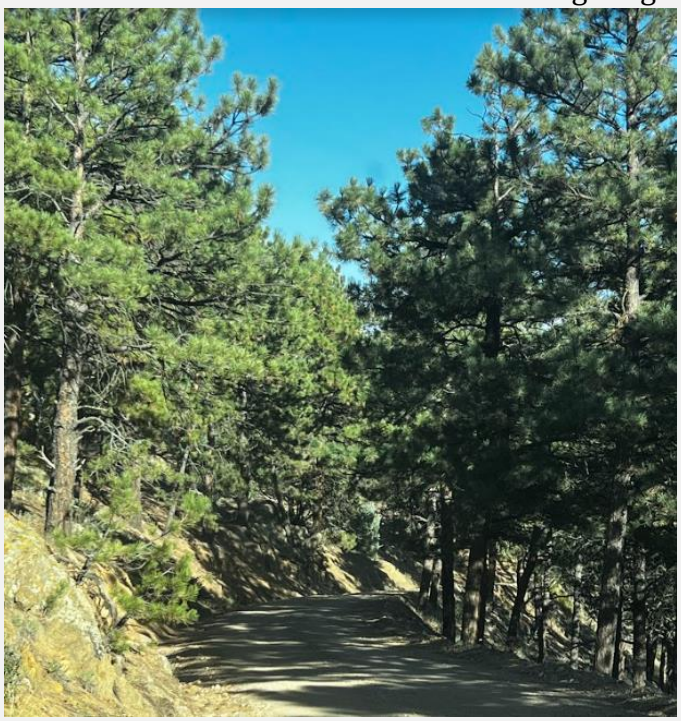
primary recommendation of the CWPP, and this recommendation should be carried to all property owners in the Study Area, irrespective of relative exposure to potential wildfire.

Concerted education surrounding defensible space and home hardening, particularly emphasizing simple steps homeowners can take to mitigate risk to their property can lessen property loss and damage from wildfires. Outreach and education should be complemented with providing resources to property owners to make it easier to accomplish comprehensive defensible space and home hardening.

FUELS

Historically aberrant fuel characteristics, such as fuel density and unseasonable fuel dryness are significant influences in destructive wildfire behavior in Boulder County. Hazardous fuels reduction projects should be designed to reflect the patterns in recent wildfire behavior and must conform with best practices and evidence-based prescriptions for fuels reduction treatments.

Fuels reduction is an essential tool in mitigating wildfire risk, but, as shown by the Four Mile Fire[xvii], forest thinning is unlikely to prove effective in moderating wildfire growth or impacts if project prescriptions do not provide for adequately reducing surface fuels, eliminating ladder fuels, increasing canopy base height, and increasing canopy spacing.



It is also important to recognize that during extreme burning conditions, even well-implemented fuels reduction projects may not accomplish intended objectives. As such, complementing hazardous fuels reduction with other project and program types is essential.

A representative example of overgrown forest in the Study Area

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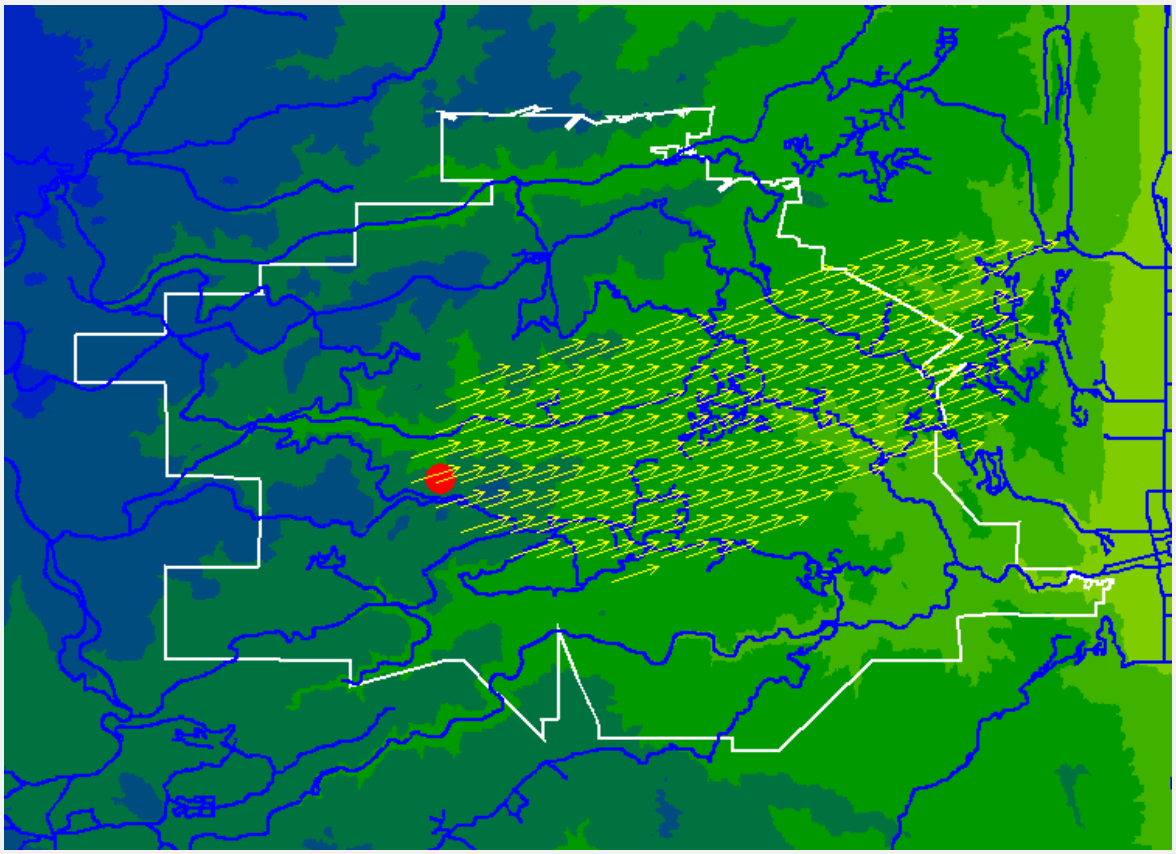
WIND

A common factor of all local destructive wildfires is wind. Boulder has some of the highest peak winds of any city in the US.[xviii] Downslope, westerly wind events result from high pressure on the western slope of the Front Range, and low pressure on the eastern slope. During these wind events, strong, gusty downslope winds intensify on the east face of the Front Range. Strong westerly and southwesterly winds are frequently a primary wildfire influence during destructive or catastrophic wildfires in the county.

A wildfire model based on observed wind direction during the Four Mile, Cold Springs, Calwood and Marshall Fires shows the likely direction of spread for future destructive wildfires. The average wind direction during the peak burns of these four fires was **west-southwest**, with actual wind directions during these burns generally ranging from **west** to **southwest**. The map below visually represents the average wind direction of these fires, with the red circle as a randomly chosen ignition location.[4]



Other wildfire influences and factors are salient in the Study Area, but wind is among the most salient factors to destructive wildfire and should be carefully considered in developing wildfire risk reduction projects. **When strong winds align with dry weather and dry fuels the potential for catastrophic wildfire increases.**

[4] This model is not intended to suggest that destructive wildfire will only travel from west to east, but rather that wildfire risk reduction and preparedness activities should account for the most likely wind direction associated with wind-driven wildfires in Boulder County.

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STUDY AREA RISK SITUATION

The previous discussion of trends and influences in global and regional wildfire risk provides a useful context for the risk situation in the Study Area. Establishing the **Study Area Risk Situation** requires a more detailed analysis of the four factors that define wildfire risk:

Likelihood of Wildfire Occurrence

Potential Wildfire Intensity

Area Exposure to Wildfire

Susceptibility of Values

This section will explore these factors as they relate to the Study Area. The following section will apply the risk assessment process to smaller Community Study Areas to understand the relative risk profiles of populated communities within the study area.

The risk assessment methodology relies on fire behavior modeling, which incorporates extensive datasets capturing the main influences on wildfire behavior:

Weather

Weather influences on wildfire are modeled using historical data for temperature, wind speed and direction, relative humidity, precipitation, and atmospheric stability. These data vary significantly with time, and risk modeling selects for observed weather conditions that are conducive to wildfire spread.

Topography

Topographical data reflects features such as elevation, slope, aspect, and terrain shape. These are constant inputs in wildfire risk modeling.

Fuels

Fuels, or flammable vegetation, is modeled using Lidar data (light detection and ranging) to determine the type (species) of vegetation, in addition to fuel density and arrangement. Fuel dryness is calculated based on historical weather conditions.

These data produce wildfire risk models, which are complemented with supplemental analysis to determine how expected fire behavior threatens values at risk. A more detailed overview of the CWPP methodology for assessing risk is detailed in Appendix A.

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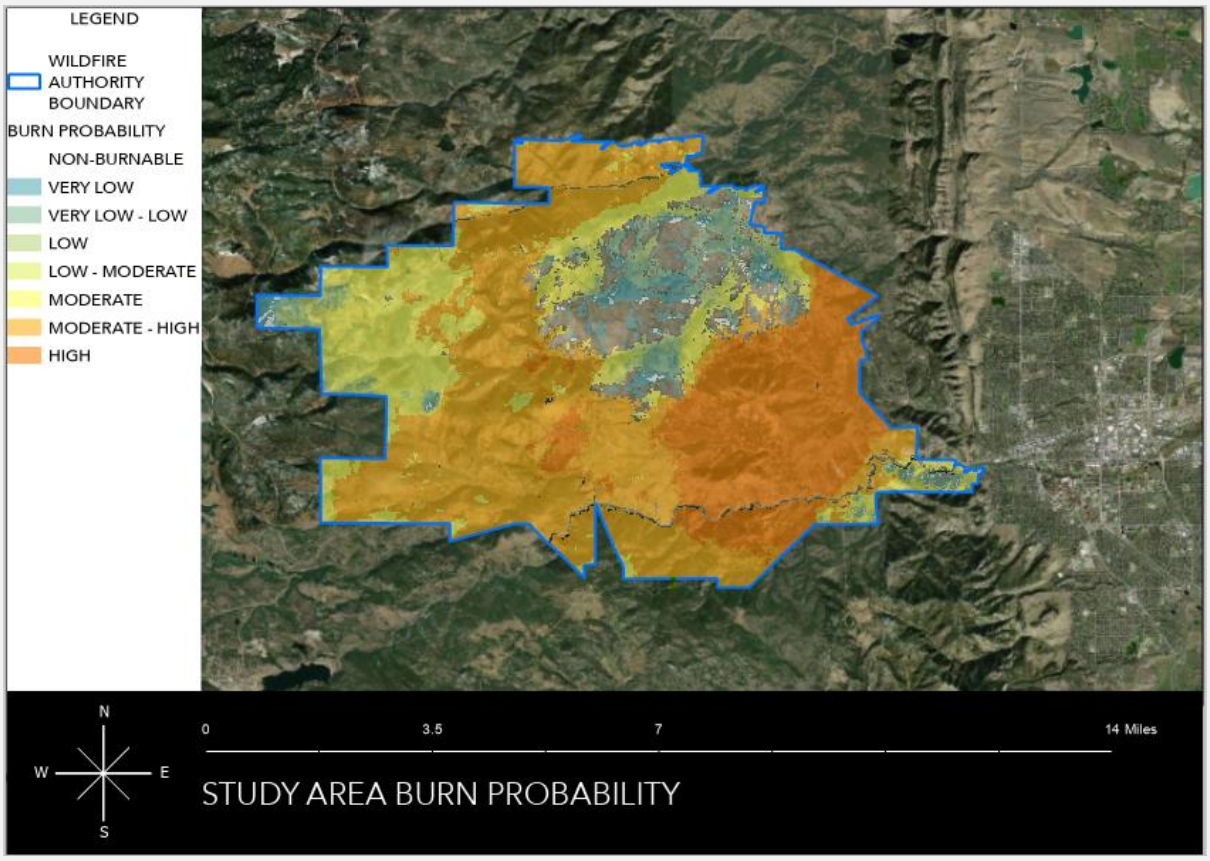
LIKELIHOOD OF WILDFIRE OCCURRENCE

The first risk factor of the four that contribute to wildfire risk is **likelihood of wildfire occurrence**. This risk factor is represented by the Colorado State Forest Service Wildfire Risk Assessment (CO-WRA) Burn Probability Theme.

Based on high-risk and extreme-risk weather conditions, and reflecting landscape characteristics including topography and vegetation, 3,200,000 wildfire scenarios were modeled with ignition points distributed every 500 meters. These wildfire scenarios produce the Burn Probability theme. The theme represents the probability that a fire will burn an area (at 30-meter resolution) in a year.

The aggregate **moderate** burn probability in the Study Area reflects that the Four Mile burn area is represented as very low probability of burning, but most of the Study Area ranges from moderate to high probability of burning.



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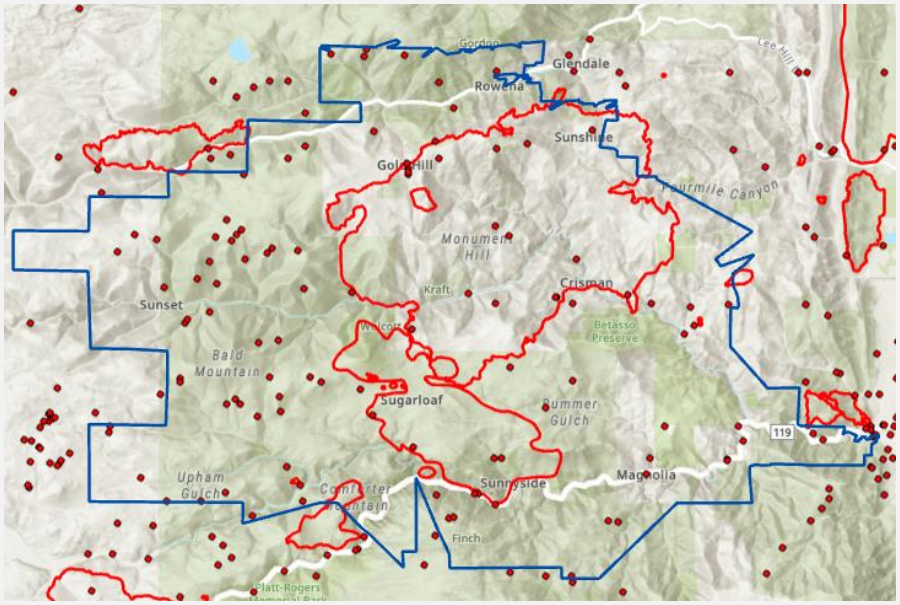
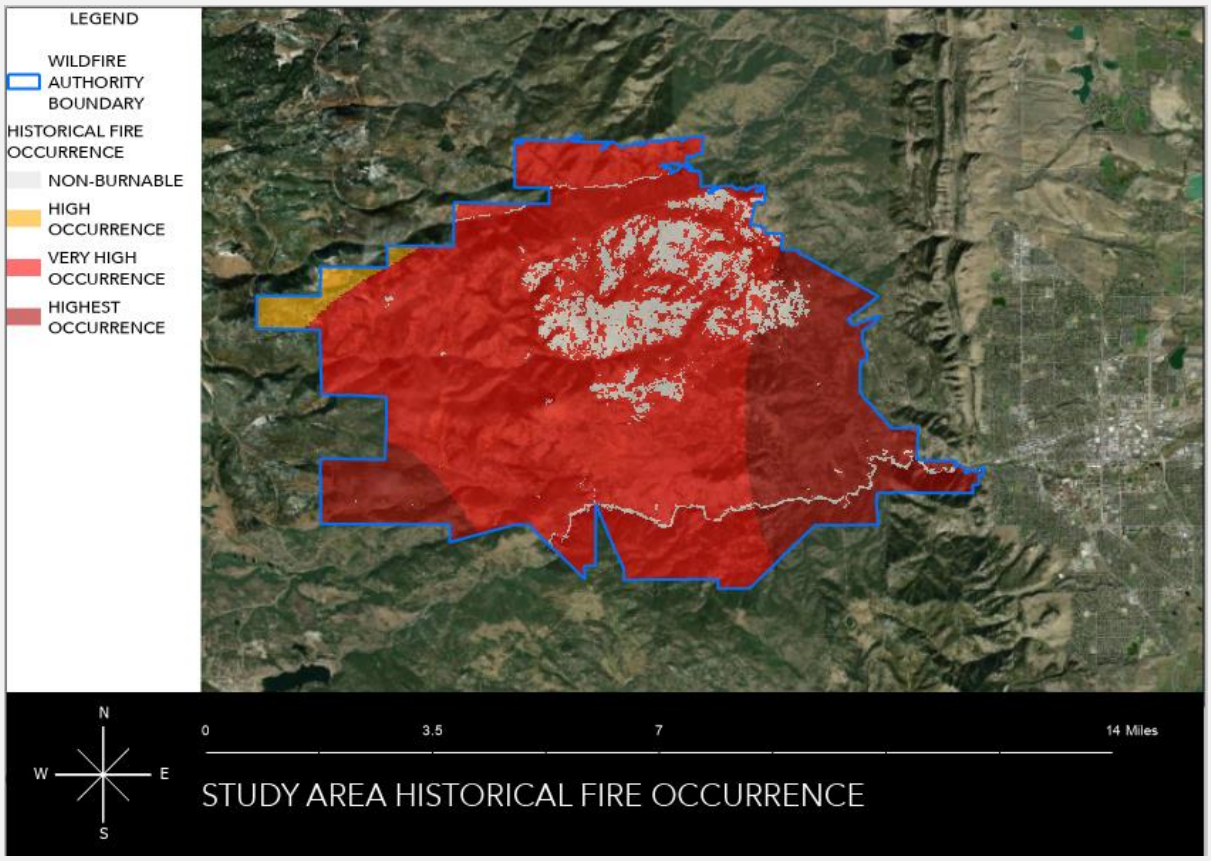


The Burn Probability Theme uses an even distribution of ignition points for wildfire simulations, and then the results are weighted with reference to historical ignition locations and areas that are likely to experience wildfire ignitions.

Figure 1 - Federal and Non-Federal Ignitions 1992-2022

The Fire Occurrence Theme displays areas likely to experience ignitions based on historical data for wildfire occurrence, while excluding the probable impacts (i.e., areas expected to burn) as a result of those ignitions. This theme shows the Study Area to be mostly at very high risk of occurrence.



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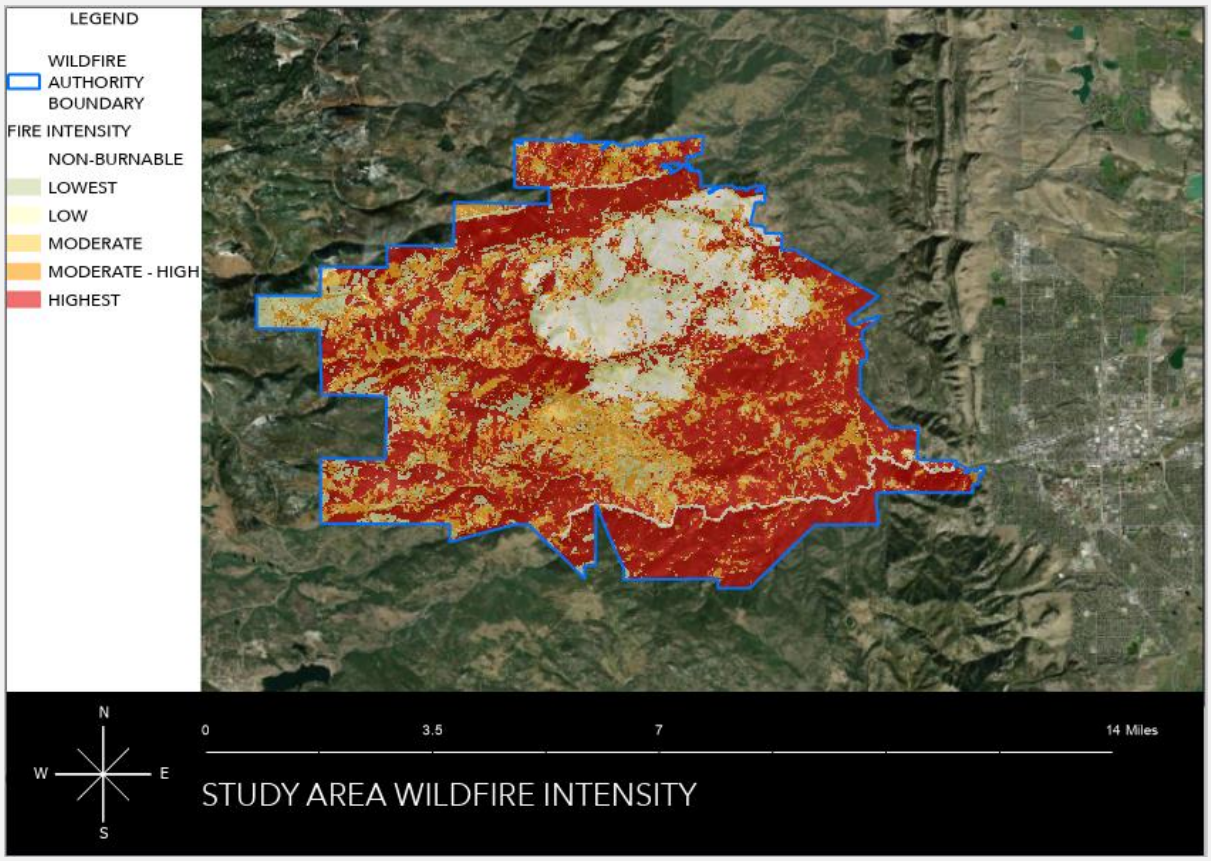
POTENTIAL WILDFIRE INTENSITY

The second risk factor, **potential wildfire intensity** relates to expected flame lengths and other fire behavior characteristics, with greater fire intensities correlating to greater risk. Each adjective rating reflects a 10-fold increase in modeled wildfire intensity. The CO-WRA Fire Intensity Theme is derived from the same datasets landscape and weather datasets as the Burn Probability Theme. This theme, however, does not base fire intensity predictions on the likelihood of an area to burn, but rather models how wildfire could behave *if* an area burns, irrespective of burn probability.



Due to the profound alteration of vegetation in the Four Mile Fire Burn area, that area is largely represented as lowest intensity, with flame lengths expected to be 1-4' in length, posing less risk to values and fewer suppression challenges. However, the burn area is adjacent to very dense forests prone to high-intensity wildfire, and wildfire could readily spread from the short grasses in the burn area to these dense forests. As such, areas of "lowest risk" are still hazardous and risk in these areas should be understood in the context of the Study Area.

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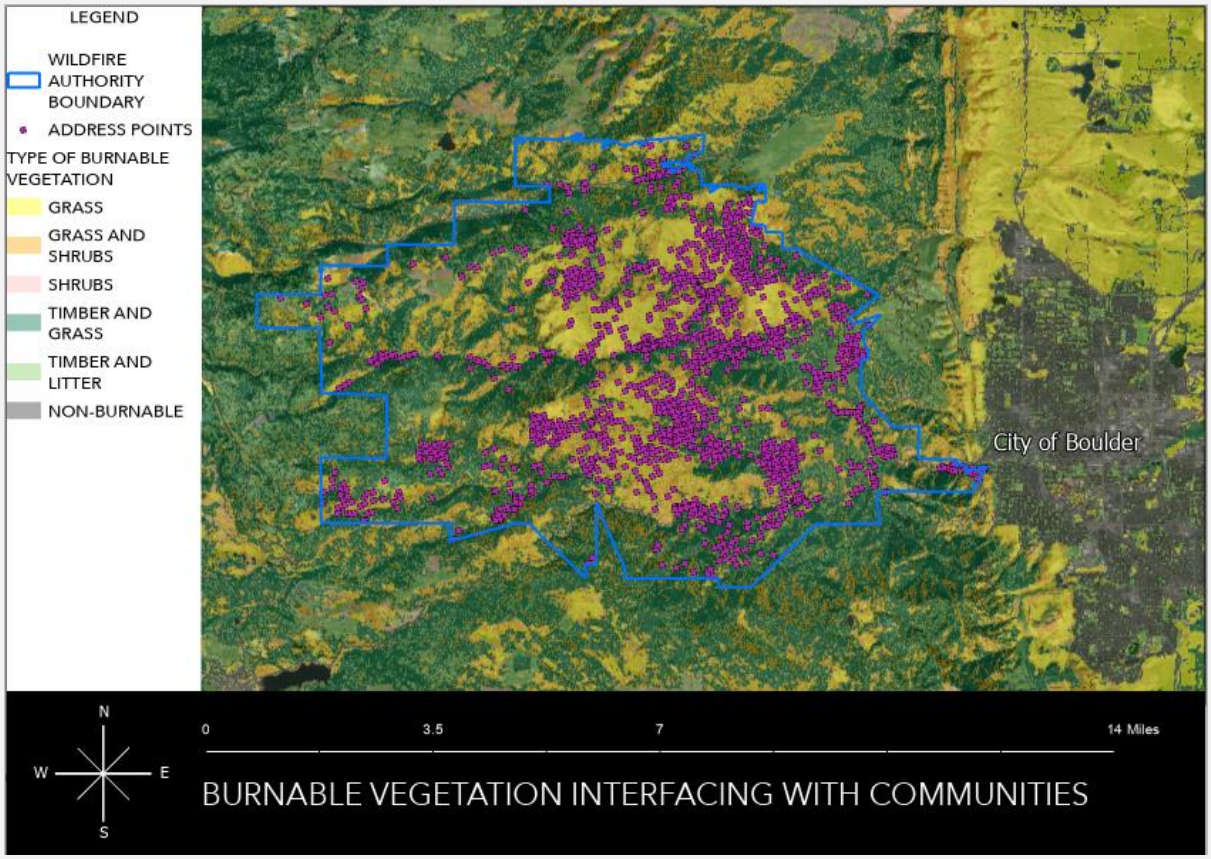
In total, the Study Area is expected to experience **moderate to high intensity wildfire.**

However, modeled wildfire intensity in over half of the Study Area is rated as **highest intensity**, which is characterized by flame lengths up to 150' and very high rates of spread, posing immense risk to values and extreme suppression challenges. The extent of areas of highest potential intensity argues for very robust risk reduction activities.

AREA EXPOSURE TO POTENTIAL WILDFIRE

The third risk factor, **exposure to potential wildfire**, describes the proximity of communities and other values to burnable vegetation. The entire Study Area directly interfaces with wildland vegetation and thus is **directly exposed** to potential wildfire.



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Comparing the Study Area's exposure with the city of Boulder's exposure helps to clarify the difference between direct and indirect exposure. Many communities in Boulder are indirectly exposed to wildfire, due to potential home ignitions caused by ember-cast and the potential for home-to-home wildfire spread.

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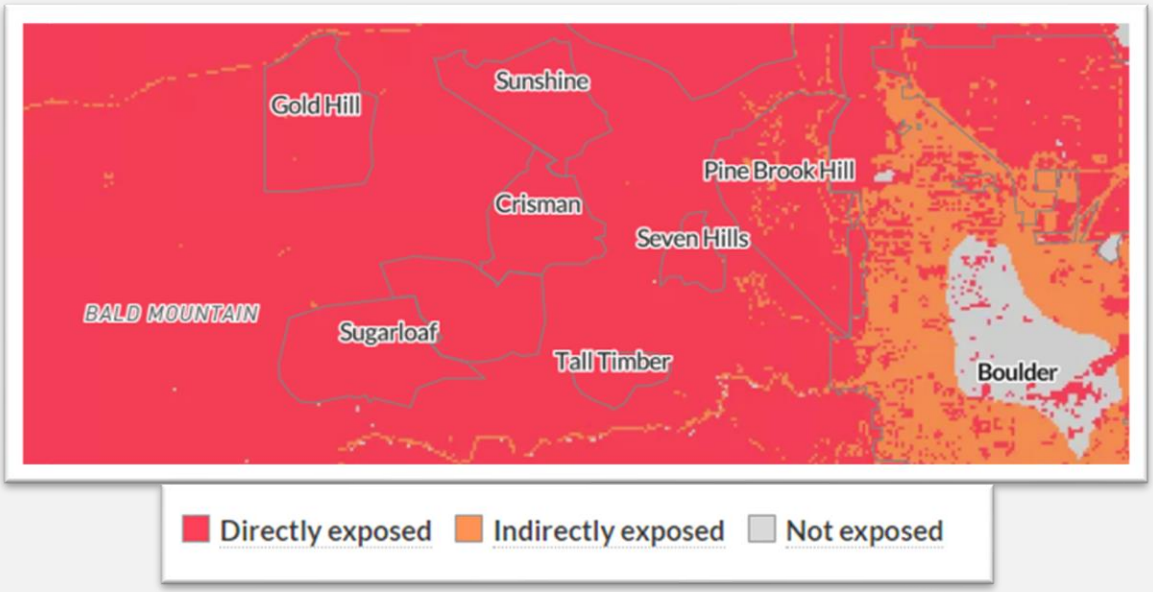

While homes in the Study Area are all directly exposed to wildfire, indirect exposure should also be considered. Even a wildfire that does not directly encroach on a community or residence remains an indirect risk due to ember cast—which can be intense during certain types of wildfires. Research shows[xix] that structural ignition and loss is most associated with ember cast and is less frequently caused by direct flame impingement.

The risk of structural ignition associated with ember cast was considered through geospatial analysis. Based on high fire weather inputs, the Core Team analyzed areas expected to experience active canopy fire, which is intense fire behavior characterized by wildfire spreading from treetops to treetops and is the type of wildfire most expected to produce significant ember cast.

Buffers were drawn to determine area exposure to short-range embers (100-meters from potential canopy fire) and long-range embers (500 meters from potential canopy fire)[xx]. The results of this analysis demonstrate that most residential property in the Study Area is exposed to short-range ember cast, and nearly all of the Study Area is exposed to long-range ember cast.

[5] "Wildfire Risk to Communities" – U.S. Forest Service, Department of Agriculture

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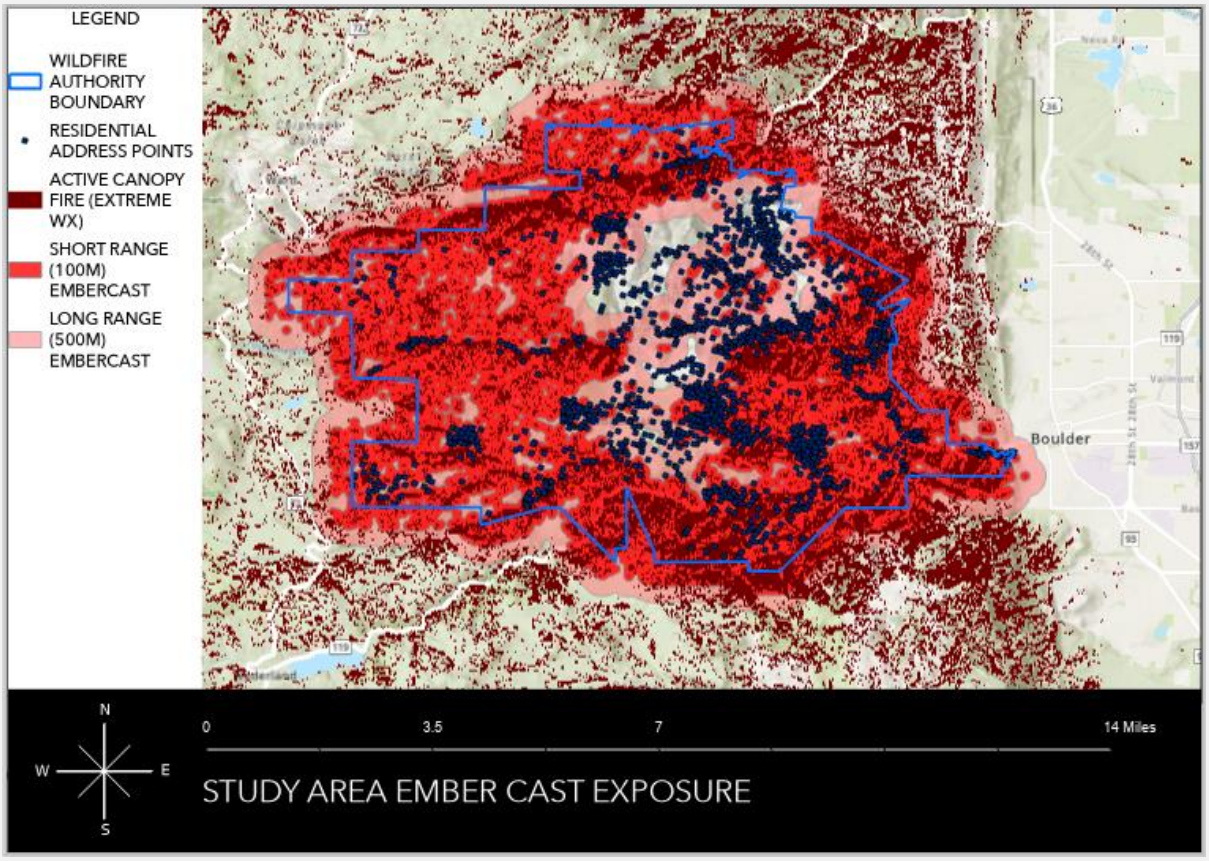

SUSCEPTIBILITY OF VALUES

Susceptibility of Study Area values is the most complex and the most crucial factor in an area's risk profile. This risk factor considers the potential impacts of wildfire on a full spectrum of values. The Values at Risk section of this document provides an overview of values in the Study Area that could be damaged or destroyed by wildfire but does not discuss how vulnerable or susceptible these values are to the potential impacts of wildfire. **This section will aim to explore how 'at risk' values in the Study Area are.**

A baseline description of the susceptibility of Study Area values is accomplished by the CO-WRA Wildfire Risk Theme. This theme represents susceptibility of values by relating Burn Probability to Values at Risk datasets, including:

Human populations

Residential property

Forest assets and environmental values

Drinking water

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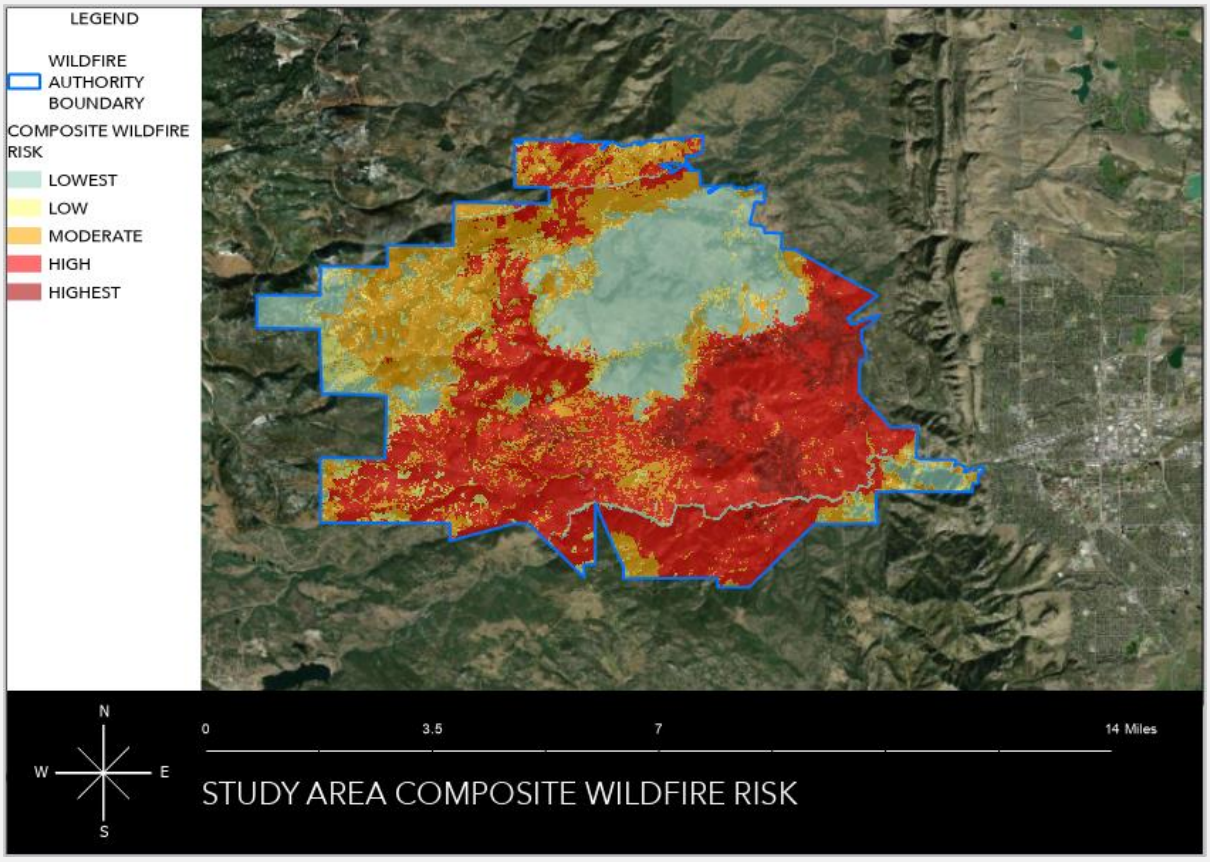
The Wildfire Risk Theme shows the Study Area at **high** and **highest risk,** with areas of **moderate risk** at higher elevations, and the Four Mile burn scar generally as **lowest risk**.



The CO-WRA Wildfire Risk Theme forms a useful baseline but must be supplemented with additional analysis to include other hazards and risk factors that are significant when evaluating the susceptibility of area values. A comprehensive understanding of the susceptibility of values requires collecting and interpreting local data and field observations relating to:

Life Safety Risk and Evacuation Preparedness, considering non-survivable wildfire environments, the expected success of residential evacuations, and the ability for emergency responders to protect vulnerable communities.

Emergency Response Capacity and Readiness to engage in life-safety objectives and fire suppression during escalating wildfires.

The Home Ignition Zone, considering the presence and quality of comprehensive defensible space as it relates to challenges in protecting property and the potential extent of property loss.

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Many of these additional risk factors vary significantly between communities in the Study Area and will be evaluated in greater detail in the following section that describes community-level wildfire risk.

It is also important to understand that the risk factors discussed below are fundamentally interconnected. For example, limited access and egress routes in the Study Area represent a risk to evacuating residents, *and* an impedance to incoming first responders.

LIFE SAFETY RISK AND EVACUATION PREPAREDNESS

The risk wildfire poses to human life is closely connected to evacuation preparedness in the Study Area. Evaluating the potential for injury or death resulting from wildfire involves assessing the probability that residents and visitors can safely escape from a wildfire, and the probability that first responders can safely execute life safety operational objectives during a wildfire.

Life Safety and Evacuation Preparedness factors include the anticipated reach of evacuation notifications; number and quality of access and egress routes; travel times to evacuation destinations, and roadway flammable vegetation.

Anticipated Reach of Evacuation Notifications

The Study Area is challenged by limitations on the mechanisms by which residents can be notified for a wildfire evacuation.

Due to the lack of reliable cellular coverage in most of the Study Area, utilizing **Wireless Emergency Alert System (WEAS)**, or other opt-in technologies that communicate with mobile devices, would not be effective as a means of alerting residents to evacuation orders or a wildfire burning in the area.

Interviews conducted with Study Area residents point to a trend towards "wireless-only households" in the area, that is, households that do not use landlines. A 2020 report estimates that 62.5% of American households do not have landlines.[xxi] Although in the Study Area's rural communities where cellular service is unreliable, this percentage is likely to be lower, the trend negatively impacts the expected reach of **reverse 911** evacuation notifications or other emergency alerts.

These systems are not entirely dependable for residents of the Study Area, nor could these systems be used to notify recreationalists or other visitors to the Study Area.

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The current situation in the Study Area is decidedly hazardous. A memorandum regarding emergency notifications following the Marshall Fire concluded that

> "...nothing will ever replace door-to-door evacuations in an emergency such as the Marshall Fire. First responders who are incredibly efficient and adapt quickly to mobilize door-to-door evacuations make sure people are notified in the path of danger regardless of what technology is available."[6]

On the one hand, this conclusion accurately reflects that no single piece of technology can be entirely expected or relied on to alert residents to evacuation orders, and it is important to recognize and plan for the fact that door-to-door efforts should and will be part of the evacuation sequence.

On the other hand, it is concerning that evacuation notification technologies and evacuation efforts can be so challenging even for communities where cellular service is dependable, and where door-to-door efforts are less challenged due to tighter communities with easier access.

Given that many residences in the Study Area are in remote and dispersed communities, often situated on confusing or dead-end roadways, relying on neighbors notifying one another of evacuation orders and first responders conducting door-to-door evacuations represents a significant hazard.

Number and Quality of Egress Routes

Mainly owing to the rural nature of the Study Area, and the steep and rugged terrain that characterizes the topography, the number and quality of access and egress routes to and from communities is a significant risk factor in the Study Area.

Many communities are serviced by a single access and egress route. This poses the serious risk of wildfire cutting off communities from an evacuation route, or first responders being cut off from safely entering areas to provide for life safety and engage in fire suppression. In some communities, dual egress routes are present, but some emergency routes are inadequately maintained, rendering these routes unreliable and potentially unsafe.

Primary roads in the Study Area often span many miles without turnoffs to alternate routes, which likewise represents risk of resident and first responder entrapment during wildfires.

[6] "Information on Boulder County's Emergency Notification System" – Boulder County, 2022

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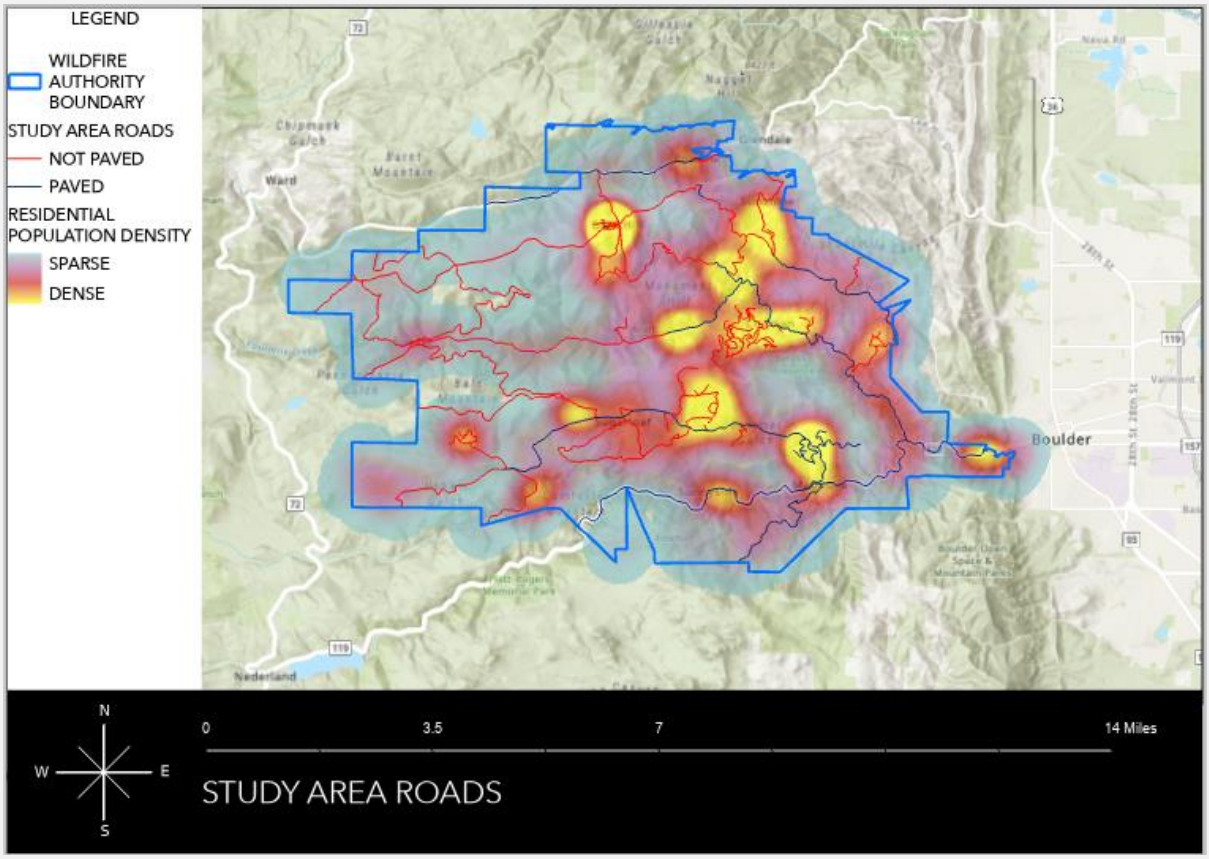
Narrow, sometimes single-lane roads such as 'secondary townsite roads'—roads that are exempt from complying with county standards for roadway width and quality—represent significant life-safety hazards.

During situations when two-directional travel is required (i.e., incoming suppression resources travelling against fleeing residents), narrow roads become very hazardous. Many of the Study Area roads are single lane roads, or roads with inadequate pull-offs and turnarounds, especially for large fire suppression apparatus.

Road construction is an additional risk factor, as most roads in the Study Area are unpaved, dirt roads. These roads are harder to travel on, delaying evacuation travel times, increasing the probability of motor vehicle accidents, and challenging access for first responders.

Most of the roads in the Study Area present visibility challenges, with many blind curves and hills. Terrain and vegetation occlude visibility along many access and egress travel routes. Smoke impacts from wildfires, even if the fire is not burning in the immediate area that is being travelled, will exacerbate visibility and roadway conditions.



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Finally, evacuation route signage is incomplete and often misleading in the Study Area. Certain routes are marked as evacuation routes that are unsafe or unreliable for passage in ordinary, two-wheel-drive vehicles. A highest-priority recommendation calls for attention and improvement for evacuation routes, signage improvement, substantial public education on evacuation route awareness, and other evacuation preparedness efforts.

An instance in the Logan Mill subdivision of inadequate egress signage

Travel Times to Evacuation Destinations

The Study Area is entirely devoid of areas that could be considered a truly safe zone or adequate evacuation destination without firefighter intervention (e.g., burning a field to remove all vegetation, thus making it safe for sheltering populations).

Although evacuation destinations will depend on the location of a wildfire and the direction of spread, in most circumstances, evacuees would be directed to the City of Boulder. For many parts of the Study Area, this represents a long duration of travel in a hazardous environment.

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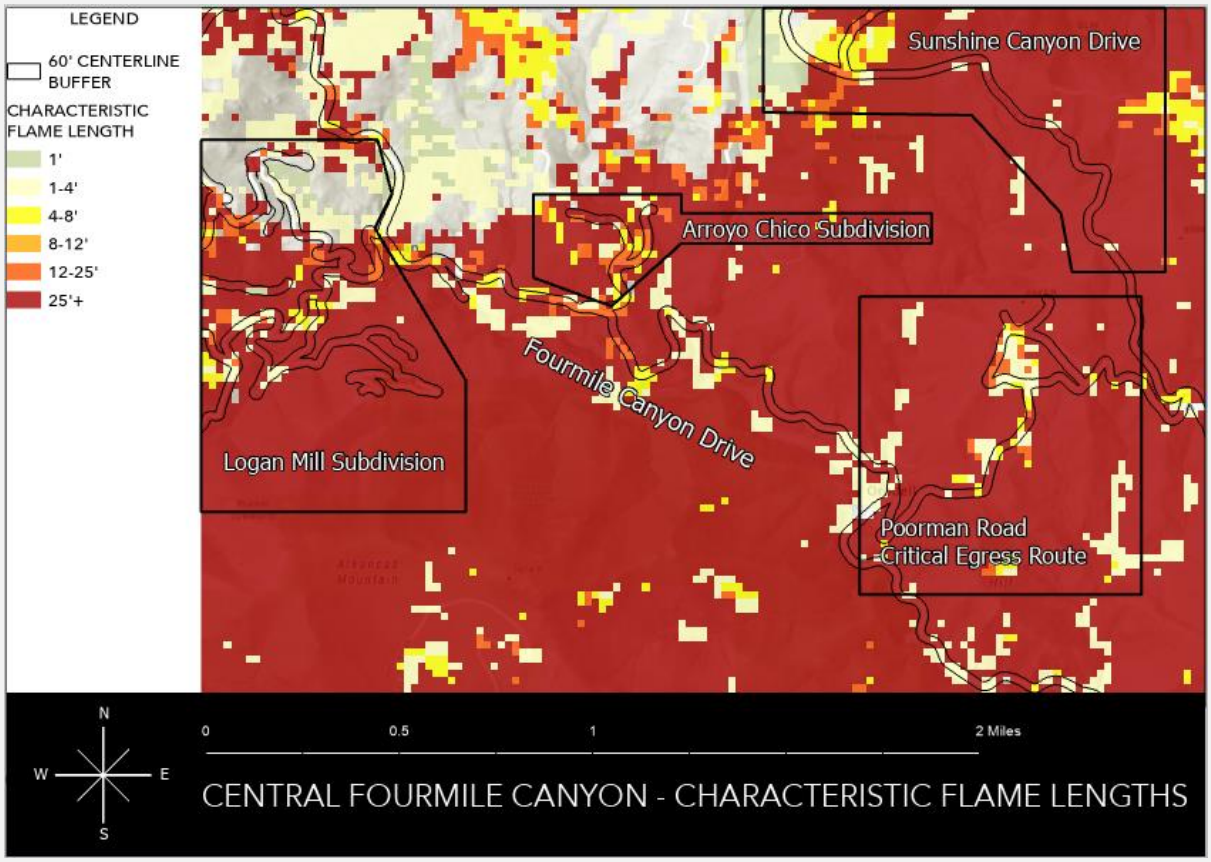
Roadway Vegetation

The fuels situation along roadways in the Study Area is very hazardous. A buffer analysis of potential roadside fire behavior (30' on either side of the roadway centerline) shows that most roads in the Study Area may be subject to intense wildfire and non-survivable conditions.



Active fire with flame lengths of more than 8' along roadways is likely to render the roadway environment non-survivable.

Except for certain stretches of roads in previously burned areas, most roadways would require fuels reduction treatments to create survivable access and egress corridors. These treatments would also enhance the probability of successful suppression, as roads are among the most advantageous features for containing the spread of wildfire.

EMERGENCY RESPONSE CAPACITY AND READINESS

When wildfire occurs, containing and controlling wildfire before the incident threatens values at risk is a fundamental response objective. A speedy initial attack with sufficient response resources increases the probability of suppressing wildfires before values become seriously threatened. During escalating or large-scale wildfires that cannot be controlled quickly, speed and weight of response remains critical to facilitating evacuations and creating the foundation for successfully managing the wildfire incident.

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Emergency response factors include initial attack resource availability; road and address signage; water availability; and fire station service areas.

Initial Attack Resources

The Study Area is primarily serviced by all-volunteer fire protection districts. Automatic aid and mutual aid agreements amongst neighboring fire districts and response agencies bolster the response capabilities of each district but because the all-volunteer response models do not entail 24-hour firefighter staffing, speed and weight of wildfire response cannot be guaranteed.

The level of training and experience in first arriving volunteer firefighters is likewise not guaranteed in the Study Area.

It cannot be guaranteed that properly trained, experienced firefighters in sufficient numbers will arrive within 20-minutes of a confirmed wildfire in most of the Study Area.

Although Basic Wildland Firefighter qualification (FFT2) is obtained by most members of the agencies servicing the Study Area, higher-level NWCG operational qualifications are limited.

Road and Address Signage

Proper road and address signage is a critical element to successful emergency response and wildfire suppression. Although recent programs to develop signage have improved the situation, there are still significant signage deficiencies throughout the Study Area.

Particularly in communities serviced by a single main road with branching minor roads, it will be challenging for first responders who do not have solid familiarity with the Study Area to navigate many of its communities.

Improving roadway signage can be accomplished and is recommended in the CWPP. An additional project to improve the navigability of the Study Area (while accomplishing many other objectives) is an operations map for Study Area responders, that can also be distributed through the county Office of Disaster Management and linked with a QR code at strategic locations in the Study Area.

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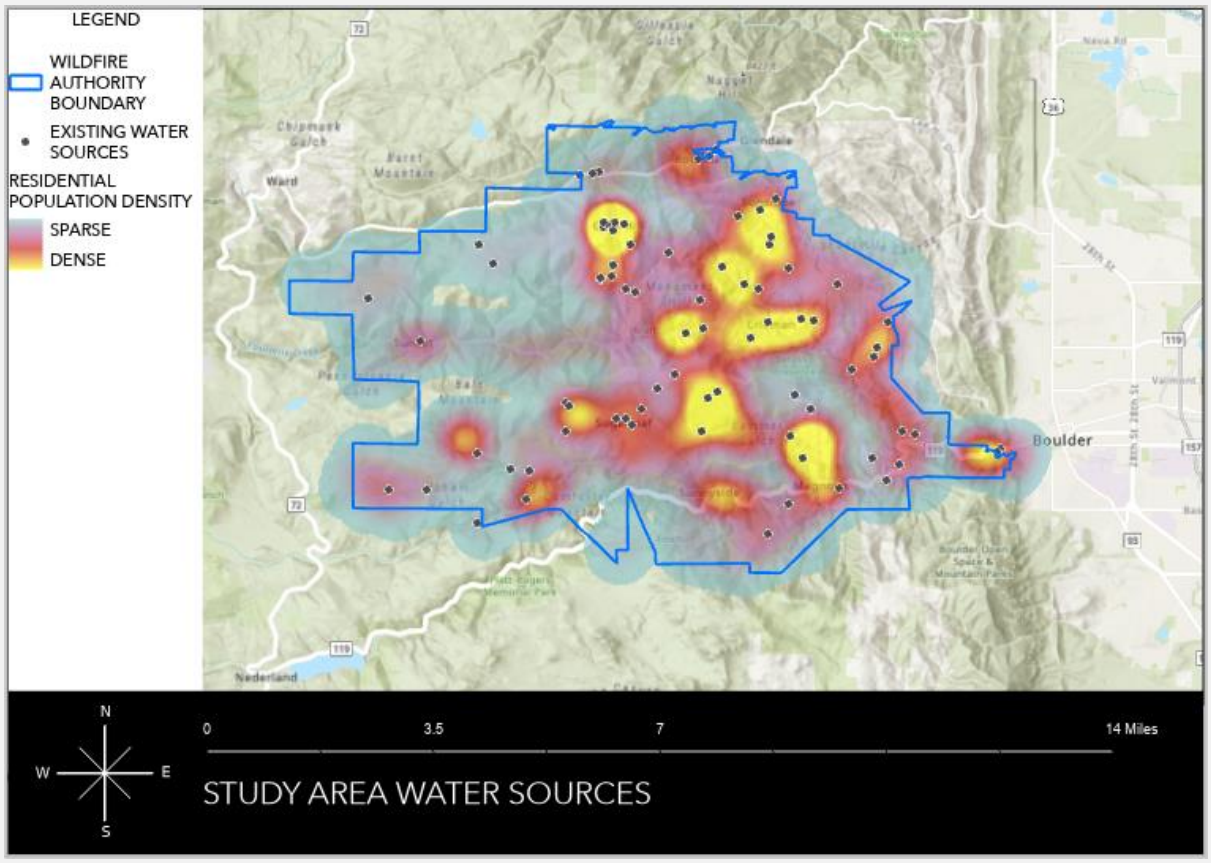
Water Availability

Water availability is key to successful wildfire suppression, and defensive operations. Except for several positive pressure hydrants—mainly in the eastern parts of the Study Area—available water sources are primarily static water cisterns or improved natural bodies of water (creeks and ponds), which can be unreliable and challenging to utilize.

Although there are many water sources in the Study Area, most are low-volume or have other limitations.



Water cisterns offer a fixed, limited supply of water, and drafting—drawing water from a static source as opposed to receiving pressurized water from, for example, a city hydrant—is prone to failure. Natural bodies of water are limited by environmental conditions and present similar drafting challenges as static cisterns. In drought conditions, many water supplies may vanish with diminished or absent in-creek flow.

Some water sources in the Study Area are backed up by pumps, and some have generator backup as well. These features are useful but are characterized by multiple fail points.

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Inconsistency in style and function of water sources is found in the Study Area, along with inconsistent water source signage. Operational assessments in the four districts revealed that fire district personnel are sometimes unfamiliar with the locations, functions, and limitations of water sources throughout the Study Area.

Fire Station Service Areas

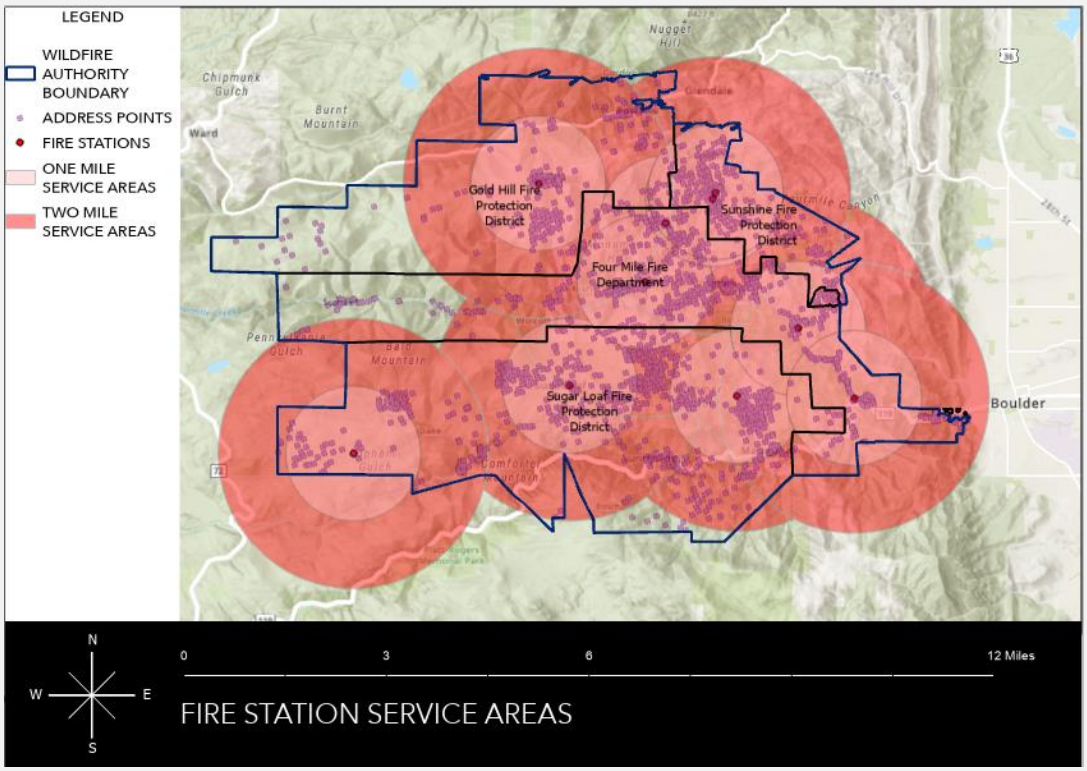
The proximity of communities to a fire station increases the likelihood of a prompt arrival of useful suppression resources, such as engines and hand crew carrying vehicles.

When combined with the mostly all-volunteer staffing model of the four districts providing emergency response coverage to the Study Area, fire station service area coverage is a compounding hazard.

A buffer analysis of existing fire stations shows large parts of the Study Area that are not expected to be quickly reached in the event of a wildfire.

Given that wildfire initial attack does not always occur in areas that are accessible by fire apparatus, and the mode of traveling to and accessing a wildfire is difficult to predict (i.e. wildfire suppression often requires driving to the nearest access point and hiking on foot to reach the fire), service areas are represented as radiuses from existing fire stations, as opposed to travel time polygons.

Areas within a one-mile radius of fire stations are at slightly less risk associated with response delays. Areas within or beyond a two-mile radius are at greater risk.



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A related risk factor for many of the remote communities in the Study Area is proximity to robust mutual aid wildfire suppression resources. The Boulder County Sheriff's Office Fire Management crew and the City of Boulder Wildland Division staff, as two key examples, are critical wildfire response resources in Boulder County. The primary stations for these resources are in or around the City of Boulder, where many other mutual aid partners with robust emergency response staffing models also operate.

This leads to a general map of continuously increasing risk as you move from east to west, that is, farther away from the City of Boulder, and farther away from the response resources that are based in the eastern portions of Boulder County.

THE HOME IGNITION ZONE

Home Ignition Zone mitigation, or defensible space and home hardening, entails efforts to reduce flammable materials and vegetation surrounding structures, modify building features and materials, and promote good residential maintenance practices (e.g., keeping combustible debris away from the home).

Observations of the overall, aggregate home ignition zone situation in the Study Area helps to define risk by describing the probability of substantial residential property loss resulting from wildfire, the potential for structural conflagration (home-to-home fire spread) [7], and measuring hazards to first responders (engaging wildfires in well-mitigated communities poses lesser risk to first responders).

There is no existing model for accurately predicting probability or extent of structural conflagration. However, certain risk factors that increase the likelihood of home-to-home wildfire spread can be evaluated using existing datasets, including housing density and relative proximity of homes. Structural conflagration risk in the Study Area is low, except for some subdivisions and, most notably, the town of Gold Hill.

A community survey conducted as part of the CWPP questioned respondents on the presence and quality of their defensible space, and 75% of respondents stated that their home is "well-mitigated." However, home ignition zone observations in 38 community Study Areas showed many communities with inadequate defensible space and home hardening.

In addition to promoting the creation and maintenance of hardened homes and defensible space, users of the CWPP should aim to educate the public on what quality

[7] Risk associated with conflagration is captured in the CO-WRA Wildfire Risk Theme (which incorporates neighborhood design, spacing and proximity of homes in relation to one another).

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defensible space consists of, to correct this gap between residents' estimation of their own defensible space, versus the observations of trained professionals.

Quality and comprehensive defensible space is a high priority recommendation for all residents living in the Study Area, as it can improve the probability of structures surviving wildfire flame impingement, radiant heat, and ember cast.

CONCLUSION: STUDY AREA RISK

This section has explored the four factors that describe wildfire risk in the Study Area.

The methodology for assessing and discussing risk in the Study Area mirrors the risk assessment methodology used for comprehensively evaluating risk in Community Study Areas.

A summary statement of wildfire risk is achieved by aggregating the results of the community-level risk assessments that are presented in the following section of this document.

The aggregate rating of study area risk reflects a deep analysis of the risk factors introduced and discussed in this section. This analysis was accomplished through data interpretation, operational assessments, and field surveys in each community in the Study Area.

Based on 38 detailed, community-level assessments, the Study Area was found to be at **high** risk of wildfire.

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COMMUNITY STUDY AREAS
AND RISK ASSESSMENTS

The Community Wildfire Risk Assessment Process (CWRA) is the most granular level of risk analysis conducted in the CWPP. Detailed, community-level risk assessments are the basis for the Study Area risk conclusions discussed in the previous section of this document.

The Community Wildfire Risk Assessments accomplish two essential objectives

1. Achieve a comprehensive understanding of community characteristics and risk factors through focused data interpretation, operational assessments, and on-the-ground field surveys for each community in the study area.

2. Determine which areas and communities in the study area are most at-risk, to prioritize risk reduction plans, programs, and projects for those higher risk communities.

38 Community Study Areas were developed within the Study Area, and boundaries drawn for each community. Boundaries were determined based on existing neighborhoods, areas of denser population and areas with similar risk and hazard features.

The CWRA methodology and process was developed by the Core Team, and was vetted by county, state and federal fire management specialists, and other subject matter experts.

The process involves data analysis to determine a baseline wildfire risk score, operational assessments to assess anticipated emergency response and suppression challenges, and field surveys to verify the results of the data analysis and operational assessments, and to observe hazards and features of each community.

Through this process, the four risk factors that define wildfire risk are thoroughly assessed.

Each community is assigned a risk score based on the CWRA scoring methodology, and score ranges correspond with a risk adjective (e.g., high risk).

A detailed overview of the CWRA methodology is provided in Appendix A.

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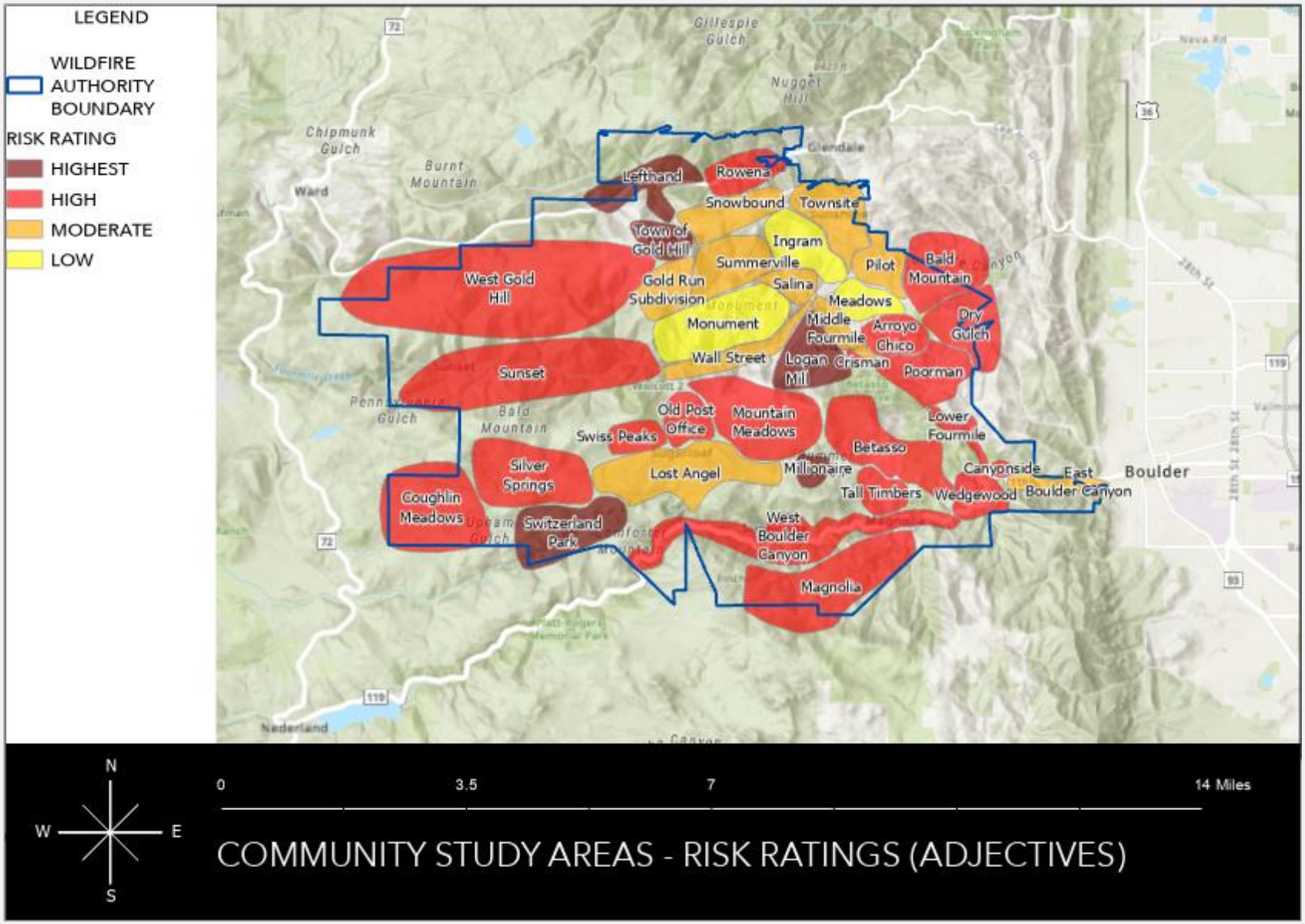

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COMMUNITY STUDY AREAS **RISK RATINGS BY DISTRICT**

Each Community Study Area below is linked to the findings for that community in **APPENDIX B**

FOUR MILE FIRE DISTRICT	
Logan Mill	Highest
Crisman	High
Sunset	High
Poorman	High
Arroyo Chico	High
Wedgewood	High
Lower Fourmile	High
Canyonside	High
Wall Street	Moderate
Summerville	Moderate
Middle Fourmile	Moderate
East Boulder Canyon	Moderate
Salina	Moderate
Monument	Low
SUNSHINE FIRE DISTRICT	
Dry Gulch	High
Bald Mountain	High
Pilot	Moderate
Townsite	Moderate
Ingram	Low
Meadows	Low
GOLD HILL FIRE DISTRICT	
Lefthand	Highest
Town of Gold Hill	Highest
Rowena	High
West Gold Hill	High
Snowbound	Moderate
Gold Run Subdivision	Moderate
SUGARLOAF FIRE DISTRICT	
Millionaire	Highest
Switzerland Park	Highest
Magnolia	High
Tall Timbers	High
Betasso	High
Swiss Peaks	High
Silver Springs	High
Coughlin Meadows	High
West Boulder Canyon	High
Old Post Office	High
Mountain Meadows	High
Lost Angel	Moderate

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COMMUNITY STUDY AREAS IN ORDER OF RISK SCORE

Well over half of the communities in the Study Area were rated at **highest or high risk**. The table below displays communities in order of the risk scores to better demonstrate relative risk in the Study Area.

Each Community Study Area below is linked to the findings for that community in **APPENDIX B**

Millionaire	171
Switzerland Park	167
Lefthand	162
Town of Gold Hill	161
Logan Mill	161
Crisman	160
Dry Gulch	158
Magnolia	153
Sunset	153
Tall Timbers	150
Poorman	145
Betasso	141
Swiss Peaks	141
Bald Mountain	141
Coughlin Meadows	141
Arroyo Chico	140
Silver Springs	138
Rowena	135
West Gold Hill	132
West Boulder Canyon	131
Wedgewood	131
Lower Fourmile	126
Old Post Office	124
Canyonside	124
Mountain Meadows	122
Lost Angel	120
Snowbound	113
Wall Street	107
Pilot	92
Gold Run Subdivision	90
Summerville	90
Middle Fourmile	90
Townsite	89
East Boulder Canyon	88
Salina	85
Monument	80
Ingram	75
Meadows	70

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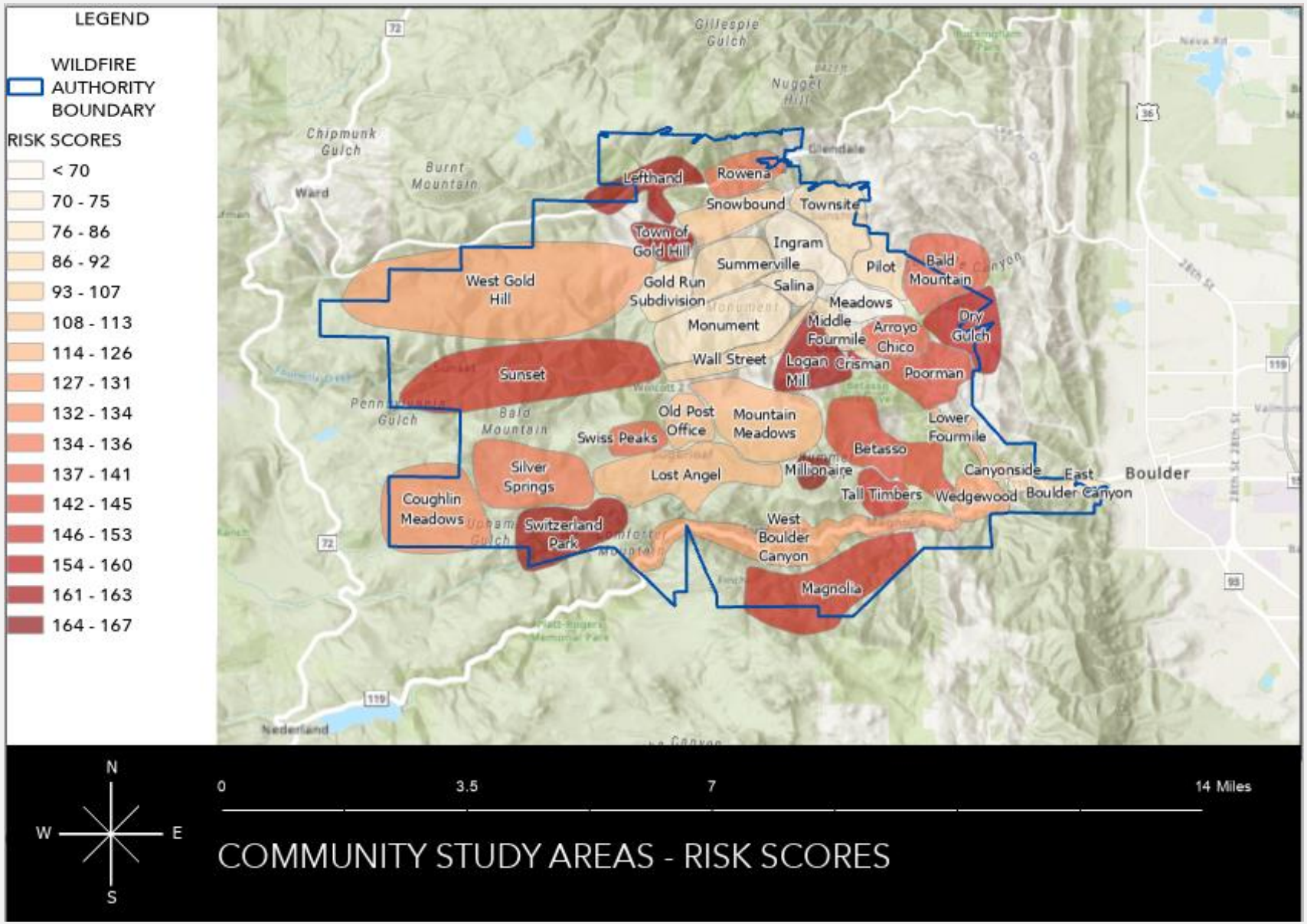

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Public Safety, Response, and Suppression

Home Ignition Zone

Hazardous Fuels Reduction

Community Engagement and Education

Other Recommendations

SECTION FOUR

RECOMMENDED SOLUTIONS

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INTRODUCTION

The CWPP has aimed to carefully explore the main drivers of destructive wildfire, and the main risk factors associated with wildfire in the Study Area. Recommending solutions to reduce wildfire risk involves exploring the drivers and risk factors associated with wildfire, and determining if and how these factors can be modified by some project, program, or other human intervention.

Any wildfire will begin with an ignition. Projects and programs in this section will seek to reduce the probability of human caused ignitions and improve detection time for both natural and human-caused ignitions.

When a wildfire occurs, the primary drivers of wildfire behavior are weather, topography and fuels. Of these primary drivers, only fuels can be meaningfully modified, so projects and programs to reduce hazardous fuels and improve forest health will also be pursued in this section. Fuels modification surrounding residential property, including the construction materials of the structures themselves will also be highlighted in this section.

Aside from the naturally occurring drivers of wildfire behavior (weather, topography, and fuels), the extent and impacts of wildfire will depend significantly on human factors, both prior to (e.g., preparedness efforts) and during a wildfire (e.g., suppression resources and efforts). By addressing these human factors, wildfire risk can be mitigated through a variety of project and program types. Recommendations in this section will seek to improve emergency response and suppression capacity in as wide a range as possible, while also improving community awareness of and engagement with wildfire risk.

During the development of the CWPP, regular public meetings were held to solicit input. The recommendations in this section are supported by the community. Some of the recommendations were conceived by community members, and the Core Team can only take credit for recognizing and documenting these good ideas. Other projects were presented to community members as concepts, and the community played a key role in helping to refine these concepts and develop them into projects.

The CWPP aims to present the following recommended solutions to wildfire risk in a style that is clear, while also being succinct and allowing for flexibility and initiative on behalf of the users of this document and implementers of its recommendations.

Recommended solutions are presented in five categories. **Within each category, projects and programs are listed in order of priority.** Although the CWPP recommends undertaking the highest priority projects first, it also acknowledges that good opportunities for any wildfire risk reduction activities should not be neglected, even when that means seizing the opportunity to complete a lower priority project before a higher priority project.

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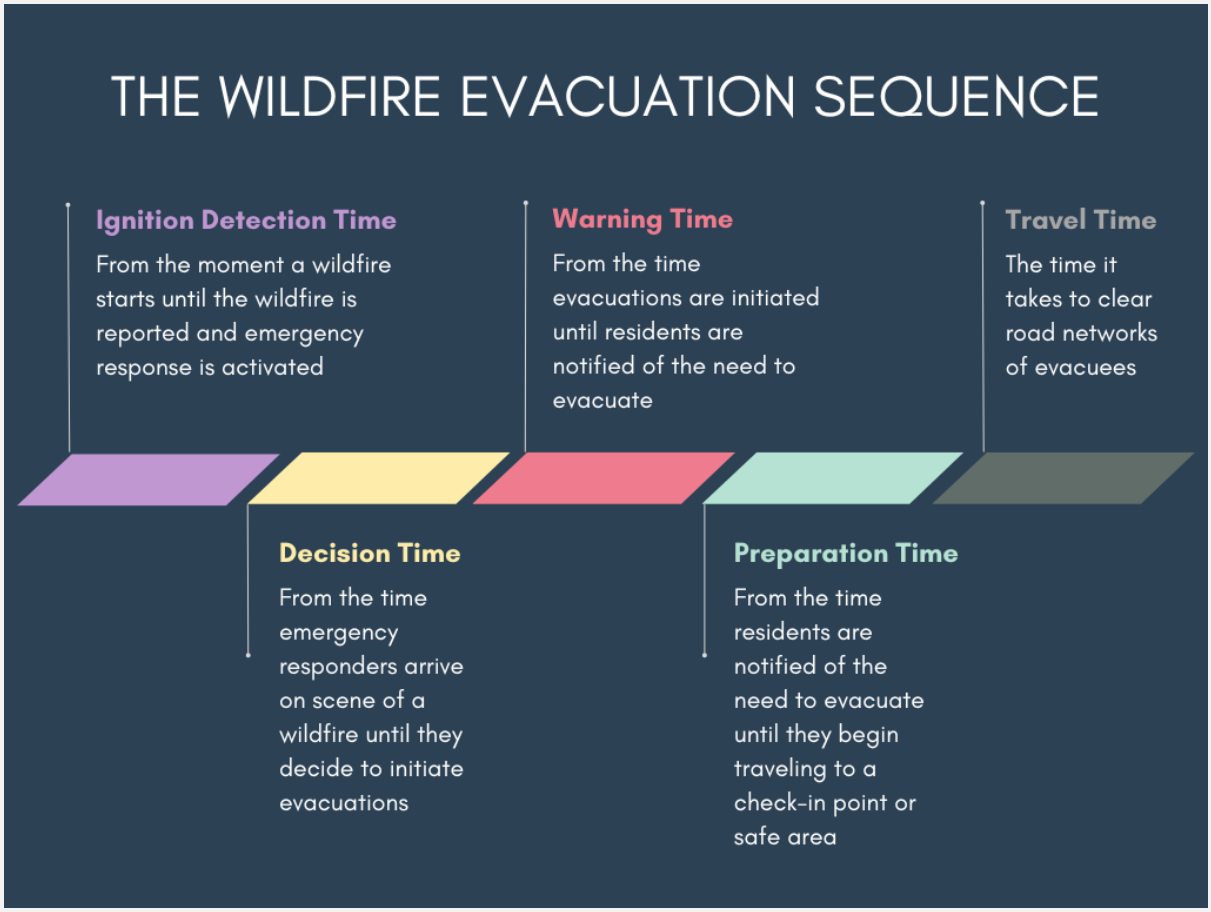
1 PUBLIC SAFETY
EMERGENCY RESPONSE AND SUPPRESSION

PROJECT 1A EVACUATION PREPAREDNESS

Improving evacuation preparedness is a key project to mitigate the hazard wildfire poses to human life.

Wildfire evacuations are multifaceted situations involving many complex risk factors. The Core Team recommends a multi-tiered strategy to improve evacuation preparedness in the Study Area that will address risks associated with each phase of an evacuation sequence, mitigate life-safety hazards during evacuations, and ensure that communities are well-prepared for wildfire evacuations.

An overview of the elements and sequence of wildfire evacuations helps to inform evacuation preparedness recommendations in the CWPP.



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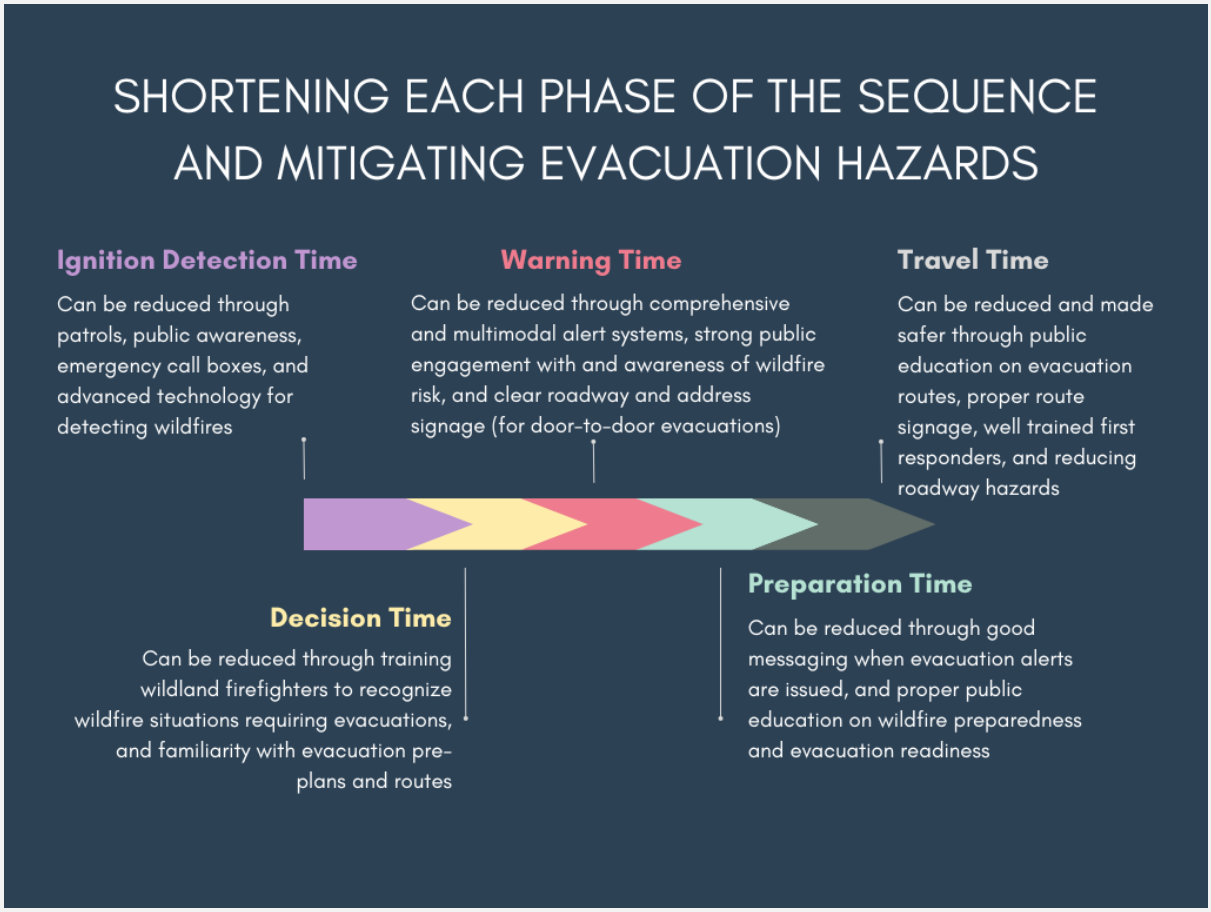
Wildfire evacuations are dynamic and inherently unpredictable events. A complex web of natural, social, and built (e.g., road networks) factors and influences will determine how an evacuation unfolds. The CWPP has aimed to comprehensively assess risk factors involved in each phase of the evacuation sequence, and now seeks to make recommendations that reduce risk to life resulting from evacuations, particularly during dire wildfire scenarios.

A variety of evacuation preparedness projects can work to shorten each phase of the evacuation sequence and mitigate hazards to evacuees.



Certain projects that will improve speed, efficiency, and safety during the various phases of a wildfire evacuation will also accomplish broader objectives. For example, projects aiming to improve ignition detection time accomplish risk reduction goals that go beyond improving evacuation preparedness, as early detection of wildfires will reduce risk to all values.

To avoid confusing redundancy in this section of the CWPP, the **evacuation preparedness** project elements recommended below are elements that are directly and exclusively related to evacuation risk. Projects that are described later in this section of the document will seek to reduce evacuation risk, in addition to other objectives.

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EVACUATION ROUTE ASSESSMENT

BWWA should begin with an assessment of existing evacuation routes. Many routes are privately maintained, or maintenance obligations fall to entities apart from Boulder County.

Maintenance plans and agreements should be explored to ensure that any secondary egress routes can be travelled by most vehicle types.

Where feasible, the construction or creation of new evacuation routes should be explored, particularly in single access/egress communities.

EVACUATION ROUTE SIGNAGE

Following a Study Area-level assessment of existing routes, consistent evacuation route signage should be installed to ensure that residents and visitors alike can readily identify road networks that lead to non-burnable environments.

The Core Team recommends that signage include a succinct statement to inform on the inherent dangers of evacuations routes, e.g., “Follow recommendations of public officials during evacuations. Do not use routes that are in the path of wildfire”

An instance in the Logan Mill subdivision of inadequate egress signage

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EVACUATION ALERT SYSTEMS[8]

"There never has been, there never will be, a silver bullet for disseminating warnings. One technology is insufficient."

– Dennis Mileti, Former Director of the Natural Hazards Center

Due to the challenges of relying on any single method or technology used to alert the public of wildfire evacuations, particularly in the rural and remote Study Area, the Core Team recommends promoting a system of evacuation and emergency alerts that relies on diverse means of reaching the public, including Wireless Emergency Alerts, Reverse 911, and possibly the inclusion of amateur radio networks, emergency alert sirens, or other technologies not in official use at the time of this plan's publication.

In addition to these technologies, a well-prepared community with robust networks of neighborhood communication should be a cornerstone of the Study Area alert system, as research has shown that friends and family notifying one another of emergency warnings is among the most effective modes of alert. Additionally, the CWPP recommends promoting a well-prepared network of responders equipped to facilitate door-to-door notifications.

The CWPP also recommends working in collaboration with county officials to discuss effective messaging for alerts to ensure that county-level practices reflect respected academic research on the subject.

COMMUNITY EVACUATION PREPAREDNESS

The Core Team recommends partnering with the Boulder Office of Disaster Management and using the ODM train-the-trainer model for building better community awareness and preparedness for wildfire evacuations. Fire district personnel and community members should be included in the audience for cohesive standards for community disaster preparedness in the Study Area.

The districts should also publish clear and succinct informational materials regarding evacuation preparedness, including maps of existing evacuation routes, with attributes of the evacuation routes clearly described. Key fire district personnel should be thoroughly trained and educated in the best guidance to offer residents, and up-to-date

[8] These recommendations are largely informed by the research of Dennis Mileti

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information regarding evacuations, such as evacuation polygons, routes, and other key information.

BWWA and the fire districts should engage the community to identify households or areas that require special evacuation preparedness, such as homes with teenage children, residents with disabilities, and properties with livestock.

FIRE DISTRICT TRAINING

Fire District training should focus on how fire district personnel will recognize the need for evacuations, correctly initiate evacuations, and successfully facilitate evacuations. Fire district personnel should also be trained in door-to-door evacuations. Although this responsibility will typically be assigned to law enforcement officials, during dire wildfire scenarios or rapidly escalating incidents, firefighters may be required to execute this life-saving task.

PROJECT 1B PROTECTING SPECIAL VALUES

Through the Values at Risk assessment and the Community Risk Assessments, several sites were identified that represent elevated risk to values. The Core Team recommends that BWWA engage the owners and operators of these sites to develop pre-plans for wildfires. These plans should emphasize similar wildfire preparedness and awareness outlined in other project recommendations, and at minimum should help the operators of these sites prepare for how they will facilitate evacuations for their employees and customers. These consultations should also include Home Ignition Zone assessments for the property involved with these sites. These consultations could also work towards preparedness relating to non-wildfire emergencies. The sites identified are:

The Sacred Mountain Ashram	10668 Gold Hill Rd	Religious site
The Colorado Mountain Ranch Summer Camp	10063 Gold Hill Rd	Summer camp
The Gold Hill Elementary School	890 Main St	Elementary school
The Gold Hill General Store	531 Main St	Store and restaurant
The Gold Hill Inn	401 Main St	Restaurant, bar, live music venue, lodging
The Star House	3476 Sunshine Canyon Drive	Retreat center
The Boulder Adventure Lodge	91 Fourmile Canyon Dr	Hotel
Boulder Creek by Wedgewood	38470 Boulder Canyon Dr	Event venue
The Foot of the Mountain Motel	200 Arapahoe	Motel
The Betasso Water Treatment Facility	1094 Betasso Rd	Critical infrastructure
The Boulder Canyon Hydroelectric Facility	3778 Boulder Canyon Dr	Critical infrastructure

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This list is certainly incomplete, as there are likely many values present in the Study Area that are at greater relative vulnerability to wildfire, but there is no guaranteed method of identifying all special values or especially vulnerable values. As such, part of this project recommendation is to develop better methods of communication between emergency services entities and the public in and around the Study Area. Operational assessments revealed limited standards or procedures for identifying and addressing the needs of vulnerable populations, and how any special needs would be addressed in the event of a wildfire.

Examples of vulnerable populations include children, the elderly, residents with disabilities, transient populations, and others. The special needs of the many categories of vulnerable populations defy easy classification and remedy.

The CWPP recommends that BWWA work to better address the special needs of vulnerable populations through developing better wildfire preparedness guidelines and procedures; incorporating vulnerable populations in first responder training; improving community engagement and gathering intelligence relating to where vulnerable residents are and what their needs consist of; and developing partnerships with relevant emergency and disaster response entities to ensure that critical information and plans relating to vulnerable populations is available and accessible.

PROJECT 1C ADDRESS AND ROADWAY SIGNAGE

The results of the Community Risk Assessments showed inconsistent and non-standard address and roadway signage in many parts of the Study Area. This will impede successful emergency response efforts during wildfires.

The Core Team recommends a Study Area-level project of installing non-combustible signposts with standard, reflective road and address numbering and lettering.

It is also recommended that complex roadway networks have clear signage indicating which secondary roads are accessed via primary roads. For example, at the Logan Mill and Wendlyn Way junction, there should be signage indicating that Blue Ribbon and Alaska Road are accessed via Wendlyn Way.

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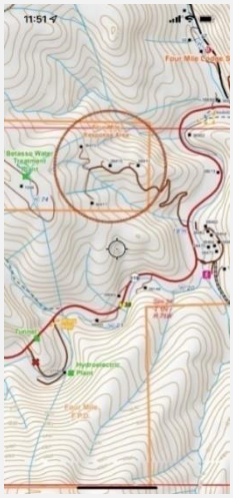
PROJECT 1D MAP PRODUCTS

BWWA OPERATIONS MAP



The Core Team recommends georeferenced map preparation for district responders in the Boulder West Study Area. This should be complemented with district training on Avenza Maps and ensuring that responders understand the basic functions of georeferenced maps.

These maps should include, at minimum: labeled roads, evacuation routes, address points, fire stations, water sources, possible staging areas, useful landmarks, and special sites and areas of concern.

PUBLIC MAPS

Boulder West should also create public maps, emphasizing evacuation routes, **emergency call boxes**, and other features that will better orient residents and visitors to the Study Area, and will improve awareness before and during wildfires (and other emergencies).

PROJECT 1E EMERGENCY CALL BOXES

The Core Team recommends a project to install Emergency Call Boxes at strategic locations throughout the Study Area.

This project addresses the risks associated with limited cellular coverage in the Study Area and will improve the likelihood that wildfire ignitions will be promptly reported.

The project will also enable residents to report problems, or 'incidents-within-the-incident' during wildfires.

This project has broader value, as call boxes will enable residents to report non-wildfire emergencies in areas where cellular phone service is unreliable.

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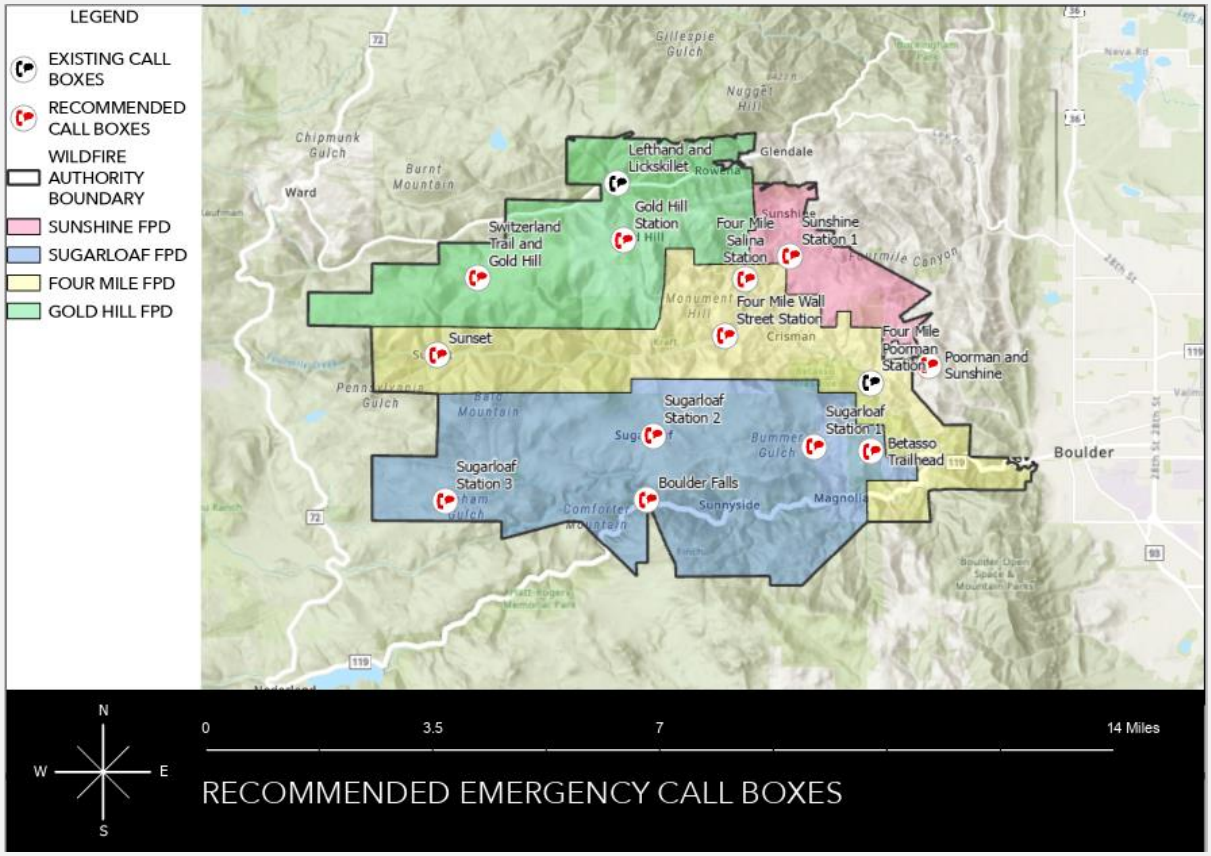

It is recommended that call boxes be installed at all fire stations first. This should be easiest to accomplish, as the creators of this plan have the authority to install call boxes at sites that are owned by the fire districts. These locations also have the advantage of being noticeable and known sites, and members of the public are likely to instinctively travel to a fire station if they intend to report a wildfire ignition (or other trouble) and do not have landline or cellular service.

RECOMMENDED EMERGENCY CALL BOXES		
Project Tag	**Call Box Location**	**Priority**
1E.1	Sugarloaf Station 1	High
1E.2	Sugarloaf Station 2	High
1E.3	Sugarloaf Station 3	High
1E.4	Sunshine Station 2	High
1E.5	Sunshine Station 1	High
1E.6	Gold Hill Station	High
1E.7	Four Mile Salina Station	High
1E.8	Four Mile Wall Street Station	High
1E.9	Boulder Falls	Moderate
1E.10	Poorman and Sunshine	Moderate
1E.11	Sunset	Moderate
1E.12	Betasso Trailhead	Moderate
1E.13	Switzerland Trail and Gold Hill	Moderate

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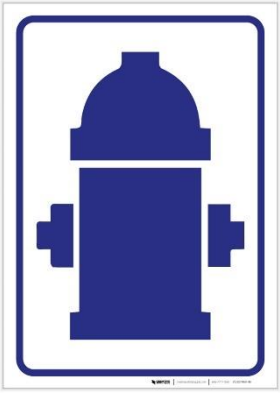
PROJECT 1F WATER SOURCE SIGNAGE AND INSTALLATION

PROJECT 1F.1 – WATER SOURCE SIGNAGE



The Core Team recommends a thorough assessment of water sources in the Study Area. Consistent signage (i.e., reflective placards) was absent or inconsistent for most water sources observed during field surveys. For water sources requiring more complex operation, instructional placards should also be installed. This project should aim to make water sources identifiable and readily useable not only for Study Area fire district personnel, but for incoming suppression personnel during an escalating or large-scale wildfire.

PROJECT 1F.2 – WATER SOURCE INSTALLATION

Increasing reliable water availability should be an ongoing goal of the Boulder West Wildfire Authority.

The CWPP recommends:

1. Developing water sources where reliable natural bodies of water are available.
2. Installing static water cisterns in areas where water availability is limited or in areas where additional water availability may be necessary to adequately provide protection for nearby values, and in areas that are serviced primarily or exclusively by natural bodies of water that may vanish during drought conditions.
3. Improving water sources that do not have hydrants present (e.g., the Lefthand Water Source, which requires direct drafting from an infiltration gallery).

The recommended water sources shown on the map and included in the table below are not intended to be a final list, nor should the recommended locations be interpreted as absolute. The map's intent is to identify potential areas for water source installation or improvement.

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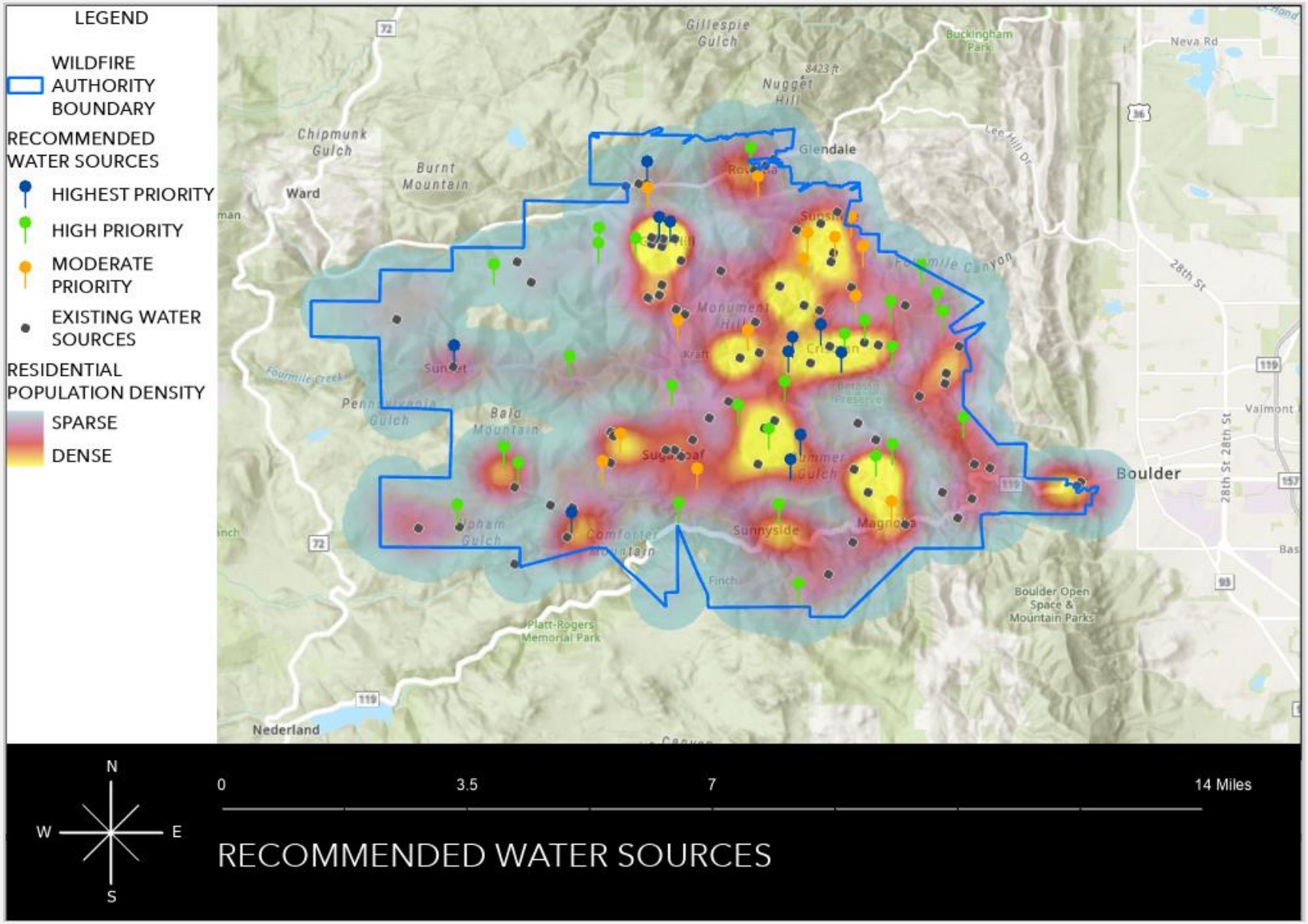

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RECOMMENDED WATER SOURCES			
Project Tag	**Water Source Name**	**Project Type**	**Priority**
1F.2A	Alaska Hill	New cistern	Highest
1F.2B	Wild Turkey	New cistern	Highest
1F.2C	Fred	New cistern	Highest
1F.2D	Dime	New cistern	Highest
1F.2E	Gold Hill North	New cistern to augment existing	Highest
1F.2F	Gold Hill East	New cistern to augment existing	Highest
1F.2G	Millionaire South	New cistern	Highest
1F.2H	Millionaire North	New cistern	Highest
1F.2I	Lefthand	Add hydrant to existing infiltration gallery	Highest
1F.2J	Switzerland Park	New cistern to back up creek hydrant	Highest
1F.2K	Bald Mountain	New cistern	High
1F.2L	Dry Gulch East	New cistern	High
1F.2M	Dry Gulch West	New cistern	High
1F.2N	Poorman	Add generator backup to station water source	High
1F.2O	Middle Fourmile	New cistern	High
1F.2P	Camino Bosque	Add hydrant to existing cistern	High
1F.2Q	Arroyo Chico Upper	New cistern	High
1F.2R	Crisman	New cistern	High
1F.2S	Sunset West	New cistern to back up pond	High
1F.2T	Ashram South	New cistern	High
1F.2U	Ashram North	New cistern	High
1F.2V	Mountain Ranch	New cistern	High
1F.2W	Switzerland	New cistern	High
1F.2X	Sunset East	New cistern	High
1F.2Y	Tall Timbers	New cistern	High
1F.2ZZ	Mountain Meadows NE	New cistern	High
1F.2AA	Mountain Meadows W	New cistern	High

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1F.2BB	Mountain Meadows SE	New cistern	High
1F.2CC	Silver Springs North	New cistern to backup pond hydrant	High
1F.2DD	Coughlin Meadows	New cistern to back up creek hydrant	High
1F.2EE	Rowena	New creek cistern	High
1F.2FF	Magnolia South	New cistern	High
1F.2GG	Boulder Canyon Central	New creek cistern	High
1F.2HH	Boulder Canyon West	New creek cistern	High
1F.2II	Weaver	New cistern	Moderate
1F.2JJ	Magnolia and Canyon	New cistern	Moderate
1F.2KK	East of Swiss Peaks	New cistern	Moderate
1F.2LL	Camino Escape Route	New cistern	Moderate
1F.2MM	Salina Ingram	New cistern	Moderate
1F.2NN	Whispering Pines	New cistern	Moderate
1F.2OO	Pilot	New cistern	Moderate
1F.2PP	Wall Street	New cistern to back up pond hydrants	Moderate
1F.2QQ	Lost Angel West	New cistern	Moderate
1F.2RR	Snowbound	New cistern	Moderate
1F.2SS	Lost Angel South	New cistern	Moderate
1F.2TT	Lickskillet	New cistern	Moderate
1F.2UU	Ingram	New cistern	Moderate
1F.2VV	Townsite Junction	New cistern	Moderate
1F.2WW	Emerson Gulch	New cistern	Moderate

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PROJECT 1G EMERGENCY RESPONSE AND SUPPRESSION TRAINING

The four districts are following NWCG Standards for wildfire incident qualifications, and good training opportunities are available to members of all four districts through local, county, state and nationally sponsored programs and classes. The Core Team recommends engaging responders individually to develop training plans designed to enhance wildfire response skills and capabilities and to promote advancement in NWCG qualification.

Wildland firefighters in all four districts should be encouraged to pursue national wildfire assignments and prescribed fire events as means to build experience and confidence in responding to wildfires. These out-of-district activities also provide opportunities to complete NWCG Position Task Books for higher-level qualifications. Earning higher qualifications can be challenging to accomplish solely through local response and initial attack.

Although Position Task Book training opportunities can be limited in local response, district Training Officers should also work to develop wildfire procedures that instruct senior firefighters to recognize appropriate opportunities to put firefighters into trainee positions during local response. For example, a firefighter pursuing FFT1 – Squad Boss qualification should be given opportunities, when feasible, to act in the Squad Boss position during initial attack on local incidents.

The Core Team also recommends partnering with neighboring fire districts and other response agencies in Boulder County to conduct large-scale training to improve interoperability among local resources.

A first responder survey conducted as part of the CWPP helped the Core Team identify specific training needs.

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PROJECT 1H WILDFIRE COORDINATION

The four districts should explore means to better coordinate wildfire preparedness and response. Wildfire Coordination should entail structured and frequent communication relating to:

LOCAL WILDFIRE RISK AND WEATHER INDICES

INDICES-BASED STAFFING AND RESPONSE LEVELS

STAFFING DRAWDOWN

PATROLS OF LIKELY IGNITION LOCATIONS (E.G. CAMPSITES)

The Boulder West Wildfire Authority Advisory Committee may prove to be a useful mechanism for wildfire prevention and response coordination.

PROJECT 1I INTERAGENCY WILDLAND TEAM / INITIAL ATTACK RESOURCE

The districts should explore forming an Interagency Wildland Team, to build stronger working relationships between responders who have emphasized wildfire response skills, qualifications, and experience in their careers. This would create a stronger initial attack response in any of the four districts, when all four districts are likely to be working together on emergency response and wildfire suppression objectives. A Wildland Team would also offer greater training opportunities for all wildland personnel serving the four districts.

An Interagency Wildland Team could serve as the mechanism to accomplish the recommendations in Project 1H -Wildfire Coordination and could complement the efforts of the Boulder West Wildfire Authority Committee in a variety of ways.

PROJECT 1J GEAR AND EQUIPMENT ACQUISITION

The CWPP did not entail a full inventory of wildfire response gear and equipment.

The districts should consult NFPA and NWCG standards for gear lifespan to ensure that all core Personal Protective Equipment (PPE) is compliant with safety regulations and in serviceable condition.

The districts should also seek funding sources to standardize and improve issued wildland gear such as mobile and handheld radios, and fire-line packs.

Wildland fire apparatus acquisition and replacement should also refer to NFPA and NWCG to ensure that apparatus is safe to operate, within intended lifespans, and meets standards for inventories.

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2 HOME IGNITION ZONE

INTRODUCTION TO THE HOME IGNITION ZONE

Wildfire science is clear that embers are the largest contributor to home loss during wildfire events.[xxiii] During large-scale and high-intensity wildfires, there will not be enough responders available to defend every home and, once ignited, a structure will usually not survive unless actively defended. Therefore, to improve outcomes to homes and other values at risk within the Study Area, structures must be hardened to withstand ember exposure.

Studies also show that outcomes to structures during wildfires are influenced primarily by conditions within 100-200 feet of the building.[xxiv] Creating defensible space through fuel modification within a 100-foot minimum radius of buildings can reduce the impact of heat and ember cast and provide responders with conditions that allow them to safely engage in defensive operations. These actions will also reduce the likelihood of fire spreading from the home to the surrounding forest and neighboring homes.

Therefore, mitigation in the Home Ignition Zone—defined as the home and the area around the home[xxv]—has been identified as a high priority recommendation for all residents living within the Study Area. The prescription for Home Ignition Zone mitigation, or defensible space, will vary significantly depending on the structure(s), the property, and the surrounding landscape and community features.

PROJECT 2A HOME IGNITION ZONE ASSESSMENTS

The process of creating and maintaining a hardened home with properly managed vegetation begins with the home assessment.

All homeowners within the Study Area would benefit from a personalized Home Ignition Zone (HIZ) assessment which will look at both home hardening and defensible space. These assessments should include the active participation of the homeowner to ensure that recommendations are well-understood, and to create consensus on the required mitigation measures. Ideally, these assessments should be repeated at six-year intervals.

The HIZ assessment should inspect all aspects of the home (or primary structure) as well as any outbuildings and secondary structures that could potentially impact the residence or cause fire to spread to neighboring homes or forest. Home hardening measures will be detailed.

The HIZ assessment should also include the creation of a defensible space prescription that would clearly identify the fuels modification requirements. Trees and other

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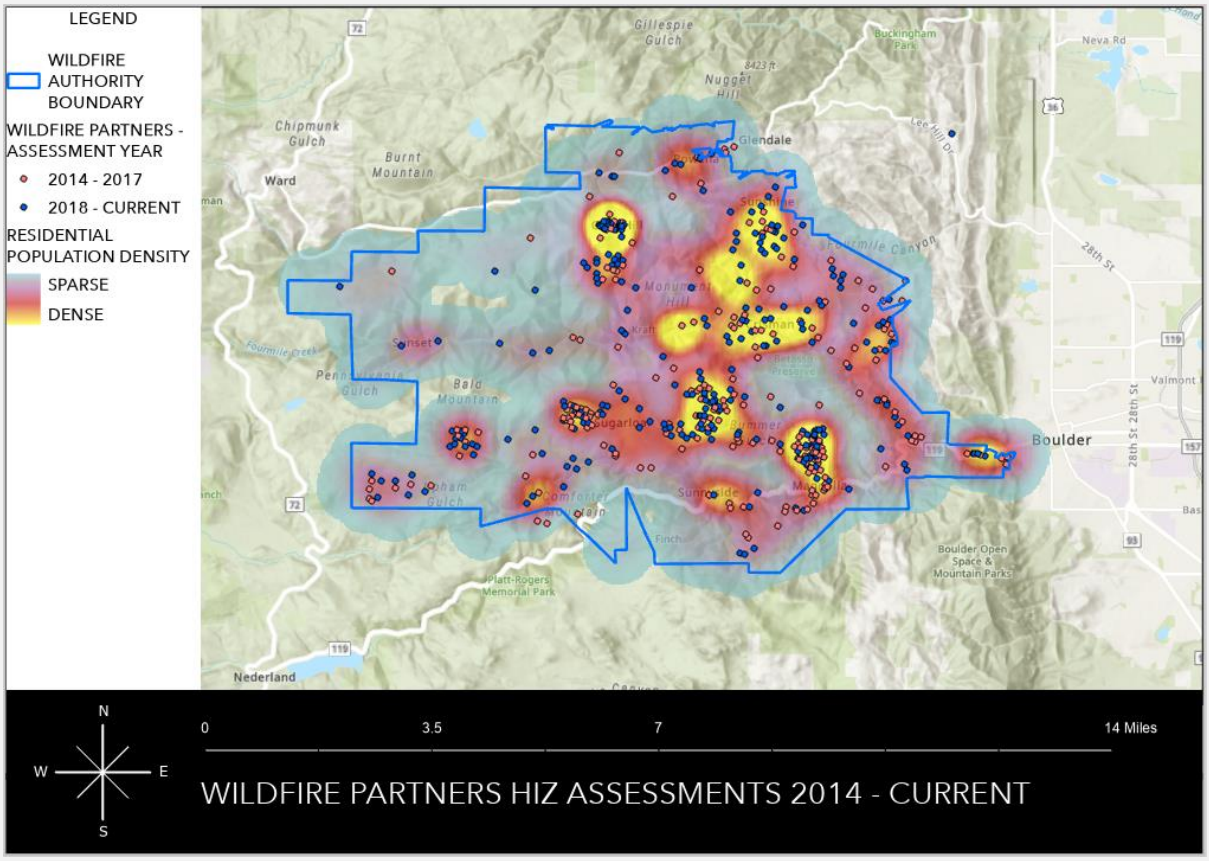
vegetation that will need to be removed or modified (e.g., low limbing of trees, pruning of shrubs) will be clearly marked or detailed in a report.

BWWA should collaborate with Boulder County's existing program, Wildfire Partners, for HIZ assessments. This program has been providing free HIZ assessments, complete with a detailed PDF report of findings, since 2014. All residents within the BWWA qualify for this service, and approximately 25% of property owners within the BWWA have already received an assessment and performed some or all the mitigation recommendations offered by Wildfire Partners. This baseline data will allow BWWA personnel to evaluate progress in promoting Wildfire Partners assessments and subsequent HIZ mitigation actions.



BWWA should also work to develop internal capacity to train fire district personnel to provide quality HIZ assessments, so that if Wildfire Partners services are delayed or unavailable for any reason, BWWA can provide this essential service.

A community survey conducted for the CWPP revealed that 75% of respondents in the Study Area believed that their homes are well-mitigated. The field surveys conducted for the community risk assessments found a lower percentage of homes that were sufficiently mitigated. A robust program for advertising and facilitating home assessments should help to close the gap in perception surrounding what quality HIZ mitigation looks like and will lead to residential property that is more likely to survive a wildfire.

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PROJECT 2B RESOURCES TO PROMOTE AND MAINTAIN HOME IGNITION ZONE MITIGATION

Fire district websites and other published materials should contain resources that homeowners can access to learn about creating and maintaining defensible space and hardened homes. Standards and guidance on the Home Ignition Zone should be reviewed regularly to ensure that messaging from BWWA and the fire districts reflects current consensus.

The Colorado State Forest Service is a good resource for home hardening and vegetation management in the Home Ignition Zone.

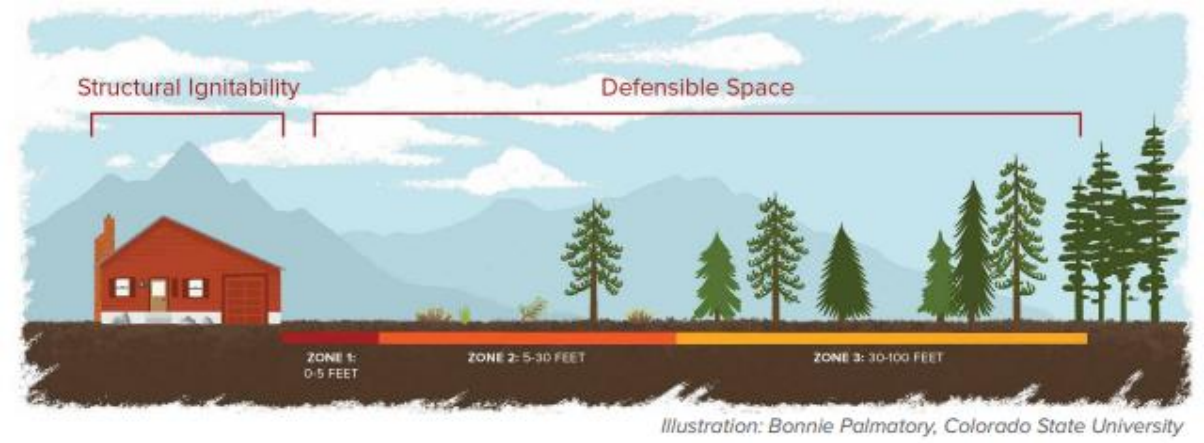

Illustration: Bonnie Palmatory, Colorado State University

Many property owners will be able to accomplish meaningful action to reduce risk in the Home Ignition Zone, but BWWA and the fire districts should explore funding sources, and other material resources that can be offered to residents to promote the creation and maintenance of defensible space, particularly for the costly, technical, or physically arduous elements of home hardening and defensible space creation that are not easily accomplishable by many residents.

Examples of events, equipment, and other resources that could be offered to the community to accomplish these goals are reflected in Project 4B**.**

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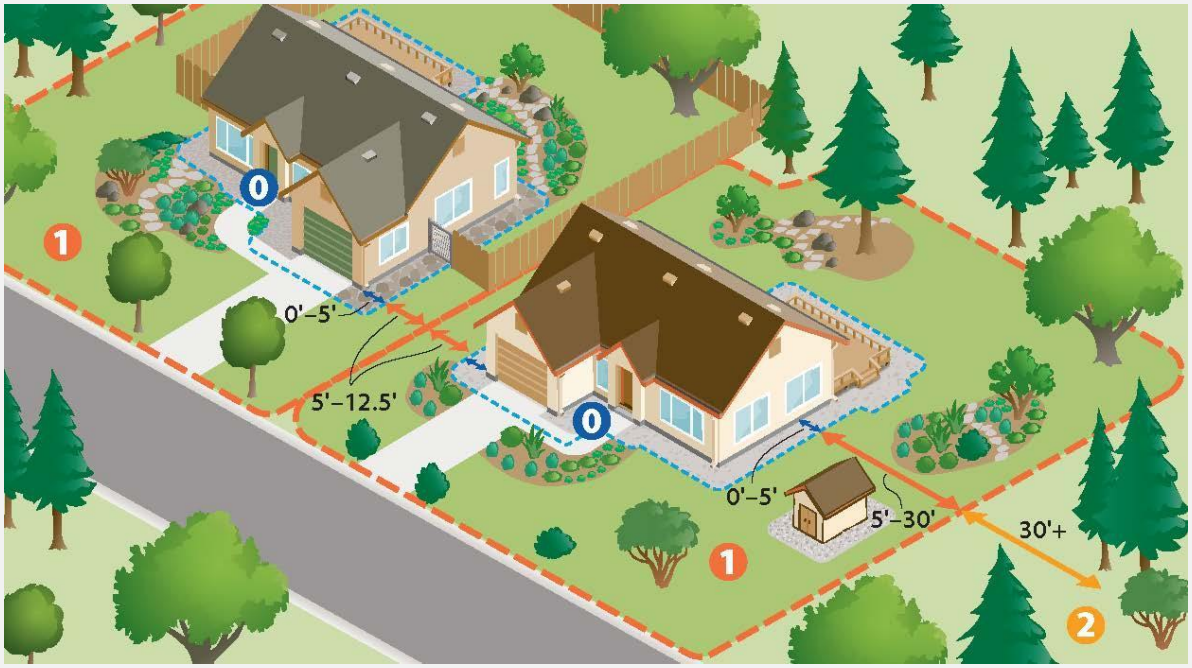
PROJECT 2C LINKED DEFENSIBLE SPACE

Wildfire mitigation is always strengthened by linking efforts with neighboring properties. This is particularly important in areas of the community where the structure separation distance is such that fire would easily spread from one building to another. Therefore, it is important to have as many community members as possible educated and engaged with community and property-level wildfire mitigation. The BWWA should foster community networking and engagement through:

- Online surveys
- Regular public meetings
- Regular and reliable published materials about mitigation resources and programs
- Community events (both wildfire-focused, and events geared toward community building and resilience in general)
- Coordination with local, state, and national wildfire awareness efforts and campaigns
- Informing residents of relevant wildfire mitigation programs



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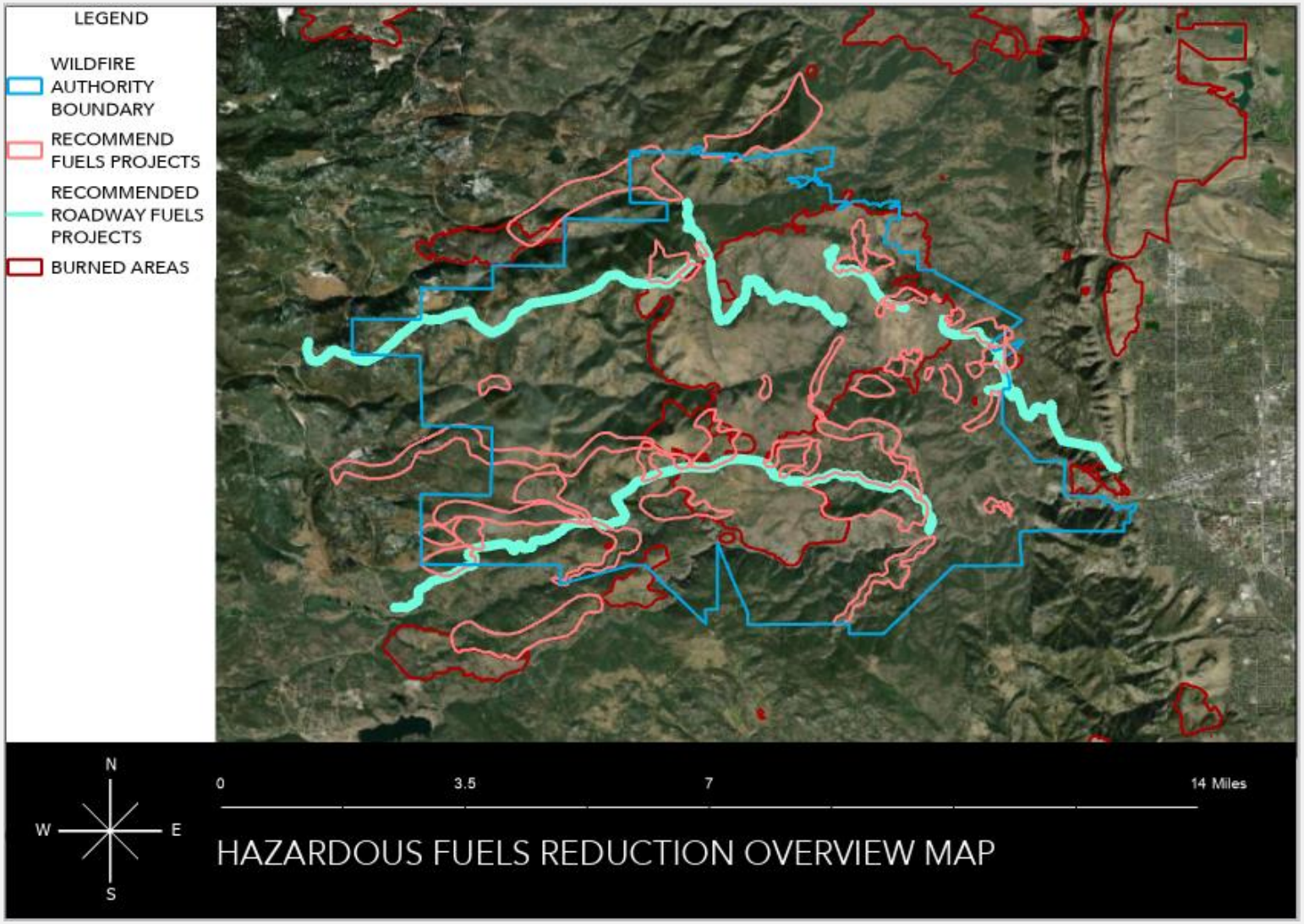
3 HAZARDOUS FUELS REDUCTION



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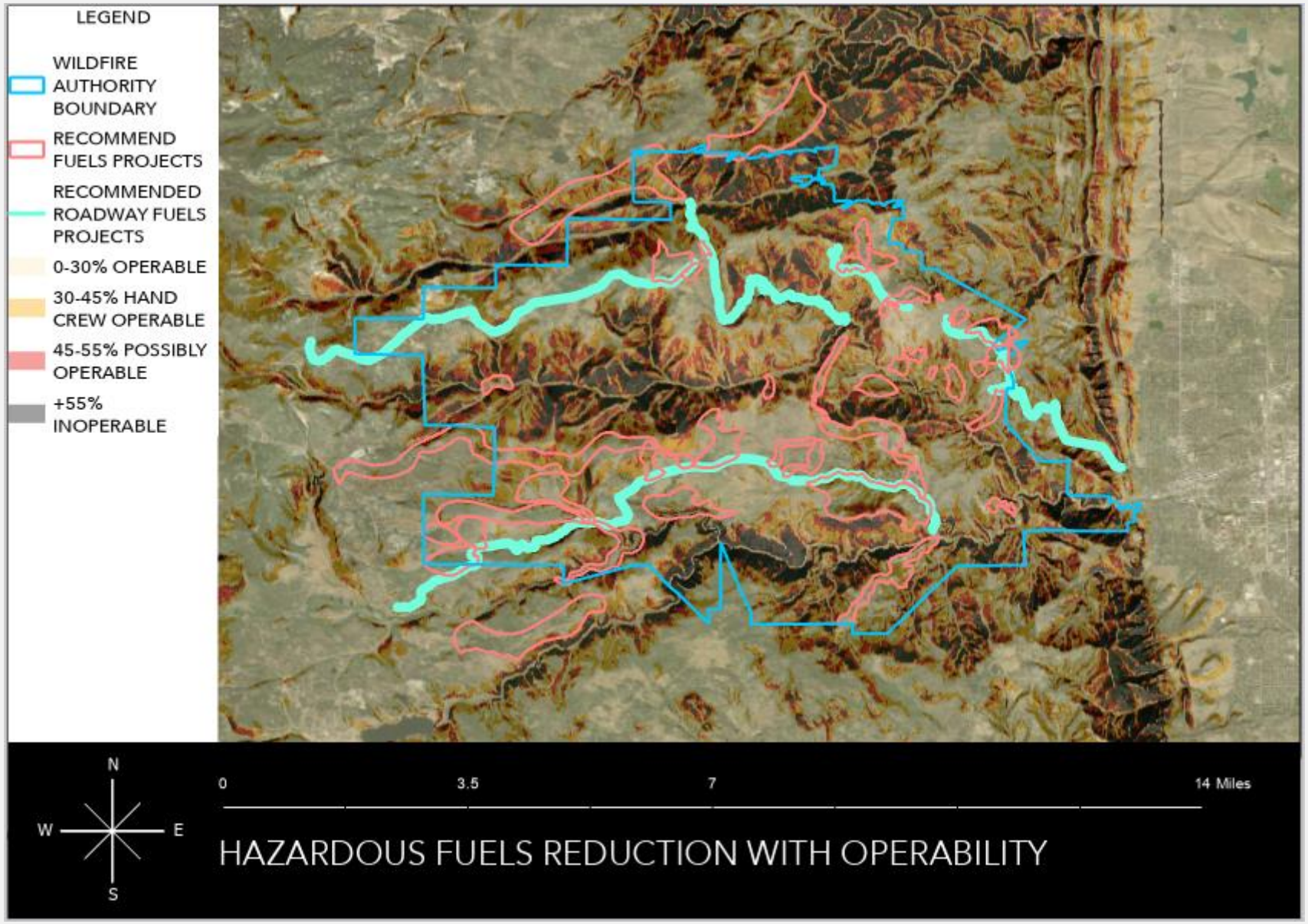

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INTRODUCTION TO HAZARDOUS FUELS REDUCTION

When a wildfire occurs and is allowed to escalate, the primary drivers of wildfire are fuels, weather, and topography. Of these drivers of wildfire behavior, only fuels conditions can be effectively modified to impact wildfire behavior. Hazardous fuels reduction and forest restoration seeks to alter the quantity, structure, and continuity of vegetation with the goal of reducing undesirable fire intensity and burn severity.

Community engagement and input throughout the CWPP process signaled strong support for hazardous fuels reduction project, on small and large scales.

Roadway fuels reduction projects will be discussed first in this section because roadways are among the most accessible and effective of the many natural and built features that are advantageous landscape features for fuels reduction treatments.

Community-level and Landscape-scale projects will often take advantage of roadways, but are also designed to be created on, or connect to, other advantageous landscape features. These features include previously burned areas (where flammable vegetation has been reduced), ridges, waterways, meadows, developed areas, rock outcroppings, among others.

The projects described in this section are deliberately ambitious. The CWPP seeks to identify as many project areas that should be treated as possible. Due to the number of landowners comprising many of the proposed project areas, it should be acknowledged that many of the large swaths of land that are recommended for treatment are unlikely to be fully completed. The CWPP recommends pursuing the goal of treating the project areas described in this section, while recognizing that a variety of challenges will require modifying project scopes. This will often require scaling down the scope of work or dividing a project into smaller projects to be pursued over a longer timeline.

The main impediments to large-scale project implementation are expected to be financial viability, landowner buy-in, and broader social licensing.

Like the other subsections in the Recommended Solutions section of this document, fuels reduction projects are listed in order of priority, based on the risk assessments conducted for the CWPP. The risk assessments were complemented with operability assessments. The factors that will challenge project implementation mentioned above (cost and public support) did not factor into the prioritization process.

The CWPP recognizes that high priority projects may be impossible to implement based on factors such as landowner willingness. As such, the CWPP recommends aggressively pursuing any recommended projects, or variations on those projects, if there are landowners who are supportive of the proposed work, even if those projects are not ranked as a high priority.

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The CWPP does not make rigid prescriptive recommendations for these projects. Current Colorado State Forest Service standards for fuel break treatments should be used as a minimum standard and the USDA GTR 373 should be consulted to ensure that the target forest structure reflects historical conditions and accomplishes forest health objectives.

During fuels reduction implementation, a wide variety of subject matter experts should be consulted. As research[xxvi] and anecdotal experience[xxvii] has shown, large-scale thinning in forests can produce unintended results when poorly planned or executed.

Examples of counterproductive outcomes to hazardous fuels reduction projects include increasing surface fuel loading or continuity (and thus allowing surface fires to burn more intensely and spread more rapidly) as a result of thinning the overstory in timber fuel models. Other unintended outcomes have included harming landscapes by introducing non-native species during project implementation.

Great care and diligence should be taken in the implementation of hazardous fuels reduction. There are many potential costs associated with failing to successfully implement these projects.

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INTRODUCTION TO ROADWAY TREATMENTS

The CWPP recommends roadway treatments as a high priority project category. As was discussed in the Susceptibility of Values subsection in this document, roadways are a critical element in life-safety risk in the Study Area, and modeled wildfire behavior on most roadways in the Study Area shows non-survivable conditions during active wildfire.

ROADWAY DEFINITIONS

The CWPP defines roads as belonging to one of three general classifications.

Primary roads are defined as roads that provide access and egress to and from many communities and serve as main routes to non-burnable evacuation destinations. The primary roads in the Study Area are Boulder Canyon Drive, Sugarloaf Road, Fourmile Canyon Drive (except for the section west of the Gold Run Road junction, where it becomes a Community Road), Sunshine Canyon Drive, Gold Hill Road, and Lefthand Canyon Drive.

Primary connector roads are defined as roads that connect primary roads to one another, and thus are parts of primary access and egress networks to many communities. The primary connector roads in the Study Area are Poorman Road, Gold Run Road and Lickskillet Road.

Community roads are defined as roads that provide access and egress primarily to one neighborhood or community. These roads are often 'one-way-in-one-way-out' roads, but sometimes have community connector roads, Jeep/Four-Wheel-Drive roads, or evacuation routes that connect to other community roads, and eventually to primary roads or primary connector roads.

ROADWAY FUELS REDUCTION PRESCRIPTION

The CWPP recommends adhering to current Colorado State Forest Service guidelines for Shaded Fuel Break Prescription for all roadway treatments. These should be considered minimum standards, and wherever possible more aggressive thinning and farther treatment distances from the road should be accomplished.

ROADWAY FUELS REDUCTION PRIORITIZATION

Prioritizing roadways for roadside fuel break treatment is a challenging endeavor. Primary roads are critical in facilitating the safe movement of high volumes of evacuees

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and first responders and represent greater and larger-scale strategic opportunities for wildfire containment and control than community roads. Non-survivable environments on primary roads pose serious risks to life but depending on the location and direction of spread of a wildfire, there are usually alternative routing options for evacuees and first responders.

Community roads are of different, but equally critical importance. Although they usually facilitate the safe movement of lower numbers of evacuees and first responders, and often represent smaller-scale strategic opportunities for wildfire containment and control, community roads are often the sole egress and access route for evacuees and first responders. Thus, non-survivable community roads represent a more finite, but more profound life safety risk.

Given the distinct risk factors associated with road types, the CWPP does not factor road types into its prioritization methodology. Instead, roadway treatments are categorized by the three roadway types. These categories are given equal prioritization in the CWPP, and individual roadways are prioritized within their category.

PROJECT 3A – HAZARD TREE REMOVAL ON ALL ROADWAYS

The highest priority roadway project is distinct from the other projects in purpose and prescription. The CWPP recommends identifying all hazard trees threatening any roadways within the Study Area. A hazard tree is defined as a tree that could fall into a roadway during wildfire, impeding the flow of evacuations or emergency response traffic. This project is rated as the highest hazardous fuels reduction project because planning and implementation could be quickly and easily accomplished when compared with most of the projects and programs recommended in this document and recognizing that roadway impediments during wildfire evacuations and response could have disastrous outcomes to life safety.

PROJECT 3A.1 – PRIMARY ROAD - SUNSHINE CANYON DRIVE

A long section within the Sunshine Fire District is primarily grass due to the Fourmile Canyon Fire impacts. Treatment to the east of the burn scar should be prioritized, and a partnership with Boulder Rural Fire District to continue the treatment to City of Boulder limits should be explored. Existing fuels reduction projects have been accomplished along the highest-risk corridor of Sunshine Canyon Drive, in the Bald Mountain and Dry Gulch communities, but re-entry and expansion of these treatments would enhance their effectiveness. Treatment west of the burn scar would be useful, but steep slopes will challenge operability through the Snowbound Community. This project is recommended as the highest priority primary roadway treatment, for objectives connected to Sunshine Canyon Drive's status as an egress route for multiple

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communities, and due to the broader strategic benefit treatment would offer large communities in neighboring districts.

PROJECT 3A.2 – PRIMARY ROAD - SUGARLOAF ROAD

All of Sugarloaf Road should receive fuels reduction treatment with some exclusions in areas that are inoperably steep. The Black Tiger burn scar is a good feature to tie into on both sides (Sugarloaf East and Sugarloaf West) but select thinning within the burn is still called for. This is a high priority treatment for values at risk along Sugarloaf Road, and for its broader strategic benefit to improve the odds that a fire could be contained on either side of Sugarloaf Road. The section along Boulder Canyon is inoperable, so the treatment should be tied into Boulder Canyon where the road turns from east to north.

Sugarloaf Road East is a higher priority due to residential population, anticipated roadway congestion, and broader strategic impact.

Sugarloaf Road West (Mountain Pines Road to Peak to Peak Highway) is a lower priority.

PROJECT 3A.3 – PRIMARY ROAD - GOLD HILL ROAD

Gold Hill Road will service smaller populations during wildfire evacuations but represents a very good strategic holding feature. Existing meadows and areas of sparser vegetation and good slope and general operability conditions make this a large-scale project that would be easier to accomplish but is less urgent than Sunshine and Sugarloaf treatments. Given the good operability conditions and the existing natural features and prior treatments, fuels reduction along Gold Hill Road should consider and take advantage of opportunities to go much wider than the 300’ minimum prescription for roadside fuel breaks, to treat all operable areas where forests are overgrown. Extending treatment widths or connecting to adjacent treatments to the north and south of Gold Hill Road would enhance the protection of the town of Gold Hill from wind driven wildfire from the west and would create a good mosaic of meadows and well-managed forest over a large area.

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INOPERABLE PRIMARY ROADS

Four Mile Canyon Drive

Four Mile Canyon Drive could experience non-survivable wildfire throughout most of its extent. However, very steep slopes leading up both sides of the canyon would render fuel break prescriptions very challenging to accomplish. The riparian corridor represents further operability and prescription challenges. Landscape scale treatments to mitigate wildfire spread and intensity throughout Fourmile Canyon Drive are recommended as alternatives to a traditional roadside fuel break. Fourmile Canyon Drive west of the Gold Run junction becomes a community road, without reliable access or egress to the west of Sunset. Pursuing aggressive Home Ignition Zone mitigation for residences along Fourmile Canyon Drive would accomplish roadway fuels reduction objectives in the operable segments of the road.

Boulder Canyon Drive

The sections of Boulder Canyon Drive in the Study Area are modeled as generally survivable, and mostly inoperable. Accomplishing prescriptive standards for shaded fuel break would be very difficult. Smaller treatment units along operable stretches of Boulder Canyon Drive could be considered, particularly where dense fuels are more closely adjacent to the roadway.

Lefthand Canyon Drive

The section of Lefthand Canyon Drive that is included in the Study Area is very steep and inoperable. Wildfire models show high intensity wildfire through the Lefthand Corridor. Landscape scale treatments to the north of Lefthand Canyon Drive could moderate intense wildfire. Further assessment in partnership with Lefthand Fire District may yield alternative roadway project recommendations on Lefthand Canyon Drive.

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PROJECT 3B.1 – CONNECTOR ROAD - POORMAN ROAD

Poorman Road services several communities and is a critical egress route for Four Mile and Gold Hill residents if lower Fourmile Canyon Drive becomes impassable during a wildfire. Roadside fuel break treatment has been completed on 36 acres starting at Fourmile Canyon Drive and terminating and Leonard's Loop. This treatment should be continued to tie into Sunshine Canyon Drive. The roadway vegetation conditions on Leonard's Loop do not call for a roadside fuel break on the loop.

PROJECT 3B.2 – CONNECTOR ROAD - GOLD RUN ROAD

Gold Run is a critical egress route for the Salina and Summerville communities, and for the Gold Hill district if wildfire activity forced evacuations to the east (which would be expected under most circumstances). The Fourmile Canyon Fire consumed vegetation surrounding the roadway, but left dense fuels unburned immediately adjacent to the road in most sections. Gold Run presents operability challenges, but a successful project could be accomplished, potentially with some inoperable segments excluded.

PROJECT 3B.3 – CONNECTOR ROAD - LICKSKILLET ROAD

Lickskillet Road is a primary connector road, offering one of four egress routes for the Town of Gold Hill, and other nearby communities. Lickskillet is a very steep, dangerous road, and should not be used for large-scale evacuation routing or suppression activities if alternative options are available. However, owing to the small residential population along Lickskillet, as a Community Road, roadside fuels treatment is recommended. A fuel break also offers strategic value in mitigating wildfire spread from west to east on the north aspect of Lefthand Canyon.

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PROJECT 3C – FUELS REDUCTION ON COMMUNITY ROADS

For many communities in the Study Area, roadside fuel breaks, or larger projects that would encompass roadside treatment, have been recommended in the Community-Level and Landscape-Scale Treatment recommendations in this section of the document. In the absence of larger-scale treatments, roadway treatments are a less advantageous but worthwhile alternative, or may serve as a starting point or first phase of a larger project. See the Community-Level and Landscape-Scale Treatment section for descriptions of many projects that involve roadside treatments (while aiming to provide fuels reduction on a larger scale).

PROJECT 3C.1 – HIGH PRIORITY COMMUNITY ROADS

Community	Approximate Length of Treatment	Operability
Millionaire	1.5 miles	Operable for hand crew
Switzerland Park	1.75 miles	Challenging for hand crew/inoperable sections
Logan Mill	4.5 miles	Challenging for hand crew/small inoperable sections
Magnolia	2.75 miles	Operable for hand crew
Tall Timbers	1.25 miles	Very operable
Townsite	2 miles	Operable, becoming challenging and inoperable at the saddle

PROJECT 3C.2 – MODERATE PRIORITY COMMUNITY ROADS

Community	Approximate Length of Treatment	Operability
Betasso	2 miles (Betasso and Weaver)	Very operable
Swiss Peaks	1.25 miles (inclusive of shared driveways)	Operable for hand crew
Coughlin Meadows	1.75 (shared driveways)	Very operable with small inoperable section
Arroyo Chico	1.75 (including 500 Arroyo Chico shared driveway)	Operable for hand crew
Silver Springs	2 miles	Challenging for hand crew/inoperable sections
Mountain Meadows	3.25 miles	Very operable
Old Post Office	1.5 miles	Very operable
Canyonside	.5 miles	Challenging for hand crew
Lost Angel	4.5 Miles	Very operable with inoperable sections in the southwest
Gold Run Subdivision	2 miles	Very operable

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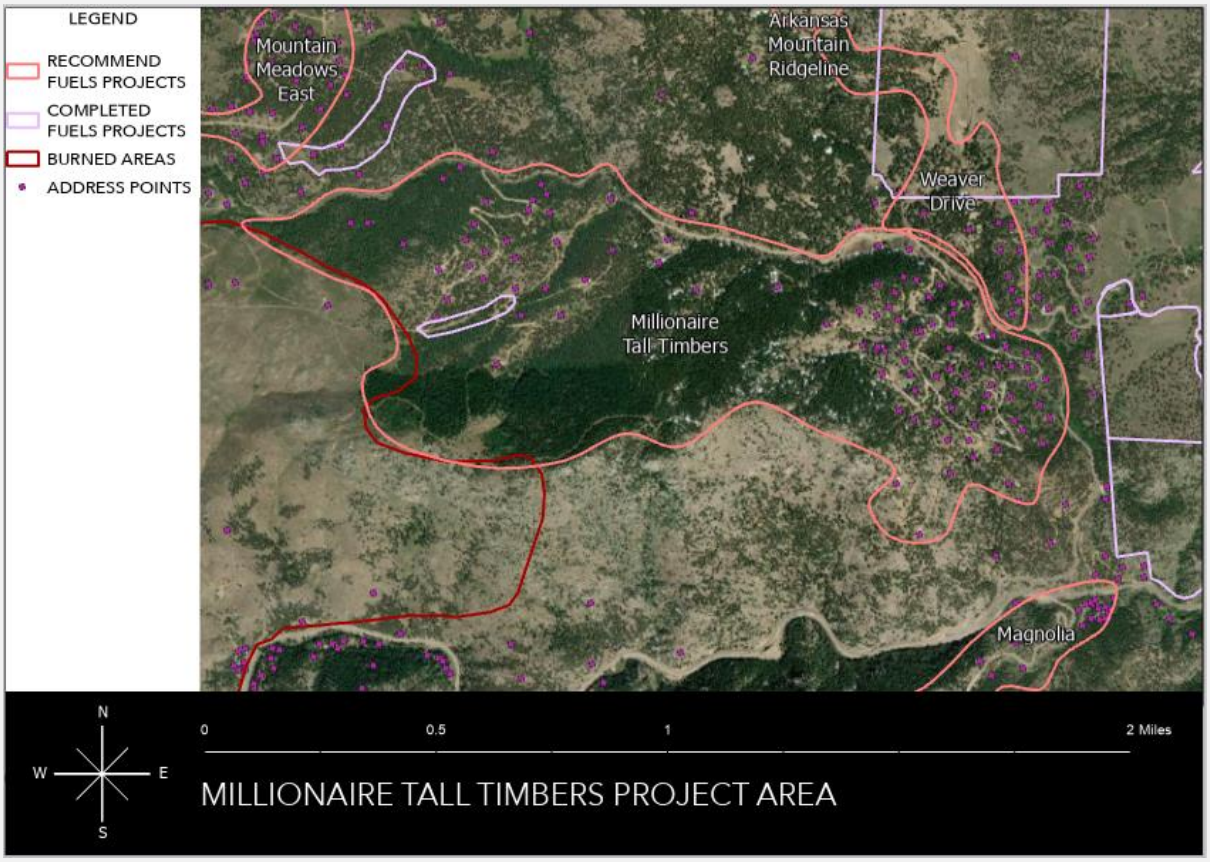
PROJECT GROUP 3D – COMMUNITY-LEVEL AND LANDSCAPE-SCALE PROJECTS

Project Name	3D.1 Millionaire Tall Timbers
Priority	Highest
Acreage	508
Land Ownership	USFS, Private
Communities Protected	Millionaire, Tall Timbers, Betasso

Project Description and Implementation Recommendations
Topographic (various slopes and aspects) and built (dead-end roads) features make it challenging to identify a smaller project area that would offer community-level protection for the highest and high-risk communities of Millionaire and Tall Timbers. These communities begin directly to the east of the Black Tiger burn scar, which is an advantageous feature to tie into. Treating all the forested land that comprises the 508-acre general project area is an ambitious goal. Units within the 508-acre footprint should be identified, using roads, driveways, and ridges as features to knit together treatment areas. Hand crew implementation is recommended, with wood chipping along roadways and driveways and slash piles in foot-access-only areas of the project. Given the high number of private landowners in the project area, fire district personnel are recommended for implementation, in partnership with trusted contractors.



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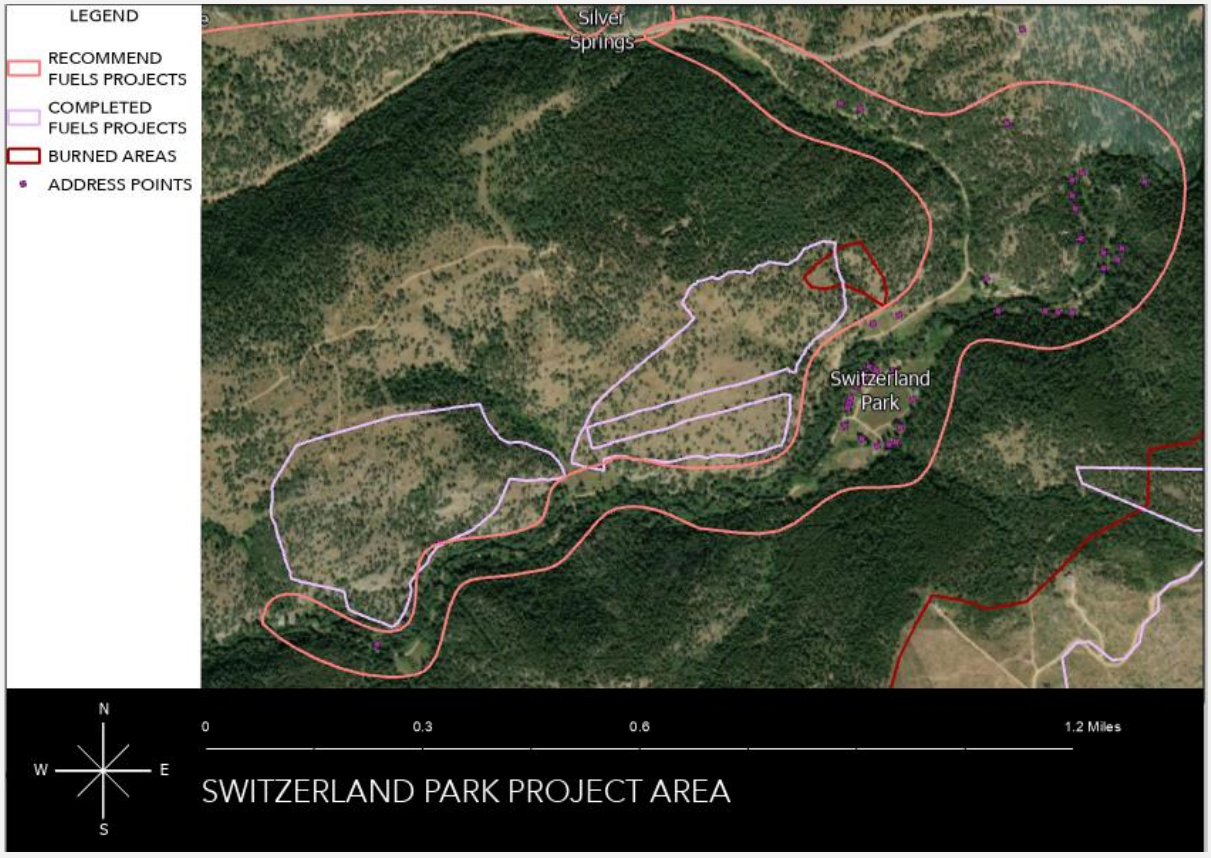
Project Name	3D.2 Switzerland Park
Priority	Highest
Acreage	161
Land Ownership	Private, USFS
Communities Protected	Switzerland Park, Lost Angel, West Boulder Canyon

Project Description and Implementation Recommendations
Given operability challenges in the high-risk Switzerland Park community, a roadside fuel break is one of the few available fuels reduction options for this area. This treatment should be expanded around the main cluster of homes, improving, and anchoring into the meadow where these homes are situated. Most of the land ownership is private, but there are pockets of USFS land, where treatments within the last 10-years have been conducted and will enhance the impacts of this project. Hand crew implementation is recommended, with wood chipping as the primary method of slash removal.



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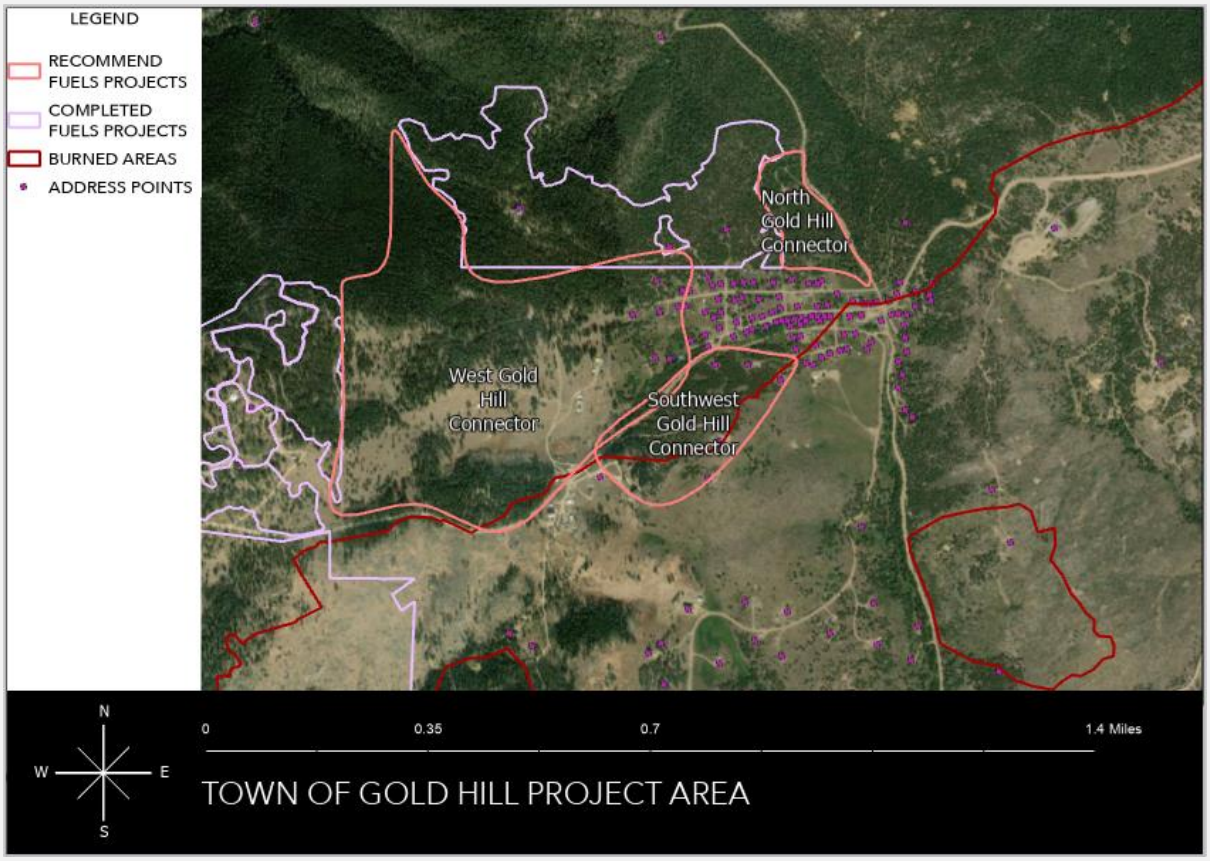
Project Name	3D.3 Town of Gold Hill
Priority	Highest
Acreage	3 Units: West Connector – 129 North Connector – 11 Southwest Connector – 28
Land Ownership	Private; BLM
Communities Protected	Town of Gold Hill, Gold Run Subdivision

Project Description and Implementation Recommendations
The Town of Gold Hill project consists of 3 units that would knit together several nearby fuels projects (that are currently in implementation phase), the Fourmile Canyon Fire burn scar, and tie into the east side of the town where slope and typical weather and wind patterns render exposure less concerning. The three projects would complete a horseshoe shape of protection for the town. This project should be complemented with robust home ignition zone projects and other risk reduction projects to offer thorough protection to the life, property, and cultural assets in the Town of Gold Hill. Hand crew implementation is recommended, with wood chipping in areas, slash hauling in other areas closest to residential areas, and pile burning primarily on the steeper sections of the north aspect where chipper access is non-viable.



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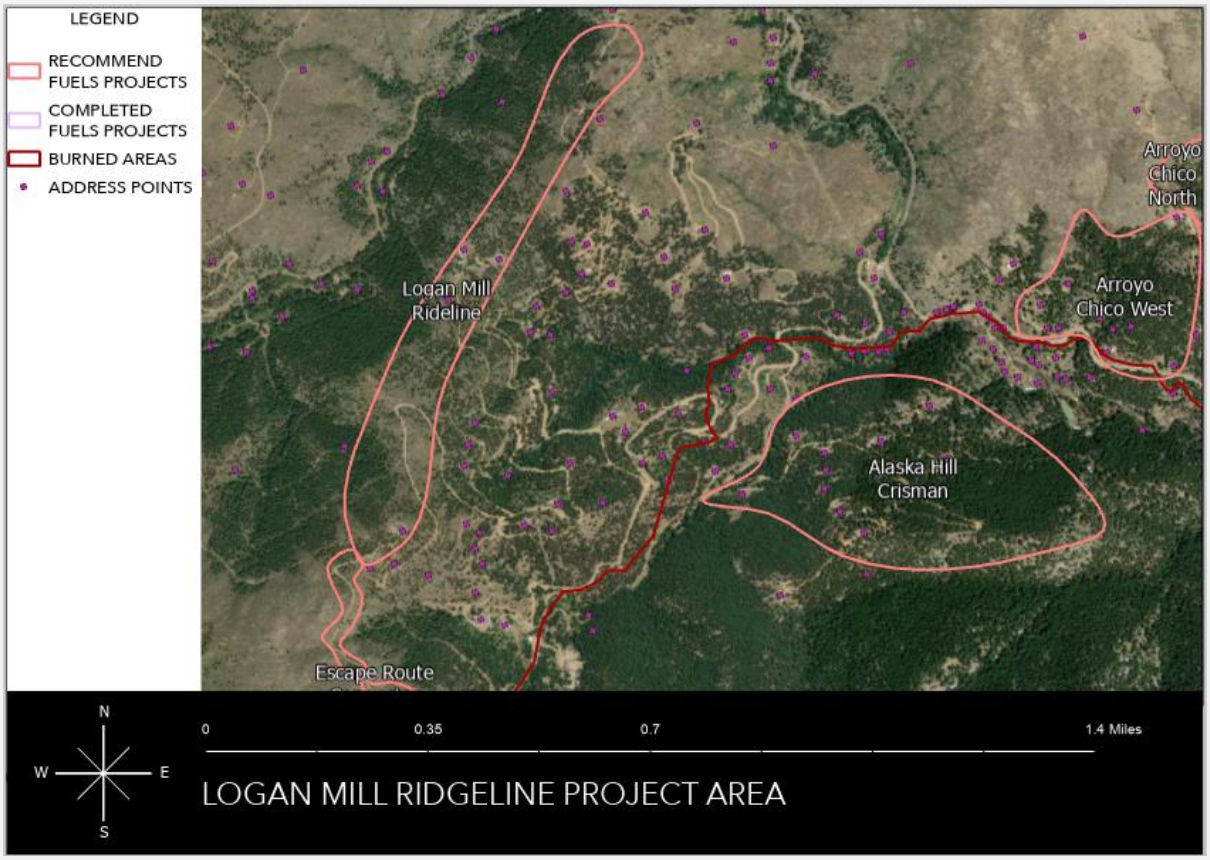
Project Name	3D.4 Logan Mill Ridgeline
Priority	Highest
Acreage	53
Land Ownership	Private
Communities Protected	Logan Mill, Crisman, Middle Fourmile

Project Description and Implementation Recommendations
The Logan Mill Ridgeline project takes advantage of a ridgeline that sits on the (typically) windward side of the Logan Mill subdivision. It ties into the Fourmile Canyon Fire burn scar on both sides of the fuel break. Given the complex network of roadways (which should also be treated for egress improvement and roadway survivability objectives), this ridgeline is the optimal strategic location for a fuel break. Hand crew implementation is recommended, with slash pile burning as the primary means of disposing of biomass.



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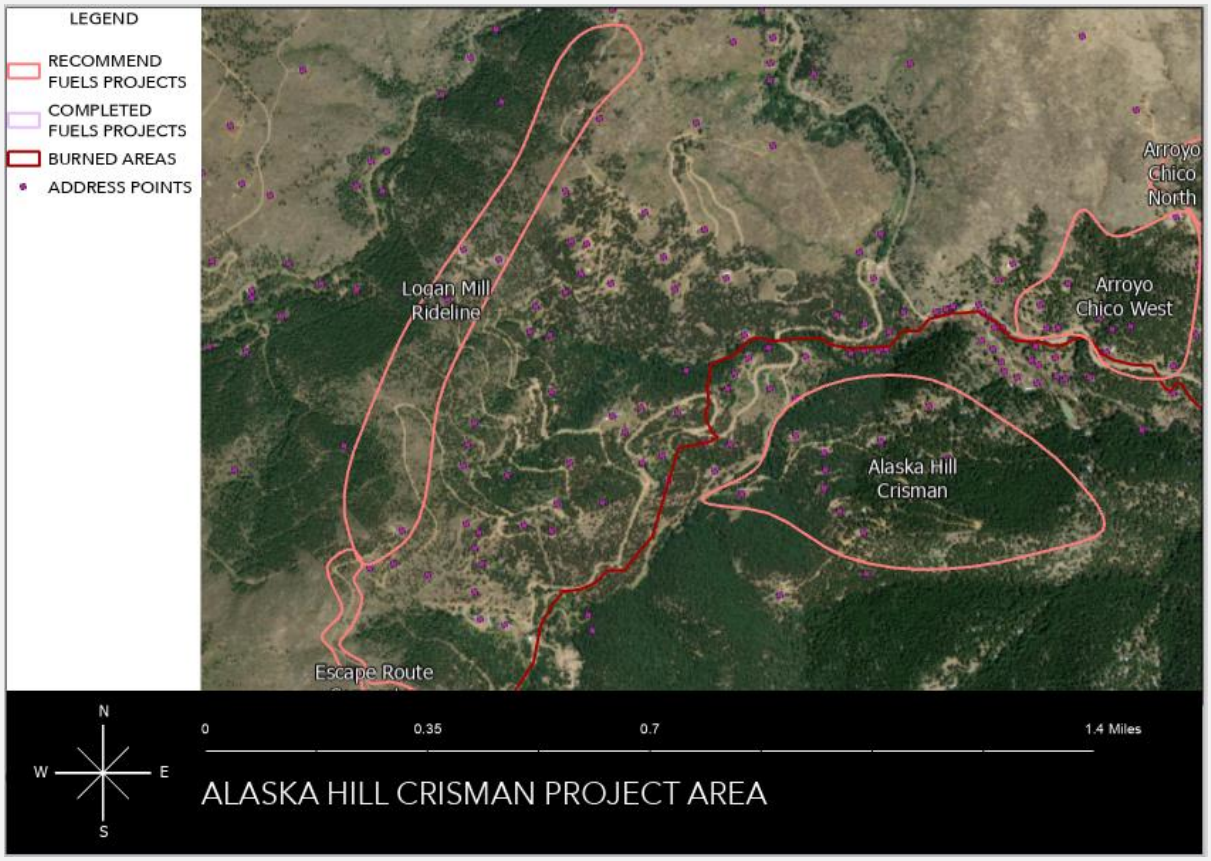
Project Name	3D.5 Alaska Hill Crisman
Priority	Highest
Acreage	79
Land Ownership	Private, County Open Space
Communities Protected	Crisman, Middle Fourmile, Arroyo Chico

Project Description and Implementation Recommendations
This project is intended to accomplish dual objectives. The first is to protect the very high-risk community of Crisman (and other communities to the north and east). The second objective is to mitigate wildfire risk along the dead-end communities on Wendlyn Way, Blue Ribbon, and Alaska Hill in the Logan Mill subdivision. These communities are at the highest risk of all the off-shoot roads in that area. The treatment is a roadside fuel break that also takes advantage of a ridgeline on the windward side of the Crisman community.



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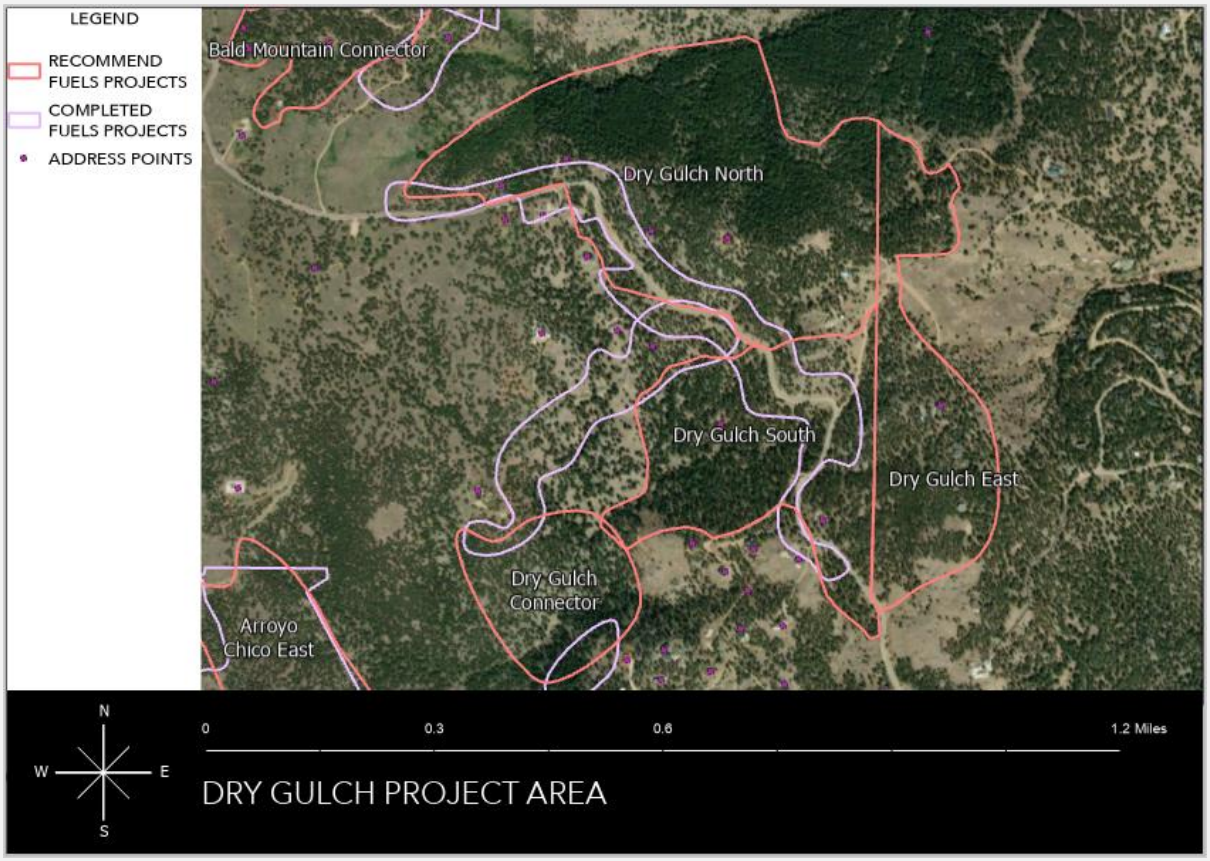
Project Name	3D.6 Dry Gulch
Priority	Highest
Acreage	3 Units: North – 69 South – 52 East – 42
Land Ownership	Private, County Open Space
Communities Protected	Dry Gulch, Boulder Mountain Fire District

Project Description and Implementation Recommendations
The proposed treatment area will tie into previous work that was done by Boulder County at Bald Mountain Open Space and work done in prior years by Sunshine FPD. This project will mitigate wildfire risk to the highest risk community in Sunshine Fire District and will also offer protection to communities in the Boulder Mountain Fire District. The project will also protect the Fourmile Canyon Creek watershed from west wind driven fires and would protect Sunshine FPD from terrain-driven wildfire coming up the Fourmile Canyon Creek drainage. It is recommended that BWWA explore partnering with Boulder Mountain to consider a large-scale project which extends into the Boulder Mountain district. This is shown in the Dry Gulch East map. Hand crew implementation is recommended, with good access points for wood chipping in many parts of the project area. Some slash pile burning will be necessary, especially for the steep north aspect where project objectives would be mitigating terrain-driven wildfire. There are small portions of the project areas that are inoperable due to steep terrain and lack of access, but these areas could be excluded from the project without compromising mitigation objectives.



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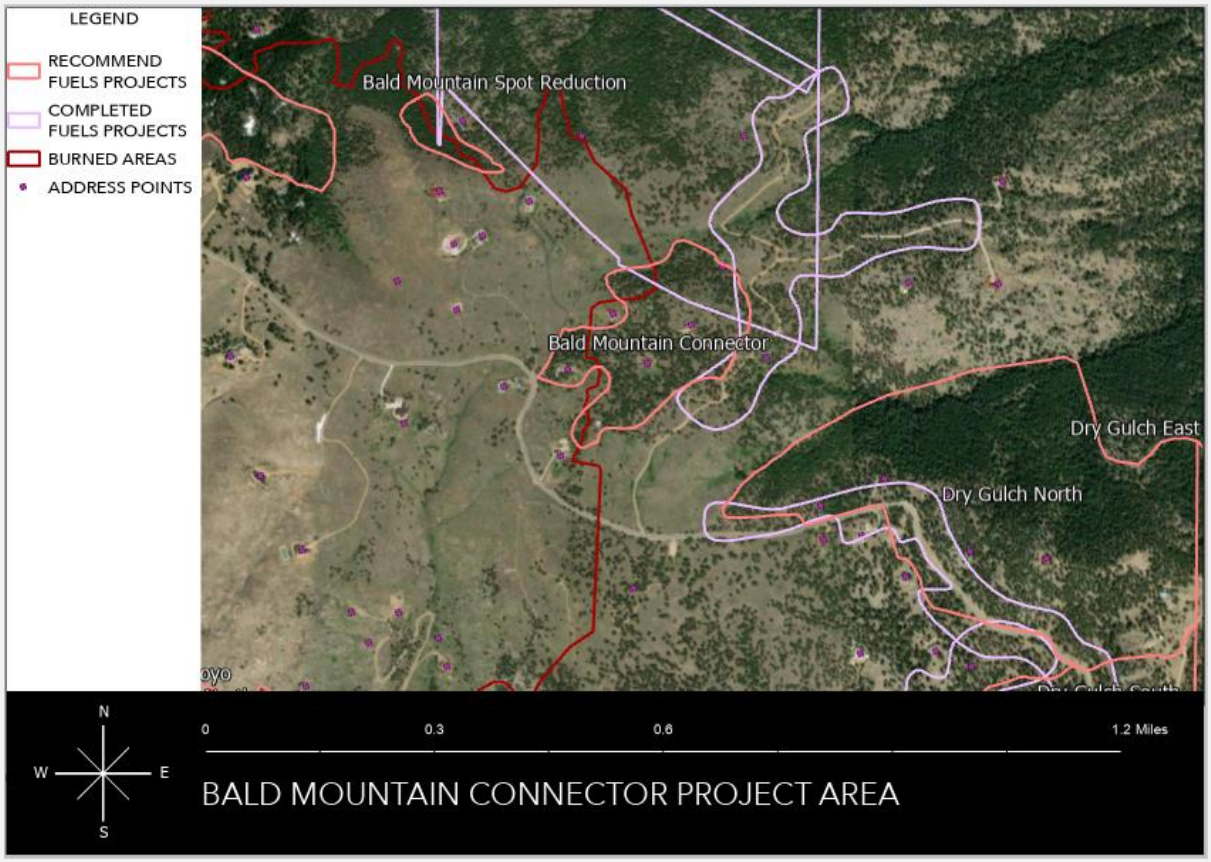
Project Name	3D.7 Bald Mountain Connector
Priority	Highest
Acreage	2 units: Main – 24 Spot Reduction – 4
Land Ownership	Private
Communities Protected	Bald Mountain, Dry Gulch, Boulder Mountain

Project Description and Implementation Recommendations
The Bald Mountain Connector project would connect the Fourmile Canyon burn scar to an existing shaded fuel break along a shared driveway in the Bald Mountain community. This would offer direct benefit to residents in Bald Mountain, but would also, in tandem with the Dry Gulch project, mitigate wildfire risk in the highest risk section of Sunshine Fire District on a landscape scale. The project will also protect the Fourmile Canyon Creek watershed from west wind driven fires and would protect Sunshine FPD from terrain-driven fires coming up the Fourmile Canyon Creek drainage. Due to the number of residential properties in the project area, hand crew implementation is recommended with full biomass extraction/utilization.



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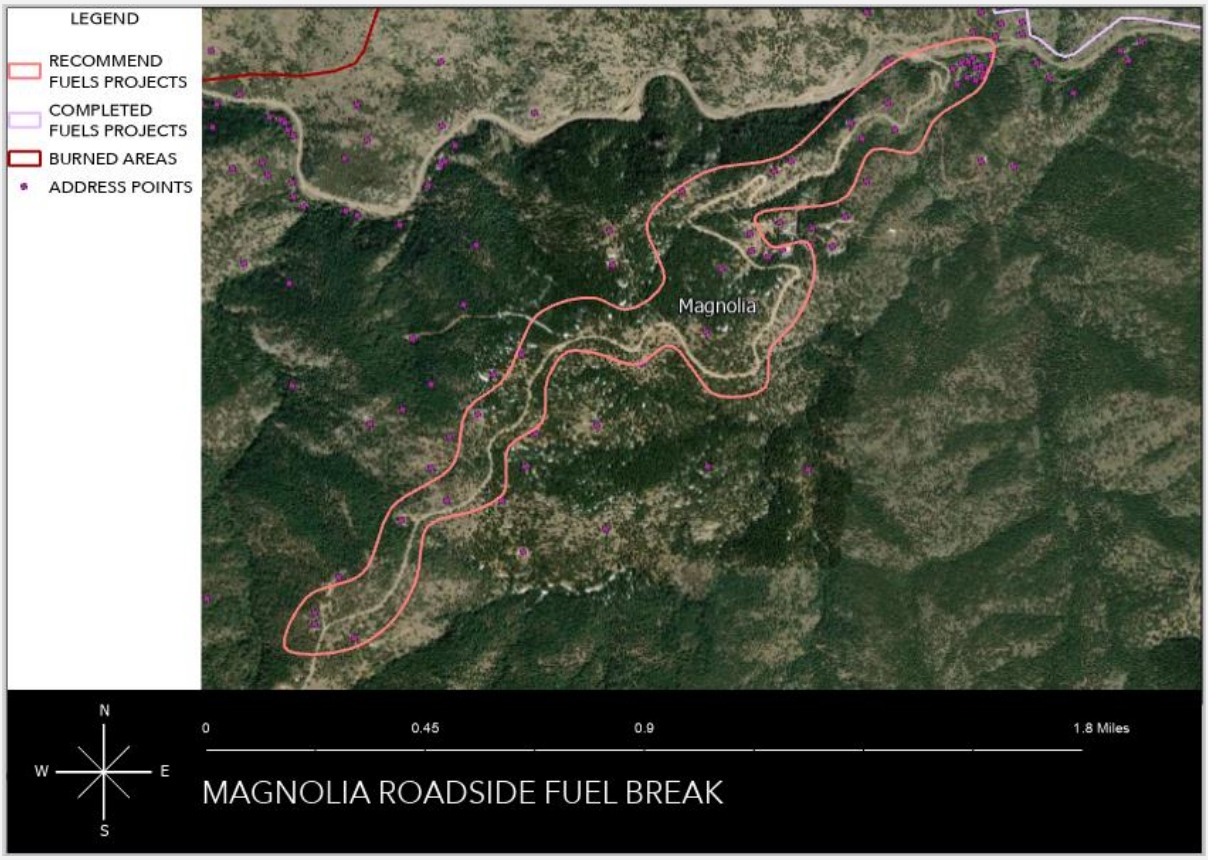
Project Name	3D.8 Magnolia Roadside Fuel Break
Priority	High
Acreage	188
Land Ownership	Private, USFS
Communities Protected	Magnolia

Project Description and Implementation Recommendations
Due to topographic operability challenges, few viable landscape-scale fuels reduction projects are viable in and around this community. A roadside fuel break will be challenging due to steep areas and drainages, but this is the best option for the Magnolia community. This project presents many implementation challenges, including many property owners and large sections of federal lands. The project also terminates at the edge of the BWWA boundary, but when pursuing implementation of a Magnolia fuel break, partnership with neighboring districts should be explored to continue this project and anchor into Highway 72, or at least Aspen Meadow.



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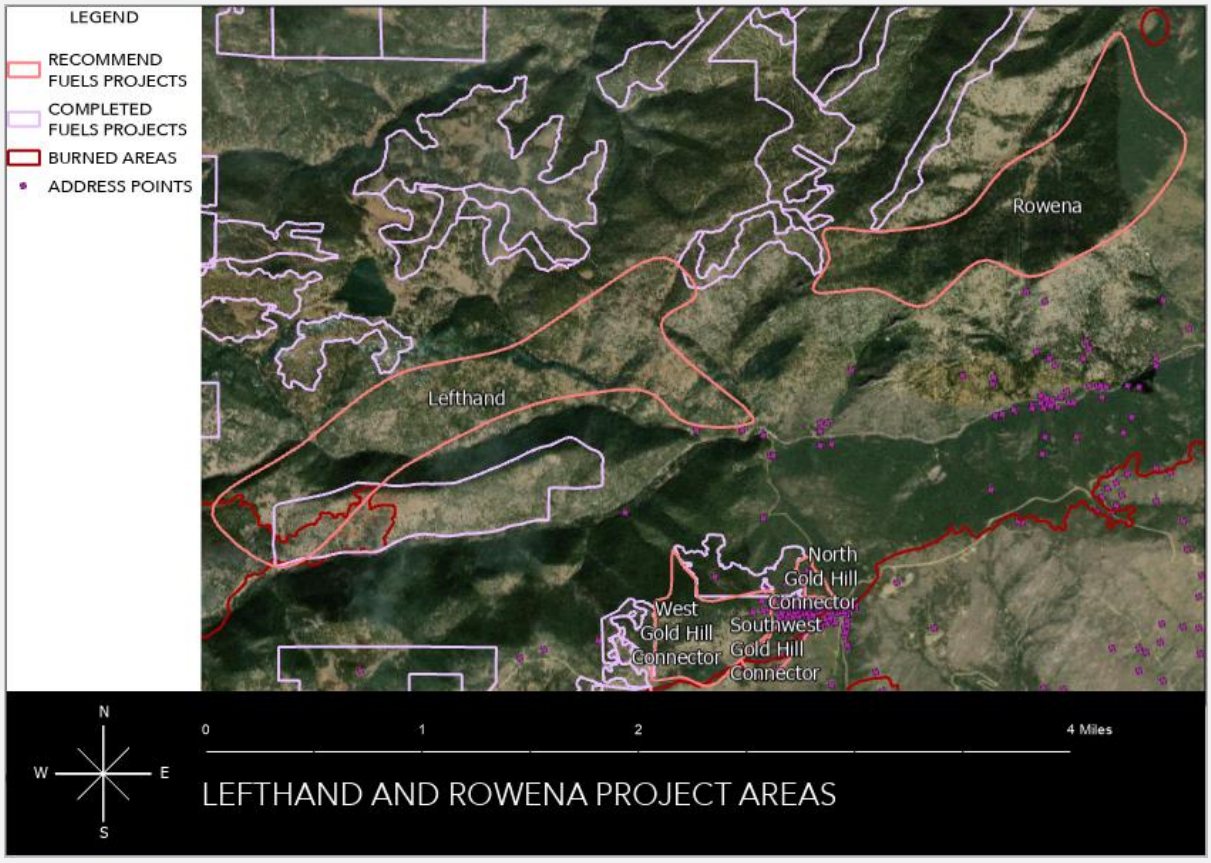
Project Name	3D.9 Lefthand/Rowena
Priority	High
Acreage	Lefthand – 640 Rowena – 492
Land Ownership	USFS
Communities Protected	Lefthand, Rowena, Landscape

Project Description and Implementation Recommendations
Due to large swaths of inoperable land surrounding the Lefthand and Rowena communities in Gold Hill Fire District, there are few viable landscape-scale fuels reduction projects that offer protection to these areas. The large expanses of ridgeline to the north and west of these communities offer the most obvious and strategically sound locations for very largescale fuel breaks. As these projects would exclusively entail federal land, accomplishing implementation would require engaging the USFS. The United States Forest Service is in the process of developing a strategic fuels reduction plan in northern Boulder County and Larimer County, and this project is reflected in that plan. In the absence of these landscape-scale fuels reduction solutions, very robust Home Ignition Zone mitigation and driveway thinning projects on private property appear to be the only viable fuels reduction alternatives. Due to access limitations, hand crew implementation and slash pile burning are the only implementation options.



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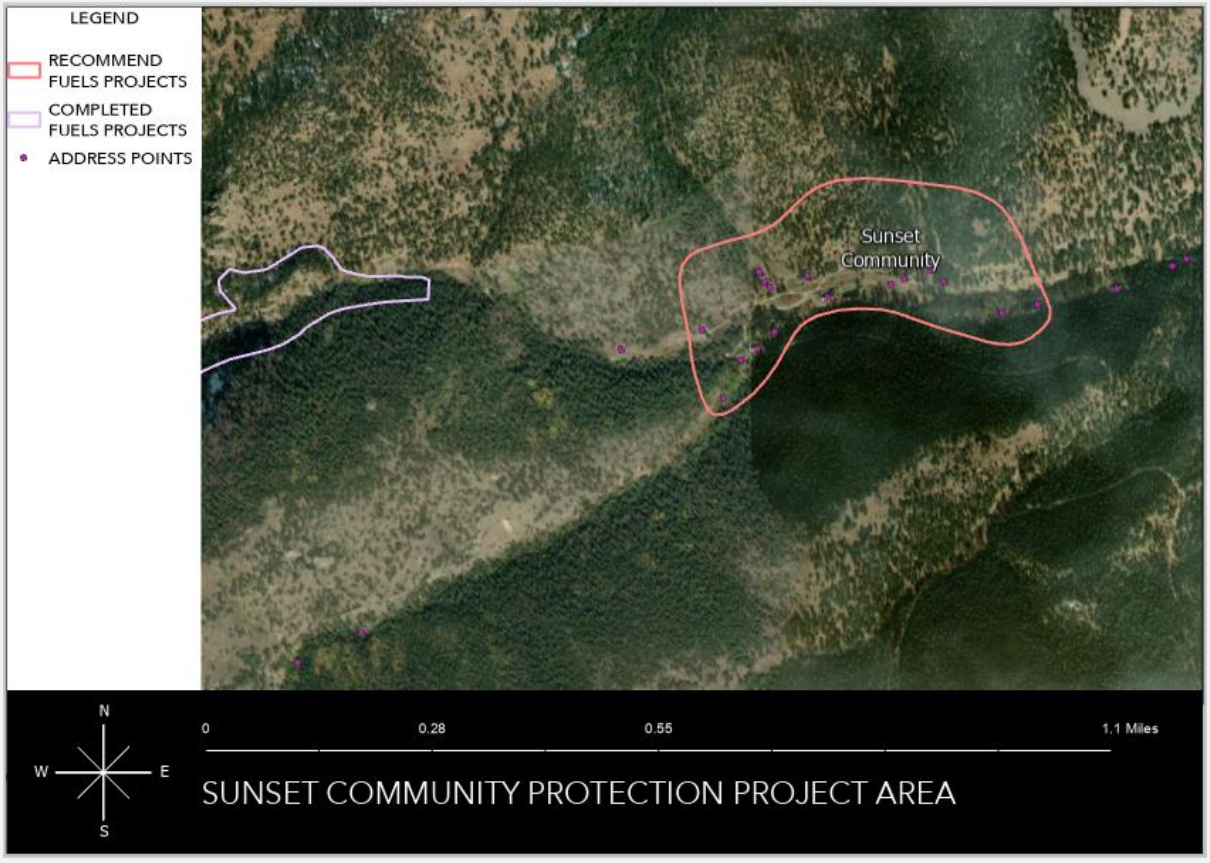
Project Name	3D.10 Sunset Community Protection
Priority	High
Acreage	46
Land Ownership	Private, USFS
Communities Protected	Sunset

Project Description and Implementation Recommendations
The Sunset Community sits at the end of the residential section of Fourmile Canyon. This community is at high risk, and the only viable escape route from wildfire is a long drive through a roadway without pull-offs and with dense roadside vegetation. The Switzerland Trails are marked as escape routes servicing this community, but these are poorly maintained "Jeep Roads" that would likely be very hazardous for residents to use for egress. The Sunset Community Protection project should feature an aggressive prescription to create a last resort refuge area if the community is cut off due to wildfire. The project would also accomplish residential property defense objectives and could begin with linked defensible space treatment for the handful of residences in Sunset and expand out onto USFS land for a more effective project that accomplishes life safety goals. A larger project would be more effective, but the steep slopes of Fourmile Canyon are mostly inoperable. Hand crew implementation is recommended, with slash hauling and wood chipping possible closer to the structures and pile burning necessary on USFS land.



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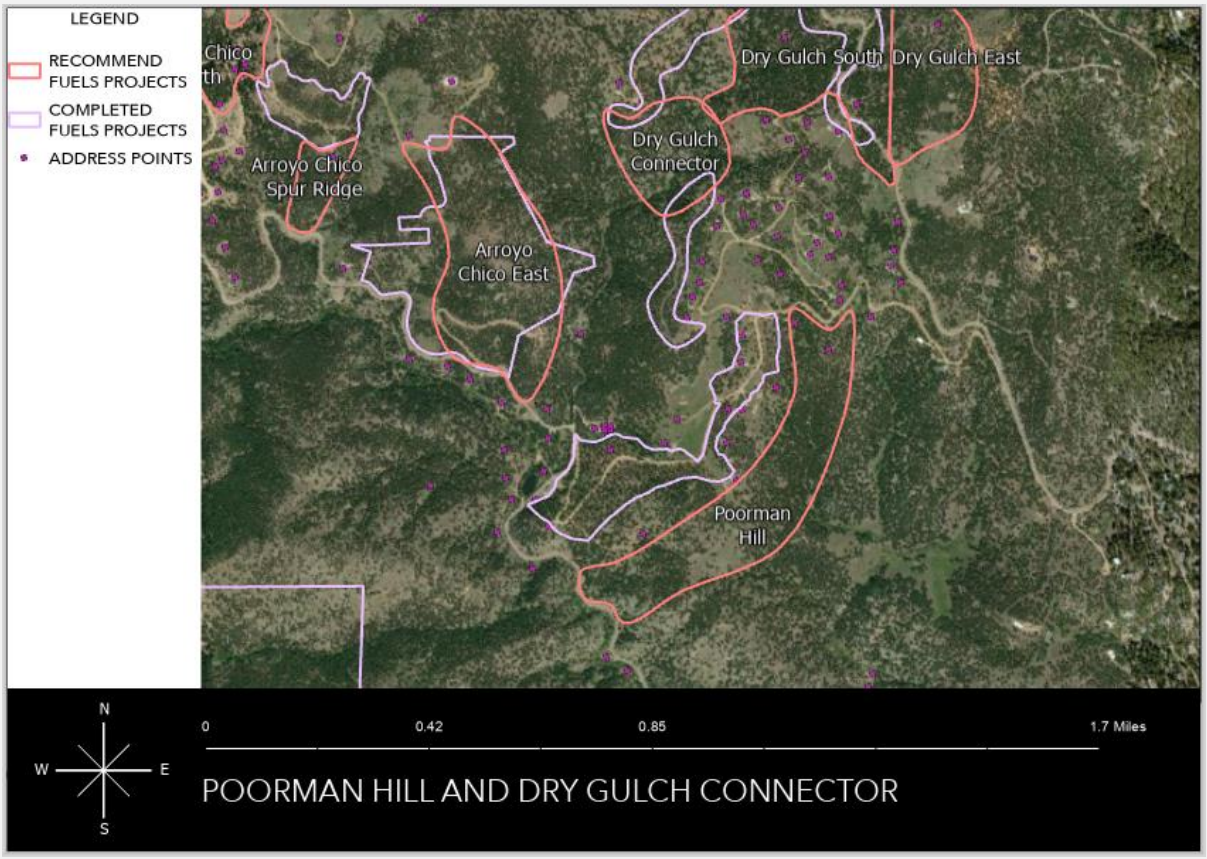
Project Name	3D.11 Poorman Hill/Dry Gulch Connector
Priority	High
Acreage	Poorman Hill – 58. Dry Gulch Connector – 24
Land Ownership	Private, small areas of BLM
Communities Protected	Poorman, Dry Gulch, Boulder Mountain

Project Description and Implementation Recommendations
Poorman Hill and Dry Gulch Connector are projects designed to enhance and amplify the impacts of recently completed projects in the Poorman Area. The Poorman Hill project would protect the community from terrain-driven wildfire, where the recently completed Poorman Fuel Break protects the egress route and provides better wind-driven fire protection for the community. The Dry Gulch Connector would fill a gap between several existing treatments and would create a continuous band of treatment connecting Fourmile Canyon Drive to Sunshine Canyon Drive. When the Dry Gulch project is pursued, opportunities to provide maintenance, re-entry, and improvement of the existing adjacent treatments should be explored. The Dry Gulch project would offer broader strategic value, in 'completing' a quality north/south fuel break that could interrupt wildfire spread in a high-risk, densely forested corridor. Due to the remote nature of these projects, hand crew implementation, slash pile burning, and leaving some logs on-site are likely to be the only financially viable implementation options.



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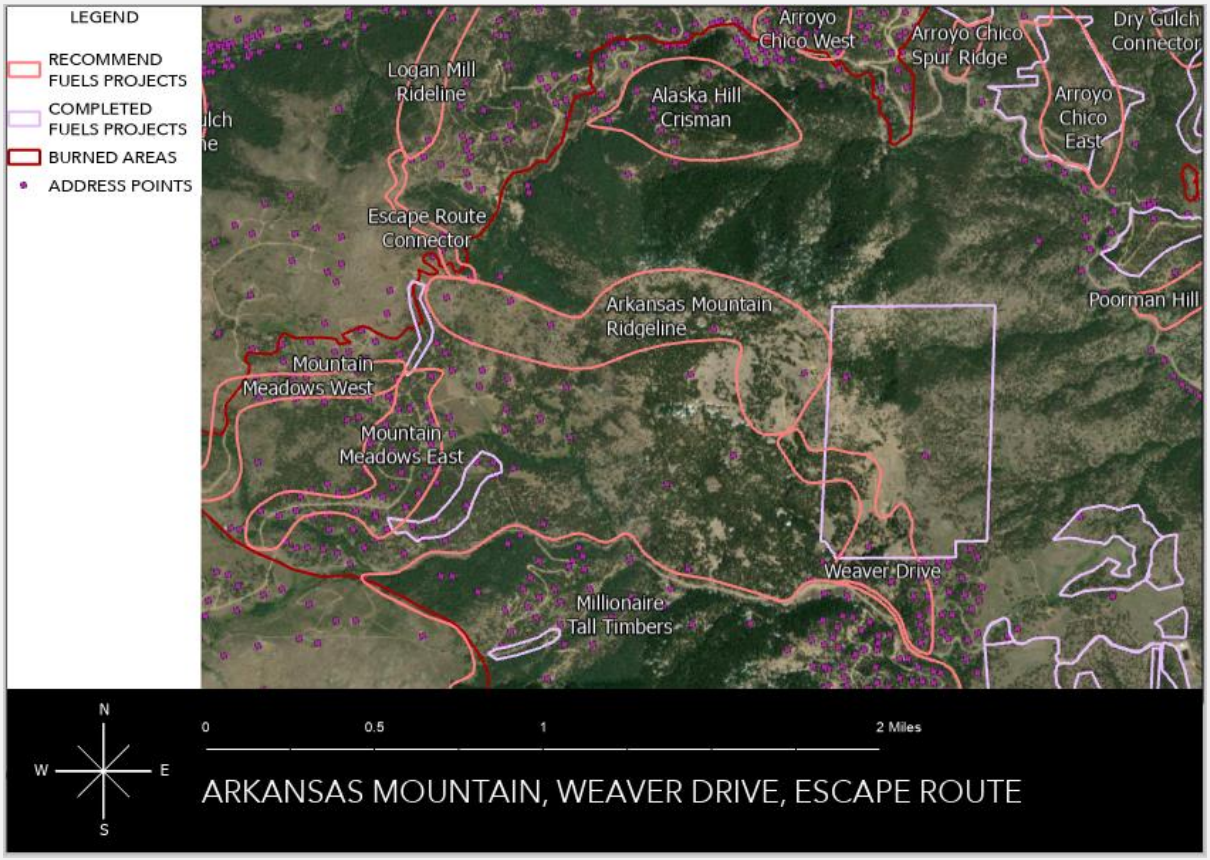
Project Name	3D.12 Arkansas Mountain Ridgeline/Weaver Drive Roadside Fuel Break/Escape Route Connector
Priority	High
Acreage	Arkansas Mountain Ridgeline – 171 Weaver Drive Roadside Fuel Break – 63 Escape Route Connector - 12
Land Ownership	Private, small sections of Boulder County Open Space that may be avoided
Communities Protected	Landscape

Project Description and Implementation Recommendations
These three projects are bundled because, if pursued collectively, they would offer broad strategic value in mitigating wildfire spread in an expected major flow path, potentially protecting large areas in Sugarloaf, Four Mile, and Sunshine Fire Districts, and mitigating fire spread to communities farther east and north. The Weaver Drive project would anchor into Sugarloaf, and tie into a meadow at the top of Weaver Drive. The Arkansas project would pick up where the Weaver Project ends, extending west to tie into the Fourmile Canyon Fire burn scar. The Escape Route Connector is a smaller project that would complement the strategic objectives of Weaver and Arkansas, but its primary objective would be thinning fuels in a small section of the Logan Mill Escape Route, with the goal of making that emergency route safer for residents and first responders.



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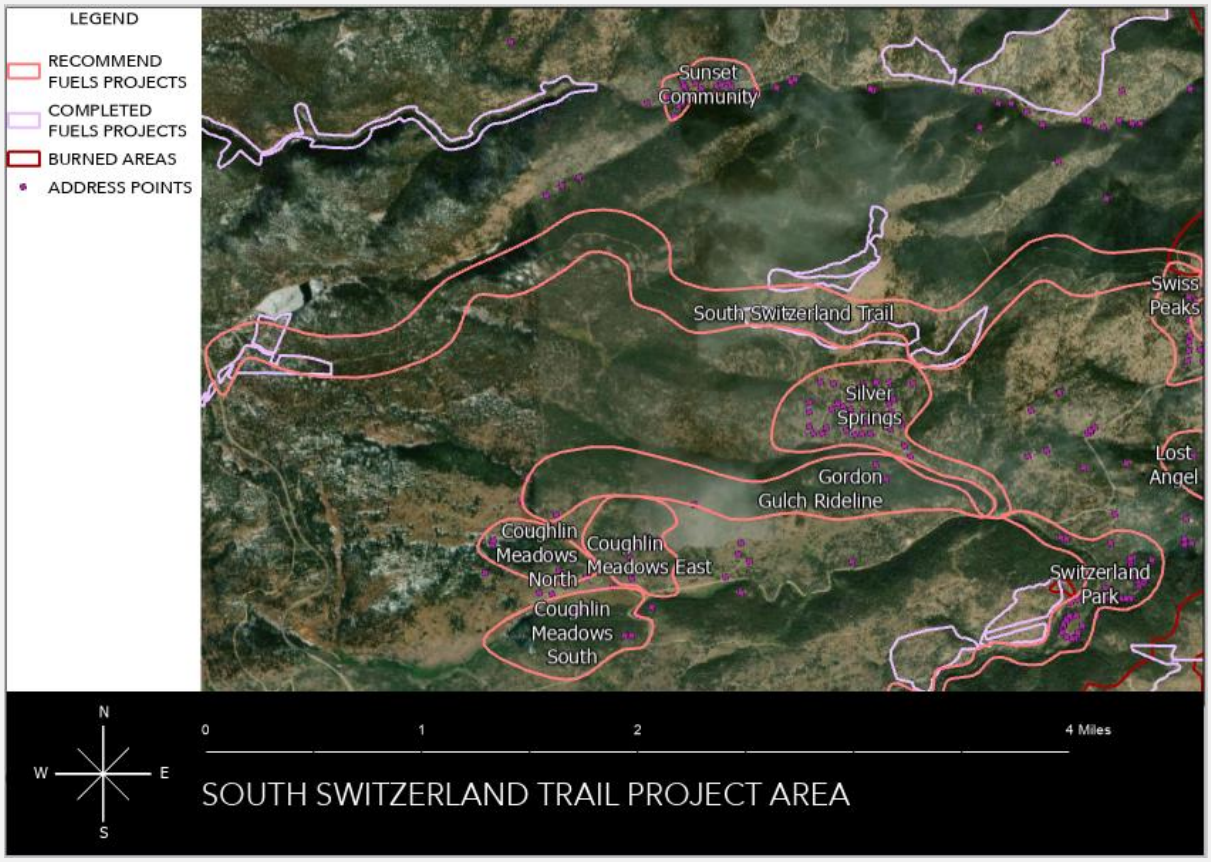
Project Name	3D.13 South Switzerland Trail
Priority	High
Acreage	633
Land Ownership	USFS
Communities Protected	Landscape, Sunset

Project Description and Implementation Recommendations
This largescale ridgeline treatment is intended to mitigate wildfire intensity from terrain/wind-driven wildfires originating in the Sugarloaf and spreading towards Fourmile Canyon, and vice versa. The community most directly impacted would be Sunset, where other larger-scale treatments are challenging to identify. This project would offer protection on a large-scale from wind-driven wildfire coming from the southwest. Heavy equipment may be utilized in some of the gently sloping project areas, but very steep sections of the ridgeline will require hand crew implementation. A blend of wood chipping and slash pile construction is recommended.



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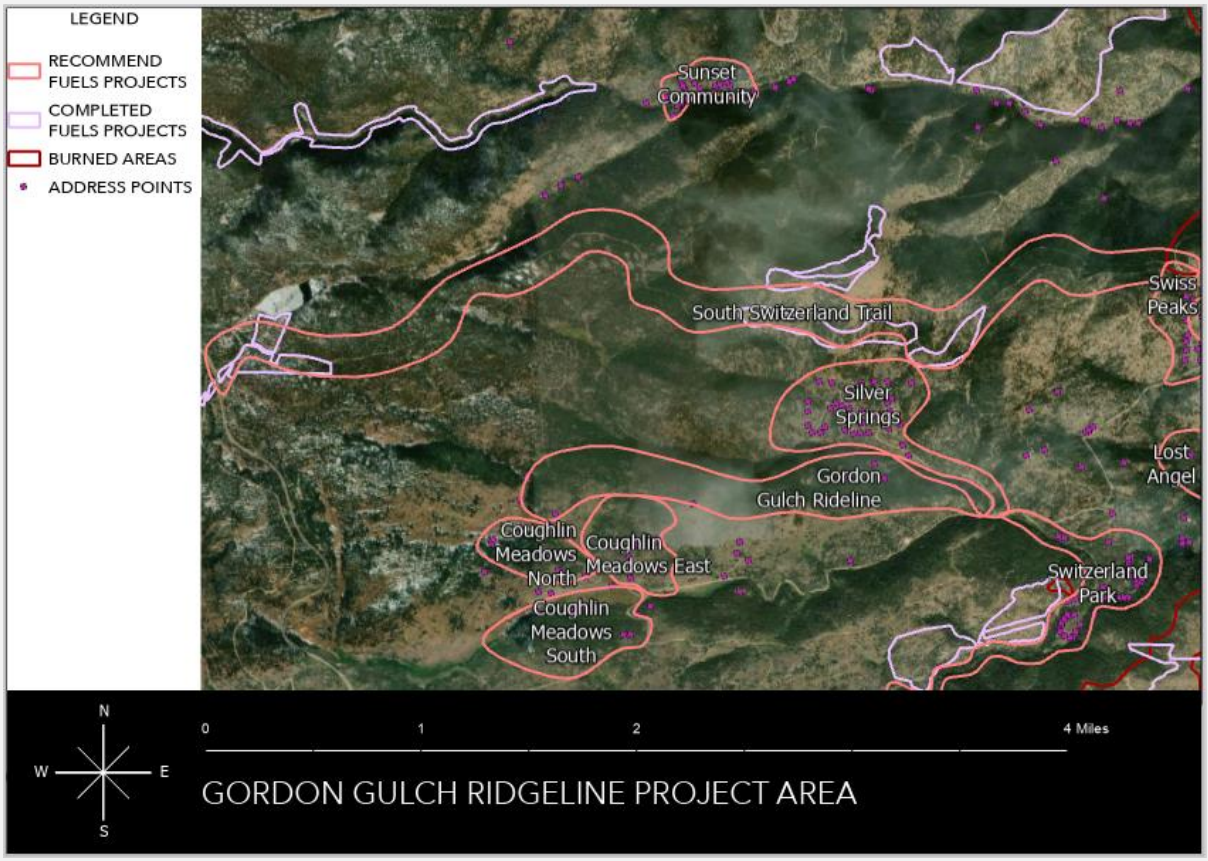
Project Name	3D.14 Gordon Gulch Ridgeline
Priority	High
Acreage	298
Land Ownership	USFS
Communities Protected	Landscape, Silver Springs, Coughlin Meadows

Project Description and Implementation Recommendations
This largescale ridgeline treatment is intended to mitigate wildfire intensity from terrain/wind-driven wildfires originating in the Sugarloaf corridor. The project would directly protect the Silver Springs community from wind/terrain alignment and would protect the Coughlin Meadows from a terrain-driven fire or flanking wind-driven fire. The project area is gently sloping, but access may preclude the use of heavy equipment. Hand crew implementation and slash pile burning is recommended. Full log extraction would be costly and challenging.



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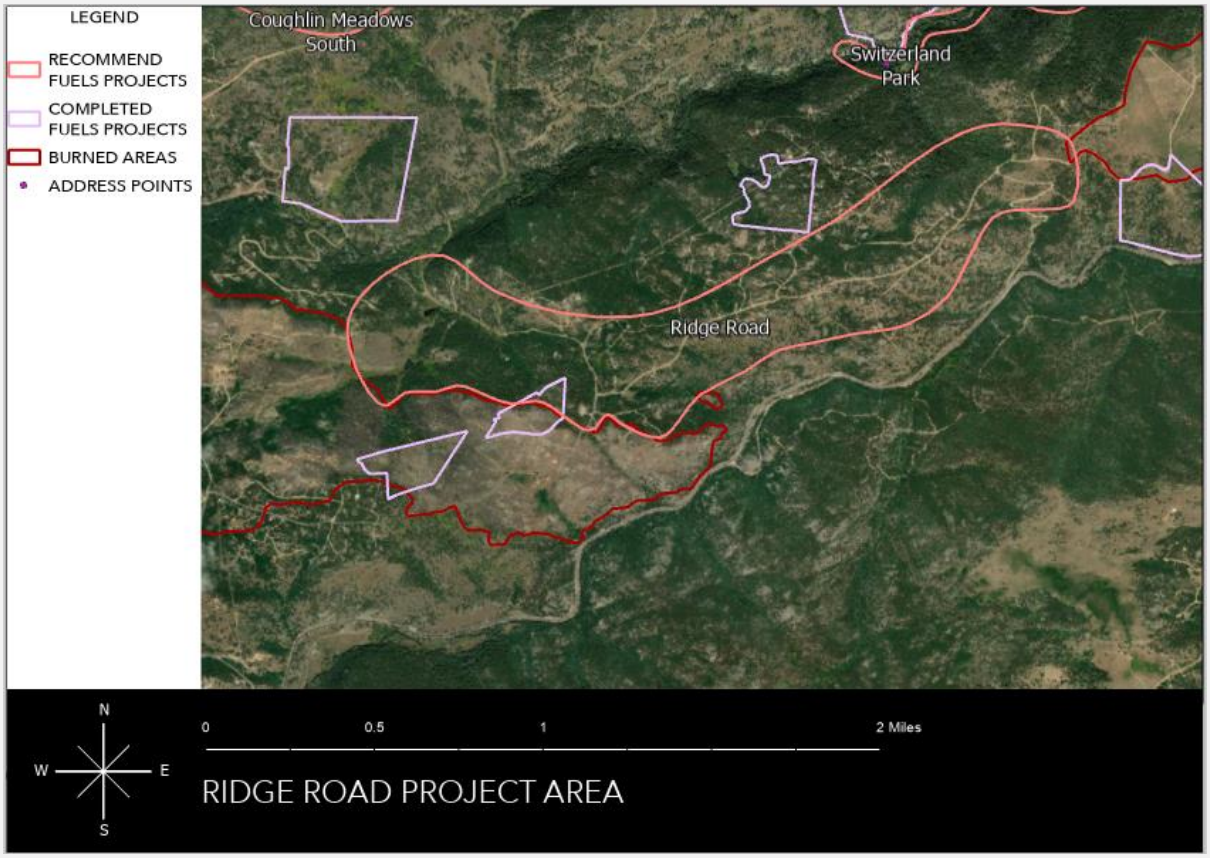
Project Name	3D.15 Ridge Road
Priority	High
Acreage	461
Land Ownership	Private
Communities Protected	Landscape, Coughlin Meadows, Switzerland Park, Silver Springs

Project Description and Implementation Recommendations
This largescale ridgeline treatment is intended to mitigate wildfire intensity from terrain/wind-driven wildfires originating in the Boulder Canyon Corridor, potentially protecting large areas in Sugarloaf and elsewhere. The project would anchor into the Cold Springs burn area to the west and the Comforter burn area to the east. Heavy equipment implementation may be possible, along with hand crew implementation on steeper sections. Wood chipping and slash pile burning would be required in tandem.



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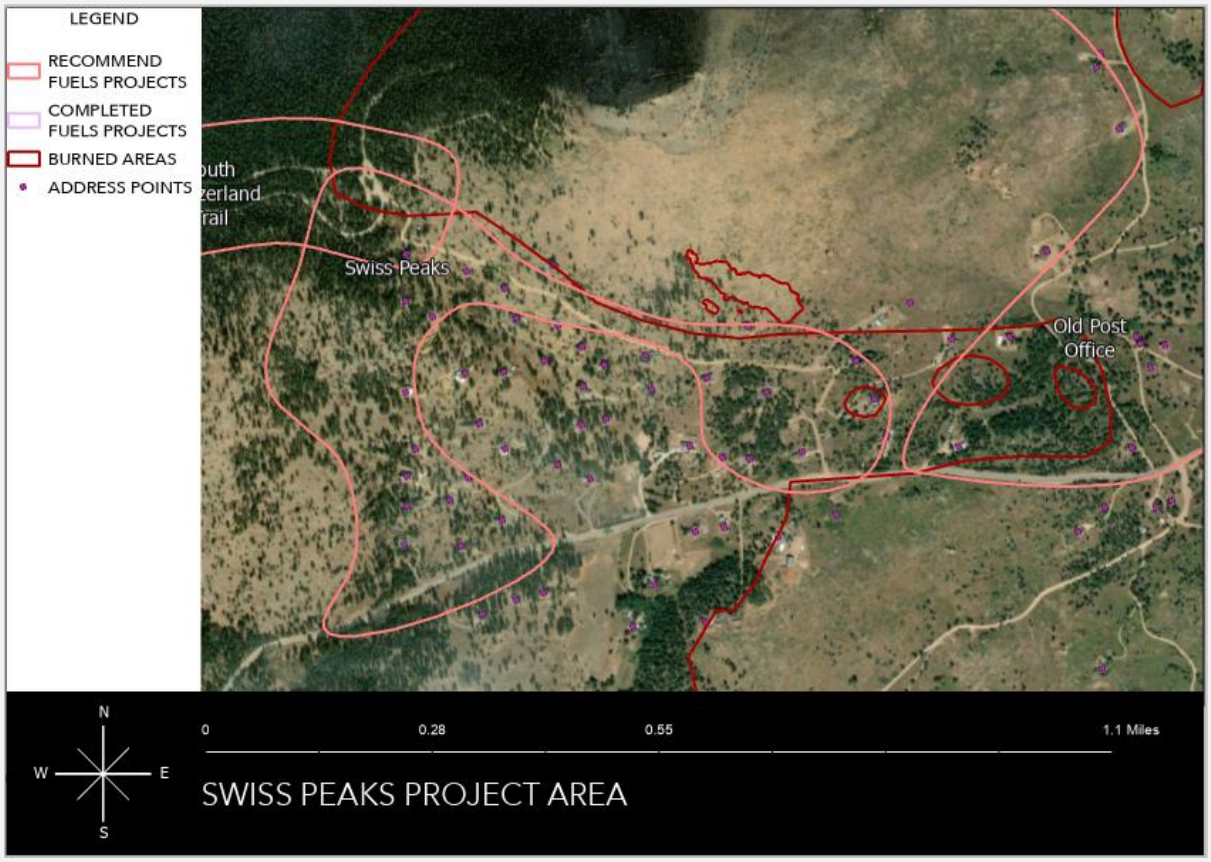
Project Name	3D.16 Swiss Peaks
Priority	High
Acreage	92
Land Ownership	Private, USFS
Communities Protected	Swiss Peaks, Old Post Office

Project Description and Implementation Recommendations
Protecting the Swiss Peaks community could be accomplished through a variety of projects. Ideally, a project targeting the areas of denser vegetation on the east and west sides of the community would offer the most benefit. A similar strategic objective could be accomplished through linked defensible space on the private parcels that comprise the community. Lastly, roadside fuel breaks along the primary roads and share driveways would accomplish similar goals. Sparser vegetation to the west of the proposed project area, and a burn scar to the northeast make it strategically desirable to treat as many acres in the Swiss Peaks community as possible, as these two lower-risk areas could be connected by such a project. The gently sloping area may allow for feller bunchers or other heavy equipment to be used and should allow for wood chipping and full biomass extraction from the project area.



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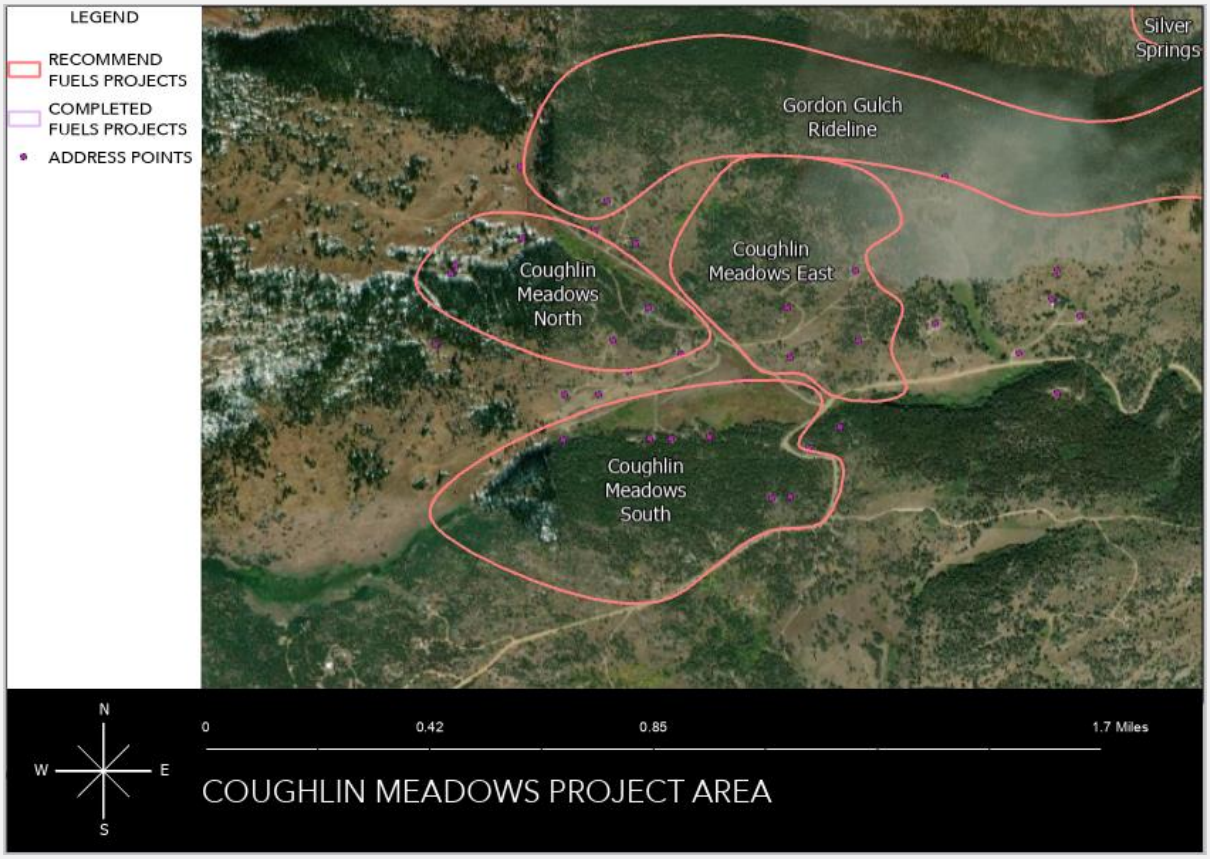
Project Name	3D.17 Coughlin Meadows
Priority	High
Acreage	3 Units South – 142 North – 70 East – 96
Land Ownership	Private, USFS
Communities Protected	Coughlin Meadows

Project Description and Implementation Recommendations
Protecting the Coughlin community could be accomplished through a variety of projects. Ideally, a project targeting the areas of denser vegetation on the east and west sides of the community would offer the most benefit. A similar strategic objective could be accomplished through linked defensible space on the private parcels that comprise the community. Lastly, roadside fuel breaks along the primary roads and shared driveways would accomplish similar goals. The South unit should be the highest priority, then North, then East. Slopes are too steep for heavy equipment to be useful for implementation, but the terrain is very operable for hand crews, and wood chipping would be possible in much of the project area. Slash piles would be necessary for the areas farther away from homes.



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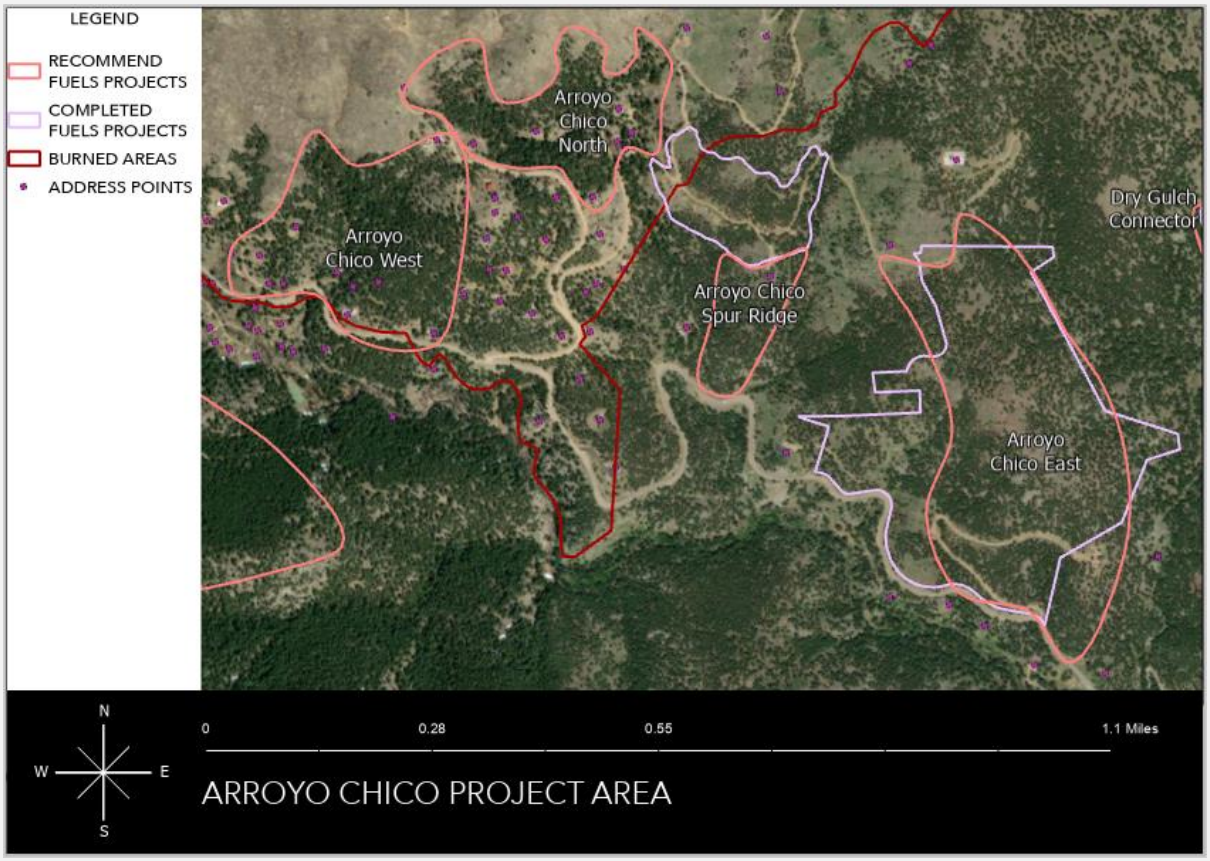
Project Name	3D.18 Arroyo Chico
Priority	High
Acreage	4 Units: West – 37 East – 59 Spur Ridge – 8 North – 24
Land Ownership	Private
Communities Protected	Arroyo Chico, Poorman, Sunshine District, Boulder Mountain District

Project Description and Implementation Recommendations
The Arroyo Chico corridor begins with the Fourmile Canyon burn scar to the west and ends at Dry Gulch (the topographical feature) and Poorman Road. Wildfire intensity in this overgrown south aspect could be severe, and slope and weather alignment could contribute to largescale and rapid fire spread. This series of projects aims to offer protection to the Arroyo Chico community, but also to disrupt a potential major wildfire pathway. The West and North units tie into the burn scar, and the Spur Ridge and East projects take advantage of ridgelines that run perpendicular to the westerly/southwesterly winds that typically drive destructive wildfire in Boulder County. There is good existing treatment in the area, along the 500 Arroyo Chico shared driveway, and further east where a large parcel has been well managed for over a decade. Hand crew implementation and primarily pile burning will be necessary to accomplish this project. Heavy equipment may be useable on the flatter ridgeline treatments.



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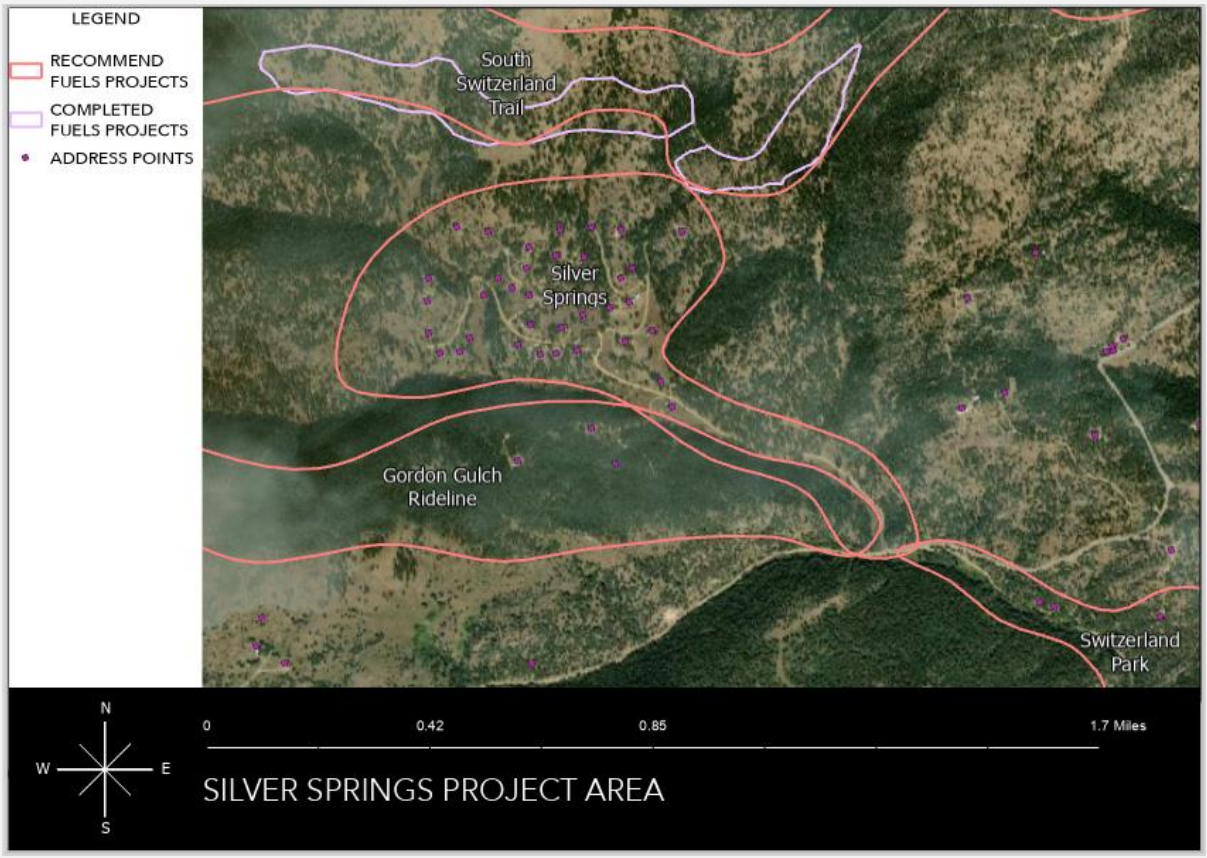
Project Name	3D.20 Silver Springs
Priority	High
Acreage	202
Land Ownership	Private, USFS
Communities Protected	Silver Springs

Project Description and Implementation Recommendations
The Silver Springs community consists of homes at the northwest end of a dead-end canyon and road. The fuels reduction project is designed to protect the community, and then create a survivable and workable egress route for residents and a holding feature for first responders. Hand crew implementation with wood chipping should be possible for most of the project. Some slash pile construction will be necessary.



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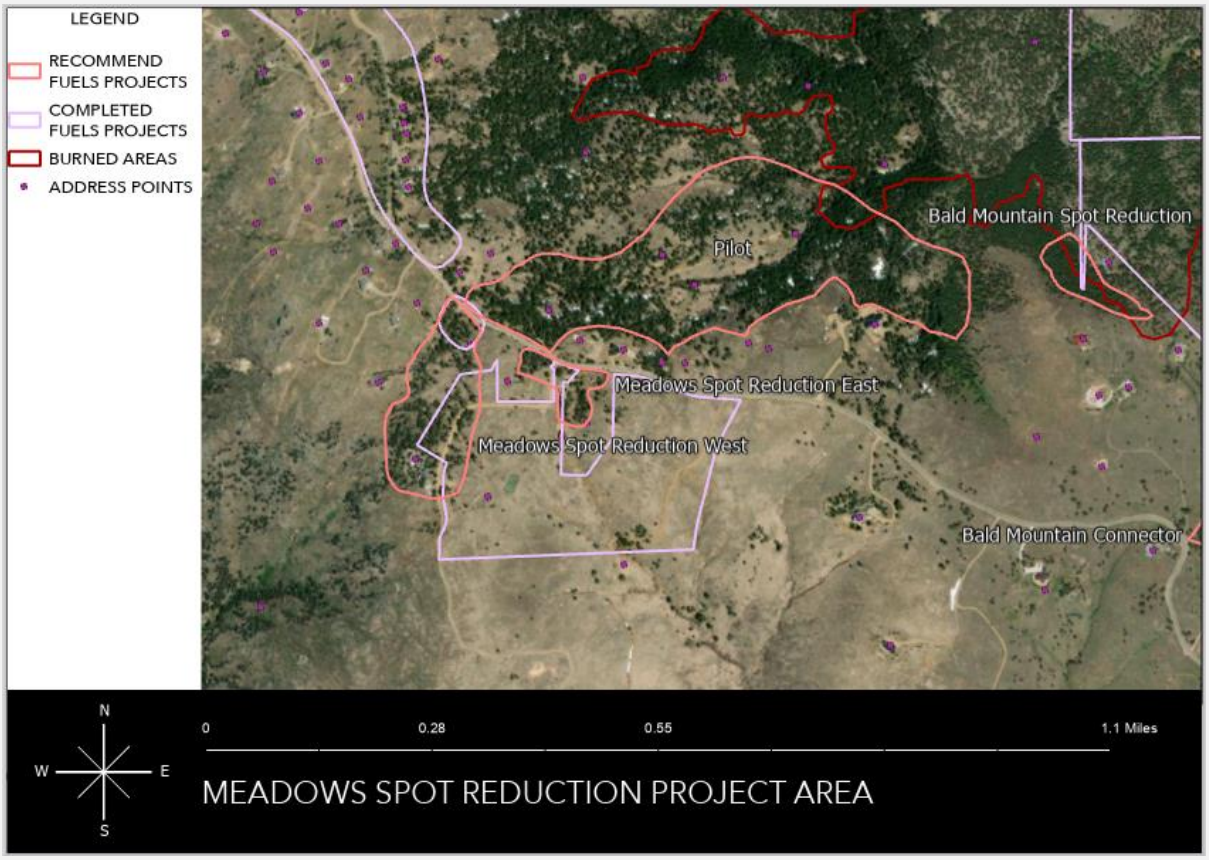
Project Name	3D.21 Meadows Spot Reduction
Priority	High
Acreage	2 units: West – 12 East – 3
Land Ownership	Private
Communities Protected	All communities in Sunshine Fire District

Project Description and Implementation Recommendations
The Fourmile Canyon Fire heavily reduced timber fuel loading on the southside of Sunshine Canyon Drive, eliminating forests entirely in many sections. This destruction creates a strategic opportunity, where selective thinning in two remaining stands within the burn area could dramatically mitigate spot fire potential crossing Sunshine Canyon Drive. This project would not necessarily need to follow traditional fuel break prescriptions, but instead could focus on complete elimination of ladder fuels and selective canopy spacing to mitigate the potential for single-tree or group torching (that would more likely lead to spotting across the road than surface fire). Hand crews could easily accomplish these projects with a woodchipper for slash removal. Very few logs would be generated in implementation.



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Project Name	3D.22 Wedgewood Shared Drive
Priority	High
Acreage	29
Land Ownership	Private
Communities Protected	Wedgewood, Lower Fourmile, East Boulder Canyon

Project Description and Implementation Recommendations
The Wedgewood Shared Driveway project would mitigate risk on a very hazardous shared driveway, while also connecting Boulder Canyon to the Betasso Fuels Reduction Treatment, creating good defense for Lower Fourmile Canyon and other communities to the west and the north and mitigating risk to the critical infrastructure at the Betasso Water Treatment Facility. Hand crew implementation and wood chipping would be required in the steep terrain.

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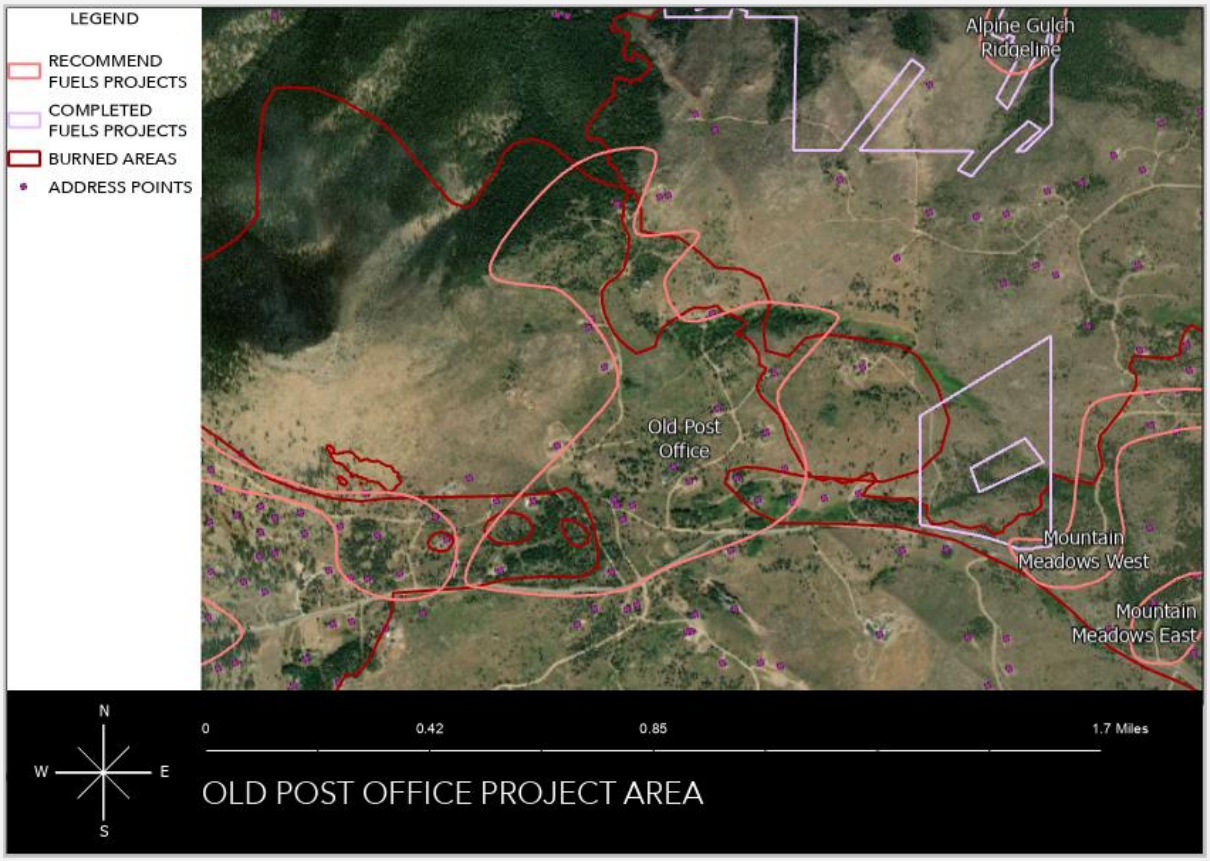
Project Name	3D.23 Old Post Office
Priority	High
Acreage	193
Land Ownership	Private, USFS, BLM
Communities Protected	Old Post Office

Project Description and Implementation Recommendations
Like many of the communities in Sugarloaf, reducing risk to Old Post Office should entail as much treatment as is achievable over a large swath of land. There are many good areas of sparse vegetation, but most of the forested areas in the community would benefit from some degree of thinning. Alternatively, roadside fuel breaks along the main dead-end roads and robust defensible space would offer good community-level protection. The gentle slopes in much of the project area may allow for heavy equipment for implementation, complemented by hand crews in some areas. A blend of wood chipping and slash pile burning will be necessary for slash removal.



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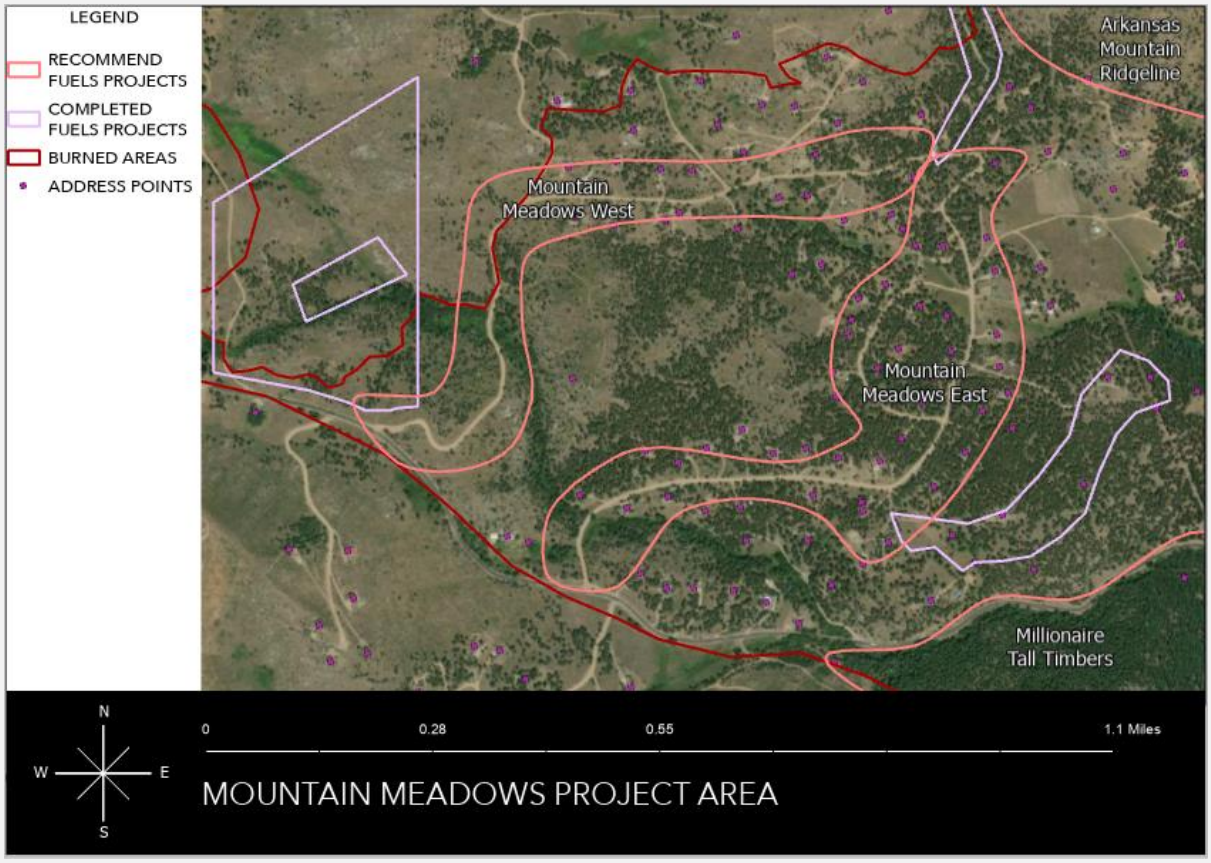
Project Name	3D.24 Mountain Meadows
Priority	High
Acreage	East – 70 West – 49
Land Ownership	Private, USFS
Communities Protected	Mountain Meadows, Millionaire, Tall Timbers, Betasso

Project Description and Implementation Recommendations
Wildfire risk is moderated in the Mountain Meadows area due to the proximity of the Fourmile and Black Tiger burned areas. However, intensity could be high, particularly in the eastern portions of the community and along roadways. These treatments are designed as roadside fuel breaks that are expanded to offer residential property defense in populated areas. The East unit is a higher priority due to denser vegetation and more intense expected wildfire behavior. Gentle slopes would make this area an ideal candidate for heavy equipment implementation and full biomass removal.



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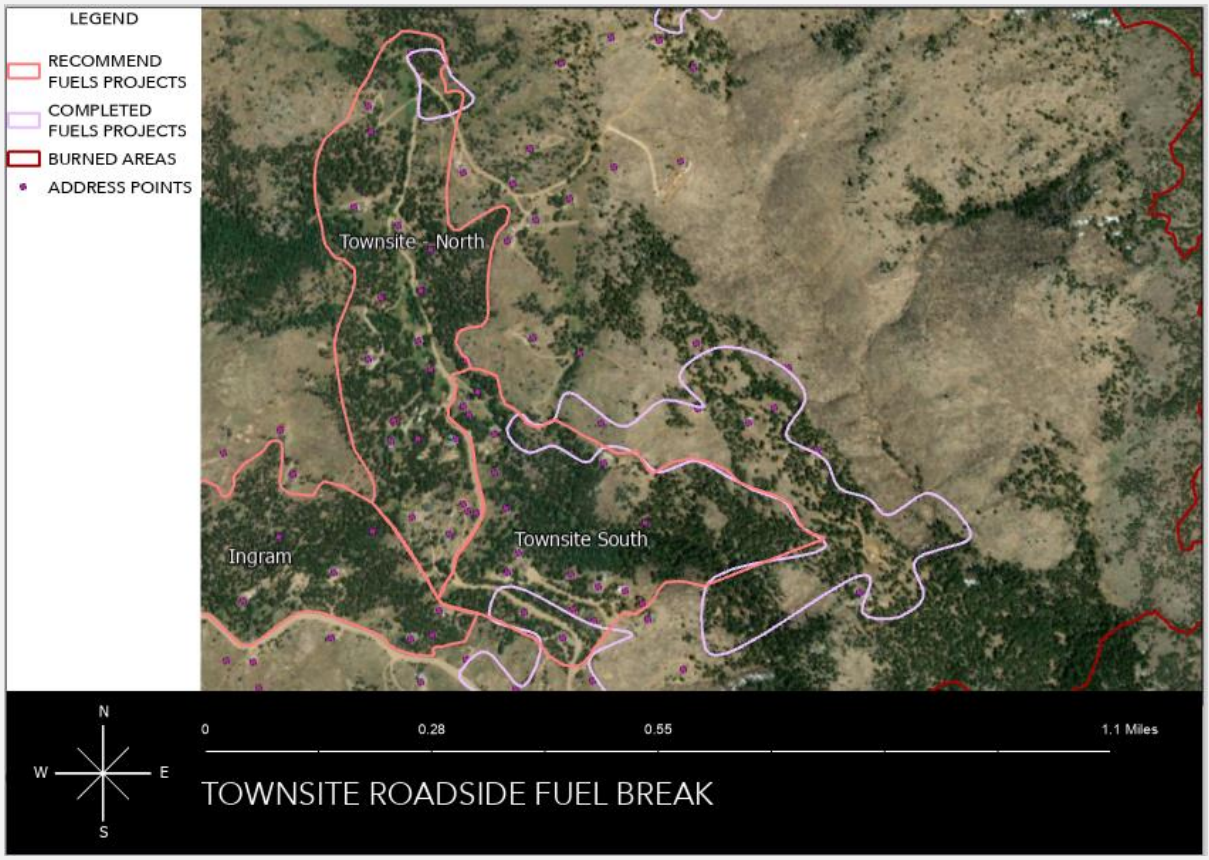
Project Name	3D.25 Townsite Roadside Fuel Break
Priority	High
Acreage	Two units: North – 58 South – 51
Land Ownership	Private, BLM
Communities Protected	Townsite, Pilot, Ingram

Project Description and Implementation Recommendations
The Townsite Community has a riparian quality owing to a creek/drainage that runs through much of the community that is likely the reason that the Fourmile impacts were moderated in much of the community. The burn area surrounds Townsite, but some dense forests remain, primarily adjacent to County Road 83. A roadside fuel break in this area of denser forest would be an optimal treatment to fortify the Townsite Community. This project would tie into and enhance several existing treatments in the area as well as tie into burned areas from the Fourmile Canyon Fire. Because of the terrain at the upper portion of County Road 83 there is only a single reliable egress route for the Townsite Community and that is back to Sunshine Canyon Drive. Therefore, mitigation in this area and along County Road 83 is a life safety issue. Given the number of residences, hand crew implementation is recommended, as is full biomass extraction/utilization.



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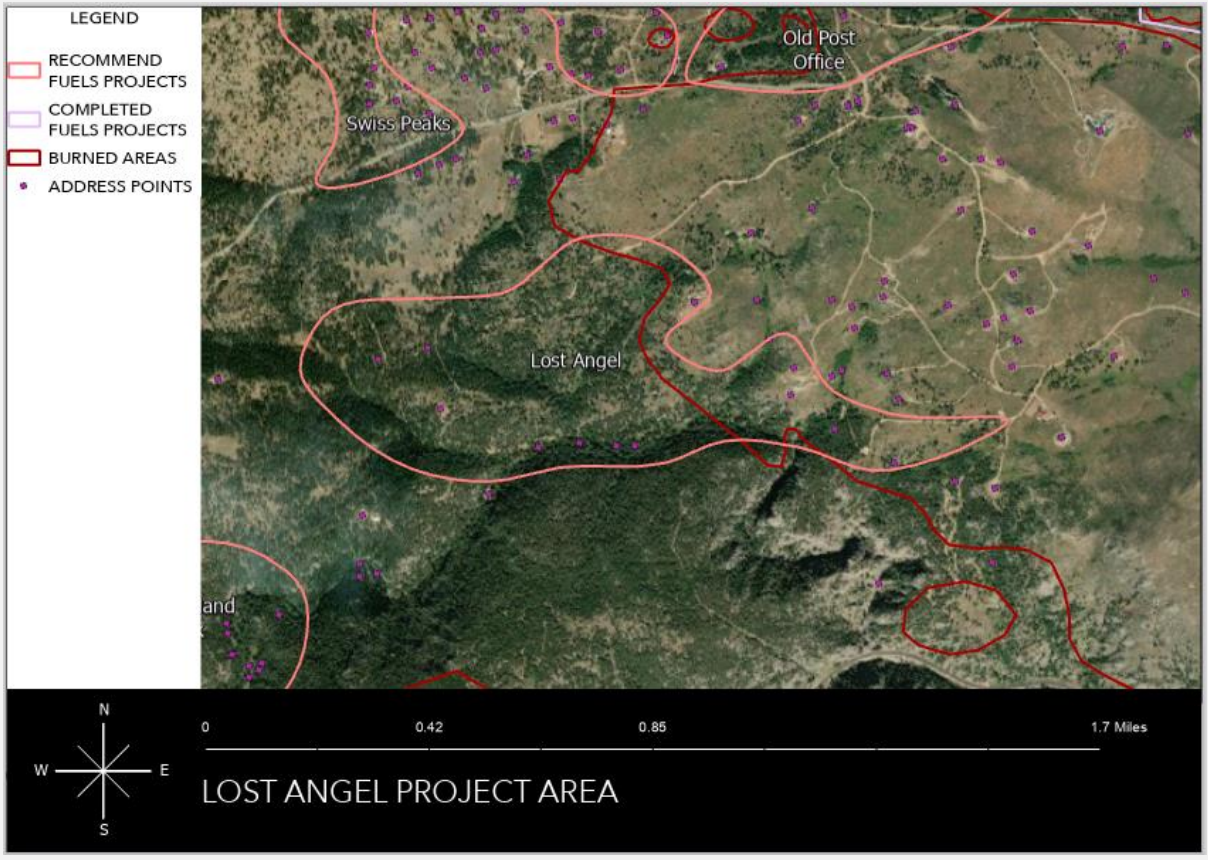
Project Name	3D.26 Lost Angel
Priority	Moderate
Acreage	210
Land Ownership	USFS, Private
Communities Protected	Lost Angel

Project Description and Implementation Recommendations
The Lost Angel community is mostly within the Black Tiger burned area, where vegetation is sparse. The unburned area around Old Townsite Road is at the greatest risk and could generate intense wildfire that would readily spread through the flashier fuels in the remainder of the Lost Angel community. The Old Townsite area also sits on the (typically) windward and downhill side of the rest of the community, adding to the hazards represented by this area of dense forest. Much of the steep terrain in the project area is inoperable or very challenging, so developing a final project footprint would require 'ground truthing' the area. Additionally, most of the land is federal, so an effective project would require USFS support. Hand crew implementation and a blend of wood chipping and slash pile burning would be required.



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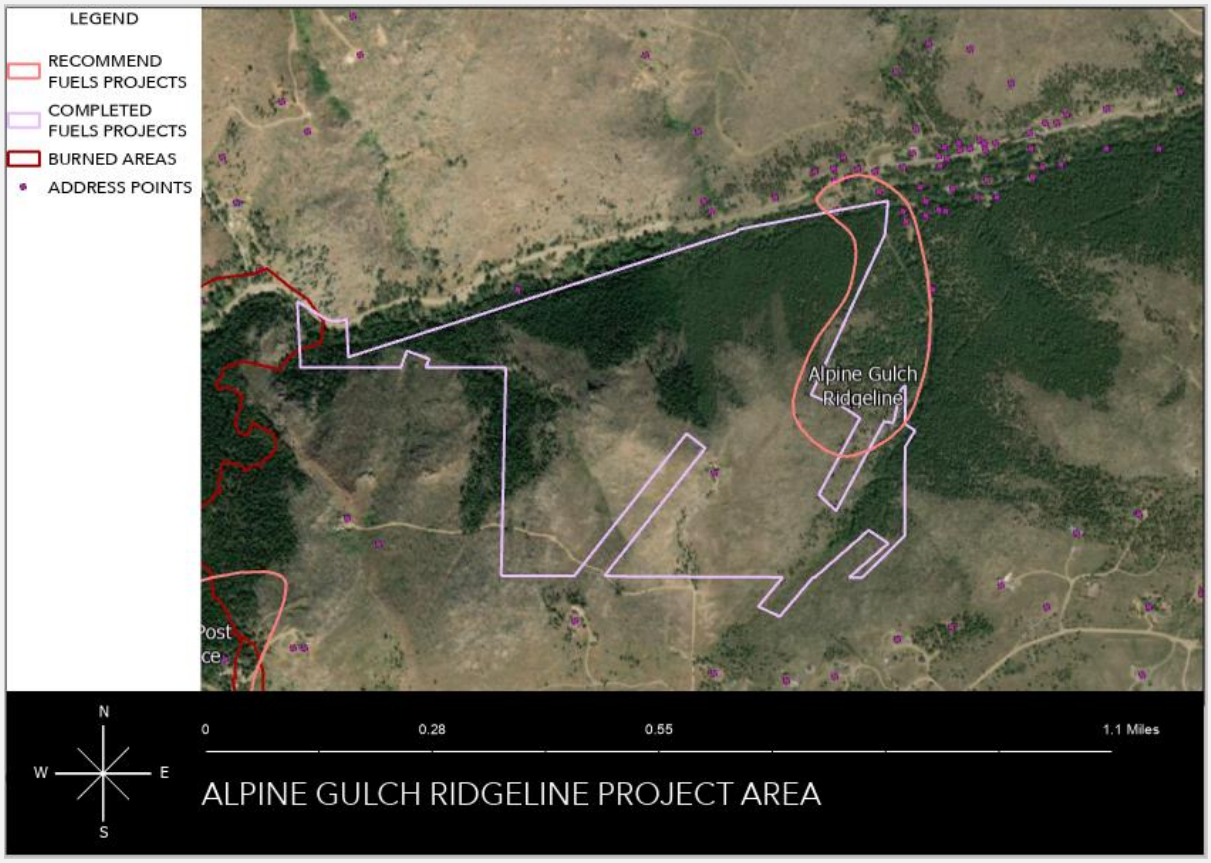
Project Name	3D.27 Alpine Gulch Ridgeline
Priority	Moderate
Acreage	24
Land Ownership	Private
Communities Protected	Wall Street

Project Description and Implementation Recommendations
The inoperably steep slopes surrounding the Wall Street community challenge community-level fuels reduction projects. A minor ridge in Alpine Gulch offers one of the few topographic features that may serve as a project location. Even this project perimeter comprises some areas where implementation would be extraordinarily challenging or in some places inoperable. Hand crew implementation and slash pile burning are the only options for this project, but steep slopes would make slash pile burning potentially dangerous. This project may be found to be non-viable due to these challenges. The best alternative for the Wall Street community is robust linked defensible space treatment.



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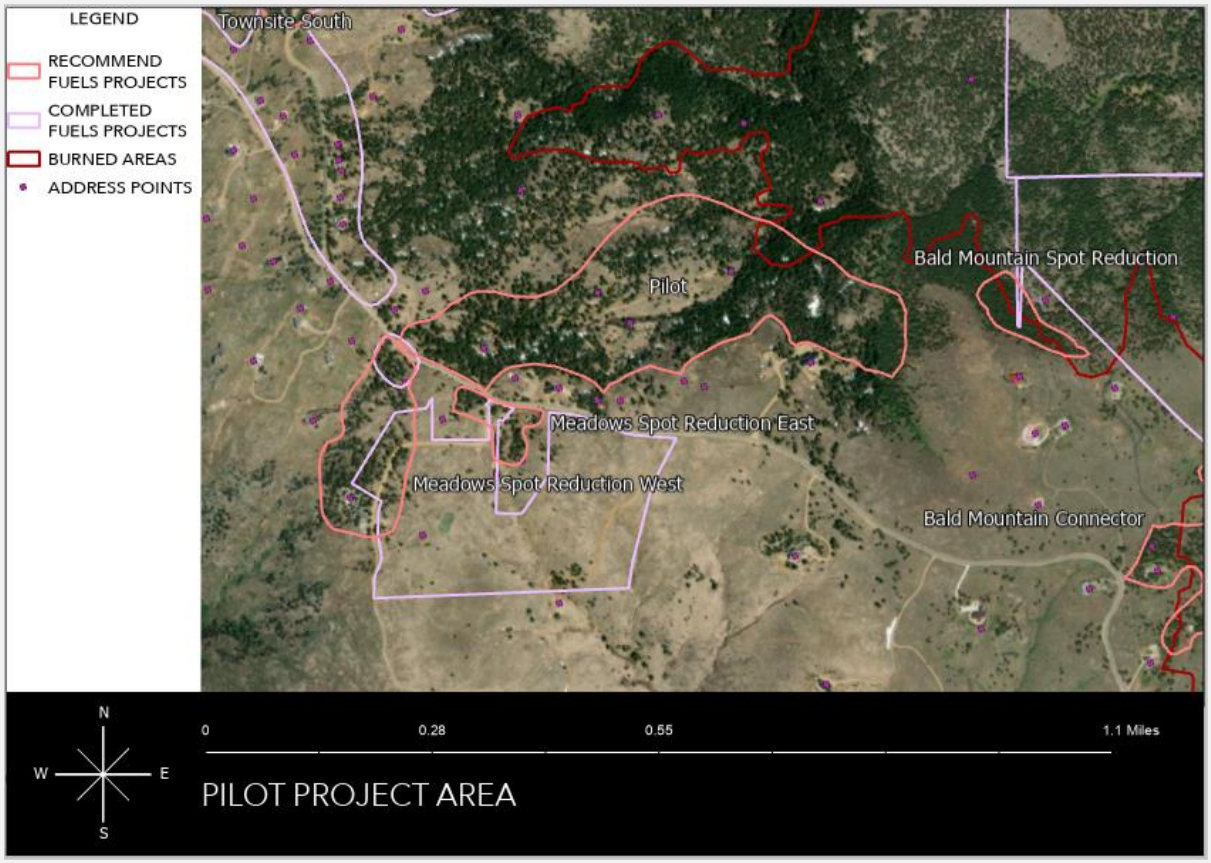
Project Name	3D.28 Pilot
Priority	Moderate
Acreage	32
Land Ownership	Private
Communities Protected	Pilot, Townsite, Bald Mountain

Project Description and Implementation Recommendations
Most of the Pilot community was within the perimeter of the Fourmile Canyon Fire. However, there are several unburned, forested areas within the perimeter of the fire that surround houses in the Pilot community. This project performs mitigation on several of these areas to create a larger contiguous area which connects to areas which were burned in the Fourmile Canyon Fire. The mitigation will include Zone 3 thinning in the areas close to the structures. The project will provide protection for 6 houses in the Pilot community. Hand crew implementation is recommended, with good access points for wood chipping in most parts of the project area.



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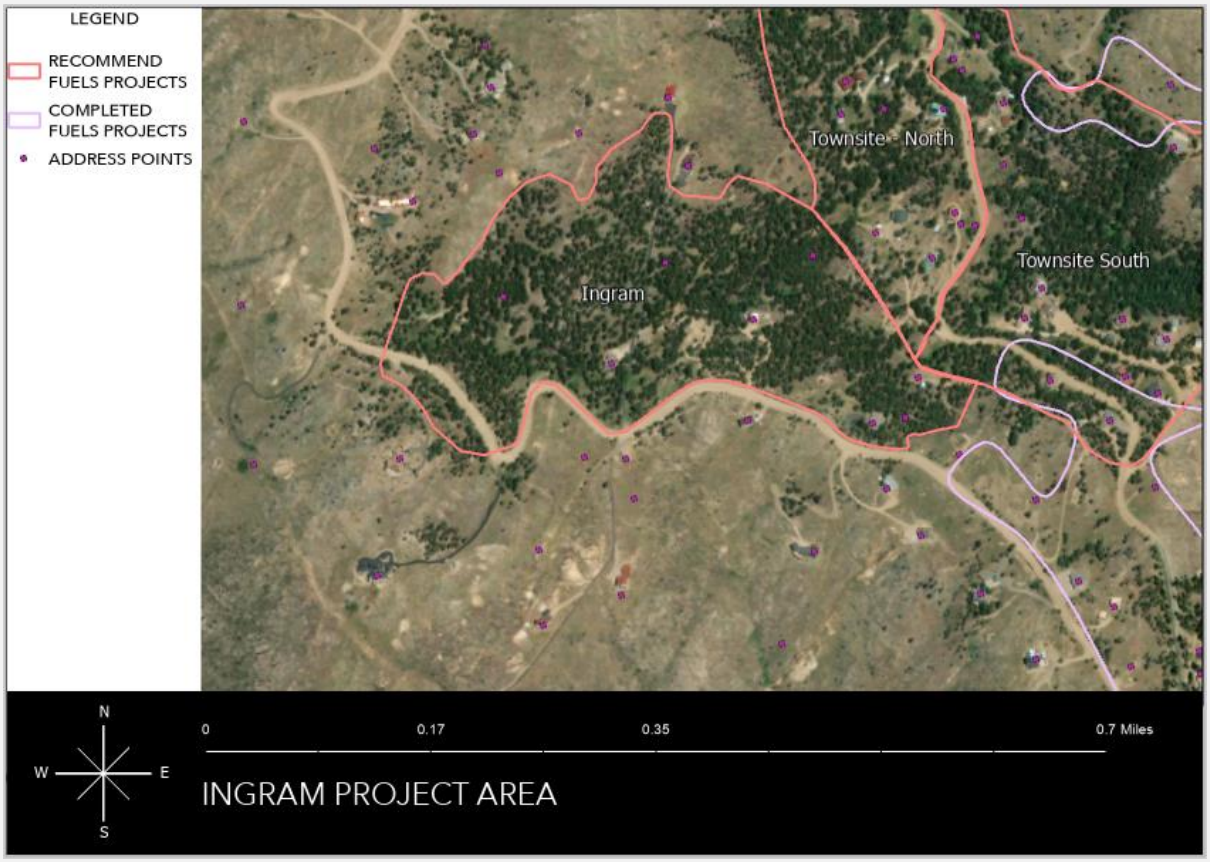
Project Name	3D.29 Ingram
Priority	Moderate
Acreage	42
Land Ownership	Private
Communities Protected	Ingram, Townsite

Project Description and Implementation Recommendations
The Ingram community was significantly impacted by the Fourmile Canyon Fire, and much of the vegetation has been reduced to short grasses. On the north side of Sunshine Canyon Drive, however, there is an area of overgrown ponderosa forest that should be thinned. The project could be viewed as a robust linked defensible space project, and a smaller version of this project would accomplish good residential property defense objectives. However, treatment of the full 42 recommended acres would accomplish the same objectives, while also mitigating wildfire on a larger scale and offering protection to the Townsite community as well. Due to the number of residential properties in the project area, hand crew implementation is recommended and full biomass extraction/utilization.



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PROJECT 3E – GRASS MANAGEMENT

Finer fuels (grass and shrubs) are the primary carriers of wildfire and can contribute to extreme rates of spread. Observations during the Fourmile Canyon Fire concluded that forest thinning projects that opened the canopy along roadways contributed to higher loads of grass and other fine fuels, which may have made it easier for wildfire to cross the roads.[xxviii]

Whether associated with forest thinning projects or not, grass management along roadways or near values at risk should be promoted by BWWA. Partnership should be explored with Boulder County to explore routine vegetation management along roadways to mitigate wildfire risk.

On private roads (or along public roads as well) fire district personnel or auxiliary support personnel could 'adopt' sections of roads to manage grasses.

These activities should be developed in close consultation with wildfire management professionals, ideally professionals with wildfire modeling and risk assessment knowledge and expertise, to ensure that grass management is correctly prioritized and timed to maximize risk reduction.

PROJECT 3F – BIOMASS UTILIZATION

Fire District personnel involved in hazardous fuels reduction report feasibility challenges in extracting logs from wildfire mitigation and forest restoration projects. Especially in steep areas of the Study Area, or areas where access is difficult, this component of project implementation is often cost-prohibitive within typical project budgets.

As the Fourmile Canyon Fire demonstrated, adding to surface fuels (logs) while opening the canopy can undermine the effectiveness of a wildfire mitigation project, so removing most logs from the landscape is an important project component.

BWWA should partner with other agencies to consider implementation methods to make the project of log extraction more feasible and should also develop shared means of making the logs available for utilization, for example, identifying fire district property that could be regularly used as "wood lots" for firewood sale or giveaway.

Fire districts are frequently contacted by residents who would like permission to use logs left on the landscape for firewood. In the Ponderosa-dominant forests in the Study Area, firewood is one of the few uses of logs. However, making the logs available as firewood will require addressing a variety of issues relating to cost, feasibility, and license to enter private property.

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PROJECT 3G – BUILDING IMPLEMENTATION CAPACITY

Of the four fire districts in the BWWA, Four Mile FPD is the only agency that sponsors a wildfire mitigation crew.

The operational assessment in this CWPP revealed that Four Mile's mitigation crew struggles to meet the demand for wildfire mitigation projects.

The development/modification of the Four Mile Fire Crew to meet mitigation demands in the four-district service area is a goal of the CWPP (or creating a new mitigation program to perform wildfire mitigation in all four districts).

It is also recommended that BWWA create a qualified vendor list to streamline the process of hiring contractors to perform wildfire mitigation implementation.

PROJECT 3H – PRESCRIBED FIRE

Although the CWPP recognizes the critical role of prescribed fire for wildfire mitigation and ecological goals, it also recognizes the significant risks and challenges associated with broadcast prescribed fire, particularly in a Study Area with such an intermix of public and private lands, and few areas that are distanced from residential property and other vulnerable values at risk.

Even public land management agencies have experienced profound difficulty in safely and successfully implementing prescribed fire programs, and 2022 was an especially problematic year for prescribed fire in the United States.[xxix]

The CWPP recommends pursuing prescribed fire as a land management tool, but that pursuit should begin with serious community engagement and discussion surrounding the risks and benefits of prescribed fire.

Partnership with public land management entities should also be explored. It is more likely that a public land broadcast burn in the Study Area could be accomplished before private land is considered for broadcast burning, owing to the greater resources and capacity of public land management entities.

Slash pile burns already take place in the Study Area, and these controlled burns have been the subject of some controversy, occasionally causing alarm in the community.

BWWA should work to ensure that the public is properly educated and aware of these burns and should consider developing an internal supplement to county permitting processes, to ensure that any slash pile burning conducted by fire district personnel or residents is conducted in a safe manner.

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4 COMMUNITY ENGAGEMENT AND EDUCATION

PROJECT 4A – CITIZEN ADVISORY COUNCIL

The community engagement conducted for the development of this document proved very useful, both for residents, and for the Core Team. A formal Citizen Advisory Council should be established to create an official and permanent communication link between residents in the Study Area and wildfire management professionals working for BWWA and other interested organizations.

The Council should be open to all community members who are interested, by way of a self-nomination process. BWWA should offer guidance and assistance to the Council through its incorporation.

This program aims to ensure that community members and fire districts are communicating regularly and effectively. The goals of this program are to promote a better understanding of wildfire risk, better engagement with risk reduction, and an increased tempo of more effective and accepted projects and programs to reduce wildfire risk.

PROJECT 4B – CWPP DIGEST AND INTERACTIVE CWPP

Although the CWPP aims to be useable and actionable for wildfire management professionals and residents alike, the length of the document is likely to make it challenging for residents to meaningfully engage with the content and recommendations.

As such, a shorter 'CWPP Digest' should be prepared and published for the benefit of residents in the Study Area who seek to quickly extract the key elements of the CWPP that are most relevant to residents, and to easily explore risk in their community.

Additionally, it is recommended that BWWA develop an interactive CWPP to engage residents and other users of the CWPP who would like to explore the findings and recommendations of the document in a user-friendly, online interface.

PROJECT 4C – COMMUNICATING WILDFIRE RISK CONDITIONS

Community input and operational assessments pointed to the fact that fire districts should improve standards and methods for communicating wildfire intelligence, such as seasonal trends in wildfire danger ratings, red flag days, county fire restrictions, and other crucial information.

Wildfire risk communications should be issued in a wide range of communication mediums, and fire district personnel should be available to help members of the public interpret risk conditions or local fire restrictions.

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This project will accomplish a variety of objectives and should be implemented with the goal of creating a social environment of enhanced wildfire risk awareness. This should improve public preparedness for wildfire incidents, reduce the probability of human-caused ignitions, increase the probability that wildfires are reported, and will accomplish other broad social objectives relating to wildfire.

PROJECT 4C – WILDFIRE PREPAREDNESS EVENTS AND OUTREACH

The fire districts in the Study Area are often community hubs in addition to emergency response entities. The districts, and BWWA as a collaborative entity, should embrace these roles by hosting useful community events to engage, educate and assist residents in a variety of ways that improve individual and community preparedness for wildfires. Events could include the following:

EVACUATION READINESS WORKSHOP

SOCIAL MEDIA AND TECHNOLOGY WORKSHOP

EVACUATION DRILLS

HOME IGNITION ZONE WORKSHOP

HOME HARDENING AND ZONE 1 WORKSHOP

WEED WHACKING WEEK

SLASH PILE CONSTRUCTION AND BURNING

FIRE-RESISTANT LANDSCAPING WORKSHOP

CHAIN SAW OPERATION WORKSHOP

CHIPPING AND/OR DUMPSTER DAYS

WILDFIRE AWARENESS DAYS

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PROJECT 4D – OUTREACH EFFORTS

The CWPP recommends complementing wildfire preparedness events with wildfire preparedness outreach. Outreach should reflect the same key messages relating to wildfire preparedness that will be included in community events.

Outreach should not rely on a sole medium for engaging the community. During community input events for CWPP development, residents voiced frustration with the trend towards social media and web-based platforms as a primary apparatus by which important information is being distributed. Outreach efforts should aim to reach residents by traditional mail, door-to-door contact, public message boards, email, and social media, to ensure that all residents are reached in the way that they are reachable.

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5 OTHER RECOMMENDATIONS

PROJECT 5A – CAPACITY BUILDING

Capacity limitations that impede or delay progress in wildfire risk reduction vary with each of the four districts participating in this CWPP.

Capacity improvements may be pursued collectively by the BWWA, or individually by each fire district. Examples of projects or programs that may improve capacity are:

VOLUNTEER RECRUITMENT AND RETENTION

PAID ADMINISTRATIVE STAFF (E.G. GRANT WRITER)

PAID WILDFIRE MITIGATION LABORERS

JOINT EQUIPMENT PURCHASE (E.G. WOODCHIPPER)

Capacity building should be an ongoing process and the CWPP does not intend to prescribe concrete or inflexible solutions to capacity limitations. Any programs or projects that are expected to improve the pace and scale of wildfire risk reduction activities should be vigorously pursued.

PROJECT 5B – COMMUNITY SUPPORT

During community input meetings, many residents voiced willingness to support wildfire risk reduction activities, while also expressing an unwillingness to volunteer as wildland firefighters (i.e., suppression resources).

The BWWA should explore useful and meaningful ways to incorporate residents who are willing to support the district in a non-operational capacity.

Models for community participation could include:

COMMUNITY ADVISORY COUNCIL FOR WILDFIRE RISK REDUCTION PROJECTS

AUXILIARY FIRE DISTRICT MEMBERS TO SUPPORT NON-OPERATOINAL FUNCTIONS DURING WILDFIRE INCIDENTS

NON-TECHNICAL WILDFIRE MITIGATION SUPPORT

The CWPP recognizes that new programs and personnel carry with them a demand on management, so this recommendation should be pursued thoughtfully to ensure that well-intended but unmanageable programs are not created.

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PROJECT 5C – SUPPORT FOR HOMEOWNERS INSURANCE

Each of the districts comprising the BWWA reports an increase in homeowner inquiries relating to homeowners insurance. Residents report insurance coverage cancellations, or confusing or challenging demands from insurance providers relating to Home Ignition Zone mitigation to reduce the risk of property loss. This problem is common to many fire-prone communities in the United States.[xxx]

Although it falls outside of the normal mission and scope of fire protection districts, the CWPP recommends the BWWA explore ways to advocate for clarity and fairness in insurance practices. This may involve public policy advocacy on behalf of the constituents of the fire districts.

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CONCLUSION

The project of reducing wildfire risk is a continuous process. There is already strong engagement with wildfire risk in the CWPP Study Area, and this is expected to improve with the formation of the Boulder West Wildfire Authority.

The Boulder West Wildfire Authority aims to revise this plan annually, or at least once every five years, to reflect progress made in implementing the recommendations presented in this plan, and to account for changes in the risk profile of the Study Area.

The CWPP Core Team concludes this plan with the hope that its content will enhance life safety, promote healthy landscapes and safe communities, mitigate undesirable fire outcomes to all values at risk, promote community engagement with wildfire risk, and expand the capacity of fire districts, residents, and any other users of this document.

GOLD HILL SUNSHINE

BOULDER WEST
WILDFIRE AUTHORITY

FOUR MILE SUGARLOAF

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APPENDICES

APPENDIX A
RISK ASSESSMENT METHODOLOGY

OVERVIEW

Community Study Areas are identified as part of CWPP development to assess risk on a smaller and more focused scale than the risk assessments for the general Study Area. The goal of the Community-level Wildfire Risk Assessment **(CWRA)** is to determine an **approximate level of risk** in community Study Areas. This process enables the CWPP Core Team to describe the relative risk profile of communities within the CWPP Study Area. The CWRA produces a wildfire risk rating for each community Study Area, which is a **numeric score** corresponding to a **descriptive adjective**. The process informs the development and prioritization of wildfire risk reduction projects.

The process begins by using a geographic information system (GIS) platform to draw and define Community Study Area polygons. Then, wildfire risk data analysis, emergency response operational assessments, and community field surveys are conducted for each community Study Area.

The assessment consists of two sections and five risk categories. Each category contains a scoring range, with a higher score indicating a higher degree of risk in that category. The scoring ranges are weighted according to the salience of the risk factor(s) considered in that category. Additional factors beyond those listed in established categories are evaluated by field surveyors, and modifications to risk scores considered by the CWPP Core Team.

SECTION 1 – Baseline Wildfire Risk (100 points)

Category 1 – **Composite Wildfire Risk** (CO-WRAP) – 60 points

Category 2 – **Potential Fire Intensity** (CO-WRAP) – 40 points

SECTION 2 – Supplemental Analysis (100 points)

Category 3 – **Evacuation Preparedness** – 40 points

Category 4 – **Response Resources** – 40 points

Category 5 – **Defensible Space** – 20 points

Additional Observations – Score modification at the discretion of the Core Team

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The total score produces the Community Wildfire Risk Rating. Each community's rating is accompanied in the CWPP by a community map, representative photographs, and a narrative to provide context and supplemental information. Score ranges correspond to a risk adjective assigned to each community:

Highest Risk – 161-200 points

High Risk – 121-160 points

Moderate Risk – 81-120 points

Low Risk – 41-80 points

Lowest Risk - 1-40 points

No Risk – 0 points

SECTION 1 – BASELINE WILDFIRE RISK

Methodology: Import Wildfire Risk Theme and Fire Intensity Theme from CO-WRAP to CWPP GIS Project. **Wildfire Risk** relates burn probability to a partial values-at-risk dataset. **Fire Intensity** describes flame length and potential wildfire behavior without relating to values-at-risk.

Use GIS geoprocessing tools to clip raster data and calculate aggregate baseline scores for each community Study Area. Buffer polygons ensure that areas/features that are relevant to wildfire influences around the community Study Area are reflected in the baseline risk scores.

The CO-WRA 2017 Final Report[9] details the datasets and processes used to produce these themes. Risk factors reflected in these themes are not evaluated in **Section 2** to avoid skewed results.

CATEGORY 1 of 5 - CO-WRAP Composite **Wildfire Risk** (60 point maximum)

- **Highest Risk** +60
- **High Risk** +48
- **Moderate Risk** +36
- **Low Risk** +24
- **Lowest Risk** +12
- **No risk** +0

[9] https://coloradoforestatlas.org/customers/colorado/manuals/CO-WRA_2017_Final_Report.pdf

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CATEGORY 2 of 5 - CO-WRAP **Fire Intensity** (40 point maximum)

- **Highest Intensity** +40
- **Moderate-High** +32
- **Moderate** +24
- **Low-Moderate** +16
- **Lowest** +8
- **Unburnable** +0

SECTION 2 – SUPPLEMENTAL ANALYSIS

Methodology: Supplemental data are analyzed to evaluate risk factors that are not reflected in the CO-WRAP themes. These data are obtained through available datasets and are complemented with emergency response operational assessments and field surveys.

Data analysis in Section 2 is conducted in concert with operational assessment facilitators and field surveyors who are Wildland Firefighters with significant experience in wildfire response and incident management. Facilitators and surveyors are qualified as NWCG Single Resource Boss or higher and have experience in evaluating neighborhoods and developing strategies during wildfire incidents. Surveyors also have direct experience with wildfire evacuations. More than one surveyor should conduct independent surveys, particularly in complex or ambiguous Community Study Areas. Substantial deviation in surveyors' scores prompts further analysis.

Sub-categories are tagged to indicate the recommended process(es) for evaluating that risk factor.

(O) – Operational Assessment; **(F) –** Field Survey; **(SD)** – Supplemental Data and Analysis.

***Notes**:*

(1) Operational assessments and field surveys are intended to produce a general representation of emergency response capacity and community risk factors. These processes are not intended to evaluate intricate response plans and procedures, or risk factors for individual properties or parcels.
(2) CO-WRA datasets include population and residential analysis that adequately describes lives at risk, structural conflagration risk, and other associated hazards stemming from dense neighborhoods. These risk factors are not considered in Section 2.
(3) Many of the risk factors assessed in Section 2 cannot be perfectly quantified. The scoring range allows for a 'best fit' approach to numerically scoring qualitative data. Scoring rationales are documented and carefully reviewed by the Core Team.

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CATEGORY 3 of 5 – Evacuation Preparedness (50 point maximum)

- **(O)(F) Anticipated Reach of Evacuation Notification – Community and Telecommunications Situation (12 point maximum)**
  - Community situation unconducive to evacuation awareness, cellular coverage (WEAS) not viable for evacuation notifications +12
  - Community is well-situated for evacuation awareness and cellular coverage is substantial +0
- **(SD)(F) Number of Egress Routes (12 point maximum)**
  - One + 12
  - Two +6
  - More than two +0
  - ***Note:*** *if shared driveways servicing more than 2 residences are present, and driveway length exceeds 1/8-mile, +1 point for every shared driveway, up to a maximum of 12 points.*
- **(SD)(F) Travel Times to Non-burnable Environment (8 point maximum)**
  - Longest travel time in Study Area +8
  - Minimal or no travel time +0
- **(SD)(F) Roadside/Egress Vegetation (6 point maximum)**
  - Roadways heavily threatened by roadside fuels +6
  - Roadways unthreatened by roadside fuels (survivable environment during active fire) +0
- **(SD)(F) Lanes (6 point maximum)**
  - All single lane/inadequate pull-offs +6
  - All dual lane, good fire apparatus turnarounds +0
- **(SD)(F) Road Construction (6 point maximum)**
  - Majority Dirt + 6
  - Majority Paved + 0

CATEGORY 4 OF 5 – Response and Suppression Resources (30 point maximum)

- **(O) Initial Attack Resources (10 point maximum)**
  - No guarantee of initial attack resources +10
  - Multiple initial attack resources and coordination guaranteed (e.g., Officer, Brush Truck, Water Tender) within 20 minutes of incident notification +0
  - ***Note:*** *this category is evaluated with representatives of service area(s) response resources*
- **(O)(F) Road and Address Signage (8 point maximum)**
  - Road, address, evacuation route and other useful signage is absent or misleading +8
  - Signage present for all roads, addresses and evacuation routes +0
- **(O)(SD) Water Sources/Cisterns (6 point maximum)**

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  - Less than 1,000 gal/residence within 10-minutes of majority of homes +6
  - 2,000 gal/residence, or more, within 10-minutes of majority of homes +3
  - Positive pressure hydrants within 10-minutes of majority of homes +0
  - ***Note:*** *(1) Omit private/unverifiable cisterns. (2) Many areas rely on water sources that are creek/pond fed. Due to the probability that severe wildfire risk would be accompanied by low creek/pond levels, a community that falls into the ranges above, but is serviced primarily by creek/pond established water sources should receive a score modification depending on quality of the water sources.*
- **(SD)(F) Fire Station Response Radius (6 point maximum)**
  - Majority of community falls outside a 2-mile radius of nearest fire station +6
  - Majority of community falls outside a 1-mile radius of nearest fire station +3
  - Majority of community is within a 1-mile radius of nearest fire station +0

CATEGORY 5 OF 5 – Home Ignition Zone (20 point maximum)

Note: *Parcel-level analysis for large Study Areas is not practical. Field Surveyors should have experience in structural triage* ***and*** *prescriptive recommendations for defensible space. Scores in Category 4 should reflect general observations and impressions.*

- **(F) Zone 1** (*Based on CSFS key Zone 1 considerations*) **(12 point maximum)**
  - Structure, roofs, decks and 5' vegetation non-compliant in more than 2/3s of homes +12
  - All or most homes Zone 1 compliant +0
- **(F) Zone 2 and 3** (*based on current CSFS guidelines for defensible space*) **(8 point maximum)**
  - More than 2/3s of homes are not Zone 2 and 3 compliant +8
  - Most homes Zone 2 and 3 compliant +0

FIELD SURVEY – ADDITIONAL OBSERVATIONS

A comprehensive measure of risk cannot be captured in a static set of risk categories. Surveyors make additional notes regarding relevant hazards, values or features not represented in the scoring methodology, but that are helpful to include in the accompanying narrative. These may impact the community's overall risk score, according to the discretion of the Core Team, and/or may be informative in developing risk reduction projects specific to the community. Rationale for any numeric scoring impacts should be carefully reasoned and documented.

Examples of additional observations:

Hazards: untested/unmarked bridges, poorly maintained power/utility poles

Values: critical infrastructure, popular recreational areas, schools, livestock

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Features: existing or possible last resort refuge areas, natural features available for fire containment (e.g., rivers)

DISCLAIMER AND ACKNOWLEDGEMENTS

The details of this document reflect the risk profile of the Study Area(s) for which it was developed. It is not intended for use in other Study Areas or for purposes other than CWPP development.

Subject matter experts and specialists vetted the methodology to ensure a comprehensive set of risk factors were appropriately considered. The Core Team thanks the many contributors and advisors who provided input and assistance.

Contributors included representatives of the Colorado State Forest Service, the United States Forest Service, the Division of Fire Prevention and Control, the Boulder County Sheriff's Office Fire Management Office, the Boulder Office of Emergency Management, Coalitions and Collaboratives, Fire Adapted Colorado, other local firefighters, law enforcement officers and members of the community.

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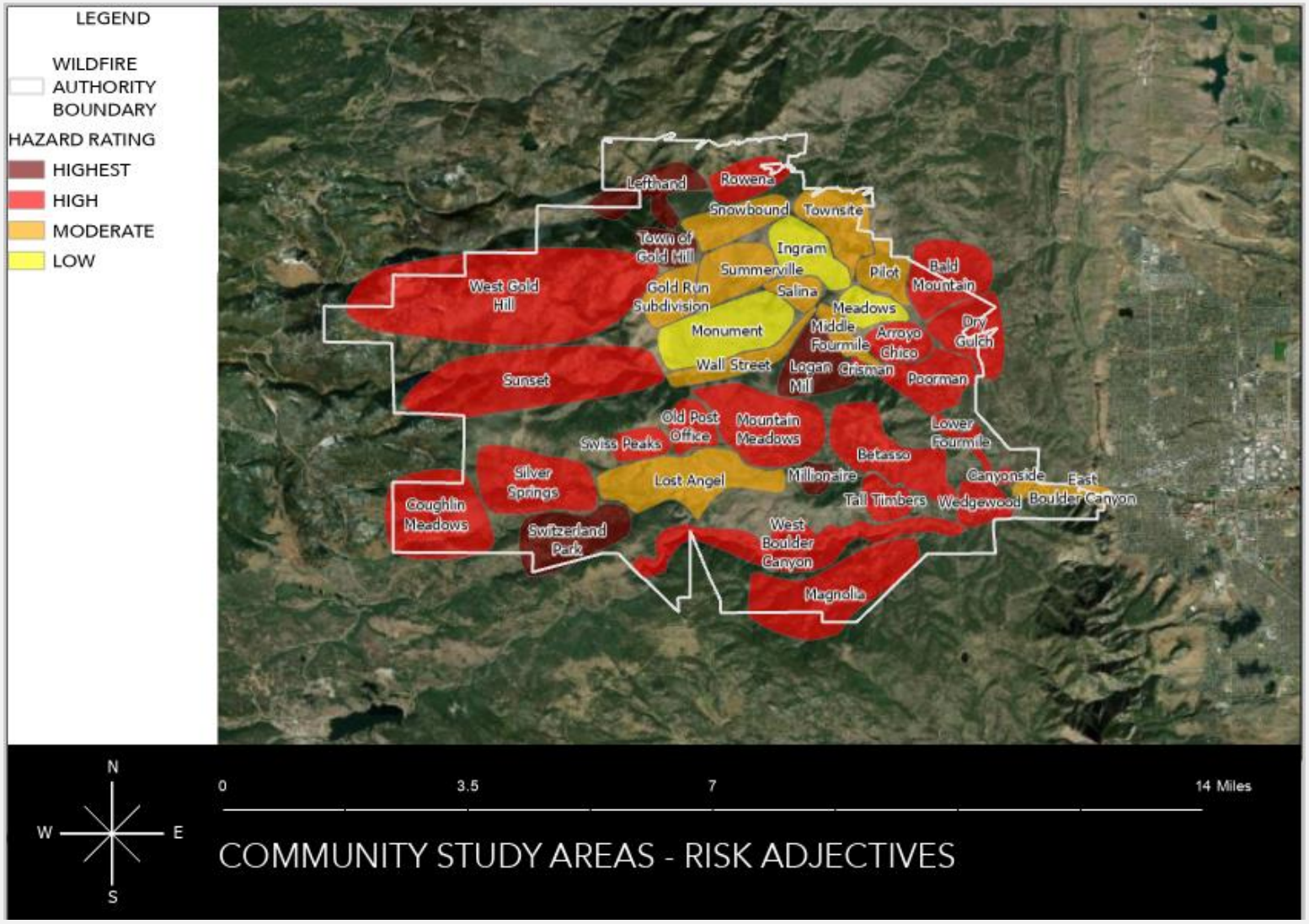
APPENDIX B COMMUNITY RISK ASSESSMENT FINDINGS



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COMMUNITY STUDY AREAS **RISK RATINGS BY DISTRICT**

Each Community Study Area below is linked to the findings for that community in **APPENDIX B**

FOUR MILE FIRE DISTRICT	
Logan Mill	Highest
Crisman	High
Sunset	High
Poorman	High
Arroyo Chico	High
Wedgewood	High
Lower Fourmile	High
Canyonside	High
Wall Street	Moderate
Summerville	Moderate
Middle Fourmile	Moderate
East Boulder Canyon	Moderate
Salina	Moderate
Monument	Low
SUNSHINE FIRE DISTRICT	
Dry Gulch	High
Bald Mountain	High
Pilot	Moderate
Townsite	Moderate
Ingram	Low
Meadows	Low
GOLD HILL FIRE DISTRICT	
Lefthand	Highest
Town of Gold Hill	Highest
Rowena	High
West Gold Hill	High
Snowbound	Moderate
Gold Run Subdivision	Moderate
SUGARLOAF FIRE DISTRICT	
Millionaire	Highest
Switzerland Park	Highest
Magnolia	High
Tall Timbers	High
Betasso	High
Swiss Peaks	High
Silver Springs	High
Coughlin Meadows	High
West Boulder Canyon	High
Old Post Office	High
Mountain Meadows	High
Lost Angel	Moderate

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COMMUNITY STUDY AREAS IN ORDER OF RISK SCORE

Well over half of the communities in the Study Area were rated at **highest or high risk**. The table below displays communities in order of the risk scores to better demonstrate relative risk in the Study Area.

Each Community Study Area below is linked to the findings for that community in **APPENDIX B**

Millionaire	171
Switzerland Park	167
Lefthand	162
Town of Gold Hill	161
Logan Mill	161
Crisman	160
Dry Gulch	158
Magnolia	153
Sunset	153
Tall Timbers	150
Poorman	145
Betasso	141
Swiss Peaks	141
Bald Mountain	141
Coughlin Meadows	141
Arroyo Chico	140
Silver Springs	138
Rowena	135
West Gold Hill	132
West Boulder Canyon	131
Wedgewood	131
Lower Fourmile	126
Old Post Office	124
Canyonside	124
Mountain Meadows	122
Lost Angel	120
Snowbound	113
Wall Street	107
Pilot	92
Gold Run Subdivision	90
Summerville	90
Middle Fourmile	90
Townsite	89
East Boulder Canyon	88
Salina	85
Monument	80
Ingram	75
Meadows	70

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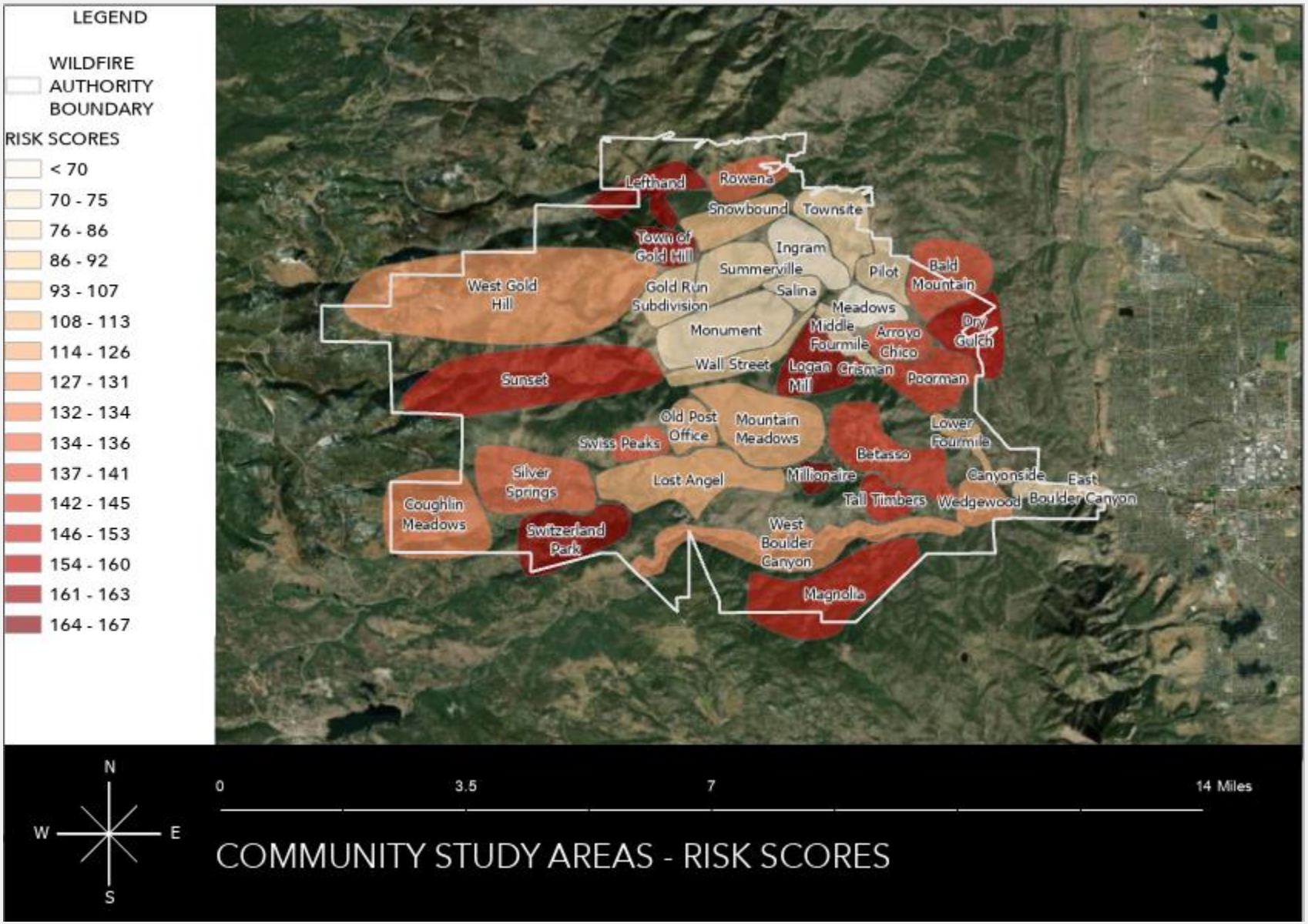

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LOGAN MILL COMMUNITY – FOUR MILE FIRE PROTECTION DISTRICT

Risk Adjective	Highest
Risk Score (out of 200)	161
Number of access/egress routes	1-2. Many single-access subdivisions within Logan Mill, and the general Logan Mill Community has one egress route, with an unreliable, privately maintained, secondary egress route.
Roadway Risk Situation	Very hazardous. Many sing-lane townsite roads, and narrow dual-lane roads. Dirt construction with inadequate pull-offs.
Water Source Risk Situation	Very hazardous. Quality, creek-fed cistern at base of Logan Mill and a static cistern approximately .5 miles from the base of Logan Mill.
Home Ignition Zone Risk Situation	Zones 1, 2 and 3 – Very hazardous.

Additional Description
This area has a very hazardous roadway network. Access throughout the community and to many homes is steep and narrow with difficult or absent turnarounds. There are missing or inadequate streets and address signs. Many homes are built at the top or mid-slope on slopes of greater than 30%. There is a heavy fuel load and a continuous canopy with dense ladder fuels. There is a high structure density in this community. Many of the secondary roads that shoot off from Logan Mill Road are one-way-in-one-way-out, and Logan Mill Road is serviced by a privately maintained and inadequately signed evacuation route. Although the Fourmile Canyon Fire burned in sections of this community, modeled wildfire behavior is intense. Compounding hazards contribute to make Logan Mill one of the highest risk communities in the Study Area.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3C.1 – High Priority Community Roads, 3D.4 – Logan Mill Ridgeline

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CRISMAN COMMUNITY – FOUR MILE FIRE PROTECTION DISTRICT

Risk Adjective	High
Risk Score (out of 200)	160
Number of access/egress routes	1
Roadway Risk Situation	Very hazardous – Although the road is short, it is single lane with poor pull-offs, an untested bridge and is dirt construction.
Water Source Risk Situation	Very hazardous – Although there are nearby water sources, given the dense cluster of homes in Crisman, a community water source would be a significant benefit.
Home Ignition Zone Risk Situation	Zone 1 – Very hazardous Zones 2 and 3 – Moderately hazardous

Additional Description
Crisman is a small community in the Fourmile riparian corridor. Despite its proximity to the creek, fire behavior could be very intense in this community. Road and address signage is good, but the sign for Crisman Road could be improved. Significant Zone 1 issues were observed in this community.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3D.4 – Logan Mill Ridgeline, 3D.5 – Alaska Hill Crisman

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SUNSET COMMUNITY – FOUR MILE FIRE PROTECTION DISTRICT

Risk Adjective	High
Risk Score (out of 200)	153
Number of access/egress routes	1
Roadway Risk Situation	Moderately Hazardous – good dual-lane primary road, narrow shared-drives and secondary roads, long sections leading up to Sunset proper without adequate pull-offs, dirt construction.
Water Source Risk Situation	Moderately Hazardous – Community is serviced by a pond with a dry hydrant and generator-powered discharge. Water supply may vanish due to environmental conditions.
Home Ignition Zone Risk Situation	Zone 1 – Very hazardous Zones 2 and 3 – Moderately Hazardous

Additional Description
The Sunset community begins west of Wall Street, with 'Sunset proper' at the end of Fourmile Canyon Drive. Although access to the community is good along Fourmile Canyon Drive, there are few adequate pull-offs, and secondary access/egress routes are limited to the Switzerland Trails, which are poorly maintained Jeep roads despite placards identifying these roads as evacuation routes. Heavy insect infestation and blowdown was noted in the community, particularly on the north side of the canyon. This area has a history of unattended and illegal campfires along the Switzerland Trail, which could be ignition sources for wildfires.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3D.10 – Sunset Community Protection, 3D.13 South Switzerland Trail, 3D.27 Alpine Gulch Ridgeline

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POORMAN COMMUNITY – FOUR MILE FIRE PROTECTION DISTRICT

Risk Adjective	High
Risk Score (out of 200)	145
Number of access/egress routes	2
Roadway Risk Situation	Moderately hazardous – generally dual-lane with some pinch points, all dirt construction.
Water Source Risk Situation	Minimally hazardous – Good community cistern at Leonard's Loop (locked, code may not be widely known), plus medium capacity cistern and good water sources on both ends of the community.
Home Ignition Zone Risk Situation	Zone 1 – Very hazardous Zones 2 and 3 – Moderately hazardous

Additional Description
Poorman is a community built along a critical 'connector' road in the Study Area, as Poorman Road would become vital if Sunshine Canyon Drive or lower Fourmile Canyon Drive were not viable routes during a wildfire. The portion of Poorman in the Study Area has had recent fuel break treatment, which connects to a large meadow, and the area is generally defensible. Fuels treatment should continue into Boulder Rural Fire District and connect to Sunshine Canyon Drive. Homeowners should be encouraged to 'connect' the fuel break to their properties by improving defensible space vegetation management, along with general recommendations for Zone 1 that apply to all communities.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3B.1 – Poorman Road, 3D.11 – Poorman Hill/Dry Gulch Connector, 3D.18 Arroyo Chico

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ARROYO CHICO COMMUNITY – FOUR MILE FIRE PROTECTION DISTRICT

Risk Adjective	High
Risk Score (out of 200)	140
Number of access/egress routes	1-2. Privately maintained escaped route extending north from Camino Bosque to Sunshine services parts of the community under certain circumstances.
Roadway Risk Situation	Very hazardous – narrow dual-lane and sections of single-lane road, inadequate-turnoffs, dirt construction.
Water Source Risk Situation	Moderately hazardous – static water cistern on Arroyo Chico, non-standard static water supply on Camino Bosque.
Home Ignition Zone Risk Situation	Zones 1, 2 and 3 – Moderately Hazardous

Additional Description
The Arroyo Chico community is on the north side of Fourmile Canyon, adjacent to the Fourmile Canyon Fire burn scar. Access issues could be significantly improved with modest improvements in signage. Evacuation routes should be formally evaluated, and route signage should be improved. Heavy dwarf mistletoe infestation was observed in this community. Zone 1 observations varied significantly throughout the community.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3C.2 – Moderate Priority Community Roads, 3D.5 – Alaska Hill Crisman, 3D.18 Arroyo Chico

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WEDGEWOOD COMMUNITY – FOUR MILE FIRE PROTECTION DISTRICT

Risk Adjective	High
Risk Score (out of 200)	131
Number of access/egress routes	2+
Roadway Risk Situation	Moderately hazardous – There is a narrow, winding single lane shared drive servicing the 38400s of Boulder Canyon Drive that is very hazardous. Boulder Canyon Drive is minimally hazardous.
Water Source Risk Situation	Minimally hazardous – good positive pressure hydrant, supplemented by other creek-fed water sources.
Home Ignition Zone Risk Situation	Zones 1, 2 and 3 – moderately hazardous

Additional Description
The Wedgewood Community can be separated into the 'shared drive' around 38400 Boulder Canyon Drive on the north side of Boulder Canyon, and the Wedgewood Event Center on the south side. The shared drive shows many characteristic hazards present throughout the Study Area, including a single access road that is steep and narrow, and dirt construction that has dense roadside vegetation. The Wedgewood Event Center portion of the community has fewer roadway and vegetation concerns but should be engaged by the fire districts for wildfire preplanning. Weddings and other special events are often held here, and a wildfire during such an event (with guests who may be unaware of wildfire) could cause significant challenges.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3D.22 – Wedgewood Shared Drive

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LOWER FOURMILE COMMUNITY – FOUR MILE FIRE PROTECTION DISTRICT

Risk Adjective	High
Risk Score (out of 200)	126
Number of access/egress routes	2
Roadway Risk Situation	Moderately hazardous – Good dual lane, pull-offs could be improved, paved roads. Untested bridges accessing many homes is a hazard.
Water Source Risk Situation	Minimally hazardous – Water sources are generally cisterns, recharged by the creek. This is beneficial, because even in drought conditions some water will be available. Proximity to positive pressure hydrant on Boulder Canyon Drive is an added benefit.
Home Ignition Zone Risk Situation	Zones 1, 2 and 3 – Moderately hazardous.

Additional Description
Lower Fourmile Canyon is situated in the riparian corridor from Boulder Canyon to Poorman Road. Although road conditions are generally good, access to most homes is provided by bridges which are unmarked. Some bridges have been reconstructed since the 2013 flood. The power line situation in Lower Fourmile is more hazardous than most communities in the Study Area. The primary risk to structures in Lower Fourmile is ember cast and rolling burning debris. Home Ignition Zone recommendations in this area should emphasize mitigating these risk factors.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3D.22 – Wedgewood Shared Drive

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CANYONSIDE COMMUNITY – FOUR MILE FIRE PROTECTION DISTRICT

Risk Adjective	High
Risk Score (out of 200)	124
Number of access/egress routes	1
Roadway Risk Situation	Very hazardous – steep, narrow, winding dirt road with inadequate pull-offs.
Water Source Risk Situation	Minimally hazardous – 20,000-gallon static water cistern in the community, which is supplemented by quality sources near to the community.
Home Ignition Zone Risk Situation	Zones 1, 2 and 3 – Moderately hazardous.

Additional Description
The small Canyonside community begins at the junction of Fourmile Canyon Drive and Boulder Canyon Drive and climbs the north side of Boulder Canyon. Good defensible space efforts are evident in this community, and vegetation management is generally good. An in-progress fuels reduction project will protect the community on its northern exposure, but inoperably steep terrain and difficult access render fuels reduction on the east side challenging. Roads and riparian corridors protect this community, which remains at high risk due to lack of multiple egress routes and steep slopes. The area has experienced a history of illegal campfires and other activities that could cause a wildfire ignition, due to recreational and other activities along the Boulder Creek path.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3C.2 – Moderate Priority Community Roads

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WALL STREET COMMUNITY – FOUR MILE FIRE PROTECTION DISTRICT

Risk Adjective	Moderate
Risk Score (out of 200)	107
Number of access/egress routes	1
Roadway Risk Situation	Moderately Hazardous – narrow dual-lane road, some pull-offs, mix of dirt and pavement road construction.
Water Source Risk Situation	Minimally to Moderately Hazardous – two quality pond-fed dry hydrants. In drought conditions the absence of a static water cistern could limit water availability.
Home Ignition Zone Risk Situation	Zone 1 – Very hazardous Zones 2 and 3 – Moderately hazardous.

Additional Description
Wall Street is located at the bottom of Four Mile Canyon along both sides of the creek. Fuel loading is significantly higher on the south side of the Canyon, due to the impacts of the Four Mile Canyon Fire on the north side of the canyon. Residential structure density is higher in this community than in most parts of the Study Area. Fourmile Canyon Drive is narrow in this section, and residents parking in the right of way challenges access. Although Fourmile Canyon Drive can be taken east or west from Wall Street, the road dead-ends in Sunset, where there are only Jeep roads providing access to Sugarloaf and Gold Hill. These roads are not recommended for evacuations unless significant maintenance improvements are made. Wall Street is a deceptive 'one-way-in-one-way-out' community, which appears to have dual-egress routes.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal

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SUMMERVILLE COMMUNITY – FOUR MILE FIRE PROTECTION DISTRICT

Risk Adjective	Moderate
Risk Score (out of 200)	90
Number of access/egress routes	2
Roadway Risk Situation	Moderately hazardous – narrow dual-lane road, blind curves, dirt construction.
Water Source Risk Situation	Moderately hazardous – Static water cistern in the community, with another static cistern proximate to the community at the Salina Fire Station.
Home Ignition Zone Risk Situation	Zone 1 – Very hazardous Zones 2 and 3 – Moderately Hazardous

Additional Description
The main portion of Summerville is a collection of very old houses located along Gold Run Road between Salina and the town of Gold Hill. There is a secondary area on Hoosier Hill located up a steep narrow road with single access. Although the Fourmile Canyon Fire burned around Summerville, fuel loading along the roadway and around structures remains high. Access is challenged by steep slopes and narrow stretches of road.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3B.2 - Gold Run Road

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MIDDLE FOURMILE COMMUNITY – FOUR MILE FIRE PROTECTION DISTRICT

Risk Adjective	Moderate
Risk Score (out of 200)	90
Number of access/egress routes	2
Roadway Risk Situation	Minimally hazardous – Good, dual-lane paved roads.
Water Source Risk Situation	Minimally hazardous – Good variety of naturally fed water sources (i.e., creek and pond). Despite few homes in this community a static water cistern would be of good strategic value.
Home Ignition Zone Risk Situation	Zone 1 – Moderately hazardous Zones 2 and 3 – Minimally hazardous

Additional Description
Middle Fourmile is a string of dispersed properties between Logan Mill and Salina/Wall Street communities. The Fourmile Canyon Fire burned much of the forest in this community, but woody vegetation remains dense in the sections nearest to roadways.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3D.4 – Logan Mill Ridgeline, 3D.5 – Alaska Hill Crisman

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EAST BOULDER CANYON COMMUNITY – FOUR MILE FIRE PROTECTION DISTRICT

Risk Adjective	Moderate
Risk Score (out of 200)	88
Number of access/egress routes	1-2. Mostly dual-egress, with short sections of single-egress, namely in Canon Park.
Roadway Risk Situation	Moderately hazardous – Boulder Canyon is a well-maintained state highway. Otherwise, Canon Park and shared driveways are short, narrow, dirt roads.
Water Source Risk Situation	Minimally hazardous – Good proximity to positive pressure hydrants.
Home Ignition Zone Risk Situation	Zones 1, 2 and 3 – Moderately hazardous

Additional Description
Boulder Canyon East most involves the Canon Park Community, several structures across Boulder Canyon Drive from Canon Park, and residences and commercial buildings on Arapahoe Avenue. Very short travel times to Boulder mitigate life-safety risk in these communities, despite the presence of short 'one-way-in-one-way-out' roads. Depending by area in East Boulder Canyon, risk to structures alternates between rolling burning material, ember cast, direct flame impingement, or a combination of these. Address and roadway signage is generally good, with some confusing signage in the business district on west Arapaho. The area has experienced a history of illegal campfires and other activities that could cause a wildfire ignition, due to recreational and other activities along the Boulder Creek path.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3D.22 – Wedgewood Shared Drive

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SALINA COMMUNITY – FOUR MILE FIRE PROTECTION DISTRICT

Risk Adjective	Moderate
Risk Score (out of 200)	85
Number of access/egress routes	2.
Roadway Risk Situation	Moderately hazardous – Mostly paved, with occasional narrow, poor visibility sections, as seen at the junction of Fourmile Canyon Drive and Gold Run Road.
Water Source Risk Situation	Moderately to very hazardous – Single static cistern services a densely populated community. A second cistern on Fourmile Canyon Drive improves the situation, but the addition of a water source within the town of Salina would be very beneficial.
Home Ignition Zone Risk Situation	Zones 1, 2 and 3 – Very hazardous

Additional Description
The historical town of Salina is within the Four Mile burn area, and as such baseline wildfire risk is lower than other areas. However, portions of the community still have dense vegetation, which combined with dense clusters of historic homes constructed with combustible materials adds to community risk. The town suffered significant damage in the 2013 Flood, and reconstruction of the road left narrow, hazardous sections. The community has a historic schoolhouse and church house, representing important cultural assets.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3B.2 – Gold Run Road

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MONUMENT COMMUNITY – FOUR MILE FIRE PROTECTION DISTRICT

Risk Adjective	Moderate
Risk Score (out of 200)	84
Number of access/egress routes	1
Roadway Risk Situation	Very hazardous – Narrow, single-lane roads, dirt construction with inadequate pull-offs.
Water Source Risk Situation	Moderately hazardous – No cistern present in sufficient proximity to Emerson Gulch. Several small cisterns in proximity to Rim Road. Single cistern on Melvina Hill.
Home Ignition Zone Risk Situation	Zone 1 – Moderately Hazardous Zones 2 and 3 – Minimally hazardous

Additional Description
The Monument Community comprises Emerson Gulch, Melvina Hill, and Rim Road. These communities are each serviced by a single access road, and they all sit in steep and rugged terrain with poor pull-offs and turnarounds. Vegetation has been reduced to short grasses in most of these communities due to the Fourmile Canyon Fire. Several pockets of denser vegetation adjacent to roadways should be mitigated.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal

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DRY GULCH COMMUNITY – SUNSHINE FIRE PROTECTION DISTRICT

Risk Adjective	High
Risk Score (out of 200)	158
Number of access/egress routes	1-2 – Mostly long, shared driveways, but dual-egress when Sunshine Canyon Drive is reached.
Roadway Risk Situation	Moderately hazardous – Good, paved, dual-lane primary road with narrow and mixed construction shared driveways.
Water Source Risk Situation	Moderately hazardous – Good cistern availability on Sunshine Canyon Drive, but shared driveways would benefit from community cisterns.
Home Ignition Zone Risk Situation	Zones 1, 2 and 3 – Very hazardous

Additional Description
The Dry Gulch Community sits atop the gulch of the same name. Terrain and dense, ponderosa pine dominant vegetation aligns with the winds associated with severe wildfire behavior in this high-risk community. The community sits east of the extent of the Four Mile Canyon Wildfire perimeter, and despite recent fuels reduction treatments, fuel loading is generally high throughout the community. There are many opportunities to expand on existing fuels treatments. The primary road is Sunshine Canyon Drive, which is steep and hazardous in this section of the Study Area, and most of the residences are along steep, narrow shared driveways. There is a good emergency route to Bristlecone Way in Boulder Mountain Fire District, but signage could be improved to ensure ease of access.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3A.1 – Sunshine Canyon Drive, 3D.6 Dry Gulch, 3D.7 – Bald Mountain Connector, 3D.11 – Poorman Hill/Dry Gulch Connector

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BALD MOUNTAIN COMMUNITY – SUNSHINE FIRE PROTECTION DISTRICT

Risk Adjective	High
Risk Score (out of 200)	141
Number of access/egress routes	1-2 – Mostly long, shared driveways, but dual-egress when Sunshine Canyon Drive is reached.
Roadway Risk Situation	Moderately hazardous – Good, paved, dual-lane primary road with narrow and mixed construction shared driveways.
Water Source Risk Situation	Moderately hazardous – A single 10,000-gallon cistern on Sunshine Canyon Drive services this community. The addition of a cistern on the shared driveway across from Bald Mountain would be beneficial.
Home Ignition Zone Risk Situation	Zones 1, 2 and 3 – Minimally hazardous

Additional Description
The Bald Mountain Community is partially in the burn perimeter of the Fourmile Canyon Fire, and partially outside, with areas of meadow in the western portion of the community and forested areas to the east. A fuel break was completed along the shared driveway, but re-treatment would improve the effectiveness of the project. The residences in Bald Mountain are threatened by steep slopes and drainages leading to the Fourmile Canyon Creek to the north and east, and unsheltered exposure to strong winds from the west and south.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3A.1 – Sunshine Canyon Drive, 3D.7 – Bald Mountain Connector, 3D.28 - Pilot

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PILOT COMMUNITY – SUNSHINE FIRE PROTECTION DISTRICT

Risk Adjective	Moderate
Risk Score (out of 200)	99
Number of access/egress routes	1-2 – Mostly long, shared driveways, but dual-egress when Sunshine Canyon Drive is reached.
Roadway Risk Situation	Moderately hazardous – Good, paved, dual-lane primary road with narrow and mixed construction shared driveways.
Water Source Risk Situation	Moderately hazardous – no water sources within the community, but quality water sources are within relatively close proximity
Home Ignition Zone Risk Situation	Zone 1 – Minimally hazardous Zones 2 and 3 – Moderately hazardous

Additional Description
The Pilot community is directly east of Townsite, on the north side of Sunshine Canyon Drive. The forested areas to the west give way to meadows to the east. Fuels reduction focusing on ladder fuel elimination could help keep fast moving grass fire on the surface and prevent spread to the canopy. Although access and visibility are very good along Sunshine Canyon Drive, there are long intersecting shared driveways in Pilot that should receive egress thinning treatment and could form the center of a larger-scale fuels reduction project.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3A.1 – Sunshine Canyon Drive, 3D.25 - Townsite Roadside Fuel Break, 3D.28 - Pilot

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TOWNSITE COMMUNITY – SUNSHINE FIRE PROTECTION DISTRICT

Risk Adjective	Moderate
Risk Score (out of 200)	89
Number of access/egress routes	1-2 – Egress route at the 'Sunshine Saddle' is behind a locked gate.
Roadway Risk Situation	Moderately hazardous – Narrow, dual-lane with dirt construction.
Water Source Risk Situation	Minimally to moderately hazardous – Good cistern availability.
Home Ignition Zone Risk Situation	Zone 1 – Minimally hazardous Zones 2 and 3 – Moderately hazardous

Additional Description
The Townsite community comprises County Road 83, Misty Vale, and Whispering Pines. All one-way-in-one-way-out communities, with CR83 being the primary road. There is an emergency egress route at the top of CR83 that leads to Lee Hill, but the route is gated and locked, and signage for the escape route is inadequate. Although the Fourmile Canyon Fire burned much of the forest surrounding the community, fuel density remains high along the roadways. There are several historic structures in Townsite, and the Sunshine Fire District Station 1, which houses fewer apparatus than Station 2, but typically houses a Type 6 engine (Brush Truck).

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3A.1 – Sunshine Canyon Drive, 3D.25 - Townsite Roadside Fuel Break, 3D.28 – Pilot, 3D.29 - Ingram

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MEADOWS COMMUNITY – SUNSHINE FIRE PROTECTION DISTRICT

Risk Adjective	Low
Risk Score (out of 200)	84
Number of access/egress routes	1-2 – Mostly long, shared driveways, but dual-egress when Sunshine Canyon Drive is reached.
Roadway Risk Situation	Moderately hazardous – Good, paved, dual-lane primary road with narrow and mixed construction shared driveways.
Water Source Risk Situation	Moderately hazardous – the community is serviced by a single 10,000 gal. cistern, which is low, but there are few residences in Meadows.
Home Ignition Zone Risk Situation	Zones 1, 2 and 3 – Minimally hazardous

Additional Description
The Meadows community spans the south side of Sunshine Canyon Drive from CR83 to the Bald Mountain recreational area. The community is nearly devoid of forested vegetation, except for small pockets of forest, mainly in the western portion of the community. The areas of dense forested vegetation are along the escape route from Camino Bosque in Four Mile District. This should be thinned to improve wildfire conditions along a critical route. As is common throughout the Sunshine District, driveways are long, posing entrapment hazards in potentially fast-moving grass fire.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3A.1 – Sunshine Canyon Drive, 3D.22 – Meadows Spot Reduction

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INGRAM COMMUNITY – SUNSHINE FIRE PROTECTION DISTRICT

Risk Adjective	Low
Risk Score (out of 200)	81
Number of access/egress routes	2
Roadway Risk Situation	Moderately hazardous – Dual-lane dirt road with some areas of poor visibility and inadequate pull-offs.
Water Source Risk Situation	Minimally hazardous – Two high-capacity, high quality cisterns within the community. Hazard level would be decreased by the addition of a cistern at the intersection CR 85J and Sunshine Canyon Dr.
Home Ignition Zone Risk Situation	Zone 1 – Moderately hazardous Zones 2 and 3 – Moderately hazardous

Additional Description
The Ingram community is situated on both sides of Sunshine Canyon Drive, beginning west of CR83 as the road begins its ascent towards the town of Gold Hill. Although the burn scar has moderated wildfire risk in many portions of the community, dense forest surrounding around half of the properties in Ingram could produce high intensity fire, posing risk to property and life.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3A.1 – Sunshine Canyon Drive, 3D.25 - Townsite Roadside Fuel Break, 3D.29 - Ingram

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TOWN OF GOLD HILL COMMUNITY – GOLD HILL FIRE PROTECTION DISTRICT

Risk Adjective	Highest
Risk Score (out of 200)	161
Number of access/egress routes	2+
Roadway Risk Situation	Very hazardous – Narrow, dirt roads servicing area of comparatively dense population, on-street parking and parking for commercial sites adds to the congestion.
Water Source Risk Situation	Although there are large-capacity cisterns, these are inadequate to provide adequate coverage to the residential values at risk in the town.
Home Ignition Zone Risk Situation	Zones 1, 2 and 3 – Very hazardous, primarily due to building materials and structural proximity posing risk of home-to-home wildfire spread.

Additional Description
The town of Gold Hill is a tight grouping of historic structures. The terrain in town is flat, but several steep hills and drainages lead up to Gold Hill. The proximity of buildings to one another, and the predominant wood construction renders the town very vulnerable to direct flame impingement, ember cast, and home-to-home wildfire spread. The town has an elementary school, several dining establishments, and a museum. The Fourmile Canyon Fire came close to encroaching into the town of Gold Hill. This burned area to the south of town should serve as an anchor for aggressive fuels reduction treatments to the west and north of town, and other risk reduction projects and programs should also be vigorously pursued for this high-risk community.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3A.3 – Gold Hill Road, 3B.3 – Lickskillet Road, 3D.3 – Town of Gold Hill

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LEFTHAND COMMUNITY – GOLD HILL FIRE PROTECTION DISTRICT

Risk Adjective	Highest
Risk Score (out of 200)	161
Number of access/egress routes	2+
Roadway Risk Situation	Very hazardous on steep Lickskillet Road, minimally hazardous on paved, dual-lane Lefthand Canyon Drive
Water Source Risk Situation	Very hazardous – Community is serviced by a concrete riser dropping into the creek, without a dry hydrant or cistern. Creek water source should be improved, and cistern added.
Home Ignition Zone Risk Situation	Zones 1, 2 and 3 – Very hazardous

Additional Description
The high-risk Lefthand Area includes Lickskillet Road descending from Gold Hill to Lefthand, and residences at the bottom of steep Lefthand Canyon, on Lefthand Canyon Drive itself. The area is very steep and could experience high-intensity wildfire. Very challenging terrain on Lickskillet and Lefthand will challenge community-level projects. Address signage is often inadequate and inconsistent.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3B.3 Lickskillet Road, 3D.9 – Lefthand/Rowena

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ROWENA COMMUNITY – GOLD HILL FIRE PROTECTION DISTRICT

Risk Adjective	High
Risk Score (out of 200)	135
Number of access/egress routes	2
Roadway Risk Situation	Minimally hazardous – Paved, dual-lane roads with generally good visibility.
Water Source Risk Situation	Very hazardous – Single, low-capacity cistern is present. Possible water source availability from Lefthand Fire District, but that has not been verified.
Home Ignition Zone Risk Situation	Zones 1, 2 and 3 – Very hazardous

Additional Description
The Rowena community is directly east of the Lefthand Community, at the bottom of steep Lefthand Canyon. This cluster of homes is at high risk, and terrain conditions make community-level work very challenging. Address signage is often inadequate and inconsistent.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3D.9 – Lefthand/Rowena

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WEST OF GOLD HILL COMMUNITY – GOLD HILL FIRE PROTECTION DISTRICT

Risk Adjective	High
Risk Score (out of 200)	132
Number of access/egress routes	2
Roadway Risk Situation	Moderately hazardous – Generally good visibility on dual-lane Gold Hill Road, but dirt construction and some properties with long, shared driveways.
Water Source Risk Situation	Very hazardous – Several small capacity cisterns cover a large expanse of land
Home Ignition Zone Risk Situation	Zones 1, 2 and 3 – Moderately hazardous

Additional Description
The West of Gold Hill Community sits atop a ridge between Fourmile Canyon to the south and Lefthand Canyon to the North. The community is very dispersed, with long stretches between residential properties. The Colorado Mountain Ranch is a special area of concern, with many children present at this facility in the summer months. Vegetation conditions in West of Gold Hill are mixed, with some meadowed areas and some areas of dense forests with Ponderosa Pine, Douglas-Fir, Lodgepole and Aspen. Areas of denser forest could be effectively treated, and these treatments could 'knit together' meadows and other strategic wildfire holding features. Risk of ignition is higher in this area due to camping on Forest Service property.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3A.3 – Gold Hill Road

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SNOWBOUND COMMUNITY – GOLD HILL FIRE PROTECTION DISTRICT

Risk Adjective	Moderate
Risk Score (out of 200)	113
Number of access/egress routes	2
Roadway Risk Situation	Very hazardous – Inadequate turn-offs, poor visibility, very steep drops, and dirt construction.
Water Source Risk Situation	Moderately hazardous – Water source is absent in the community, but there are quality water sources on either side of the community and very few homes within Snowbound.
Home Ignition Zone Risk Situation	Zones 1, 2 and 3 – Very hazardous

Additional Description
The aptly named Snowbound Community is a very small collection of homes where Sunshine Canyon Drive climbs towards the town of Gold Hill. Wildfire intensity could be very high on the ridgeline community, but inoperably steep slopes on the densely vegetated north side of the road will challenge reducing wildfire risk on a community-level.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal

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GOLD RUN SUBDIVISION COMMUNITY – GOLD HILL FIRE PROTECTION DISTRICT

Risk Adjective	Moderate
Risk Score (out of 200)	90
Number of access/egress routes	1-2. Two routes on a horseshoe-shaped single road lead to Gold Run Rd.
Roadway Risk Situation	Moderately hazardous – Narrow, dual-lane roads with dirt construction, but moderate slopes and good visibility.
Water Source Risk Situation	Moderately hazardous – Adequate static water cistern availability.
Home Ignition Zone Risk Situation	Zone 1 – Moderately hazardous Zones 2 and 3 – Minimally hazardous

Additional Description
The Gold Run Subdivision is situated along Dixon Road, which runs in a horseshoe shape from Gold Run Road, and rests to the south of the town of Gold Hill. The Fourmile Canyon Fire burned around and into the community, mitigating wildfire intensity, although modeled fire intensity along the roadway would be non-survivable in high fire weather conditions. Although the community is technically a dual-egress community, both roads eventually lead east to Gold Run Road.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3B.2 - Gold Run Road, 3C.2 – Moderate Priority Community Roads, 3D.3 – Town of Gold Hill

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MILLIONAIRE COMMUNITY – SUGARLOAF FIRE PROTECTION DISTRICT

Risk Adjective	Highest
Risk Score (out of 200)	171
Number of access/egress routes	1-2. Two routes connected by a poorly maintained road.
Roadway Risk Situation	Very hazardous – Single-lane, inadequate pull-offs, dirt construction with poor visibility.
Water Source Risk Situation	Very hazardous – Nearest water sources are over .5 miles from the community. Community cistern should be installed.
Home Ignition Zone Risk Situation	Zones 1, 2 and 3 – Very hazardous.

Additional Description
The Millionaire neighborhood is rated as the highest risk community in the Study Area. The community has two access points, Millionaire East, and Millionaire West. A Jeep Road connects them, so for practical purposes the homes in this community are located on two single-access, dead-end roads. Both access roads are steep, narrow, and constructed of dirt; the access road in Millionaire East was observed to be the more hazardous of the two. Fuels are dense and overgrown, and low power lines are an additional hazard. Steep topography on multiple aspects will challenge fuels reduction projects, which should nevertheless be aggressively pursued with the goal of moderating the highest-intensity wildfire that could occur.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3A.2 – Sugarloaf Road, 3C.1 – High Priority Community Roads, 3D.1 – Millionaire Tall Timbers, 3D.24 – Mountain Meadows

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SWITZERLAND PARK COMMUNITY – SUGARLOAF FIRE PROTECTION DISTRICT

Risk Adjective	Highest
Risk Score (out of 200)	167
Number of access/egress routes	1
Roadway Risk Situation	Very hazardous – Single-lane, inadequate pull-offs, dirt construction.
Water Source Risk Situation	Very hazardous – Community is serviced exclusively by creek hydrants which may run dry in drought conditions. Static water cistern should be installed.
Home Ignition Zone Risk Situation	Zones 1, 2 and 3 – Moderately to very hazardous.

Additional Description
Switzerland Park is an old resort community consisting of some seasonal homes and some residences occupied year-round. The dominant construction type is small wood siding cabins with asphalt roofs. Most are close together, arranged around a central meadow. Other than the large central meadow, most fuels are mixed conifer with some deciduous shrubs. Addresses are poorly marked and should be improved. Although much of the land surrounding the community is inoperably steep, the main area of homes is very flat, and linked defensible space treatment and creating a buffer around the meadow could offer good protection to most of the values in the community.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3A.2 – Sugarloaf Road, 3C.1 - High Priority Community Roads, 3D.2 – Switzerland Park, 3D.15 Ridge Road

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MAGNOLIA COMMUNITY – SUGARLOAF FIRE PROTECTION DISTRICT

Risk Adjective	High
Risk Score (out of 200)	153
Number of access/egress routes	1-2 – Magnolia is a dual-egress road, but Old Whiskey is single-egress.
Roadway Risk Situation	Moderately hazardous – Paved on Magnolia, with dirt off-shoots. Steep and winding with visibility challenges.
Water Source Risk Situation	Moderately hazardous – Two static water cisterns well-spaced within the community.
Home Ignition Zone Risk Situation	Zones 1, 2 and 3 – Very hazardous.

Additional Description
Magnolia is a steep, winding community extending from Boulder Canyon Drive near Sugarloaf Road and terminating at Highway 72. Fuel density is high and addressing is poor throughout the area. This community is steep and heavily wooded. The Sugarloaf Fire District ends approximately 2 miles above Old Whiskey, so risk reduction solutions should be explored in partnership with neighboring districts.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3A.2 – Sugarloaf Road, High Priority Community Roads, 3D.8 – Magnolia

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TALL TIMBERS COMMUNITY – SUGARLOAF FIRE PROTECTION DISTRICT

Risk Adjective	High
Risk Score (out of 200)	149
Number of access/egress routes	1-2 – A horseshoe network of roads all lead back to Sugarloaf Road, which is dual-egress.
Roadway Risk Situation	Minimally-moderately hazardous – Paved, narrow dual-lane roads with visibility challenges in some areas.
Water Source Risk Situation	Moderately hazardous – A single 15000-gallon cistern services the entire community. A second cistern would improve the situation.
Home Ignition Zone Risk Situation	Zones 1, 2 and 3 – Moderately hazardous

Additional Description
There is dual access into Tall Timbers (East and West Kelly Road), but these roads are steep and narrow. There are many narrow and rough dirt off-shoot roads and driveways. There are a few pull-offs, but the roads are not wide enough in most places to pass apparatus. Roadway signage in the community is poor. Steep topography with heavy fuels and a variety aspects and wildfire exposures contribute to the risk profile of Tall Timbers. Good home ignition zone improvement was observed, but additional work is warranted.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3A.2 – Sugarloaf Road, High Priority Community Roads, 3D.1 – Millionaire Tall Timbers, 3D.24 – Mountain Meadows

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BETASSO COMMUNITY – SUGARLOAF FIRE PROTECTION DISTRICT

Risk Adjective	High
Risk Score (out of 200)	141
Number of access/egress routes	1
Roadway Risk Situation	Moderately hazardous – Narrow dual-lane roads with inadequate pull-offs, mixed paved and unpaved road construction.
Water Source Risk Situation	Minimally hazardous – Good cistern coverage and a positive pressure hydrant at the Betasso Water Treatment Facility.
Home Ignition Zone Risk Situation	Zone 1 – Moderately hazardous Zones 2 and 3 – Minimally hazardous

Additional Description
This community has heavy to moderate fuel loads throughout, although good fuels reduction work has taken place along Weaver Drive, in addition to a good project around the water treatment facility on Boulder County Open Space land. Most homes are close to access roads, but there are some long, narrow dirt driveways as well as some unmarked common driveways. There is one good turnaround for apparatus at the end of Broken Fence. This area experiences a high level of recreational use.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3A.2 – Sugarloaf Road, 3C.2 – Moderate Priority Community Roads, 3D.1 – Millionaire Tall Timbers, 3D.24 – Mountain Meadows

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SILVER SPRINGS COMMUNITY – SUGARLOAF FIRE PROTECTION DISTRICT

Risk Adjective	High
Risk Score (out of 200)	138
Number of access/egress routes	1
Roadway Risk Situation	Very hazardous – Narrow, dual-lane road, dirt construction.
Water Source Risk Situation	Minimally hazardous – Good pond-fed water source with cisterns nearby.
Home Ignition Zone Risk Situation	Zones 1, 2 and 3 – Minimally hazardous

Additional Description
The Silver Springs community is in a dead-end canyon. The only access to the 20-25 homes in this community is via Primos Road. There is a wet meadow and stream in the southern end of this community (along Primos Road), but most of the homes are located further up the canyon. There are also riparian shrubs in the drainage that stay wet most of the year. Most homes are located mid-slope on moderate to steep slopes, and there are several chimneys. Address markers are inconsistent, and although some are reflective, the street signs are wooden (non- reflective) on wooden poles. Some long, narrow driveways with switchbacks exist in this community.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3A.2 – Sugarloaf Road, 3C.2 – Moderate Priority Community Roads, 3D.14 – Gordon Gulch, 3D.15 Ridge Road, 3D.20 – Silver Springs

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SWISS PEAKS COMMUNITY – SUGARLOAF FIRE PROTECTION DISTRICT

Risk Adjective	High
Risk Score (out of 200)	141
Number of access/egress routes	1-3 – Primary egress is single road to Sugarloaf Road, but secondary egress routes are present in jeep roads that lead to lower Fourmile and Highway 72.
Roadway Risk Situation	Very hazardous – Steep, single-lane roads, dirt construction with poor visibility.
Water Source Risk Situation	Minimally hazardous – Two quality cisterns in the community and other cisterns nearby.
Home Ignition Zone Risk Situation	Zones 1, 2 and 3 – Moderately hazardous.

Additional Description
Primary access to Swiss Peaks is off Sugarloaf Road, but it can also be accessed from the steep and rugged Switzerland Trail. Most of the homes are built on the same slope on a southern exposure, between Sugarloaf Road and Switzerland Trail. Address markers in Swiss Peaks are inconsistent, and there are some shared driveways, making identification of homes more difficult. Roads are dirt, steep, and narrow in spots. Fuel loads are moderate with a mix of open and closed canopy Ponderosa pine stands with grass understory. The Black Tiger Fire burned into this community, mitigating fuel loading on the northeast side, and creating a strategic feature to connect to with future fuels reduction work.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3A.2 – Sugarloaf Road, 3C.2 – Moderate Priority Community Roads, 3D.16 – Swiss Peaks

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COUGHLIN MEADOWS COMMUNITY – SUGARLOAF FIRE PROTECTION DISTRICT

Risk Adjective	High
Risk Score (out of 200)	140
Number of access/egress routes	1
Roadway Risk Situation	Very hazardous – Single-lane, dirt construction roads with inadequate pull-offs.
Water Source Risk Situation	Moderately hazard – Creek hydrant and single cistern are present in this community.
Home Ignition Zone Risk Situation	Zones 1, 2 and 3 – Moderately hazardous

Additional Description
Access to the approximately 20 homes in this community is one way in and out. There are two spur roads (both dead ends) off Coughlin Meadows. Like Silver Springs there is a riparian area with a meadow that stays wet most of the summer. Most of the homes are surrounded by timber with fuels hazards in the Home Ignition Zone. There are heavy to moderate loads of closed canopy conifer broken by meadows and the riparian area. Conifer fuels here are still primarily Ponderosa pine with a grass understory but there is also some Lodgepole pine. Address markers throughout this community are poor, and in most cases, they are not visible from the road. There is potential for increased ignitions due to camping on adjacent USFS lands.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3A.2 – Sugarloaf Road, 3C.2 – Moderate Priority Community Roads, 3D.14 – Gordon Gulch, 3D.15 Ridge Road, 3D.17 Coughlin Meadows

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WEST BOULDER CANYON COMMUNITY – SUGARLOAF FIRE PROTECTION DISTRICT

Risk Adjective	High
Risk Score (out of 200)	131
Number of access/egress routes	2
Roadway Risk Situation	Minimally hazardous – Good dual-lane, paved state highway.
Water Source Risk Situation	Moderately hazardous – Pond hydrant at east end of this community, with nothing farther west. However, Boulder Creek can be used for drafting at many locations.
Home Ignition Zone Risk Situation	Zones 1, 2 and 3 – Moderately to very hazardous

Additional Description
This community has scattered homes, most of which are on the creek side and can only be accessed over unrated bridges. In many instances there are multiple homes off single driveways and bridges. There are some steep, narrow driveways (especially at homes built on the side of the highway opposite the creek). There is riparian vegetation along the creek, but most homes are surrounded by heavy conifers. There is high traffic and recreational use in and around Boulder Canyon that increases the potential for ignitions from campfires and other human ignition sources.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3A.2 – Sugarloaf Road, 3D.2 – Switzerland Park

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MOUNTAIN MEADOWS COMMUNITY – SUGARLOAF FIRE PROTECTION DISTRICT

Risk Adjective	High
Risk Score (out of 200)	122
Number of access/egress routes	1-2 – Horseshoe shaped road network with secondary egress to Logan Mill and down to Fourmile Canyon.
Roadway Risk Situation	Moderately hazardous – adequate roadway width, all dirt construction.
Water Source Risk Situation	Minimally hazardous – Good spacing of cisterns and pond hydrants throughout and near the community.
Home Ignition Zone Risk Situation	Zones 1, 2 and 3 – Moderately hazardous.

Additional Description
Mountain Meadows is located on the southwest face of Arkansas Mountain, which has a history of heavy lightning activity. This is one of the highest density communities in Sugarloaf, with many homes mostly on 1-3 acre lots. Good fuels reduction work has been completed throughout the community, and a current fuel break is underway on Arkansas Mountain. There are good meadows and areas of sparse forestation to knit together with future fuels treatments. The Fourmile Canyon Fire heavily reduced vegetation in the west and northern portions of the community. Horse properties were observed, and special evacuation planning relating to livestock should be explored. Access roads are generally good, but there are a number of dead-end roads. Roadway and address signage should be improved.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3A.2 – Sugarloaf Road, 3C.2 – Moderate Priority Community Roads, 3D.24 – Mountain Meadows

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OLD POST OFFICE COMMUNITY – SUGARLOAF FIRE PROTECTION DISTRICT

Risk Adjective	High
Risk Score (out of 200)	124
Number of access/egress routes	1-2. Mostly dead-end roads with a Jeep Road that may connect to Mountain King, which could not be ground truthed due to a locked gate.
Roadway Risk Situation	Moderately hazardous – Narrow, dirt roads, but only servicing a small number of homes.
Water Source Risk Situation	Moderately hazardous – Cisterns and hydrants are available along Sugarloaf Road, but a cistern should be added on the north section of this community.
Home Ignition Zone Risk Situation	Zone 1 – Very hazardous Zones 2 and 3 – Minimally hazardous

Additional Description
The Black Tiger and Fourmile Canyon fires burned parts of this community, rendering the sparsely populated area at lower risk of intense wildfire. Community-level fuels reduction and improving the Zone 1 situation for homes would be easy to accomplish.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3A.2 – Sugarloaf Road, 3C.2 – Moderate Priority Community Roads, 3D.16 Swiss Peaks, 3D.23 Old Post Office

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LOST ANGEL COMMUNITY – SUGARLOAF FIRE PROTECTION DISTRICT

Risk Adjective	Moderate
Risk Score (out of 200)	120
Number of access/egress routes	2
Roadway Risk Situation	Moderately hazardous – Good, dual-lane, dirt roads with good visibility.
Water Source Risk Situation	Moderately hazardous – Good cistern availability along Sugarloaf Road should be complemented with a cistern in the southern reaches of Lost Angel.
Home Ignition Zone Risk Situation	Zone 1 – Moderately hazardous Zones 2 and 3 – Minimally hazardous

Additional Description
Boulder View and Lost Angel do not connect, but they are adjacent to each other and are very similar from a wildfire perspective, so they are both included in this community. Lot sizes vary widely in this community. Most were built or rebuilt after the Black Tiger Fire (1989). In general, the homes are widely spaced. Roads in Lost Angel are dirt-construction and are steep and narrow in spots. Some of the spur roads are narrow, steep, and rough. This community is in the Black Tiger burn area and fuels are still light as a result, consisting mostly of short grass with scattered ponderosa, although there are some homes with moderate tree cover. Address markers are inconsistent and, in some instances, in disrepair.

Fuels Reduction Projects Benefitting This Community
2A-C - Home Ignition Zone, 3A – Hazard Tree Removal, 3A.2 – Sugarloaf Road, 3C.2 – Moderate Priority Community Roads, 3D.2 – Switzerland Park, 3D.26 – Lost Angel

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NOTES AND CITATIONS

SUNSHINE FIRE DISTRICT MAP ERROR

It was discovered following map product generation that an inaccurate map file was used to display the boundaries for the Sunshine Fire Protection District. The result is an error in the Boulder West Wildfire Authority boundaries as displayed in the maps throughout this document. This error will be corrected in the next revision of this document.

The map below shows the true wildfire authority boundaries, along with the inaccurate boundaries depicted in this document's maps.

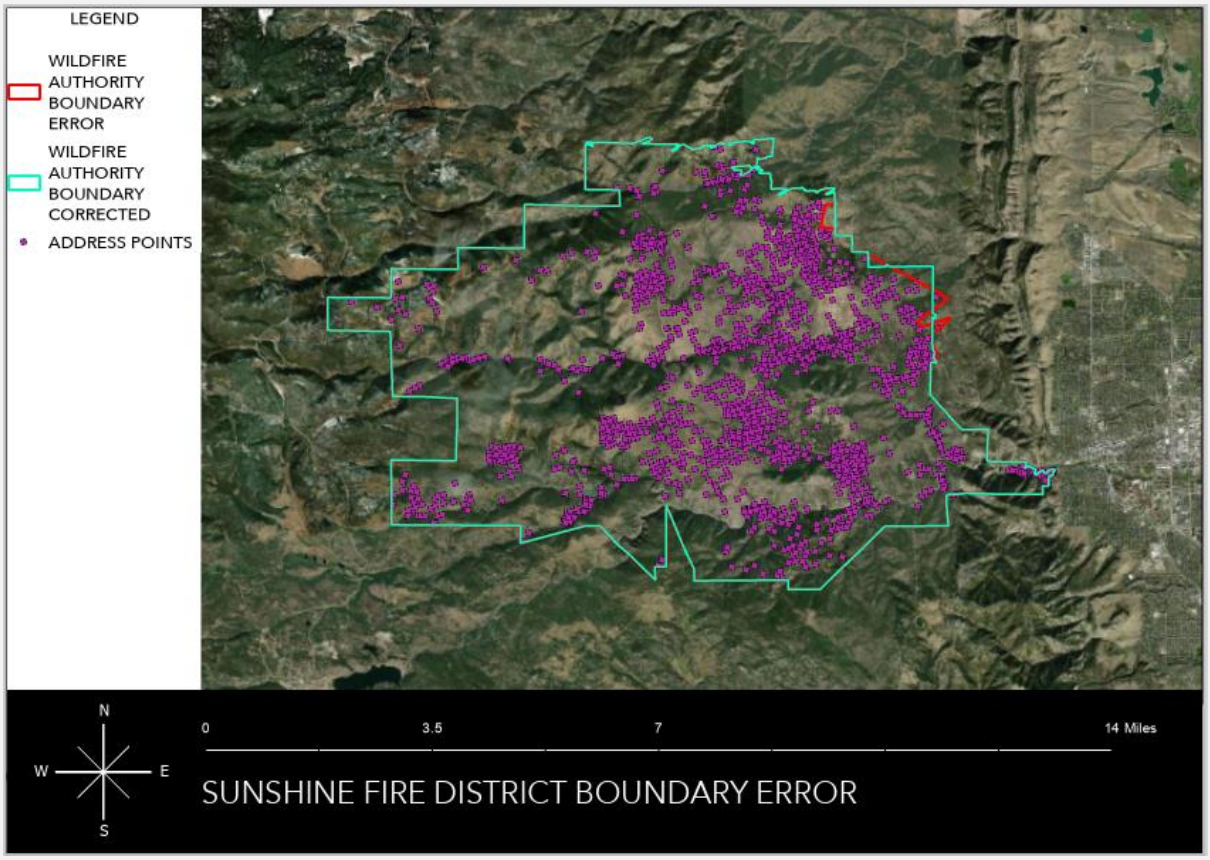

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PHOTO CREDITS

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Cover page, Page 27, Page 55 – Four Mile Canyon Wildfire. Photo credit: Patrick Cullis

Page 3 – Wildfire Approaching Home. Photo Credit: US Forest Service

Page 6 – Landscape Fire. Photo Credit: USGS

Page 11 – Historical Gold Hill. Photo Source: www.coloradoencyclopedia.org/article/goldhill

Page 16 – Switzerland Trail Jeep Road. Photo Source: 4x4explore.com, Photo Credit: Adam M.

Page 20 – Bobcat. Photo Credit: AZ Animals

Page 20 – Prescribed fire. Photo Credit: The Nature Conservancy

Page 24 – RAWS. Photo Credit: National Interagency Fire Center

Page 29 – Siberian Wildfire. Photo Credit: Greenpeace International

Page 30 – Giant Sequoia Mortality. Photo Credit: National Park Service

Page 34 – Marshall Fire. Photo Credit: University of Denver

Page 35 – Unattended Campfire. Photo Credit: University of Utah

Page 36 – Wildfire Evacuation. Photo Credit: Fire Safe Marin

Page 35 – Defensible Space. Photo Credit: Colorado State Forest Service

Page 37 – Home Ignition Zone. Figure Credit: Colorado State Forest Service

Page 43 – High Intensity Fire. Photo Credit: Colorado State Forest Service

Page 55 – Wildfire Threatening Home. Photo Credit: Karen Wattenmaker

Page 81 – Linked Defensible Space. Graphic Credit: University of California Agriculture and Natural Resources

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ENDNOTES

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SIGNATURES

The signers of this document have reviewed and approve the plan. Representatives of the fire districts signing this document do so with the permission and support of their district's governing board.

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