

MAY 2023

GRAND COUNTY COMMUNITY WILDFIRE PROTECTION PLAN

Working together to build
fire adapted communities,
resilient to wildfire



Grand County
Colorado



Grand
FOUNDATION



AIM
Action, Implementation & Mitigation

SWCA[®]
ENVIRONMENTAL CONSULTANTS

We would like to formally thank the Core Team, Grand County Fire Services, and all stakeholders for contributing their time and expertise throughout the planning process. Your participation has contributed to creating resilient landscapes, implementing public education, reducing structural ignitability, and ensuring safe and effective wildfire response.

We would like to formally thank the Coalitions & Collaboratives AIM Grant and Grand Foundation for supporting the funding of this CWPP update.

For additional information, questions, or concerns regarding this project, please contact Project Manager Arianna Porter at arianna.porter@swca.com.

For all your planning and implementation needs, please visit www.swca.com.



Grand County
Colorado



Hot Sulphur Springs Parshall Fire Protection District

DISCLAIMER

The purpose of this assessment and report is to assess the wildfire risk and hazard existing within the planning area and surrounding environment and to provide a framework for reducing and managing vegetative fuel loads on privately owned open spaces/undeveloped land and adjacent roads to minimize wildfire hazard while avoiding or minimizing negative environmental effects. However, the information provided in this report does not prevent wildfires; instead, it is intended to manage the risk of wildfires. On that account, SWCA Environmental Consultants (SWCA) accepts no responsibility and disclaims all liability for any loss or damages that may result from fires and associated effects occurring within and around the planning area.

Observations in the report are based on satellite imagery, on-the-ground evaluations, previous data, computer modeling at the parcel level, and local knowledge.

Projects recommended in this CWPP are aimed at reducing the threat of and damages from catastrophic wildfire to the county. Depending on the management goals of the project proponent, there may be many alternative site-specific solutions available to protect values at risk.

During the performance of this project work, SWCA did not unlawfully discriminate, harass, or allow harassment against any stakeholder on the basis of sex, gender, gender expression, sexual orientation, race, color, religious creed, marital status, ancestry, national origin, medical condition, age, or disability (mental and physical).

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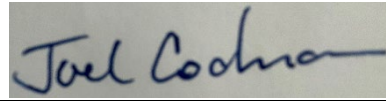
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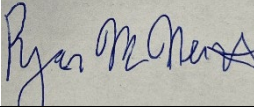
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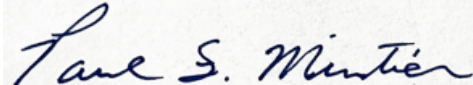
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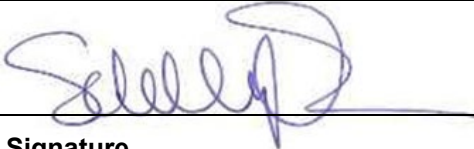
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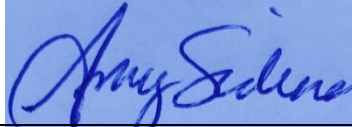
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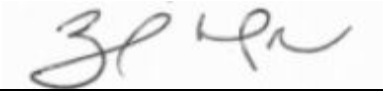
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EXECUTIVE SUMMARY

WHAT IS THE PURPOSE OF THIS COMMUNITY WILDFIRE PROTECTION PLAN?

The purpose of the 2023 Grand County Community Wildfire Protection Plan (CWPP) update is to

- provide a countywide scale of wildfire risk and protection needs,
- bring together all responsible land use planning, wildfire management, and suppression entities in the planning area to address the identified needs,
- provide a framework for future planning and implementation of necessary mitigation measures, and
- provide information to inform future land use planning, building codes, and wildfire mitigation and prevention related ordinances.

This CWPP aims to assist in protecting human life and reducing property loss due to wildfire throughout the county. This 2023 plan was compiled from reports, documents, data, and Core Team and public input. The plan was developed in response to the federal Healthy Forests Restoration Act of 2003 (HFRA).

The CWPP meets the requirements of the HFRA by addressing the following:

1. Having been developed collaboratively by multiple agencies at the state and local levels in consultation with federal agencies and other interested parties.
2. Prioritizing and identifying fuel reduction treatments and recommending the types and methods of treatments to protect at-risk communities and pertinent infrastructure.
3. Suggesting multi-party mitigation, monitoring, and outreach.
4. Recommending measures and action items that residents and communities can take to reduce the ignitability of structures.
5. Soliciting input from the public on the draft CWPP.

WHAT ARE THE KEY ISSUES ADDRESSED?

Grand County has a unique combination of environmental and social factors that result in extensive and high wildfire danger. Namely, the County is primarily composed of second homes and short-term rentals that generally do not receive proper wildfire mitigation measures; education regarding risk management techniques for second homeowners, tourists, and community members is inadequate; and fire danger is incredibly high due to very dry and extensive fuels as a result of the beetle kill epidemic following the turn of the twenty-first century.

SECOND HOMES AND SHORT-TERM RENTALS

Grand County is located a short drive from the urban Front Range corridor that is home to approximately 5 million people. Given this unique geographic positioning and the County's attractive mountain atmosphere, many second homes for residents from the Front Range are situated within its boundaries.

This dynamic is so pronounced that the County contains nearly 17,000 housing units yet is home to fewer than 16,000 residents. As such, it's estimated that nearly three-quarters of all homes are second homes/short-term rentals. Many neighborhoods are pleasantly quiet as a result, but this unique situation also presents a difficult wildfire mitigation problem. Often, basic wildfire prevention techniques on second home/short-term rental properties are not implemented, increasing fuel connectivity across neighborhoods and elevating the risk of entire communities. This CWPP is designed to address this glaring lack of defensible space and home hardening by providing recommendations for parcel-level fuel and structural ignitability treatments, and by highlighting community, township, and civic leader level discussions around hazards, land use planning, building codes, and evacuation.

EDUCATION

In many cases, second homeowners are not aware of the wildfire danger their properties face. Although the 2020 East Troublesome Fire certainly opened the eyes of many to these dangers, education of not only second homeowners, but local community members, regarding risk management techniques is still woefully inadequate for the unusually high fire risk the County faces. Additionally, millions of visitors travel to the County annually to revel in its natural beauty and visit Rocky Mountain National Park. This CWPP therefore contains a heavy focus on strategies for effective education of permanent and seasonal residents, and tourists, to develop more fire-adapted communities, particularly through home hardening, defensive space, fuels reduction, and evacuation planning. The CWPP is also designed to increase public access to information through the use of training, printed and online materials, and a story map.

BEETLE KILL RISKS

Beginning in the early 2000s, the mountain beetle, a species native to the American West but previously relatively benign, along with other insects and pests, began attacking local forests. By 2010, the beetles had taken a devastating toll on the County, killing hundreds of thousands of acres of previously healthy timber stands and killing millions of acres of spruce, pine, and fir forests across the state. In the decade since the epidemic ended, massive quantities of large, downed fuels have been drying out across County forests. Additionally, significant growth of smaller understory fuels has created an extensive network of extremely combustible and interconnected fuels across the County. As exhibited by the East Troublesome Fire, the second largest fire in Colorado's known history, these fuels create the potential for large and hot ground and crown fires that exhibit extreme fire behavior and are incredibly difficult to suppress. In addition to forest-wide hazards, the beetle kill–derived fuels extend into wildland urban interface (WUI) communities, skyrocketing risk, especially if fuel treatments and defensible space are not in place. This CWPP takes a proactive stance on defending forests and communities against this dangerously high wildfire risk that beetle kill has produced by prioritizing hazardous fuels reduction in the WUI and providing fuel treatment recommendations for land management agencies, asset owners, and homeowners.

Other Critical Issues Addressed in this CWPP:

- Investing and supporting fire response at all levels, including resources for local fire departments, to increase capacity to serve the community
- Increasing public understanding of the fire response process
- Continuing to address wildfire issues at the landscape level, across multiple jurisdictions
- Potential funding opportunities for mitigation projects, including local funding

- Managing fire to protect values and accomplish resource management goals, including protection and enhancement of community assets, wildfire habitat, water supply and quality, and forest health
- Recent climate patterns and associated changes to the wildland fire environment

HOW IS THE PLAN ORGANIZED?

The CWPP provides a Risk-Hazard Assessment, action items, project recommendations, and background information about the County's wildland fire environment as well as land management plans and agencies. Most of the background information is housed in the appendices.

Chapter 1 provides a general overview of CWPPs, the Core Team, the planning area, land ownership, and public involvement.

Chapter 2 presents an overview of the of the WUI and fire environment and specific information about vegetation and fire history, as well as fire management and response.

Chapter 3 describes the Risk-Hazard Assessment, results of the assessment, and community values at risk.

Chapter 4 provides mitigation strategies in accordance with the National Cohesive Wildfire Strategy as well as post-fire protocols and rehabilitation strategies.

Chapter 5 presents monitoring strategies to assist in tracking project progress and in evaluating work accomplished.

Appendix A contains background information on the County and associated towns, including fire policy, past planning efforts, and federal and state land management practices.

Appendix B contains additional resources for community members, which cover a variety of topics.

Appendix C provides summary information on hazard and risk for each WUI community.

Appendix D outlines modeling and geographic information system (GIS) backgrounds and explanations.

Appendix E houses project recommendations.

Appendix F details potential fuel treatment types and methods for application.

Appendix G holds resources for homeowners on preparing their houses and properties for wildfire.

Appendix H contains information on recovery and restoration following a wildfire.

Appendix I presents information on public outreach and engagement with regard to this CWPP.

Appendix J hosts additional mapping.

Appendix K presents a sample form of the National Fire Protection Association (NFPA) Wildfire Fire Risk and Hazard Severity Form 1144.

Appendix L details funding opportunities.

Appendix M lists individuals who contributed to preparation of the CWPP.

WHAT IS THE GOAL OF A CWPP?

The goal of a CWPP is to enable local communities, civic groups, and governments to improve their wildfire-mitigation capabilities and capacity, while working with fire protection agencies to identify high fire risk areas and prioritize areas for structure hardening, mitigation, fire suppression, and emergency preparedness projects. Another goal of the CWPP is to enhance public awareness by helping residents, visitors, and homeowners better understand the natural- and human-caused risks of wildland fires that threaten lives, safety, and the local economy. The minimum requirements for a CWPP, as stated in the HFRA, are the following (Society of American Foresters [SAF] 2004):

- **Collaboration:** Local and state government representatives, in consultation with federal agencies or other interested groups, must collaboratively develop a CWPP.
- **Prioritized Fuel Reduction:** A CWPP must identify and prioritize areas for hazardous fuels reduction and treatments and recommend the types and methods of treatment that will protect one or more communities at risk (CARs) and their essential infrastructures.
- **Treatments of Structural Ignitability:** A CWPP must recommend measures that homeowners and communities can take to reduce the ignitability of structures throughout the area addressed by the plan.

HOW WAS THE 2023 GRAND COUNTY CWPP DEVELOPED?

A group of multijurisdictional agencies (federal, state, and local), organizations, and residents joined together as a Core Team to update and develop this countywide CWPP. Previous CWPPs include the those for Grand Fire Protection District (FPD) No. 1 (2015), Grand FPD No. 1 (2015), East Grand FPD No. 4 (2013), Hot Sulphur Springs/Parshall FPD No. 3 (2011), and Kremmling FPD No. 5 (2011), as well as a countywide plan in 2006. Several Core Team members with many years of experience working on CWPPs, as well as in-depth knowledge of fire management in the community and surrounding areas, have contributed to the development of this CWPP.

The CWPP planning process served multiple purposes. One was to model and map wildfire hazards. Another was to identify and map the many physical characteristics throughout the planning area that could increase the threat of wildfire to communities. This mapping process allowed the Core Team to prioritize treatments tailored specifically for the community to reduce fire risk. The development of the 2023 CWPP also included public engagement, and community members were highly engaged in providing input. Various types of public outreach events, including Zoom webinars and an in-person open-house style event, were held to increase awareness and collect local input, and social media and online forums allowed for further engagement. The CWPP planning process also brought together wildfire responders and land managers into a Core Team, providing opportunities to build lasting working relationships and encourage collaboration. By incorporating public and Core Team input into the recommendations, treatments are tailored for specific areas and scenarios. Overall, the Grand County CWPP emphasizes the importance of collaboration among multijurisdictional agencies and the public in developing fuels mitigation treatment programs to address wildfire hazards.

WHY CREATE A STORY MAP FOR THE PROJECT?

The County opted to develop a story map (online web content) to disseminate information to the public and provide an opportunity for the public to provide input into the plan content. The story map presents the CWPP in a web layout with accompanying web maps and includes a project tracker. In addition to facilitating information sharing, the story map also provides the County with a platform that can be readily revised to keep the CWPP document current. The CWPP is shared on the Grand County webpage at <https://grand-county-cwpp-gcgeo.hub.arcgis.com/>.

WHO WILL LEAD THE IMPLEMENTATION OF THIS CWPP?

Implementation of most projects identified in this CWPP will require the collaboration and cooperation of multiple individuals and entities such as community residents, private organizations, the Grand County Wildfire Council, and local, state, and federal agencies. However, to ensure that projects move forward, the plan will be governed by the Grand County Office of Board of Commissioners and require coordination with the Grand County Office of Emergency Management (GCOEM).

WHO PARTICIPATED IN DEVELOPING THE PLAN?

Land managers, government representatives, and town representatives from across Grand County, Colorado, participated in this CWPP. Agencies included the GCOEM, Grand County Sheriff's Office, U.S. Forest Service (USFS), Grand FPD No. 1, Kremmling FPD No. 5, Hot Sulphur Springs/Parshall FPD No. 3, East Grand FPD No. 4, Grand Lake FPD No. 2.

State Forest Service (CSFS), Grand County Wildfire Council, Denver Water, Northern Water, Middle Park Conservation District, Grand County Department of Natural Resources, Colorado Division of Fire Prevention and Control (DFPC), Bureau of Land Management (BLM), and Colorado Water Conservation Board, along with other additional community or organization representatives, served as the Core Team for this CWPP and drove the decision-making process. Several Core Team members were involved in previous CWPPs in and around the county and have contributed their expertise to this CWPP.

WHERE IS THE PLANNING AREA?

The planning area includes Grand County as delineated by its geographic and political boundaries. It is also delineated by WUI areas (see Chapter 2 – Fire Environment).

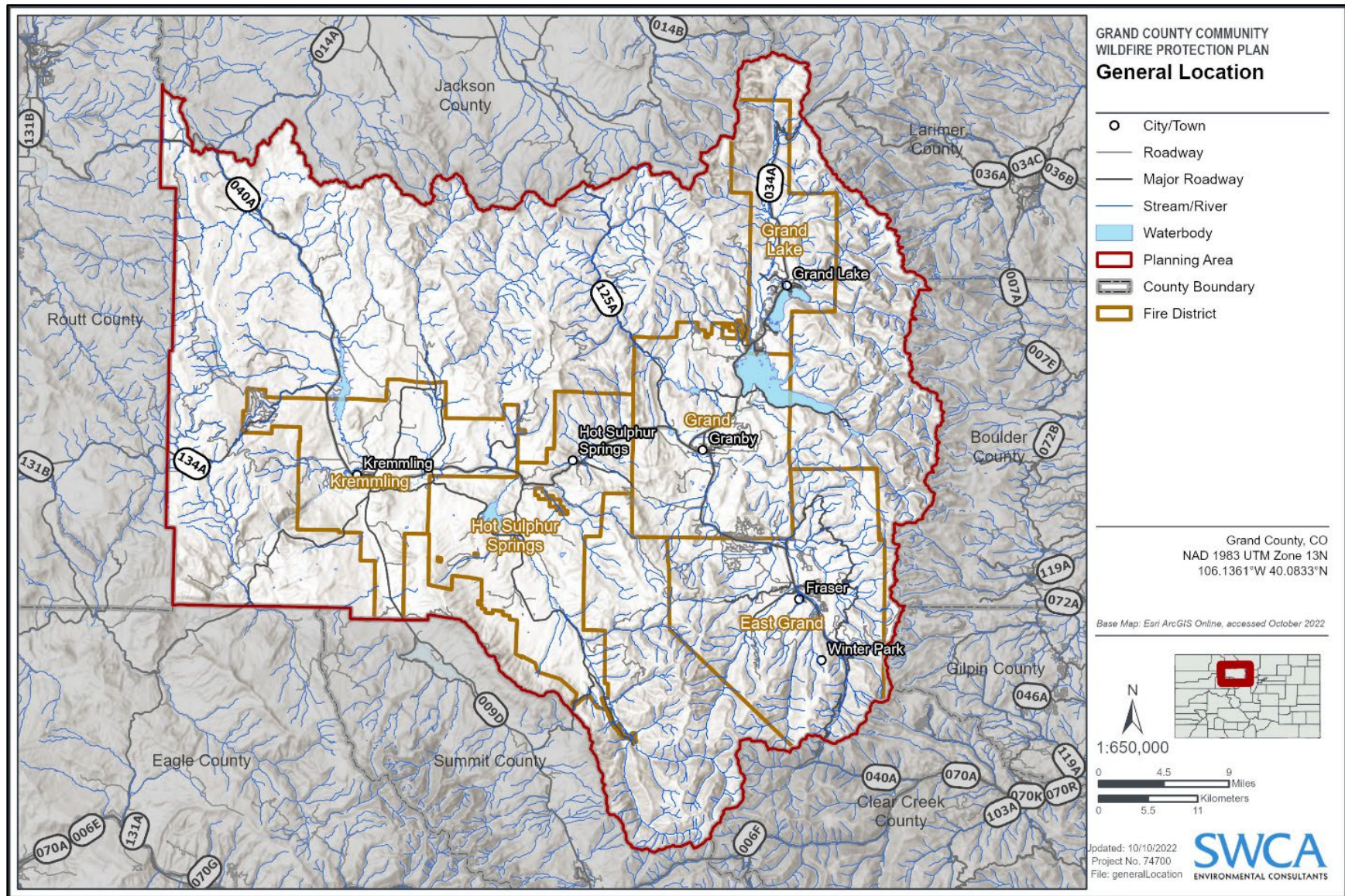


Figure ES.1. Grand County CWPP planning area.

WHAT WAS THE PUBLIC INVOLVEMENT?

The Core Team engaged in public outreach using a multimedia approach, including the story map created for the project, social media posts, community surveys, webinars, community interviews, and information distributed through mass emails. The Core Team hosted virtual public webinars on December 13, 2022, and January 10, 2023. Feedback, comments, and suggestions received from community members during these outreach events were synthesized and utilized to craft project recommendations for the CWPP. Therefore, the project recommendations are specifically tailored to address the concerns and priorities of the community.

WHAT IS THE CURRENT WILDFIRE SITUATION?

Grand County contains a large amount of wildfire-prone land. Historic fires have typically occurred within vast swaths of lodgepole pine (*Pinus contorta*)-dominated forests that are found throughout the county and generally overlap with more recently settled WUI zones and areas of human habitation. These high fire risk areas are buffered from above by alpine tundra that is considered unburnable, and from below by inter-mountain sagebrush steppe basins that experience low-severity burns on historic 10 to 70 year cycles (NatureServe 2022). Lodgepole pine are a fire-adapted species that generally require heat from wildfire to propagate, and stands within the county, which are also interspersed with Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*), are thought to have historically burned at infrequent 50- to 400-year intervals, depending on elevation, aspect, and moisture (USFS 1997). While large recent fires in the county, such as the 2020 Williams Fork and East Troublesome Fires that burned 208,000+ acres, have devastated local communities, their occurrence, and the future occurrence of similar fires within the county, is not unexpected considering the life history adaptations and fire dependence of species present in the region. While damaging wildfire will continue to occur within mid-elevation areas, the recent intensities, footprints, and timing of wildfire have been more variable and severe than what would have historically been expected (Westerling et al. 2006; Westerling 2016). This is likely due to fuels loading from mountain pine beetle (*Dendroctonus ponderosae*)-killed trees and climate-driven ecosystem changes such as increasingly ephemeral snowpacks and hotter annual temperatures (Goodwin et al. 2021; Higuera et al. 2021). Forest use practices, human development, and fire suppression regimes have also potentially pointed the county toward a hazardous and less predictable wildfire situation.

WHAT RECENT FIRES OCCURRED HERE?

Prior to 2016, very large wildfires were rarely recorded in Grand County's known history. However, the three largest and most destructive wildfires in county history have occurred since then: the Silver Creek Fire (which occurred within wilderness land), the Williams Fork Fire (which occurred on primarily USFS land), and the East Troublesome Fire (which occurred on USFS, NPS, BLM, and private lands). The first of the three, the Silver Creek Fire, was caused by a lightning strike late in the summer of 2018 and burned approximately 20,000 acres of land mostly designated as wilderness. No structure or human losses were reported (Steamboat Pilot 2019). Two years later in 2021, the Williams Fork Fire lit up just outside of Fraser and burned 14,833 acres (USFS 2021a). Although structure loss was also avoided in the incident, the fire was dwarfed later that fall by the human-caused East Troublesome Fire that burned over 193,000 acres, destroyed nearly 600 structures, was responsible for two human fatalities, and was ultimately recorded as the second largest in Colorado history (Sky-Hi News 2021; USFS 2021b). The County is currently in the midst of recovering and rebuilding from the fire.

WHAT IS THE PURPOSE OF THE RISK-HAZARD ASSESSMENT?

The purpose of the Risk-Hazard Assessment is to evaluate and provide information pertaining to the risk of wildland fires within the WUI of Grand County. The Risk-Hazard Assessment is twofold and combines a geographic information system (GIS) model of hazard based on fire behavior and fuels modeling technology (Composite Risk-Hazard Assessment) and a Core Team-generated assessment of on-the-ground community hazards and values at risk (VARs).

The Risk-Hazard Assessment considers fire behavior modeling, which includes the following:

- Fire history
- Probability of fire occurring
- Intensity and behavior of a fire if one occurs
- Exposure and susceptibility of the WUI and VARs to wildfire based on their locations

The purpose of the Risk-Hazard Assessment is to provide information about wildfire hazard and risk to highly valued resources and assets (HVRAs).

Most of the high-risk areas identified during planning are communities located in unburned montane conifer forests along the fringes of inter-mountain basins. These include those surrounding the Fraser Valley and upper Williams Fork Valley south of Williams Fork Reservoir, the foothills of the Gore Range west of Kremmling and Wolford Mountain Reservoir, the Colorado River Valley around Hot Sulphur Springs and southwest of Kremmling, and the western slope of the South Williams Fork Mountains. The heavily timbered drainages of the upper Colorado River within Rocky Mountain National Park, Arapahoe Creek east of Lake Granby, and the East Inlet area of Grand Lake also exhibit extreme wildfire risk. Undeveloped low-country rangeland throughout the county has slightly lower risk but still faces high danger due to grassland/sagebrush fires with shorter flame lengths and high rates of spread.

HOW IS MY COMMUNITY RATED?

Community field evaluations, summarizing information on hazard and risk for each WUI community within the county, are provided in this plan. A team from SWCA Environmental Consultants (SWCA) conducted on-the-ground community risk assessment surveys (field evaluations) throughout the county from October 10 through 14, 2022, using the National Fire Protection Association 1144 standard for assessing structure ignitability in the WUI. Using this standard provided a consistent process for evaluating wildland fire hazards around existing structures to determine the potential for structure ignition from wildland fire ignitions.

Community evaluations provide a broad, total score of risk and hazard based on various parameters observed during the surveys, and a corresponding descriptive rating of low, moderate, or high, or extreme are available in Appendix C. Eight communities are rated as extreme: Sunset Ridge, Ranch Creek, Junction Ranch, Upper Williams Fork, Lower Williams Fork, Big Horn Park, Gorewood, and Lake Agnes. More detailed subdivision, HOA, or home site assessments can be requested from your local fire protection district to create more individualized action plans.

WHAT ARE THE STRATEGIES TO ADDRESS WILDFIRE HAZARDS?

Goal 1 of the Cohesive Strategy and the Western Regional Action Plan is to **Restore and Maintain Landscapes**: Landscapes across all jurisdictions are resilient to fire and other disturbances in accordance with management objectives.

Recommendations for hazardous fuels treatments include the following:

- Road and vegetation maintenance
- WUI mitigation actions and maintenance
- Land-use planning and landscape standards
 - Local wood and timber use capacity
 - Evacuation routes, mitigation, and maintenance
- Special species and wildlife management
- Capacity to address projects

Goal 2 of the Cohesive Strategy/Western Regional Action Plan is **Fire-Adapted Communities**: Human populations and infrastructure that can withstand a wildfire without loss of life and property.

Recommendations for public outreach/education and structural ignitability include the following:

- Developing and promoting wildfire education
- Interagency and local government collaboration
- Defensible space development and maintenance
- Structural hardening improvements and codes
- Prioritizing the needs of vulnerable and disadvantaged families
- Hosting community awareness events

Goal 3 of the Cohesive Strategy/Western Regional Action Plan is **Wildfire Response**: All jurisdictions participate in making and implementing safe, effective, efficient risk-based wildfire management decisions:

Recommendations for improving fire response capabilities include the following:

- Subdivision/HOA specific hazard assessments and action plans
- Water supply improvements
- Emergency notification improvements
- Evacuation route identification
- Interagency collaboration

WHAT DOES POST-FIRE RESPONSE AND RECOVERY INVOLVE?

There are many aspects to post-fire response recovery, including but not limited to:

- Returning home and checking for hazards
- Coordinating and mobilizing a group of teams in the community to respond to emergencies
- Rebuilding communities and assessing economic needs—securing the financial resources necessary for communities to rebuild homes, business, and infrastructure
- Restoring the damaged landscape—restoration of watersheds, soil stabilization, and tree planting
- Prioritizing the needs of vulnerable and disadvantaged communities during response and disaster recovery efforts
- Evaluating and updating disaster recovery plans every 5 years to respond to changing needs and characteristics of the community
- Coordinating with planning, housing, health, and human services, and other local, regional, or state agencies to develop contingency plans for meeting short-term, temporary housing needs of those displaced during a catastrophic wildfire event

HOW WILL THE PLAN BE IMPLEMENTED?

The CWPP does not require implementation of any of the recommendations, but the message throughout this document is that the greatest fire mitigation could be achieved through the joint actions of individual homeowners, tribes, and town, county, state, and federal governments.

The recommendations for fuels reduction projects are general in nature; site-specific planning that addresses location, access, land ownership, topography, soils, and fuels would need to be employed upon implementation. Also, it is important to note that the recommendations are specific to WUI areas and are expected to reduce the loss of life and property.

In addition, implementation of fuels reduction projects needs to be tailored to the specific project and will be unique to the location depending on available resources and regulations. In an effort to streamline project implementation, this CWPP has identified the pertinent land management/ownership agencies associated with each recommendation. On-the-ground implementation of the recommendations in the CWPP planning area will require development of an action plan and assessment strategy for completing each project.

WHEN DOES THE CWPP NEED TO BE UPDATED?

The CWPP should be treated as a living document to be updated annually or immediately following a significant fire event. The plan should continue to be revised to reflect changes, modification, or new information such as projects completed and lessons learned from public education and project implementation. These elements are essential to the success of mitigating wildfire risk throughout the county and will be critical in maintaining the ideas and priorities of the plan in the future. Chapter 5 provides an evaluation framework that can help guide the CWPP update process.

CORE TEAM

| Name | Organization |
|--------------------|--|
| Joel Cochran | GCOEM |
| Alexis Kimbrough | GCOEM |
| Brett Schroetlin | Sheriff's Office |
| Paul Mintier | Sheriff's Office |
| Eric Freels | USFS (Arapaho and Roosevelt, Medicine Bow-Routt) |
| Brad White | Grand FPD No. 1 |
| Tony Tucker | Kremmling FPD No. 5 |
| Tom Baumgarten | Hot Sulphur Springs/Parshall FPD No. 3 |
| Todd Holzwarth | East Grand FPD No. 4 |
| Seth St. Germain | Grand Lake FPD No. 2 |
| Zachary Wehr | CSFS |
| Ryan McNertney | CSFS |
| Schelly Olson | Grand County Wildfire Council |
| Madelene McDonald | Denver Water |
| Kimberly Mihelich | Northern Water |
| Katlin Miller | Middle Park Conservation District |
| Amy Sidener | Grand County Department of Natural Resources |
| Tyler Campbell | DFPC |
| Ryan Kay | BLM |
| Jimmy Michaels | BLM |
| Philip Brinkmann | Grand County Wildfire Council |
| Clancy Philipsborn | Grand County Wildfire Council |
| Brandon J Voegtle | BLM, NWD fire unit |
| Steven Reeves | Colorado Water Conservation Board |
| Daniel Godwin | USFS |

LIST OF PREPARERS

| Name | Organization | Title |
|------------------|---|------------------------------------|
| Joel Cochran | GCOEM | Project Support Specialist and POC |
| Alexis Kimbrough | GCOEM | Director |
| Brett Schroetlin | Sheriff's Office | County Sheriff |
| Paul Mintier | Sheriff's Office | Fire Management Officer |
| Eric Freels | National Forest (ARNF, Medicine Bow-Routt NF) | District Ranger |

| Name | Organization | Title |
|---------------------|--|---|
| Brad White | Grand FPD No. 1 | Fire Chief |
| Seth St. Germain | Grand Lake FPD No. 2 | Fire Chief |
| Tom Baumgarten | Hot Sulphur Springs/Parshall FPD No. 3 | Fire Chief |
| Todd Holzwarth | East Grand FPD No. 4 | Fire Chief |
| Tony Tucker | Kremmling FPD No. 5 | Fire Chief |
| Zachary Wehr | CSFS | Supervisory Forester – Northwest Area |
| Ryan McNertney | CSFS | Forester – Northwest Area & GCWC Board |
| Madelene McDonald | Denver Water | Watershed Scientist |
| Kimberly Mihelich | Northern Water | Source Water Protection Specialist |
| Katlin Miller | Middle Park Conservation District | Executive Director |
| Amy Sidener | Grand County DNR | Natural Resource Management Specialist |
| Tyler Campbell | DFPC | Battalion Chief |
| Ryan Kay | BLM | Acting Kremmling Field Manager |
| Jimmy Michaels | BLM | District FMO |
| Philip Brinkman | Grand County Wildfire Council | Chair, Board of Directors |
| Clancy Philipsborn | Grand County Wildfire Council | Mitigation Committee Chair |
| Brandon J Voegtle | BLM, NWD fire unit | Wildfire Prevention and Mitigation Specialist |
| Steven Reeves | CWCB | Watershed and Flood Protection Specialist |
| Daniel Godwin | USFW | Forest Fire Planner |
| Victoria Amato | SWCA | Principal Fire Planner |
| Arianna Porter | SWCA | Project Manager |
| Breanna Plucinski | SWCA | Assistant Project Manager |
| Liz Hitzfelder | SWCA | Lead Geospatial Analyst |
| Tim Clute | SWCA | Fire Planner |
| Isaac Fournier | SWCA | Fire Planner |
| Alexis Roberts | SWCA | Fire Planner |
| Rachel Carlson | SWCA | Fire Planner |
| Christian Testerman | SWCA | Fire Planner |

For additional information on this project, please contact Project Manager Arianna Porter at Arianna.porter@swca.com.



CHAPTER 1 – INTRODUCTION

The United States is facing urgent forest and watershed health concerns. While the number of annual wildfires throughout the United States has been slightly decreasing (71,500 fires in 2016 vs. 59,000 fires in 2022), the number of acres burned has been on the rise (Congressional Research Service [CRS] 2022). An average of 7.4 million acres is burned every year due to wildfire, more than doubling the annual average of acres burned in the 1990s (CRS 2022). Communities are seeing the most destructive wildfire seasons in history. The 2015 fire season had the most acreage impacted in a single year since 1960 at 10.13 million acres. 2020 was the second most extensive year for wildfire with 10.12 million acres burned (CRS 2022). These statistics demonstrate that wildfires are becoming larger and harder to control.

Colorado's Forest Action Plan of 2020 states that forests and rangelands in Colorado, like other western states, face urgent issues concerning longer fire seasons and uncharacteristic wildfires that threaten the sustainability and ecological function of the state's ecosystems. These issues require an analysis of the current gap between existing and necessary wildland fire management strategies. A top priority in Colorado is coupling current and future wildland fire management strategies with wildland fire and fuel priority areas to guide federal, state, and private program funds towards projects that restore natural forest conditions, help communities live with wildfire, protect watersheds, conserve wildlife, and enhance the public benefits from trees and forests (Colorado State Forest Service [CSFS] 2020).

As wildfire severity and extent increases, communities need a plan to help prepare for, reduce the risk of, and adapt to wildland fire events. Community wildfire protection plans (CWPPs) help accomplish these goals. A CWPP provides recommendations that are intended to reduce, **but not eliminate**, the extreme severity or risk of wildland fire.

The development of the CWPP is rooted in meaningful collaboration among many stakeholders, including local, state, and federal officials. The planning process involves looking at past fires and treatment accomplishments using the knowledge and expertise of the professional fire managers who work for the various agencies and governing entities in the county. From there, the CWPP ultimately identifies the current local wildfire risks and needs that occur in the county, which is further supported with relevant science and literature from the western region of the United States.

In addition, this document, the 2023 Grand County CWPP, reviews, verifies, and/or identifies potential new priority areas where mitigation measures are needed to protect from wildfire the irreplaceable life,

property, and critical infrastructure in the county. However, this CWPP does not attempt to mandate the type and priority for treatment projects that will be carried out by the land management agencies and private landowners. The responsibility for implementing wildfire mitigation treatments lies at the discretion of the landowner; the 2023 Grand County CWPP will only identify potential treatments and a suggested priority for these projects.

GOAL OF A COMMUNITY WILDFIRE PROTECTION PLAN

The goal of a CWPP is to enable local communities to improve their wildfire-mitigation capacity, while working with government agencies to identify high fire risk areas and prioritize areas for mitigation, fire suppression, and emergency preparedness. Another goal of the CWPP is to enhance public awareness by helping residents better understand the natural and human-caused risk of wildland fires that threaten lives, safety, and the local economy. The minimum requirements for a CWPP, as stated in the Healthy Forests Restoration Act of 2003 (HFRA), are the following:

Collaboration: Town, county, and state government representatives, in consultation with federal agencies or other interested groups, must collaboratively develop a CWPP (SAF 2004).

Prioritized Fuel Reduction: A CWPP must identify and prioritize areas for hazardous fuels reduction and treatments and recommend the types and methods of treatment that will protect one or more communities at risk (CARs) and their essential infrastructures (SAF 2004).

Treatments of Structural Ignitability: A CWPP must recommend measures that local governments, homeowners, and communities can take to reduce the ignitability of structures throughout the area addressed by the plan (SAF 2004).

It is the intent of this 2023 CWPP to provide a countywide scale of wildfire risk and protection needs and bring together all responsible wildfire management and suppression entities in Grand County to address the identified needs, and to support these entities in planning and implementing the necessary mitigation measures. Additional information on the planning process is available in Appendix A.

ALIGNMENT WITH COHESIVE STRATEGY

The 2023 CWPP is aligned with the Cohesive Strategy and its Phase III Western Regional Action Plan by adhering to the nationwide goal “to safely and effectively extinguish fire, when needed; use fire where allowable; manage our natural resources; and as a Nation, live with wildland fire.” (Forests and Rangelands 2014:3).

The primary, national goals identified as necessary to achieving the vision are:

- **Restore and maintain landscapes:** Landscapes across all jurisdictions are resilient to fire-related disturbances in accordance with management objectives.
- **Fire-adapted communities:** Human populations and infrastructure can withstand a wildfire without loss of life and property.
- **Wildfire response:** All jurisdictions participate in making and implementing safe, effective, efficient risk-based wildfire management decisions.

For more information on the Cohesive Strategy, please visit: <https://www.forestsandrangelands.gov/strategy/documents/strategy/CSPhaseIIINationalStrategyApr2014.pdf>

Alignment with these Cohesive Strategy goals is described in more detail in Chapter 4, Mitigation Strategies.

In addition to aligning with the Cohesive Strategy, the CWPP also incorporates information on post-fire recovery, the significant hazards of a post-fire environment, and the risk that post-fire effects pose to communities (Figure 1.1)



Figure 1.1. The CWPP incorporates the three primary goals of the Cohesive Strategy with post-fire recovery to serve as holistic plan for fire prevention and resilience.

ALIGNMENT WITH PLANS AND AGREEMENTS

This CWPP is aligned with multiple local, state, and federal planning documents. These documents or agreements are summarized in Appendix A. In addition, fire policy and legislative direction is also summarized in Appendix A.

PLANNING AND REGULATORY BACKGROUND

Detailed information regarding planning and regulatory background and land management strategies can be found in Appendix A, Planning and Policy Background.

CORE TEAM

Grand County emergency management and fire response personnel invited engagement from government agencies in the development of this 2023 Grand County CWPP, forming the “Core Team.” Stakeholder involvement is critical in producing a meaningful document that includes all collaborators’ diverse perspectives. The Core Team drives the planning process through decision making, data sharing, experience, and communication with community members. The project was kicked off on August 11, 2022; the Core Team met for the first time on August 25, 2022, and convened again on October 13, 2022, and March 16, 2023.

The Core Team List is provided in Appendix M.

PLANNING AREA

The planning area includes the entirety of Grand County as delineated by its geographic and political boundaries (Figure 1.2).

Grand County encompasses 1,846 square miles and a population of approximately 15,860 people (U.S. Census Bureau 2021), although seasonal tourism results in much larger quantities of visitors and short-term residents. Grand County has many recreational areas including a national park, national forests, several wilderness areas, lakes, and other amenities. Grand County has roughly 16,870 housing units (U.S. Census Bureau 2021), with a large amount located within the wildland urban interface (WUI), or put simply, where the wildland meets developed land. Additional Information is provided in Appendix B, Community Background and Resources.

LAND OWNERSHIP

Land ownership in Grand County is diverse, but most of the land is publicly owned (Figure 1.3). Large portions of Grand County (approximately 70%) are owned by the federal government. Of these federal lands, approximately 37% of the county is managed by the U.S Forest Service’s (USFS’s) Routt and Arapaho and Roosevelt National Forests; 12% is managed by the Bureau of Land Management’s (BLM’s) Kremmling Field Office; 8% is managed by the National Park Service’s (NPS’s) Rocky Mountain National Park, and less than 1% (0.01%) is managed by the Bureau of Reclamation. An additional 4.2% of the Grand County is owned and managed by the State of Colorado. Finally, approximately 26% of the land in the county is privately owned.

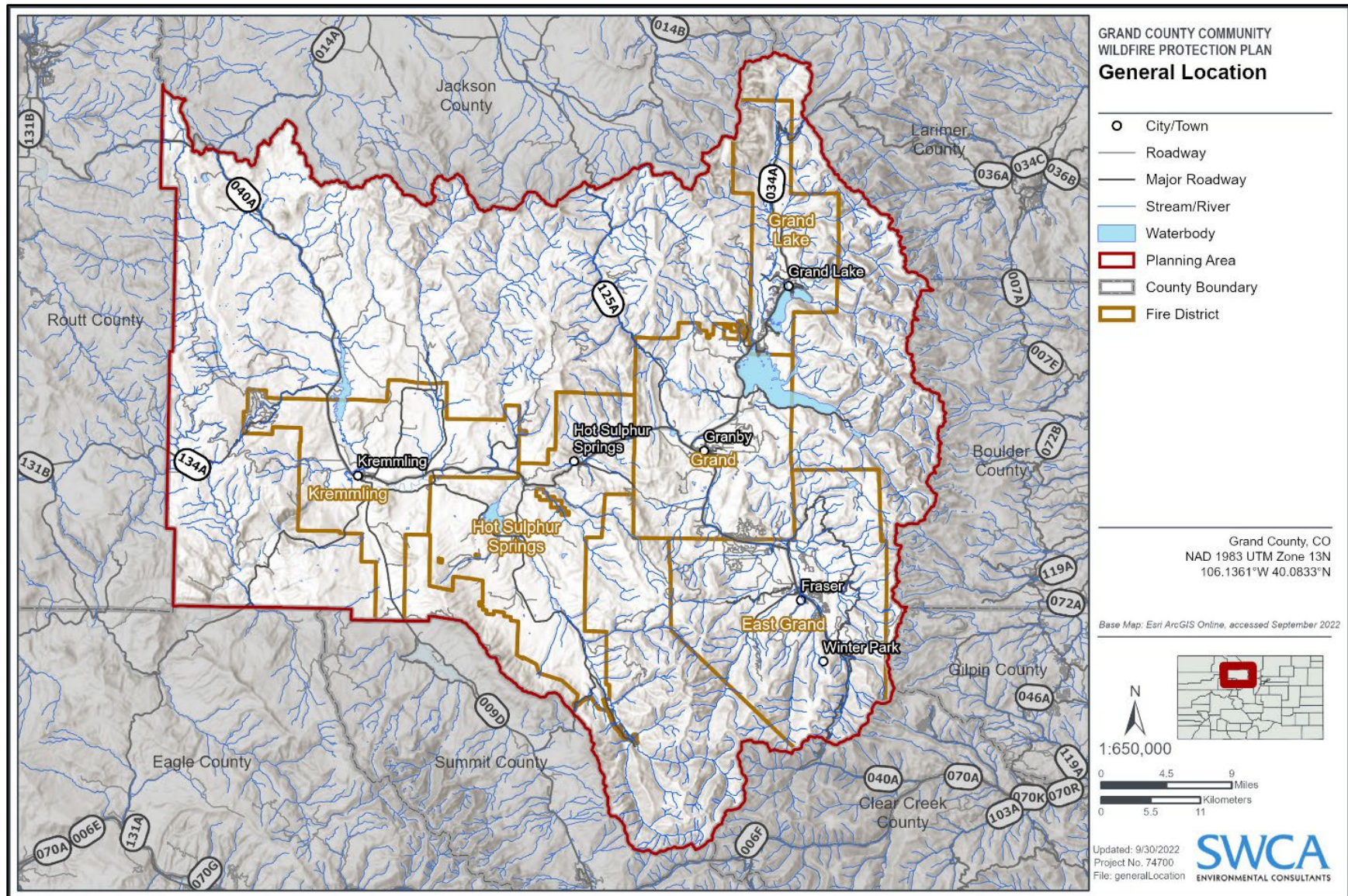


Figure 1.2. Grand County general location.

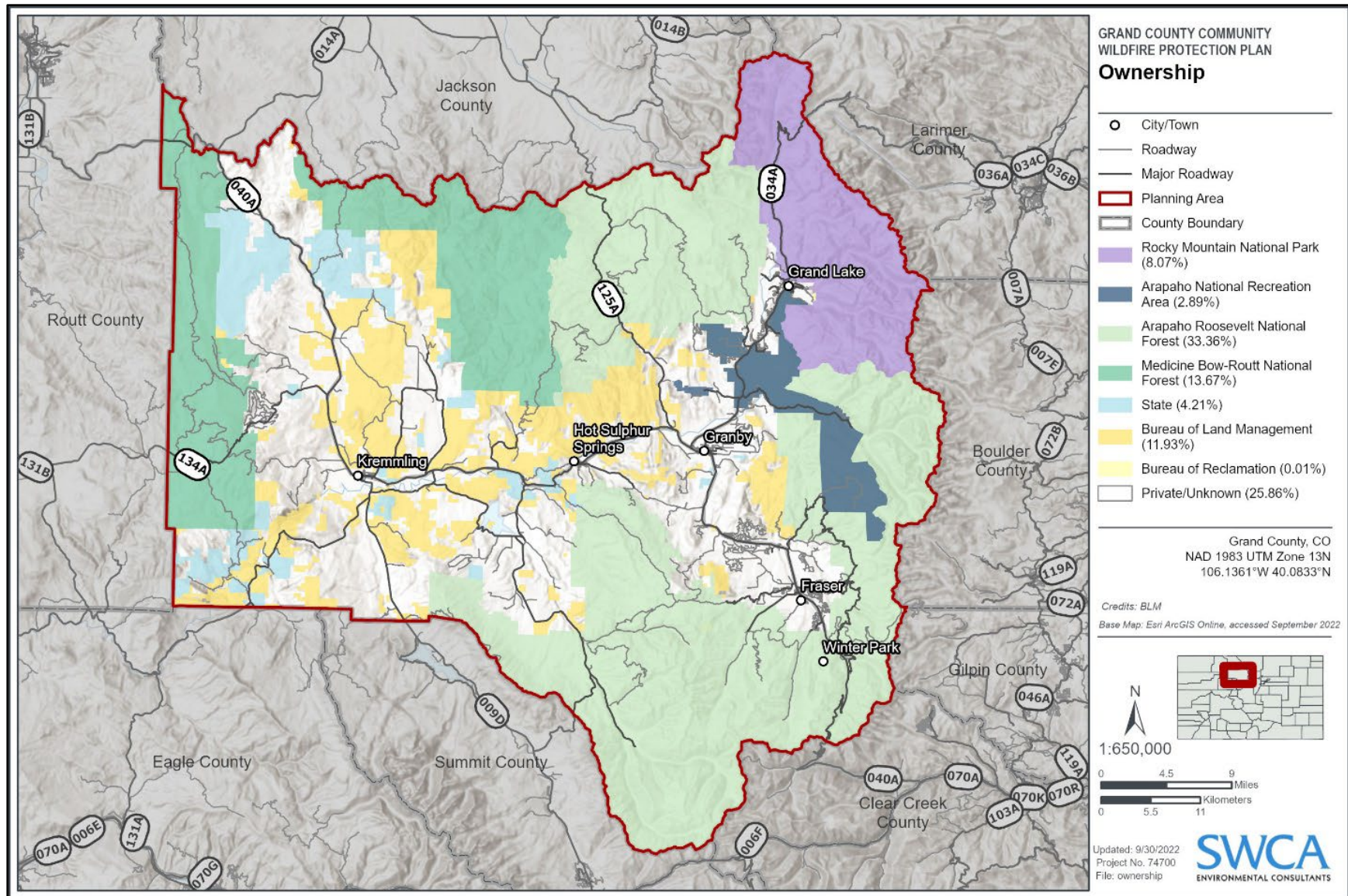


Figure 1.3. Grand County land ownership.

Additional details regarding land in Grand County, such as topography and land management direction, are summarized in Appendix B.

PUBLIC INVOLVEMENT

A key element in the CWPP process is the meaningful discussions it generates among community members regarding their priorities for local fire protection and forest management (Society of American Foresters [SAF] 2004). The draft CWPP was made available for public review from April 3 through April 16, 2023. In addition to the CWPP report, Grand County developed a CWPP story map (online content) to provide opportunities for information sharing and gathering. The public were invited to view the story map prior to public outreach events in the winter of 2022. The story map and draft were announced through several different media outlets for review (Appendix I). The story map can be viewed here: <https://grand-county-cwpp-gcgeo.hub.arcgis.com/>

Every effort was made to include a broad cross section of the community in the outreach process, and different communication channels were used to engage as many members of the public as possible (e.g., story map, social media posts, community surveys, webinars, community interviews, and email distributions). All community members were welcomed and encouraged to participate in activities and were provided multiple opportunities to provide both virtual and in-person input, such as through the community survey, public meetings, and CWPP document review. Additional information regarding public involvement and outreach can be found in Appendix I.

ACCOMPLISHMENTS SINCE THE LAST CWPP

Table 1.1. County Wildfire Prevention and Community Protection Accomplishments

| Year Completed | Entity | Project Details |
|----------------|--------|-----------------|
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WILDLAND URBAN INTERFACE

The WUI is composed of both interface and intermix communities and is defined as areas where human habitation and development meet or intermix with wildland fuels (U.S. Department of the Interior and U.S. Department of Agriculture [USDA] 2001:752–753). Interface areas include housing developments that meet or are in the vicinity of continuous vegetation. Intermix areas are those areas where structures are scattered throughout a wildland area where the cover of continuous vegetation and fuels is often greater than cover by human habitation.

In addition, the WUI has an area of influence, or influence zone. This area is described with respect to wildland and urban fire; it is an area with a set of conditions that facilitate the opportunity for fire to burn from wildland fuels to the home and or structure ignition zone (National Wildfire Coordinating Group [NWCG] 2021a).

The WUI creates an environment in which fire can move readily between structural and vegetative fuels, increasing the potential for wildland fire ignitions and the corresponding potential loss of life and property. Human encroachment upon wildland ecosystems within recent decades is increasing the extent of the WUI throughout the country (Figures 2.1 and 2.2), which is having a significant influence on wildland fire management practices. The expansion of the WUI into areas with high fire risk, combined with the collective effects of aggressive suppression policies, resource management practices, land use patterns, climate change, and insect and disease infestations, has created an urgent need to modify fire management practices and policies and to understand and manage fire risk effectively in the WUI (Pyne 2001; Stephens et al. 2005). Mitigation techniques for fuels and fire management can be strategically planned and implemented in WUI areas (e.g., with the development of defensible space around homes and structures).

A CWPP offers the opportunity for collaboration of land managers to establish a definition and a boundary for the local WUI; to better understand the unique resources, fuels, topography, and climatic and structural characteristics of the area; and to prioritize and plan fuels treatments to mitigate for fire risks. At least 50% of all funds appropriated for projects under the HFRA must be used within the WUI.

According to the HFRA, the WUI can be defined by a CWPP. In this CWPP, the WUI (Figure 2.1) is defined as

- an area extending 1 mile from the boundary of an at-risk community.
 - In the event a strategic fuel project enhances community protection, the WUI boundary may extend beyond the traditional 1-mile buffer to include said areas where the strategic project would be completed. For example, sustained slopes and ridgelines may continue beyond the 1-mile buffer. However, it is still important that project work is completed in those high-risk areas. Therefore, the entire strategic planning area would be considered as WUI, not just the sections within the 1-mile buffer.
 - In Figure 2.1, a 2.5-mile buffer is shown to depict risk related to floating embers, which are one of the leading causes of home ignition in regard to wildfire.

At-risk communities in Grand County were delineated prior to the on-the-ground community hazard assessments (Field-Based Community Hazard Assessments in Chapter 3) and were based on the presence of homes and structures surrounded by wildland fuels. For each community in the county classified as high or extreme risk, a detailed map of the WUI area is presented in Appendix C.

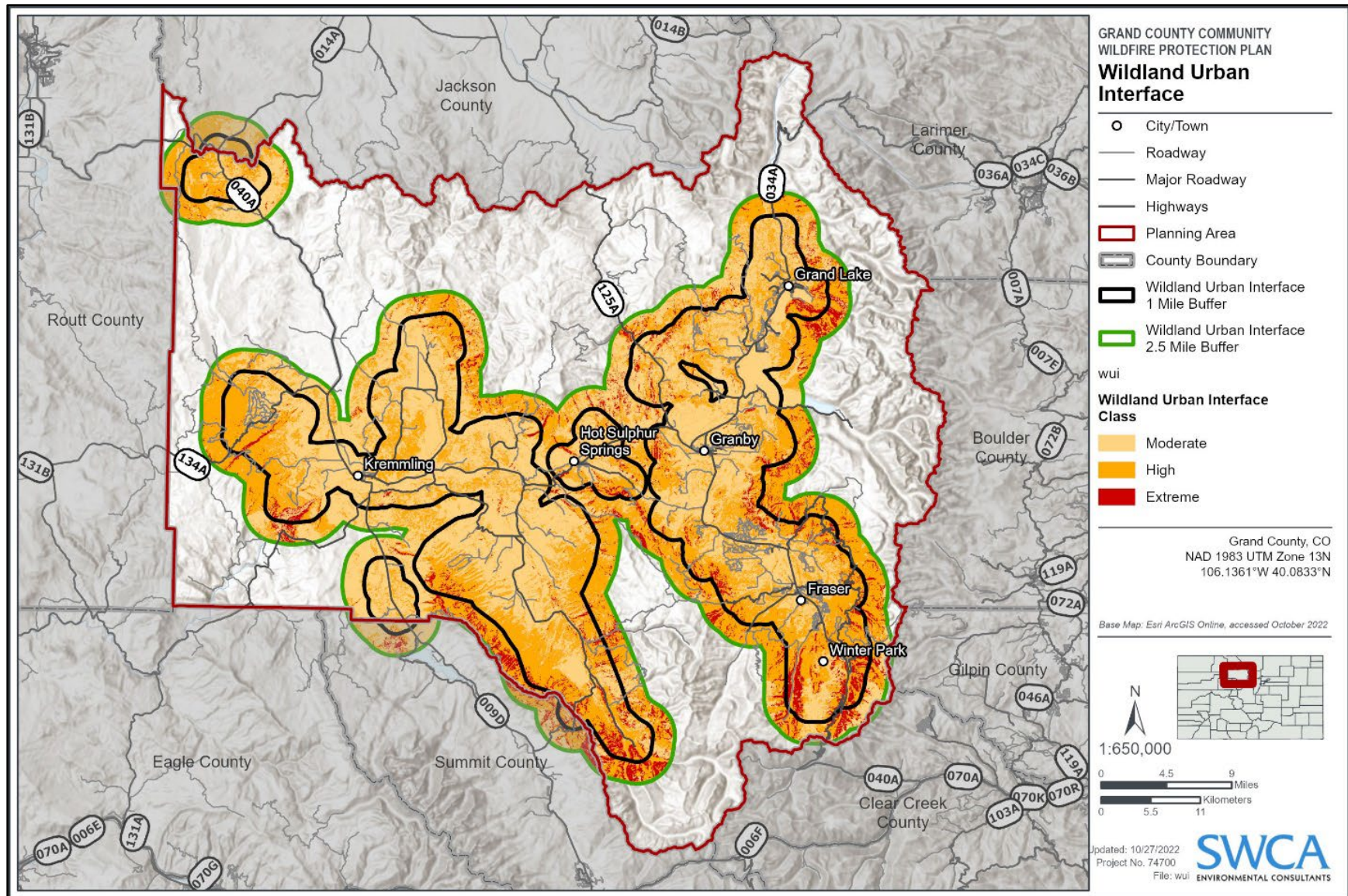


Figure 2.1. Grand County WUI map.

WILDLAND URBAN INTERFACE LAND USE

Cities and counties are continuously challenged to accommodate both current and future residents in need of safe and affordable housing. Between 2010 and 2020, Colorado's population increased by nearly 745,000 people, while the development of new housing has not increased at the same rate to meet this demand (U.S. Census Bureau 2020). Over the past few decades, jurisdictions across the state have approved many new housing units. These are often placed within or near to wildland areas, creating WUI conditions. Today, more than 46 million residences in 70,000 communities are at risk for WUI fires (U.S. Fire Administration [USFA] 2021a). When it comes to wildfire, this trend is of special concern since WUI conditions are linked with an increased risk of loss of human life, property, natural resources, and economic assets.



Figure 2.2. Example of the WUI in Grand County.

Appendix C houses descriptions and hazard ratings accompanied by a WUI delineation map for each community evaluated within Grand County that received a high or extreme risk rating (Figure 2.3). It is important to note that most of the WUI in Grand County is surrounded by federally owned and managed lands. The WUI maps depict the entire WUI boundary for each community. The WUI buffer is an area where fuel treatments should be prioritized in order to provide additional protection to the community from potential wildfire spread. During Core Team meetings, stakeholders agreed that the WUI buffer should be flexible to allow WUI hazardous fuels treatments to occur at distances beyond the 1 mile delineated because treatments should be aligned, when possible, with strategic topographic locations that could serve as anchor points. To further accentuate the threat that embers can pose to values at risk, the CWPP also includes a 2.5-mile buffer around communities to depict the potential of embers being transmitted ahead of a fire.

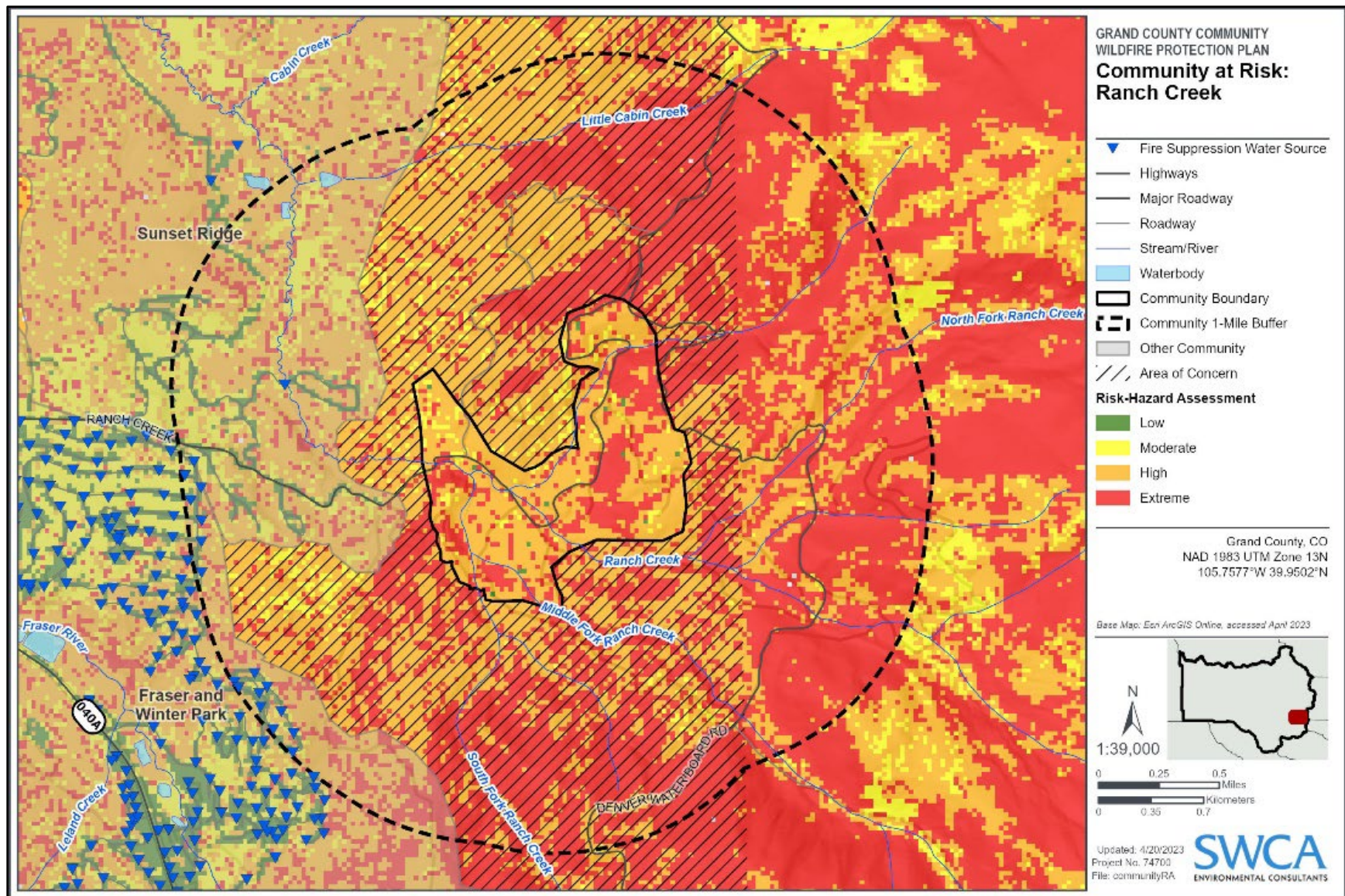


Figure 2.3. Ranch Creek community and 1-mile WUI buffer.

VEGETATION AND LAND COVER

Vegetation zones within the county are primarily a function of elevation, slope, aspect, substrate, and associated climatic regimes. Since a broad range in elevation and topography exists across the county, characteristics in vegetative communities are quite variable across the county (Figures 2.4 and 2.5).

Dominant vegetation types within the county are described based on a large spatial scale and represent the overall community structure that will play a general role in fire occurrence and behavior. Although the vegetation types are outlined for the county, site-specific evaluations of the vegetative composition and structure in each area of focus should be taken into consideration when planning fuels treatments.

According to the Southwest Regional Gap Analysis Project (SWReGAP) (2022) the dominant vegetation types in Grand County are Inter-Mountain Basins Big Sagebrush Shrubland, Inter-Mountain Basins Sagebrush Steppe, Rocky Mountain Lodgepole Pine Forest, and Rocky Mountain Subalpine Mesic Spruce-Fir Forest. Other types of land cover (alpine tundra, agricultural areas, and water bodies) also exist in the County and are not described in more detail as they do not play a significant role in fire behavior.

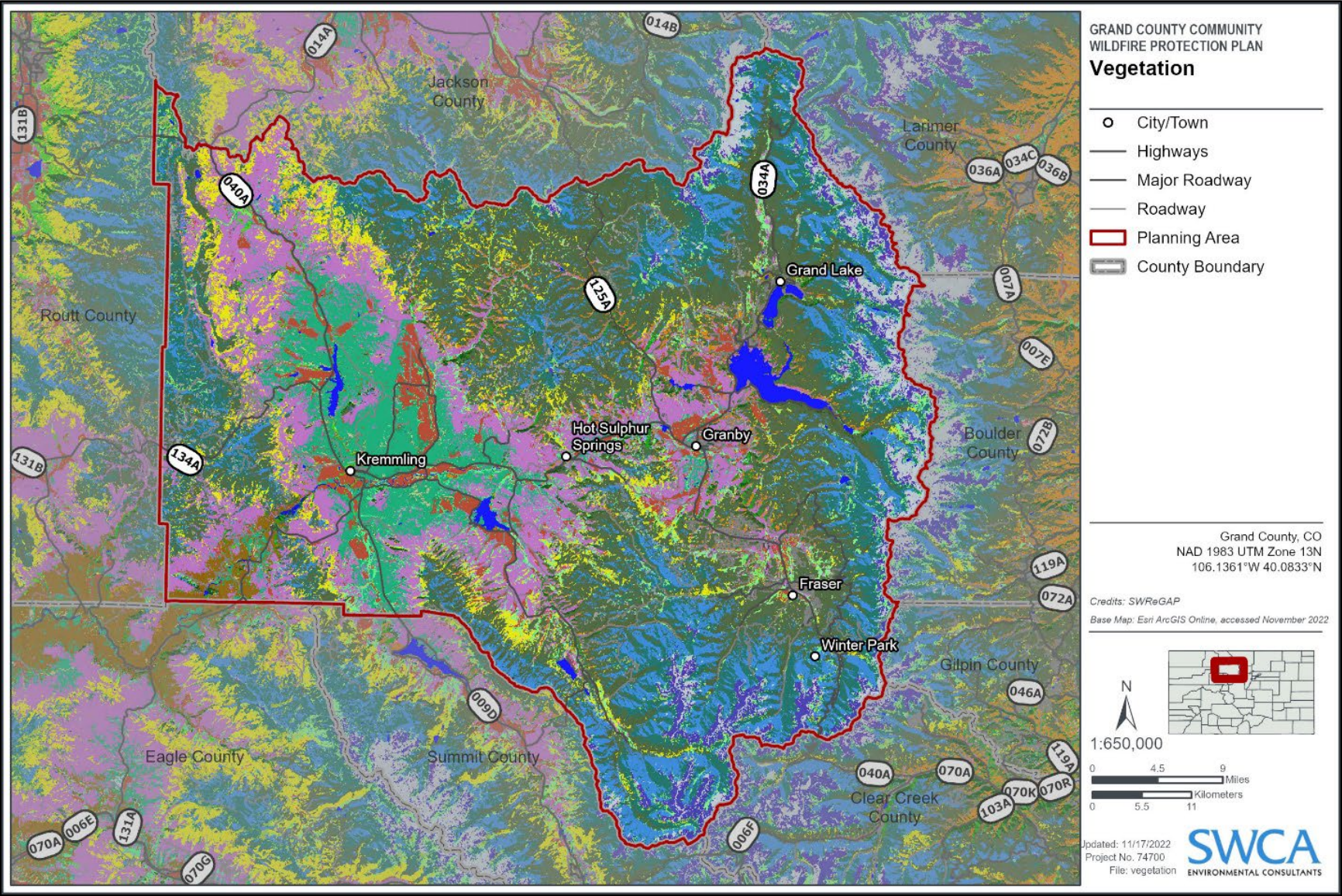


Figure 2.4. Estimated vegetation types (recent to 2016) in Grand County.
















| Vegetation Cover | |
|---|--|
|  North American Alpine Ice Field |  Rocky Mountain Dry Tundra |
|  Rocky Mountain Alpine Bedrock and Scree |  Rocky Mountain Subalpine Mesic Meadow |
|  Rocky Mountain Alpine Fell-Field |  Southern Rocky Mountain Montane-Subalpine Grassland |
|  Rocky Mountain Cliff and Canyon |  Western Great Plains Foothill and Piedmont Grassland |
|  Inter-Mountain Basins Active and Stabilized Dune |  Rocky Mountain Subalpine-Montane Riparian Shrubland |
|  Rocky Mountain Aspen Forest and Woodland |  Rocky Mountain Subalpine-Montane Riparian Woodland |
|  Rocky Mountain Subalpine-Montane Limber-Bristlecone Pine Woodland |  Rocky Mountain Lower Montane Riparian Woodland and Shrubland |
|  Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland |  Inter-Mountain Basins Greasewood Flat |
|  Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland |  North American Arid West Emergent Marsh |
|  Rocky Mountain Lodgepole Pine Forest |  Rocky Mountain Alpine-Montane Wet Meadow |
|  Rocky Mountain Montane Dry-Mesic Mixed Conifer Forest and Woodland |  Open Water |
|  Rocky Mountain Montane Mesic Mixed Conifer Forest and Woodland |  Developed, Open Space - Low Intensity |
|  Rocky Mountain Ponderosa Pine Woodland |  Developed, Medium - High Intensity |
|  Southern Rocky Mountain Pinyon-Juniper Woodland |  Barren Lands, Non-specific |
|  Colorado Plateau Pinyon-Juniper Woodland |  Agriculture |
|  Inter-Mountain West Aspen-Mixed Conifer Forest and Woodland Complex |  Recently Burned |
|  Rocky Mountain Gambel Oak-Mixed Montane Shrubland |  Recently Mined or Quarried |
|  Rocky Mountain Lower Montane-Foothill Shrubland |  Invasive Perennial Grassland |
|  Inter-Mountain Basins Big Sagebrush Shrubland |  Invasive Annual Grassland |
|  Inter-Mountain Basins Montane Sagebrush Steppe |  Invasive Annual and Biennial Forbland |
|  Inter-Mountain Basins Semi-Desert Shrub Steppe |  Recently Logged Areas |

Figure 2.5. Legend for the estimated vegetation types in Grand County.

FUELS AND TOPOGRAPHY

Fuels in Grand County were estimated using the updated Scott and Burgan (2005) 40 fuels model. The Middle Park region of the county is predominantly composed of grass (GR), grass-shrub (GS), and Shrub fuels. The grass fuels typically occur in the flatter area (commonly associated with ranches and farmlands) or on steeper south-facing slopes. The more varied topography in the Middle Park area is typically occupied by grass-shrub and shrub fuels. These fuel types are typical of high-elevation sagebrush steppe in Colorado.

Forested communities exist primarily in the higher elevations of the county on steep north-facing slopes. These montane forests are typically occupied by timber-understory (TU5) fuels and timber-litter (TL) fuels. TU forests are typically dominated by stands of lodgepole pine (*Pinus contorta*). TL forests are typically dominated by stands of Engelmann Spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*). The non-burnable areas in the county are typically associated with the alpine tundra; while these areas are considered non-burnable, wildfires have been known to “jump” these areas of sparse vegetation (e.g., East Troublesome Fire of 2020) and cause spot ignitions in areas with suitable fuels. Additional information on fuels within Grand County is in Appendix D, Fire Behavior Modeling/GIS Background and Methodology.

Table 2.1. Most Common Fuel Types in Grand County

| Existing Fuel Type | Acres | Percent |
|--|---------|---------|
| GS2 – Grass-shrub, shrubs are 1 to 3 feet high, moderate grass load | 175,668 | 14.69% |
| TU1 – Timber-understory, fuel bed is low load of grass and/or shrub with litter | 161,161 | 13.48% |
| TU5 – Timber-understory, fuel bed is high load conifer litter with shrub understory | 149,119 | 12.47% |
| SB1 – Slash-blowdown, fine fuel load is 10 to 20 tons/acre, weighted toward fuels in the 1- to 3-inch-diameter class, depth is less than 1 foot; spread rate moderate; flame length low | 140,154 | 11.72% |
| NB – Non-burnable fuels (e.g., water bodies, urban areas, barren areas, agricultural fields) | 118,454 | 9.91% |
| GS1 – Grass-shrub, shrubs are about 1 foot high, low grass load | 96,403 | 8.06% |
| TL5 – Timber-litter, high load conifer litter; light slash or mortality fuel; spread rate low; flame length low | 77,636 | 6.49% |
| TL3 – Timber-litter, moderate load conifer litter; spread rate very low; flame length low | 61,557 | 5.15% |
| GR2 – Grass, moderately coarse continuous grass, average depth about 1 foot | 58,043 | 4.85% |
| GR1 – Grass, grass is short, patchy, and possibly heavily grazed | 41,864 | 3.50% |
| SH1 – Low shrub fuel load, fuel bed depth about 1 foot; some grass may be present | 36,308 | 3.04% |
| TL2 – Timber-litter, low load, compact | 27,618 | 2.31% |
| Other – various fuel types | 51,863 | 4.34% |

Source: Scott and Burgan (2005)

Map J.1 in Appendix J shows fuels within Grand County.

FIRE REGIMES

Fires are characterized by their intensity, the frequency with which they occur, the season in which they occur, their spatial pattern or extent, and their type. Combined, these attributes describe the fire regime.

In order to classify, prioritize, and plan for fuels treatments across a fire management region, methods have been developed to stratify the landscape based on physiographic and ecological characteristics.

The county's vegetation types (see Figure 2.5) have their own unique fire regimes and ecology and have played an important role in shaping the ecology of Grand County. Inter-Mountain Basins Big Sagebrush Shrubland vegetation typically occupies the lowest elevations in the county, while Inter-Mountain Basins Sagebrush Steppe occupies the higher-elevation, non-forested rangelands. Lodgepole pine forests normally occur in the lower-elevation, montane forested regions but can also occur on higher-elevation, south-facing, xeric slopes. Spruce-fir forests typically occupy high-elevation mesic forests in the montane regions.

Most forested regions in Grand County likely experience fire intervals (number of years between successive fire events) ranging from 50 to more than 400 years (USFS 1997), while the rangelands likely experience more low-intensity, frequent wildfire with fire intervals of 10 to 30 years (NatureServe 2022). Lodgepole pine forests typically experience stand-replacing fires at moderate to longer time intervals (50 to over 150 years), while spruce-fir forests typically experience stand replacement events at long time intervals (greater than 400 years). Estimates for the sagebrush-dominated rangelands in Grand County are more uncertain (BLM 2016), but previous work has estimated, in the absence of human intervention, that these systems experience low-severity, high-frequency fire at intervals of 10 to 30 years (NatureServe 2022).

Similar to other areas in Colorado, it is likely that fire suppression, changing land use, and changing land management has resulted in more hazardous wildfire conditions in Grand County (Colorado Department of Public Safety 2018). However, it is important to address here the common misconception that all forests in Colorado's Front Range historically exhibited low-intensity, frequent surface fire regimes. The forests in Grand County are primarily dominated by three species of trees: lodgepole pine, Engelmann spruce, and subalpine fir. Most of the forests in Grand County normally exhibit standing replacement events at longer fire return intervals. In fact, evidence suggests suppression efforts of the twentieth century have had little to no impact to the natural range of variation of the fire regimes in the greater Grand County region (Sibold et al. 2006; USFS 1997). Rather, smaller and more ephemeral snowpacks and hotter annual temperatures and growing seasons brought on by climate change and its related impacts (e.g., more severe disease and insect outbreaks) are contributing to the increased risk and greater probability of large, destructive wildfires occurring in Grand County (Higuera et al. 2021).

LODGEPOLE PINE FORESTS

Lodgepole pine is typically considered a fire-adapted early seral stage (i.e., an early establishment after disturbance) species. It has serotinous cones that typically require heat (e.g., wildfire) for its cones to open and release their seeds (Anderson 2003). In the Colorado Rockies, the presence of lodgepole pine usually implies a fire-adapted and fire-prone landscape (Anderson 2003). In the forests of Grand County, lodgepole pines are typically the first tree species to reestablish after a stand-replacement wildfire (USFS 1997).

Large portions of the county's forested landscape are dominated by lodgepole pine forests. Historically, fires in lodgepole pine were typically started by lightning strikes, and most fires were usually small smoldering events with no major consequences. Climax lodgepole pine forests usually have little understory vegetation and limited amounts of fine surface fuels, which typically prevents large fires from occurring in the forest in any given year. At times, low-intensity fire can move these forests in a "log to log" fashion where they singe trees and vegetation. Like other forest communities, landscape heterogeneity and variation in stand age usually have resulted in a patchy mosaic of burn severities and burn patterns in Grand County's lodgepole pine forests (USFS 1997). However, more severe overstory burning crown fire (i.e., stand-replacing fires) are usually the defining feature of fire in lodgepole pine stands in Grand County (USFS 1997). Large stand-replacing fires typically occur at relatively infrequent intervals, are brought on by substantial tree mortality events (e.g., mountain pine beetle), occur during particularly hot fire seasons (for example, the East Troublesome Fire), and result in stand replacement of lodgepole pine forest types in all stand ages (USFS 1997).

Typically, lower-elevation and more xeric lodgepole pine forests have shorter fire return intervals that range from 50 to 150 years, while the more mesic lodgepole pine forests have longer fire return intervals that range between 200 and 400 years. Studies conducted in the southern part of Rocky Mountain National Park suggest that all lodgepole pine stands originated from stand replacement events in the last 400 years (Sibold et al. 2006).

SPRUCE-FIR FORESTS

In Grand County, spruce-fir forests are typically dominated by Engelmann spruce and subalpine fir. Compared with lodgepole pine, these species are not considered fire-adapted. They are typically secondary secessional species after a fire event. For instance, after a large fire, species like aspen (*Populus tremuloides*), lodgepole pine, and various shrubs are usually the primary seral species (Uchytil 1991a, 1991b). It may take Engelmann spruce and subalpine fir over 100 years to establish in the post-disturbance forest and another 100 or more years to reach dominance in the overstory (Uchytil 1991a, 1991b).

Due to the successional nature of spruce-fir forests, stand densities are naturally high and fire return intervals are long. Also, in Grand County, many of these forests occur in some of the coolest and wettest areas of the county. While these climate conditions naturally deter wildfire, they can also slow the rate of decomposition and result in high fuel loads in the spruce-fir forests (USFS 1991a, 1991b). In Grand County, most of the fires that have burned in spruce-fir forests were started in lower-elevation lodgepole pine forests; however, higher-elevation lightning strikes can also start fires in these forest types (USFS 1997). Most fires are usually spot ignitions that do not spread. However, when fires do spread, they are usually large, destructive stand-replacement events (Sibold 2006; Uchytil 1991a, 1991b). When large, destructive wildfires do occur, they typically follow periods where there has been substantial tree mortality from disease and insects, and they are strongly correlated with exceptionally hot and dry fire seasons (Higuera et al. 2021; Sibold 2006).

In the Grand County region, the estimated fire return interval in most spruce-fir forests is greater than 400 years (USFS 1997). Another study conducted in the southern part of Rocky Mountain National Park found that most spruce-fir forests have not been impacted by fire in more than 400 years (Sibold et al. 2006). Similar to lodgepole pine forests, climate change is expected to result in warmer annual temperatures and warmer fire seasons. This warming trend is increasing the probability of large, destructive wildfires occurring in spruce-fir forests (Higuera et al. 2021).

SAGEBRUSH SHRUBLANDS AND SAGEBRUSH STEPPE

The lower elevations are typically dominated by various communities associated with sagebrush (*Artemisia tridentata*). According to the BLM (2016), in the Kremmling area, there is uncertainty regarding the fire frequency of these systems, but other researchers have suggested that fire return intervals in these communities can range from 10 to 70 years and that these fires are usually of small and moderate sizes and burn at low to moderate severities. Throughout Colorado, healthy sagebrush rangelands reflect a mosaic of conditions created by wildfire (i.e., a landscape that exhibits different severities of wildfire and time since wildfire) (NatureServe 2022). These conditions are necessary to maintain their native ecology. However, recent modeling suggests that substantial portions of the rangelands have departed from the natural fire regime (BLM 2016). Reasons for departure have been attributed to fire suppression, overgrazing, tree and shrub encroachment, and the influx and spread non-native species such as cheatgrass (*Bromus tectorum*) (BLM 2016).

CLIMATE AND WEATHER PATTERNS

Highly varied topographical characteristics within Grand County contribute to substantial variability in regard to climate and weather within the planning area. Shifts in elevation affect wildland fuels, wind speed and direction, and fire behavior, which, in turn, can impact how the WUI is delineated. The county has complex topography and flammable fuels (e.g., portions of the Arapahoe National Forest, Rocky Mountain National Park, and various rangelands) that can put local communities at risk. Many communities in Grand County are surrounded by rangelands and montane forests that display variable, complex, and frequently steep terrain.

Differences in topographical features throughout Grand County also contribute to the divergent climatic regimes within the planning area. Temperatures in Middle Park and associated rangelands can frequently rise into the 80s in the summer months and occasionally exceed 90°F. The rangelands are comparatively warm and dry compared with the higher-elevation areas, which are generally cooler and receive more precipitation. Overall, the climate of Grand County is heavily influenced by its mountainous topography. The mountainous regions are generally cold and wet, while the valleys in the county are comparatively warm and dry (PRISM Climate Group [PRISM] 2022).

Table 2.2. Mean Annual Temperature and Precipitation by Station in Grand County

| Station | Period of Record | Mean Annual Precipitation (Inches) | Mean Annual Temperature (°F) | | |
|-------------------|------------------|------------------------------------|------------------------------|------|-------------|
| | | | Max | Min | Mean Annual |
| Grand Lake | 1991–2020 | 18.60 | 52.3 | 21.5 | 36.9 |
| Indian Peaks area | 1991–2020 | 42.2 | 41.2 | 21.2 | 31.2 |
| Kremmling | 1991–2020 | 12.00 | 54.6 | 22.5 | 38.5 |

Sources: NOAA (2022); PRISM (2022)

July is typically the hottest month of the year in the county, with average July maximum temperatures ranging from 57.8°F in the Indian Peak area to 81.3°F in the Kremmling area. January is usually the coldest month, with average January minimum temperatures ranging from -1.5°F in the Kremmling area to 4.5°F in the Grand Lake area (National Oceanic and Atmospheric Administration [NOAA] 2022; PRISM 2022). In the county's rangelands, temperatures typically display more variation between the summer and

winter months than do the more montane portions of the county. For instance, summers in the Middle Park regions are relatively hot compared with the more montane regions, but contrarily, Middle Park has colder winters than the more montane regions.

Mean annual precipitation varies dramatically between the lowland rangelands (i.e., Middle Park) and the high-elevation montane areas. Annual precipitation ranges from only 12.0 inches in the Kremmling area to over 40 inches on the western side of the Indian Peaks area. The winter and spring months are usually the wettest months of the year in the high-elevation montane areas. The Indian Peaks area generally receives most of its precipitation in March and April (4.53 and 5.33 inches, respectively) as spring snowstorms, with April typically being the wettest month. In the lower and middle elevations, spring seasons are also wet, but July and August are also some the wettest months of the year due the monsoon effect on Colorado. The wettest month in the Kremmling area is usually May, while the wettest month in the Grand Lake area is typically August. June is typically the driest month of the year in the region. Precipitation totals in June range from 0.88 inch in Kremmling to 1.79 inches in the Indian Peak area. Particularly dry Junes can exacerbate fire risk, especially in years with a weak monsoon effect in July and August.

Monthly climate normals (30-year averages) for Grand County are graphed by weather stations and modeled climate data below (Figures 2.6–2.8).

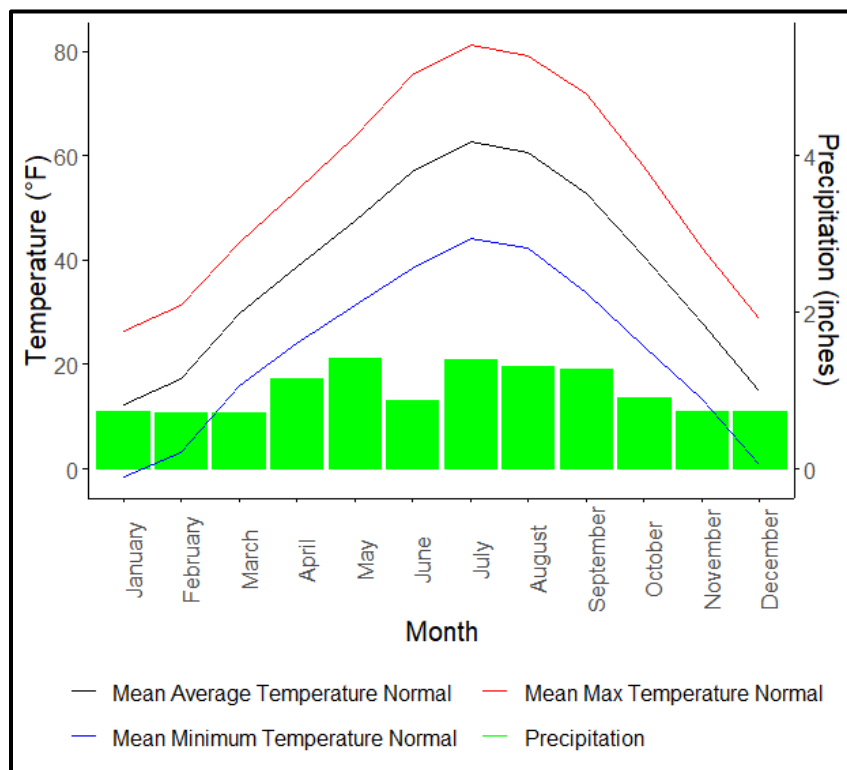


Figure 2.6. Monthly climate averages for the town of Kremmling, Colorado, 1991–2020 (source: NOAA 2022).

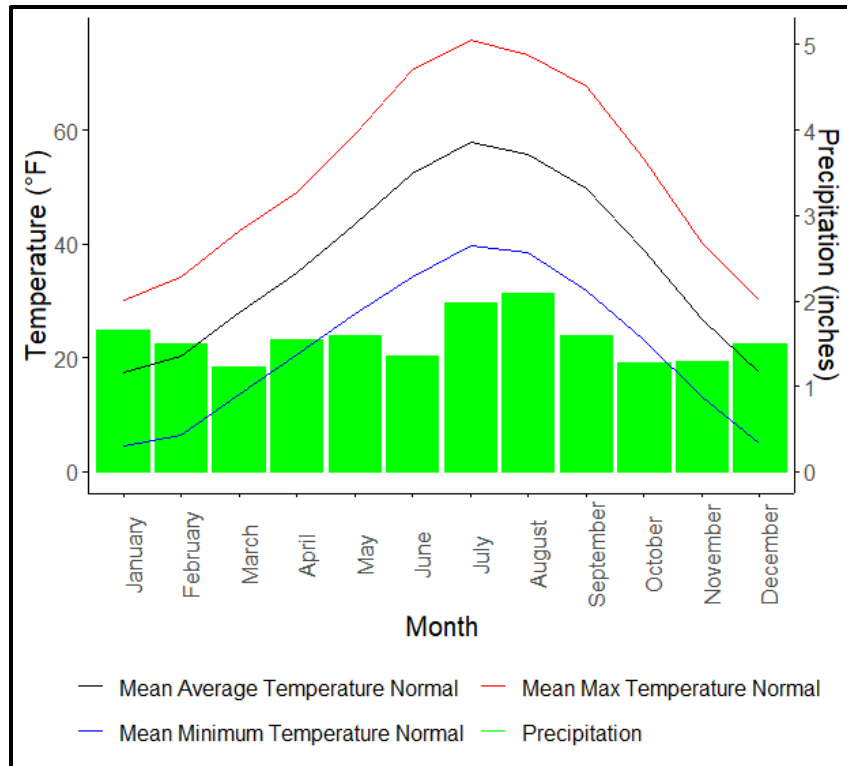


Figure 2.7. Monthly climate averages for the town of Grand Lake, Colorado, 1991–2020 (source: NOAA 2022).

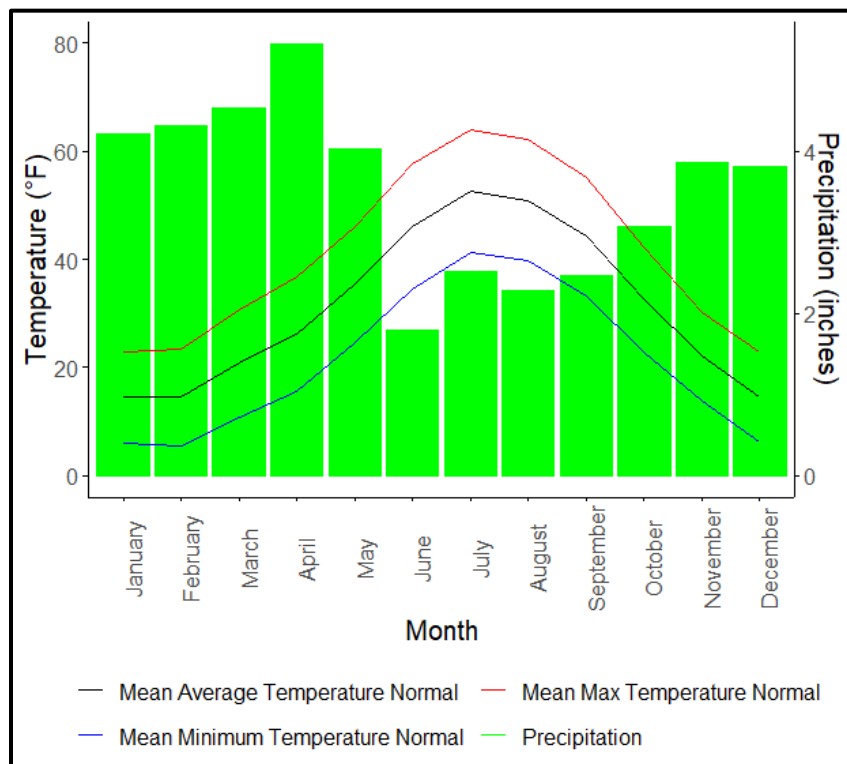


Figure 2.8. Monthly climate averages for the western Indian Peaks area, 1991–2020 (source: PRISM 2022).

It should be noted that, with climate change, Colorado is expected to experience significant changes in weather, which will likely exacerbate the behavior of future fires. Specific to wildfires, under all climate change scenarios, Colorado is expected to have increased summer temperatures and lengthening of the fire season. Precipitation totals are less likely to change, but the timing and duration of precipitation events will be more variable (Colorado Water Conservation Board 2023). Overall, the warmer temperatures will bring about drier weather in Grand County, which will exacerbate the county's fire risk.

FIRE HISTORY

Fire is a natural part of Colorado's diverse landscapes and is essential to many ecosystems across the state. Almost all of Colorado's diverse ecosystems are fire-dependent or fire-adapted. For centuries, many Colorado Native American tribes recognized this interdependence between fire and the ecosystem and used prescribed burning to maintain and restore ecosystem health. However, in the 1800s, a shift in management actions—settlers began enforcing strict fire suppression regimes—led to challenges such as dense stand conditions, unhealthy rangelands, and increased ecosystem and community vulnerability to fire. Evidence suggests that the fire regimes for Grand County's forests may not currently be outside of their historic range of variation. However, there is evidence that wildland fire suppression may be impacting the county's rangelands and causing departure from historic conditions (BLM 2016). Furthermore, other actions such as human expansion into wildlands, climate change, and forest health degradation have likely resulted in an imbalance between wildfire and ecosystem interactions (Higuera et al. 2021).

PAST FIRE MANAGEMENT POLICIES AND LAND MANAGEMENT ACTIONS

Fire management in Colorado and the western United States has adapted over time in response to changing knowledge of forest ecosystems. In 1910, just 5 years after the USFS was established, massive fires burned over 3 million acres of the agency's land in northern Idaho and western Montana, prompting a federal fire suppression policy to protect ecosystem services and timber stands (USFS 2017). The NPS and BLM were established in 1916 and 1946, respectively, and adopted similar land management philosophies. In the 1970s, forest management research began to reveal the natural role of wildfire in ecosystems (USFS 2017), and by the turn of the century, complete fire suppression tactics on publicly managed land were mostly replaced with a combination of suppression, containment, and mitigation measures such as fuel treatments and prescribed burning (Forests and Rangelands 2021). Although these practices now protect and restore public lands through more scientifically supported methods, some areas in Grand County have excessive fuel buildups, dense and continuous vegetative cover, and tree and shrub encroachment into previously open rangelands as a result of historic suppression strategies (BLM 2016; USFS 1997). In particular, the BLM has noted problems with tree and shrub encroachment into Grand County, which has impacted the vegetation and wildfire ecology of the rangelands in Grand County (BLM 2016).

RECENT FIRE OCCURRENCE

An analysis of Grand County's wildland fire history (1931–2020) (LANDFIRE 2022) shows that fires have mostly occurred in the county's forested areas (Figure 2.9). However, larger forest fires have spread into the rangelands and there have also been incidents isolated to the rangelands. There is a low number of

recorded fires in Grand County prior to 2010 (Figure 2.10). However, after 2010, Grand County has experienced numerous wildfires. Most of the fires in the county have been less than 10 acres. However, the larger fires, while few in number, comprise most of the burned acres in any given year (Figures 2.11 and 2.12). In 2018, the Silver Creek Fire burned approximately 20,000 acres of land. In 2020, two fires, the Williams Fork Fire and the East Troublesome Fire, burned more than 208,000 acres of land. These large fires, especially the East Troublesome Fire, were mostly stand-replacing events.

Colorado's fire season has been estimated to occur between mid-May and mid-October (Wei et al. 2017). Grand County's recent fire history reflects this, as most fires occurred within the period of June through September, which is when high temperatures and drier conditions are more probable across the county (Figure 2.13). While ignitions are less likely in October, these late-season ignitions can result in large and destructive wildfires, such as the East Troublesome Fire, which started on October 14, 2020 (NPS 2021). Humans have been the primary cause of wildfire ignitions (Figure 2.14); however, natural ignitions are also common. Since 2014, humans have been responsible for 71.2% of the fires that have occurred within Grand County and have a known ignition source, with many of these human-caused ignitions occurring near the county's towns and municipalities (Figures 2.15 and 2.16). This high percentage is likely to be due to the high number of recreationists in Grand County and the large proportion of WUI within the county (see Figure 2.1); ATV use, railroad sparks, campfires, garbage burns, and other similar sources of ignition are becoming increasing concerns.

The three largest and most destructive wildfires in Grand County have occurred since 2016, with two—the East Troublesome Fire and Williams Fork Fire—occurring in 2020. Recent wildfires of note are discussed below. The more recent wildfires have been attributed to impacts from drought, warmer temperatures due to climate change, and widespread beetle kill of conifers (Grand County Office of Emergency Management [GCOEM] 2020).

Silver Creek Fire: This fire, which occurred in late summer of 2018, was a lightning ignition that burned approximately 20,000 acres of land. This fire was associated with an active fire season in the region. During the 2018 fire season, northwestern Colorado experienced more than 229 active wildfires (Colorado Department of Public Safety 2018).

Williams Fork Fire: This fire occurred in the Arapaho National Forest and began approximately 15 miles southwest of the town of Fraser. It was likely human caused (9news 2020) and was exacerbated by beetle-killed conifers and dry conditions. This fire burned 14,833 acres and threatened the towns of Winter Park and Fraser (USFS 2021a). The fire was completely contained by the end of November 2020.

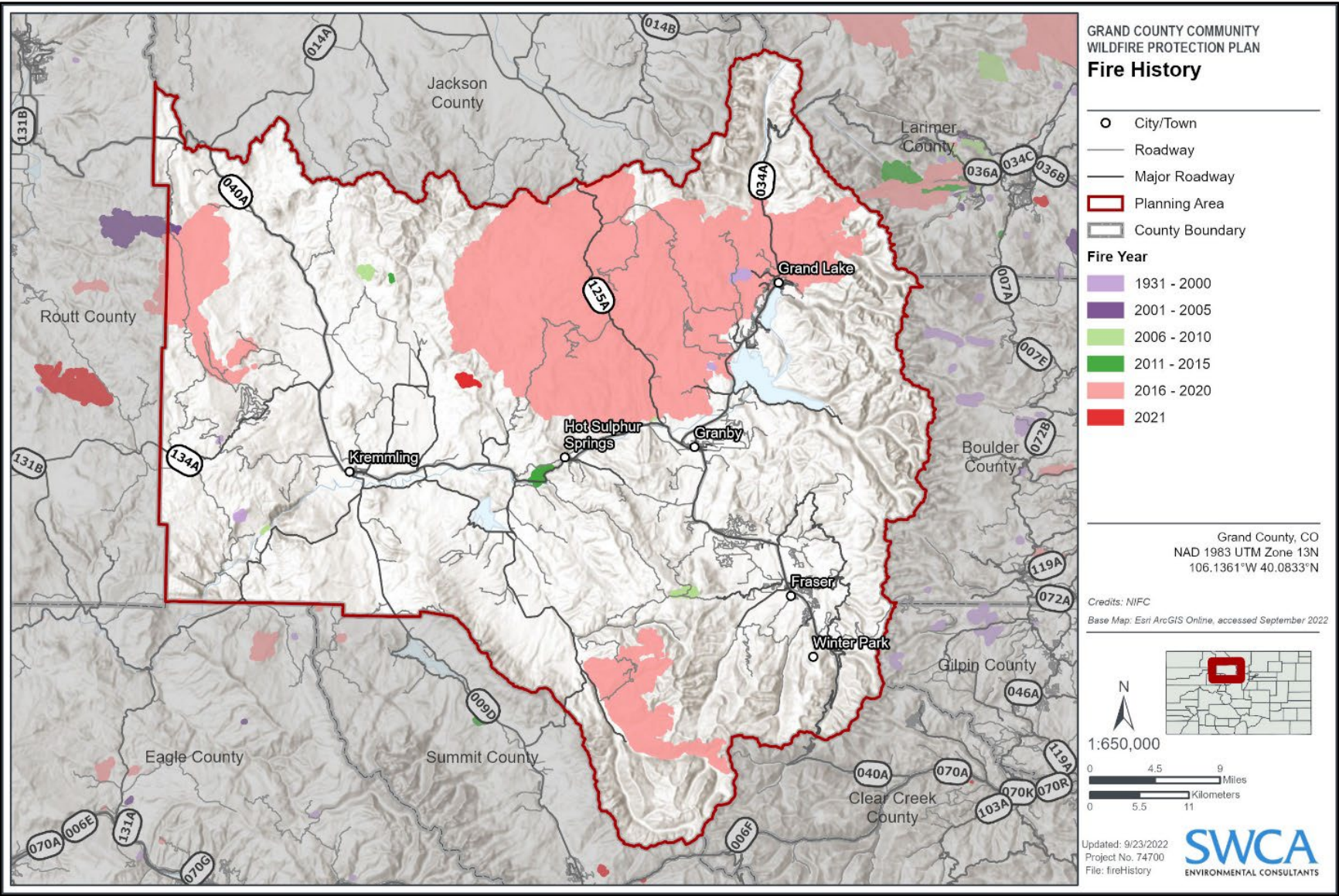


Figure 2.9. Recent wildfire history in Grand County.

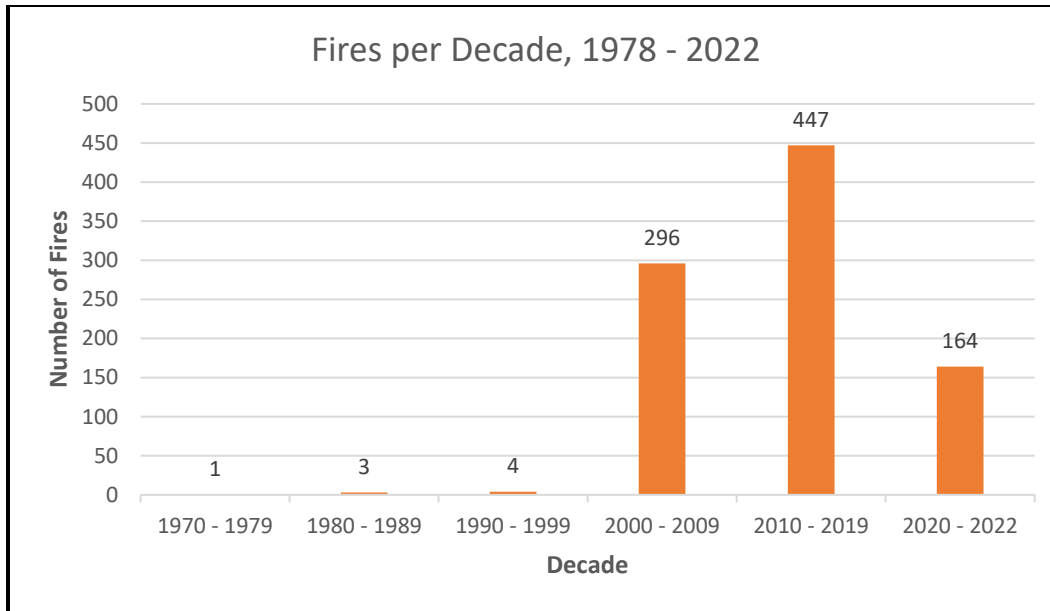


Figure 2.10. Decadal wildfire frequency for Grand County based on available data from 1970 through 2022.

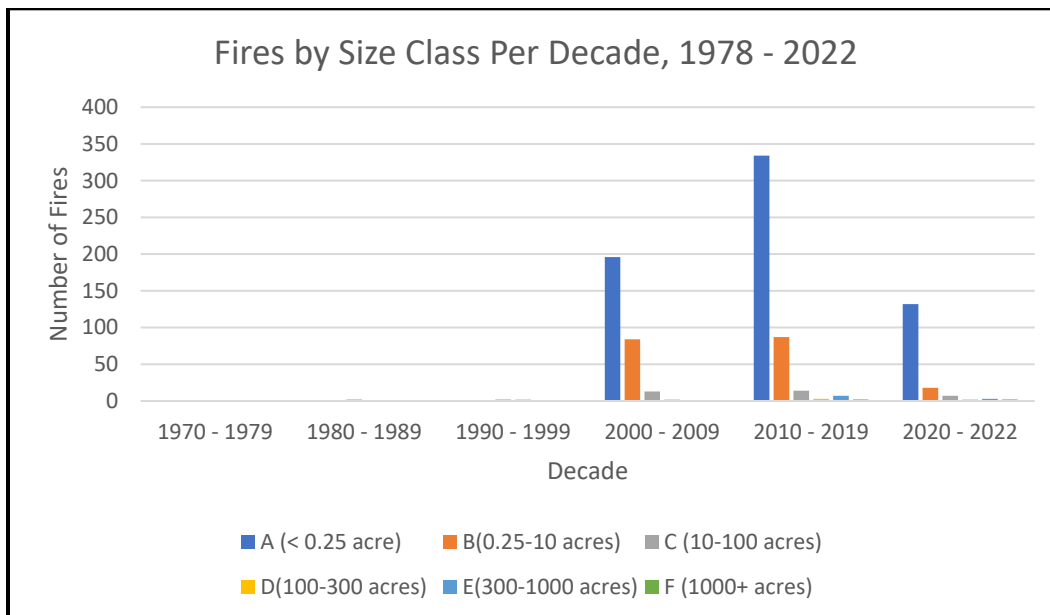


Figure 2.11. Fire size statistics for Grand County based on fire history data from 1970 through 2022.

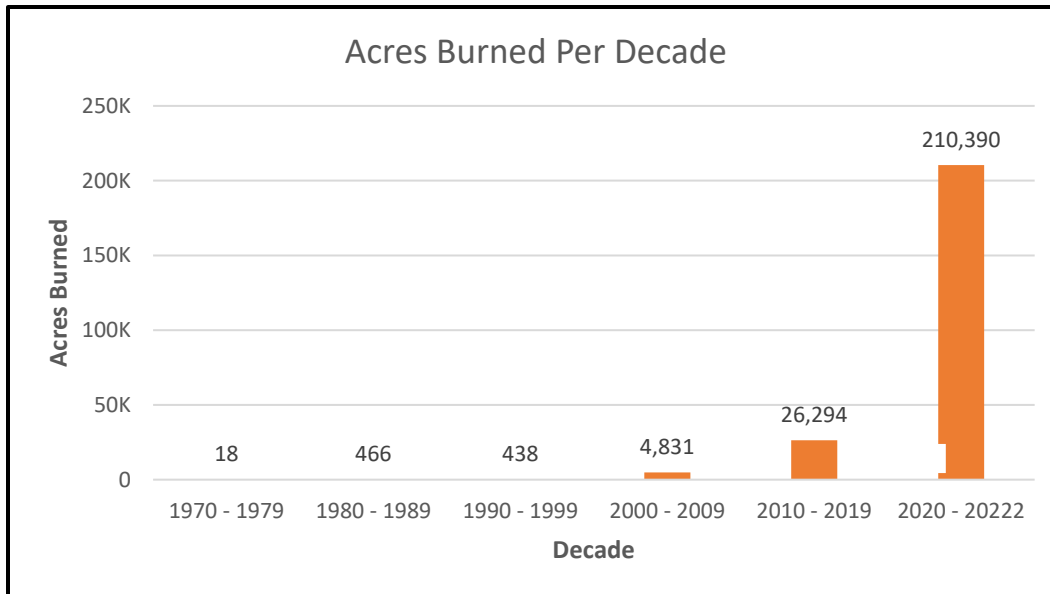


Figure 2.12. Acres burned per decade for Grand County based on fire history data from 1978 through 2022.

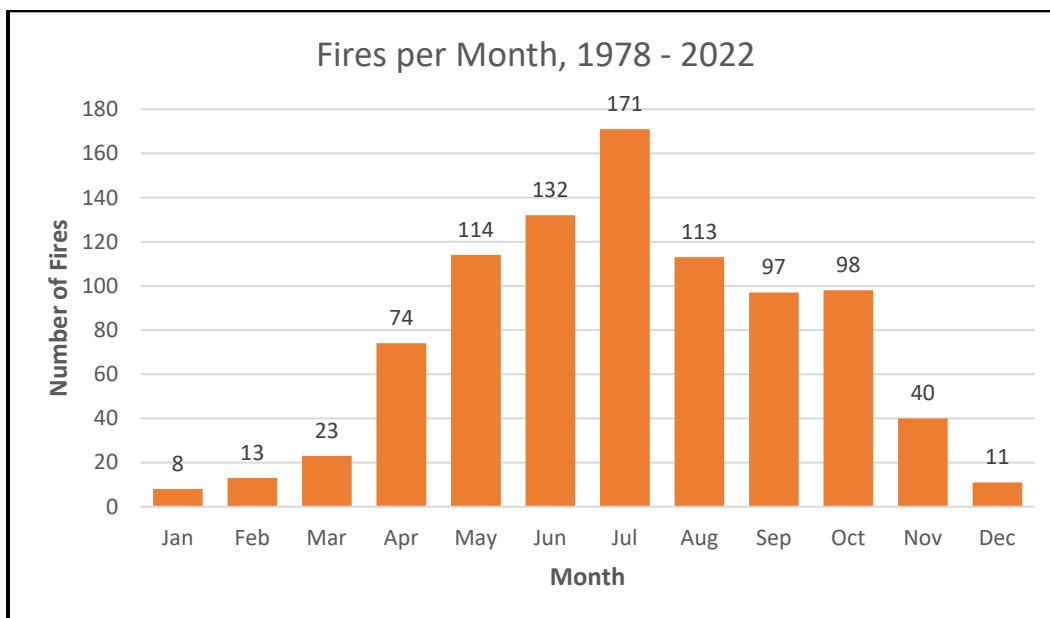


Figure 2.13. Number of recorded fires per month in Grand County from 1978 through 2022.

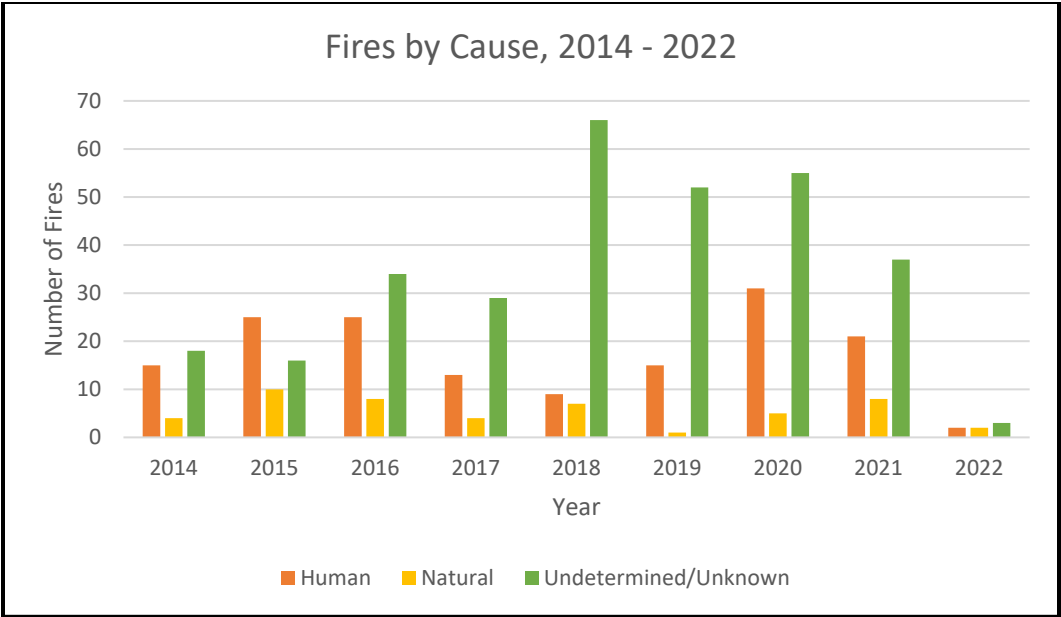


Figure 2.14. Cause of wildfire ignitions in Grand County from 2014 through 2022.

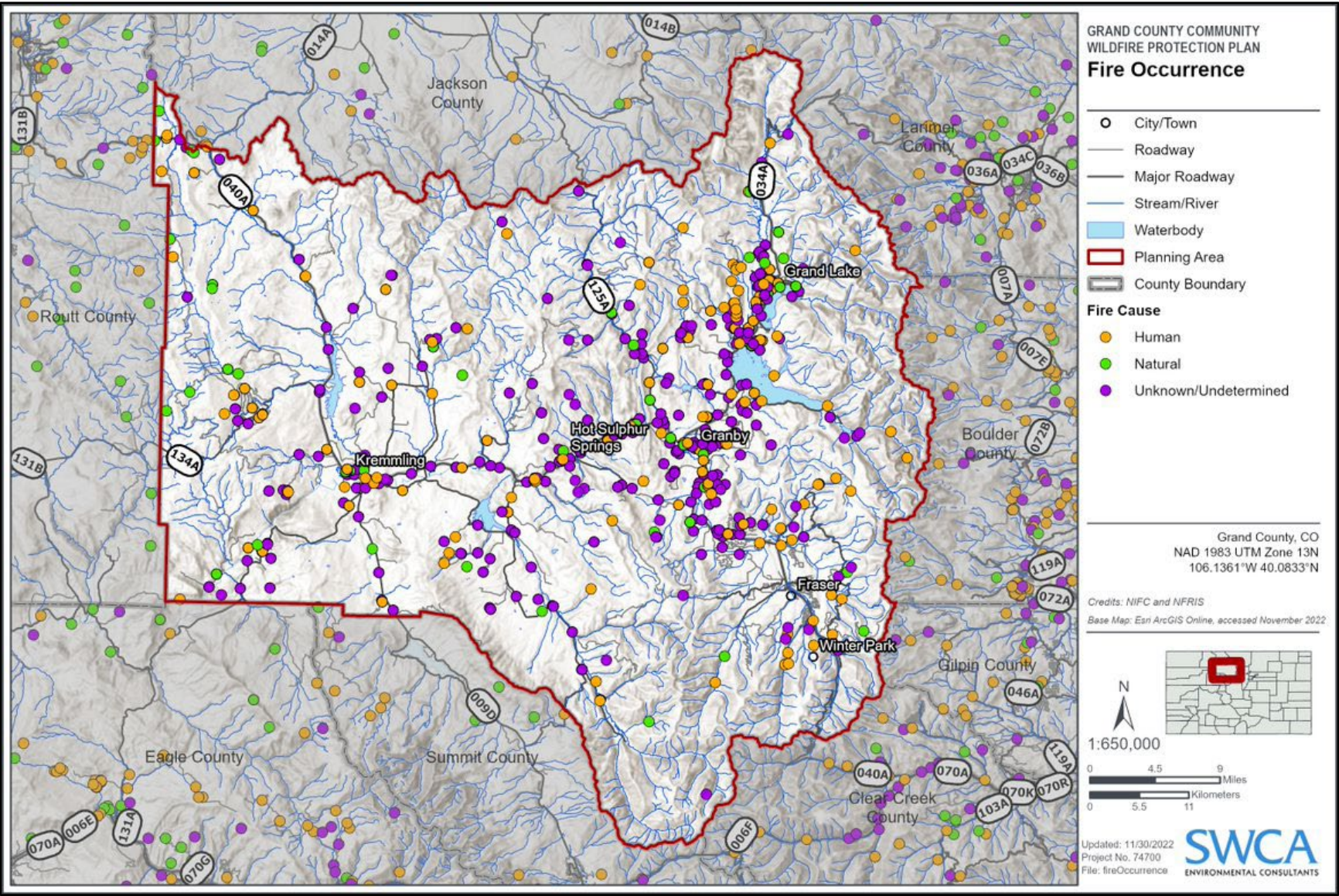


Figure 2.15. Location of wildfire occurrences in Grand County.

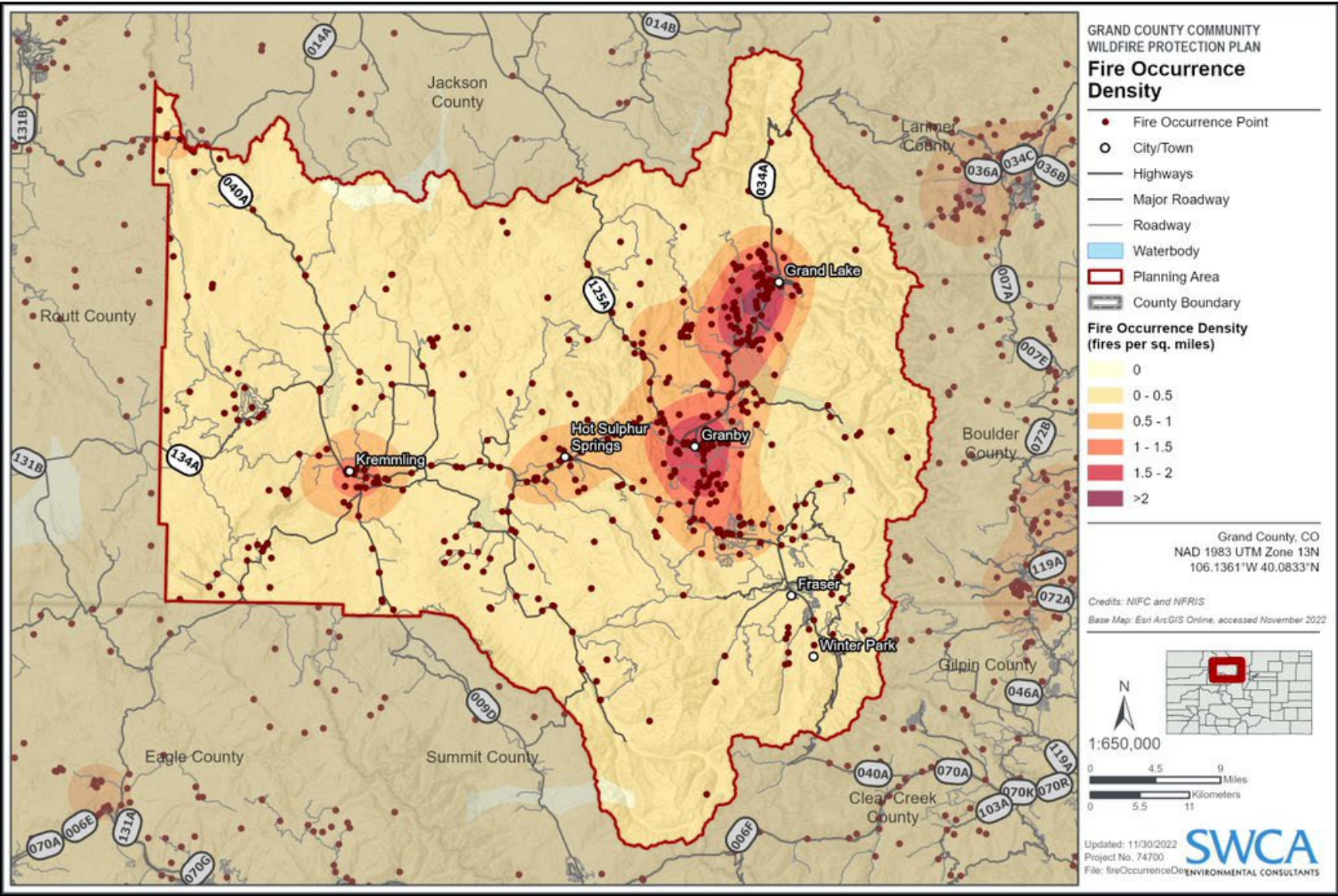


Figure 2.16. Fire occurrence densities in Grand County.

East Troublesome Fire: This is the second largest wildfire recorded in the state's history and was human caused. In total, this fire burned 193,812 acres. This fire began in mid-October 2020 approximately 15 miles northeast of Kremmling in the Arapaho National Forest. Of note was the dramatic increase in the wildfire's size in a relatively short duration. Between October 20 and 23, the fire spread increased dramatically with 24-hour increases of around 18,000 to 87,000 acres during the 4-day run. In less than 24 hours (between late afternoon of October 21 and early afternoon of October 22), the fire grew 87,093 acres. During this 4-day period, the fire grew from 18,550 acres to 187,964 acres. This dramatic increase was attributed to a combination of dry conditions (drought and low humidity), high winds, and numerous dead and/or down beetle-killed trees. This fire managed to jump the continental divide, meaning it crossed high-elevation areas of alpine tundra, which are normally considered strong barriers to wildfire spread. Embers carried by high winds are thought to be the cause of the fire spreading to the east side of the continental divide (CMAT 2021; NPS 2022a; USFS 2021b). Snowfall and cooler temperatures started on October 24 and helped quell the fire's behavior. The fire was considered 100% contained on November 30. Over 35,000 people were placed under a mandatory evacuation order during this fire event. It is estimated that the fire destroyed 366 residences and 214 outbuildings and commercial structures (CPR 2020). The most impacted and threatened regions were the Big Horn Park subdivision, houses along State Highway 125, the Trail Creek area, and the towns of Grand Lake and Granby (GCOEM 2020).

FIRE RESPONSE CAPABILITIES

Planning Decision and Support

Wildfires have continued to grow in size and severity over the last decade, requiring fire managers to institute more robust pre-fire planning as well as adapt and improve decision-making tools in order to reduce risk to fire responders and the public and assess impacts to ecological processes.

A primary decision tool utilized by fire managers across all agencies is the Wildland Fire Decision Support System (WFDSS), a system that assists fire managers and analysts in making strategic and tactical decisions for fire incidents (WFDSS 2021). WFDSS combines desktop applications for fire modeling into one web-based system. It provides a risk-informed decision process and documentation system for all wildland fires, and it also introduces economic principles into the fire decision process in order to improve efficiencies while also ensuring safe and effective wildfire response.

Fire Resources

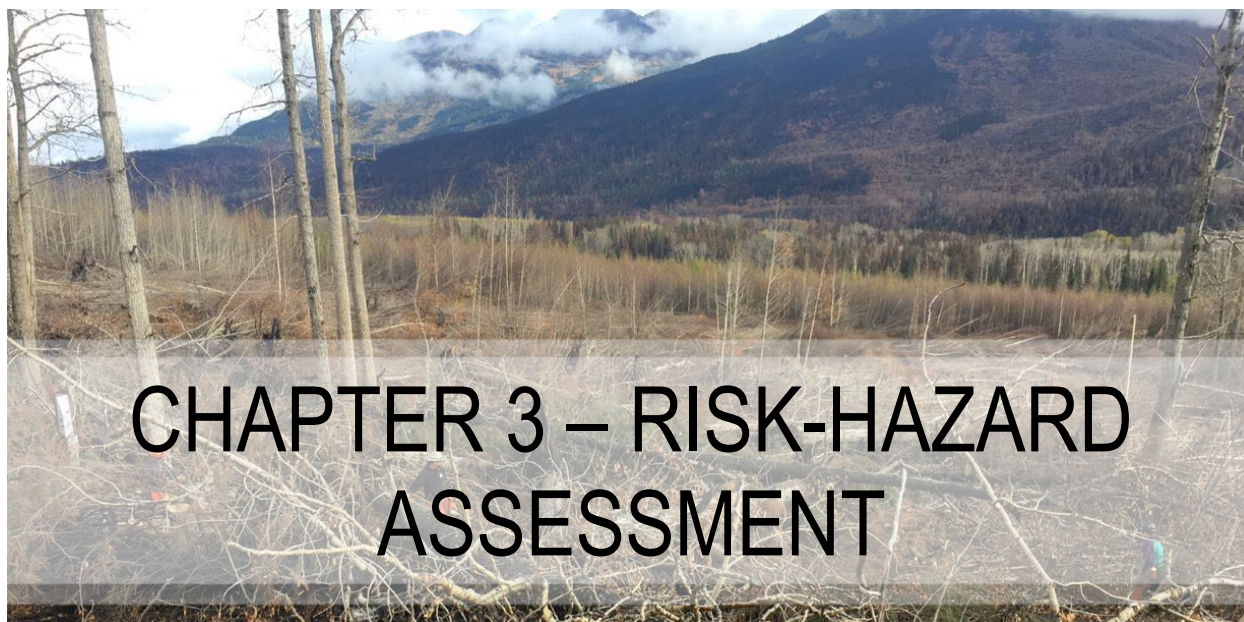
Fire management in Colorado is accomplished through a cooperative interagency partnership among federal, state, and local entities. Wildland fire response is directed and managed by regional interagency fire centers in Colorado. These dispatch centers are part of the larger Rocky Mountain Area Coordination Center. The dispatch centers in Colorado include the Fort Collins, Craig, Grand Junction, Montrose, Durango, and Pueblo Interagency Dispatch Centers. Wildfire response in Grand County is largely an interagency cooperative effort (Geographic Area Coordination Centers [GACC] 2022). The Fort Collins and Craig Interagency Dispatch Centers serve lands located in Grand County. Additional details regarding fire response resources can be found in Appendix B, and Map J.10 of Appendix J outlines local fire station service areas.

Individuals seeking fire resources can explore the Grand County Wildfire Council ([bewildfireready.org](https://www.bewildfireready.org)), which serves as an excellent local resource for collaborative education and action on wildfire prevention, mitigation, and community preparedness. In addition, community members can take National Wildfire

Coordinating Group Classes to learn about wildfires or Community Emergency Response Team (CERT) training to learn disaster response and medical skills. Additional resources for community and fire preparedness can be found in Appendix B.

HEIGHTENED FIRE RISK SINCE 2006

The most recent countywide CWPP was completed in 2006, and since its completion, the County has experienced a considerable increase in its wildfire risk. The most notable change driving the increased risk has been the continued decline of forest health due to the continued die-off of the County's conifers due to the mountain pine beetle and spruce beetle outbreaks. The 2006 CWPP noted considerable tree die-off and heightened wildfire risk due the mountain pine beetle attacks on lodgepole pines (Grand County 2006). Since 2006, this trend had continued and has been exacerbated by drier and warmer conditions. These conditions lead to the continuation of fuel buildup of standing-dead and downed-dead trees. The downed-dead trees, in particular, created a complex mosaic of dense, crisscrossing, stacked, dry, and combustible ladder fuels. These hazardous conditions helped fuel the rapid spread and destructive nature of the East Troublesome Fire.



PURPOSE

The purpose of developing the Composite Risk-Hazard Assessment model described here is to create a unique tool for evaluating the risk of wildland fires to communities within the WUI areas of Grand County. Although many definitions exist for hazard and risk, for the purpose of this document, these definitions follow those used by the firefighting community:

Risk is defined as the chance of a fire starting as determined by the presence and activity of causative agents (NWCG 1998).

Hazard is a fuel complex defined by kind, arrangement, volume, condition, and location that forms a special threat of ignition and resistance to control.

The Composite Risk-Hazard Assessment combines the findings from a field-based Community Hazard Assessment (using NFPA Wildland Fire Risk and Hazard Severity Form 1144) and a Desktop Risk-Hazard Assessment using modeled inputs.

From these assessments, land use managers, fire officials, planners, and others can begin to prepare strategies and methods for reducing the threat of wildfire, as well as work with community members to educate them about methods for reducing the damaging consequences of fire. The fuels reduction treatments can be implemented on both private and public land, so community members have the opportunity to actively apply the treatments on their properties, as well as recommend treatments on public land that they use or care about.

Disclaimer

The purpose of this Risk-Hazard Assessment is to provide a community- and landscape-level overview of wildfire risk and is not recommended for use at smaller scales (such as for a subdivision- or property-level analysis). It is also not recommended for use in determining insurance rates or policies. This Risk-Hazard Assessment is a model and, as such, has inherent biases, missing data, and other shortcomings, though every effort has been made to include the best available data and use the most robust scientific processes. Also note that just because an area is shown as high or low risk does not mean that that area

will be burned or not burned in a wildfire—a low risk area can still be affected by wildfire if the conditions are right. This Risk-Hazard Assessment is also not intended for use during active wildfire events, but rather only as a tool for mitigation and pre-fire planning. It is not recommended that this Risk-Hazard Assessment be used for any other purpose than what is stated here.

FIELD-BASED COMMUNITY HAZARD ASSESSMENTS

Community Hazard Assessments were conducted using the NFPA Wildland Fire Risk and Hazard Severity Form 1144 (see Appendix K). This form is based on the NFPA Standard for Reducing Structure Ignition Hazards from Wildland Fire 2013 Edition (NFPA 2013). The NFPA standard focuses on individual structure hazards and requires a spatial approach to assessing and mitigating wildfire hazards around existing structures. It also includes ignition-resistant requirements for new construction and is used by planners and developers in areas that are threatened by wildfire and is commonly applied in the development of Firewise Communities (for more information, see www.firewise.org).

The purpose of the Community Hazard Assessment and subsequent ratings is to identify fire hazard and risks and prioritize areas in the County requiring mitigation and more detailed planning. These assessments should not be seen as tactical pre-suppression or triage plans. The Community Hazard Assessment helps to drive the recommendations for mitigation of structural ignitability, community preparedness, and public education (see the project recommendations in Chapter 4 or Appendix E, Project Recommendations). The assessment also helps to prioritize areas for fuels treatment based on the hazard rating. Each area was rated based on conditions within the community and immediately surrounding structures, including access, adjacent vegetation (fuels), defensible space, adjacent topography, roof and building characteristics, available fire protection, and placement of utilities. Where a single score could not be assigned due to a range of conditions, a range of values was assigned. Each score was given a corresponding adjective rating of low, moderate, high, or extreme.

Community Hazard Assessments for Grand County were conducted in fall of 2022. The CAR hazard ratings from the Community Hazard Assessment are provided in Table 3.1. This table also includes a summary of the positive and negative attributes of a community as they relate to wildfire risk. Full CAR descriptions are provided in Appendix C. It is recommended additional neighborhood/subdivision- and parcel-level assessments be completed to develop localized action plans.

Table 3.1. Communities at Risk Ratings with Community Hazard Assessment Summary

| Community | Score | Rating | Fire Station | Positives | Negatives |
|--|-------|---------|--|--|---|
| Big Horn Park* (Figure C.32, Appendix C) | 132 | Extreme | Kremmling FPD No. 5 | <ul style="list-style-type: none"> Some visible fuels mitigation efforts around homes Metal roof or asphalt shingle throughout | <ul style="list-style-type: none"> Road width <20 feet Limited turnarounds for fire trucks Non-reflective street signs Limited defensible space Combustible housing materials Buildings <30 feet to slope, many built on slopes Limited water sources for suppression Fire station >5 miles from community Aboveground gas and electric utilities |
| Blue Valley Acres (Figure C.54, Appendix C) | 74 | High | Kremmling FPD No. 5 | <ul style="list-style-type: none"> Ingress/egress Some defensible space Metal roof or asphalt shingle throughout | <ul style="list-style-type: none"> Limited turnarounds for fire trucks Combustible building materials Structures <30 feet to slope Fire station >5 miles from community |
| Town of Granby (including greater Granby Ranch area) (Figure C.58, Appendix C) | 104 | High | Grand FPD No. 1 Headquarters and East Grand FPD No. 4 Red Dirt | <ul style="list-style-type: none"> Ingress/egress Road width >24 feet Metal roof or asphalt shingle throughout Fire hydrants Fire station <5 miles from community | <ul style="list-style-type: none"> Limited turnarounds for fire trucks Limited defensible space Combustible building materials Many structures <30 feet to slope |
| Fraser and Winter Park (Figure C.4, Appendix C) | 97 | High | East Grand FPD No. 4 Headquarters | <ul style="list-style-type: none"> Fire hydrants throughout Many structures >30 feet from slopes Ingress/egress Class A roofing materials | <ul style="list-style-type: none"> Some narrow access to homes with no turnarounds Combustible building materials Limited defensible space High fuel loads |

| Community | Score | Rating | Fire Station | Positives | Negatives |
|--|-------|----------|--|--|--|
| Gorewood* (Figure C.36, Appendix C) | 125 | Extreme | Kremmling FPD No. 5 | <ul style="list-style-type: none"> • Reflective street signs • Some visible fuels mitigation efforts • Metal roof or asphalt shingle throughout | <ul style="list-style-type: none"> • Few roads in and out • Road width <20 feet • Limited turnarounds for fire trucks • Limited defensible space • Combustible building materials • Limited water sources for suppression • Aboveground gas and electric utilities • Dense fuel loads |
| Grand River Ranch (Figure C.56, Appendix C) | 67 | Moderate | Kremmling FPD No. 5 | <ul style="list-style-type: none"> • Some defensible space around structures • Metal roof or asphalt shingle throughout • Structures <30 feet to slope | <ul style="list-style-type: none"> • Limited turnarounds for fire trucks • Non-reflective street signs • Combustible building materials |
| Highlands/Pole Creek (Figure C.16, Appendix C) | 111 | High | <ul style="list-style-type: none"> • Grand FPD No. 1 Red Dirt • East Grand FPD No. 4 Tabernash | <ul style="list-style-type: none"> • Few hydrants • Reflective street signs • Visible fuels mitigation • Metal roof or asphalt shingle throughout • Fire station >5 miles from community | <ul style="list-style-type: none"> • Difficult to navigate • Limited turnarounds for fire trucks • Narrow, steep roads in places • Combustible building materials • Limited defensible space • Homes built near slopes |
| Highway 125 (Figure C.60, Appendix C) | 102 | High | <ul style="list-style-type: none"> • Grand FPD No. 1 Headquarters | <ul style="list-style-type: none"> • Some defensible space around structures • Metal roof or asphalt shingle throughout • Structures >30 feet to slope | <ul style="list-style-type: none"> • Limited turnarounds for fire trucks • Non-reflective street signs • Combustible building materials • Limited water sources for suppression • Fire station >5 miles from community |

| Community | Score | Rating | Fire Station | Positives | Negatives |
|---|-------|---------|--|---|---|
| Homestead Hills (Figure C.12, Appendix C) | 110 | High | <ul style="list-style-type: none"> Grand FPD No. 1 Headquarters Grand FPD No. 1 and East Grand FPD No. 4 Red Dirt | <ul style="list-style-type: none"> Reflective street signs Metal roof or asphalt shingle throughout Fire hydrants <5 miles from fire station | <ul style="list-style-type: none"> Challenging ingress/egress Limited fire truck turnarounds Homes built near slopes Combustible siding Limited defensible space |
| Hot Sulphur Springs (Figure C.24, Appendix C) | 102 | High | Hot Sulphur Springs/Parshall FPD No. 3 Station 1 | <ul style="list-style-type: none"> 2+ roads in and out Metal roof or asphalt shingle throughout Fire hydrants <5 miles from a fire station | <ul style="list-style-type: none"> Limited turnarounds for fire trucks Non-reflective street signs Limited defensible space Combustible housing materials |
| Ice Box (Figure C.22, Appendix C) | 106 | High | <ul style="list-style-type: none"> East Grand FPD No. 4 Tabernash East Grand FPD No. 4 Headquarters Grand FPD No. 1 and East Grand FPD No. 4 Red Dirt | <ul style="list-style-type: none"> Ingress/egress Reflective street signs Metal roof or asphalt shingle throughout | <ul style="list-style-type: none"> Limited turnarounds for fire trucks Limited defensible space Combustible building materials Limited water sources for suppression Fire station >5 miles from the community |
| Junction Ranch (Figure C.20, Appendix C) | 121 | Extreme | East Grand FPD No. 4 Tabernash | <ul style="list-style-type: none"> 2+ roads in and out Reflective street signs Metal roof or asphalt shingle throughout Visible fuels mitigation work | <ul style="list-style-type: none"> Limited turnarounds for fire trucks Limited defensible space Limited water sources for suppression Fire station >5 miles from community Narrow, steep roads in places |

| Community | Score | Rating | Fire Station | Positives | Negatives |
|---|-------|---------|---|---|---|
| Kremmling (Figure C.34, Appendix C) | 76 | High | Kremmling FPD No. 5 | <ul style="list-style-type: none"> • Ingress/egress • Available turnarounds for fire trucks • Reflective street signs • Metal roof or asphalt shingle throughout • Fire hydrants | <ul style="list-style-type: none"> • Limited defensible space |
| Lake Agnes* (Figure C.50, Appendix C) | 115 | Extreme | <ul style="list-style-type: none"> • Kremmling FPD No. 5 • Steamboat Springs, Routt County | <ul style="list-style-type: none"> • 2+ roads in and out • Class A roofing materials • Spacing between structures | <ul style="list-style-type: none"> • Ingress/egress • Limited turnarounds for fire trucks • Limited defensible space • Steep slopes • Combustible building materials • Structures <30 feet to slope • Fire station >5 miles from community |
| Legacy Park Ranch (Figure C.42, Appendix C) | 107 | High | Grand FPD No. 1 Headquarters | <ul style="list-style-type: none"> • 2+ roads in and out • Metal roof or asphalt shingle throughout • Some hydrants throughout | <ul style="list-style-type: none"> • Non-surfaced, steep roads • Limited turnarounds for fire trucks • Limited defensible space • Combustible building materials |
| Lower Williams Fork (Figure C.28, Appendix C) | 125 | Extreme | <ul style="list-style-type: none"> • Hot Sulphur Springs/Parshall FPD No. 3 Station 1 • Kremmling FPD No. 5 | <ul style="list-style-type: none"> • Reflective street signs • Structures well-spaced • Metal roof or asphalt shingle throughout • Visible fuels mitigation efforts | <ul style="list-style-type: none"> • Ingress/egress • Limited housing numbering • Combustible housing materials • Limited water sources for suppression • Fire station >5 miles from community • Aboveground gas and electric utilities |

| Community | Score | Rating | Fire Station | Positives | Negatives |
|--|-------|--------|---|---|--|
| Northern Grand Lake (Figure C.44, Appendix C) | 101 | High | <ul style="list-style-type: none"> Grand Lake FPD No. 2 Station 2 – Columbine Grand Lake FPD No. 2 Headquarters | <ul style="list-style-type: none"> 2+ roads in and out Reflective street signs Metal roof or asphalt shingle throughout Many structures >30 feet to slope Hydrants and water tanks throughout Station <5 miles from community | <ul style="list-style-type: none"> Limited turnarounds for fire trucks Limited defensible space In areas that remain unburned, dense fuel loads Combustible building materials |
| Old Park (Figure C.38, Appendix C) | 107 | High | Kremmling FPD No. 5 | <ul style="list-style-type: none"> Reflective street signs Some defensible space Metal roof or asphalt shingle throughout Many homes built on flat terrain | <ul style="list-style-type: none"> Ingress/egress Limited turnarounds for fire trucks Combustible building materials Limited water sources for suppression Fire station >5 miles from community Both gas and electric utilities aboveground |
| Parshall and Surrounding Areas (Figure C.30, Appendix C) | 107 | High | <ul style="list-style-type: none"> Kremmling FPD No. 5 Hot Sulphur Springs/Parshall FPD No. 3 Station 1 | <ul style="list-style-type: none"> 2+ roads in and out Reflective street signs Visible fuels mitigation efforts Metal roof or asphalt shingle throughout Houses located on flat surfaces rather than slopes | <ul style="list-style-type: none"> Limited turnarounds for fire trucks Limited defensible space Combustible housing materials Limited water sources for suppression Fire station >5 miles from community |

| Community | Score | Rating | Fire Station | Positives | Negatives |
|--|-------|---------|---|---|---|
| Ranch Creek (Figure C.6, Appendix C) | 120 | Extreme | <ul style="list-style-type: none"> East Grand FPD No. 4 Headquarters East Grand FPD No. 4 Tabernash | <ul style="list-style-type: none"> Ingress/egress Structures spaced further apart | <ul style="list-style-type: none"> House numbering inconsistent and non-reflective Steep, narrow roads in places High fuel loads Houses built near slopes Limited water sources for suppression Limited defensible space Limited turnarounds for fire trucks |
| Snow Mountain Ranch/YMCA (Figure C.14, Appendix C) | 79 | High | <ul style="list-style-type: none"> Grand FPD No. 1 and East Grand FPD No. 4 Red Dirt East Grand FPD No. 4 Tabernash Grand FPD No. 1 Headquarters | <ul style="list-style-type: none"> Visible fuels mitigation work Ingress/egress Fire station <5 miles from location Fire hydrants throughout Metal roof or asphalt shingle throughout Underground gas and electric utilities | <ul style="list-style-type: none"> Limited turnarounds for fire trucks Combustible building materials Non-reflective street signs |
| Southern Grand Lake (Figure C.46, Appendix C) | 109 | High | Grand Lake FPD No. 2 Station 3 – Soda Springs | <ul style="list-style-type: none"> 2+ roads in and out Reflective street signs Metal roof or asphalt shingle throughout Fire hydrants Fire station <5 miles from community | <ul style="list-style-type: none"> Non-surfaced roads, >5% grade Limited turnarounds for fire trucks Limited defensible space Combustible building materials Many structures <30 feet to slope |

| Community | Score | Rating | Fire Station | Positives | Negatives |
|--|-------|---------|---|--|---|
| Sun Outdoors (Figure C.40, Appendix C) | 79 | High | Grand FPD No. 1 Headquarters | <ul style="list-style-type: none"> • Reflective street signs • Metal roof or asphalt shingle throughout • Fire hydrants throughout • Fire station <5 miles from community • Underground gas and electric utilities | <ul style="list-style-type: none"> • Limited turnarounds for fire trucks • Limited defensible space • Combustible housing materials • Combustible mulch near buildings |
| Sunset Ridge (Figure C.2, Appendix C) | 121 | Extreme | <ul style="list-style-type: none"> • East Grand FPD No. 4 Headquarters • East Grand FPD No. 4 Tabernash | <ul style="list-style-type: none"> • Active fuels mitigation • Reflective street signs • Reflective house numbers • Type A roofing materials | <ul style="list-style-type: none"> • High fuel loads • Limited water sources for suppression • Combustible building materials • Houses built near slopes • Ingress/egress • Limited turnaround for fire trucks • Limited defensible space • >5 miles from a fire station |
| Tabernash (Figure C.18, Appendix C) | 70 | High | East Grand FPD No. 4 Tabernash | <ul style="list-style-type: none"> • Ingress/egress • Reflective street signs • Visible fuels reduction efforts • Metal roof or asphalt shingle throughout • Fire hydrants • <5 miles to fire station | <ul style="list-style-type: none"> • Limited turnarounds for fire trucks • Combustible building materials • 2+ roads in and out |
| Trail Creek (Figure C.48, Appendix C) | 104 | High | <ul style="list-style-type: none"> • Grand FPD No. 1 Station 3 (GCR 40) • Grand Lake FPD No. 2 Station 3 – Soda Springs | <ul style="list-style-type: none"> • Reflective street signs • In areas, good defensible space • Metal roof or asphalt shingle throughout • Many structures >30 feet to slope | <ul style="list-style-type: none"> • Ingress/egress • Limited turnarounds for fire trucks • Combustible building materials • Limited water sources for suppression • Fire station >5 miles from community |

| Community | Score | Rating | Fire Station | Positives | Negatives |
|---|-------|----------|---|--|--|
| Troublesome Creek (Figure C.52, Appendix C) | 69 | Moderate | Kremmling FPD No. 5 | <ul style="list-style-type: none"> • Ingress/egress • Some defensible space • Good spacing between structures • Metal roof or asphalt shingle throughout • Many structures >30 feet to slope | <ul style="list-style-type: none"> • Limited turnarounds for fire trucks • Combustible building materials • Fire station >5 miles from community |
| Upper Williams Fork (Figure C.26, Appendix C) | 127 | Extreme | <ul style="list-style-type: none"> • Kremmling FPD No. 5 • Hot Sulphur Springs/Parshall FPD No. 3 Station 1 • Lower Blue FPD, through Summit Fire and EMS, Summit County | <ul style="list-style-type: none"> • Visible fuels mitigation work • Metal roof or asphalt shingle throughout | <ul style="list-style-type: none"> • Ingress/egress • Limited turnarounds for fire trucks • Limited street signs • Limited defensible space • Combustible building materials • Limited water sources for suppression • Fire station >5 miles from community |
| West Granby (Figure C.10, Appendix C) | 105 | High | Grand FPD No. 1 Headquarters | <ul style="list-style-type: none"> • Reflective road signs • Metal roof or asphalt shingle throughout • Some defensible space around structures | <ul style="list-style-type: none"> • Limited roads in and out • Limited turnarounds for fire trucks • Combustible building materials • Limited visible water sources for suppression • Fire station >5 miles from portions of community • Gas and electric utilities both aboveground • Many houses <30 feet to slope |

| Community | Score | Rating | Fire Station | Positives | Negatives |
|---|-------|--------|---|---|--|
| Winter Park Resort (Figure C.8, Appendix C) | 106 | High | East Grand County FPD No. 4 Headquarters | <ul style="list-style-type: none"> • Reflective street signs • Visible fire hydrants • Class A roofing materials • Ingress/egress | <ul style="list-style-type: none"> • Homes built on slopes • High fuel loads • >5 miles from a fire station • Limited defensible space • Limited turnarounds for fire trucks • Combustible building materials |

*Community is not in an area covered by an FPD. The listed fire station is nearest station, but response is not legally required if other emergencies are ongoing.

COMPOSITE RISK-HAZARD ASSESSMENT INPUTS

The Composite Risk-Hazard Assessment is created by layering several risk-hazard inputs, including fire behavior model outputs generated in the desktop analysis (flame length, rate of spread, crown fire potential, and burn probability, all of which are discussed in Appendix D, Fire Behavior Modeling/GIS Background and Methodology), highly valued resources and assets (HVRAs) (discussed in the Values at Risk section of Chapter 3), and the WUI (discussed in the Wildland Urban Interface section of Chapter 2), fire history, and fire response (both described in Appendix B, Community Background and Resources).

DESKTOP ANALYSIS

The desktop analysis analyzes risks and hazards uses fuels properties, topography, and weather to generate fire behavior modeling outputs: burn probability (Map J.3 in Appendix J), crown fire activity (Map J.5), flame length (Map J.2), and rate of spread (Map J.4), which were used as inputs (along with fire history, fire response, VARs, and the WUI) in the Composite Risk-Hazard Assessment.

Detailed information on fuels analysis and calibration, topography, and weather are provided in Appendix D.

Information regarding fire history and response resources are explained in Chapter 2 and Appendix B, respectively.

Fire Behavior Modeling

Overview

The wildland fire environment consists of three factors that influence the spread of wildfire: fuels, topography, and weather. Understanding how these factors interact to produce a range of fire behavior is fundamental to determining treatment strategies and priorities in the WUI. In the wildland environment, vegetation is synonymous with fuels. When sufficient fuels for continued combustion are present, the level of risk for those residing in the WUI is heightened. Fire spreads in three ways: 1) surface fire spread, in which the flaming front remains on the ground surface (in grasses, shrubs, small trees, etc.) and resistance to control is comparatively low; 2) crown fire, in which the surface fire “ladders” up into the upper levels of the forest canopy and spreads through the tops (or crowns) independent of or along with the surface fire, and when sustained is often beyond the capabilities of suppression resources; and 3) spotting, in which embers are lifted and carried with the wind ahead of the main fire and ignite in receptive fuels; if embers are plentiful and/or long range (>0.5 mile), resistance to control can be very high. Crown fire and spotting activity have been a concern for fire managers, particularly under extreme weather conditions. In areas where homes are situated close to timber fuels and/or denser shrubs and trees, potential spotting from woody fuels to adjacent fuels should always be acknowledged.

Treating fuels in the WUI can lessen the risk of intense or extreme fire behavior (Martinson and Omi 2013; Safford et al. 2009). Studies and observations of fires burning in areas where fuel treatments have occurred have shown that the fire either remains on or drops to the surface, thus avoiding destructive crown fire, as long as activity fuels are treated or removed (Graham et al. 2004; Pollet and Omi 2002; Prichard et al. 2010; Safford et al. 2012; Waltz et al. 2014). Fuel mitigation efforts therefore should be focused specifically where these critical conditions could develop in or near CARs.

For this plan, data came primarily from the Northern Colorado Fireshed Wildfire Risk Assessment (NCFWRA), which was developed by the Northern Colorado Fireshed Collaborative (NCFC) (NCFC 2022). The NCFWRA was qualitative wildfire risk assessment which relied on stakeholder engagement and informed up-to-date science. The NCFWRA largely relies on models housed within LANDFIRE (2022) but has modified the modeling approach and parameters accordingly to accurately capture the wildland fire environment of northern Colorado. FlamMap (housed within LANDFIRE) was also utilized to model fire behavior that the NCFWRA did not model.

Information regarding the modeling approach and components is included in Appendix D.

COMPOSITE RISK-HAZARD ASSESSMENT RESULTS

The Composite Risk-Hazard Assessment modeling approach uses a weighted sum model, which “stacks” geographically aligned data sets and evaluates an output value derived from each cell value of the overlaid data set in combination with the weighted assessment. In a weighted sum model, the weighted values of each pixel from each parameter data set are added together so that the resulting data set contains pixels with summed values of all the parameters. This method ensures that the model resolution is maintained in the results and thus provides finer detail and range of values for denoting fire risk. Figure D.2 in Appendix D illustrates the individual data sets and the relative weights assigned within the modeling framework. These include fire behavior parameters, fire occurrence density, HVRAs, WUI, and distance from fire stations. Figure 3.1 is the Composite Risk-Hazard Assessment for the planning area and classifies the planning area into low, moderate, high, and extreme risk categories. Additional information on the Composite Risk-Hazard Assessment process can be found in Appendix D.

The Risk-Hazard Assessment is highly influenced by fuels and the WUI. Generally, forested regions composed of conifer fuels that fall within the WUI that have yet to experience recent wildfire display the highest risk to wildfire. For example, unburned forested regions that fall within the WUI east of Grand Lake display extreme risk from wildfire. Similar patterns are observed in the unburned conifer forests that surround Granby, Fraser, Winter Park, Hot Sulphur Springs, and Kremmling. Undeveloped rangelands in the WUI typically display high risks from wildfire. Fuels in these areas are typically comprised of GS (grass-shrub fuels), where bunchgrass species and sagebrush (*Artemisia tridentata*) typically comprise the fuels. These fuels can yield high rates of spread but relatively short flame lengths. Regions with the lowest risk from wildfire usually fall outside the WUI. These areas are usually composed of recently burned forests and rangelands, alpine areas, agricultural plots, water bodies, and large tracts of aspen forests. Overall, risk reduction efforts should be focused on the forests and rangelands within the WUI that place communities at high to extreme risk from wildfire.

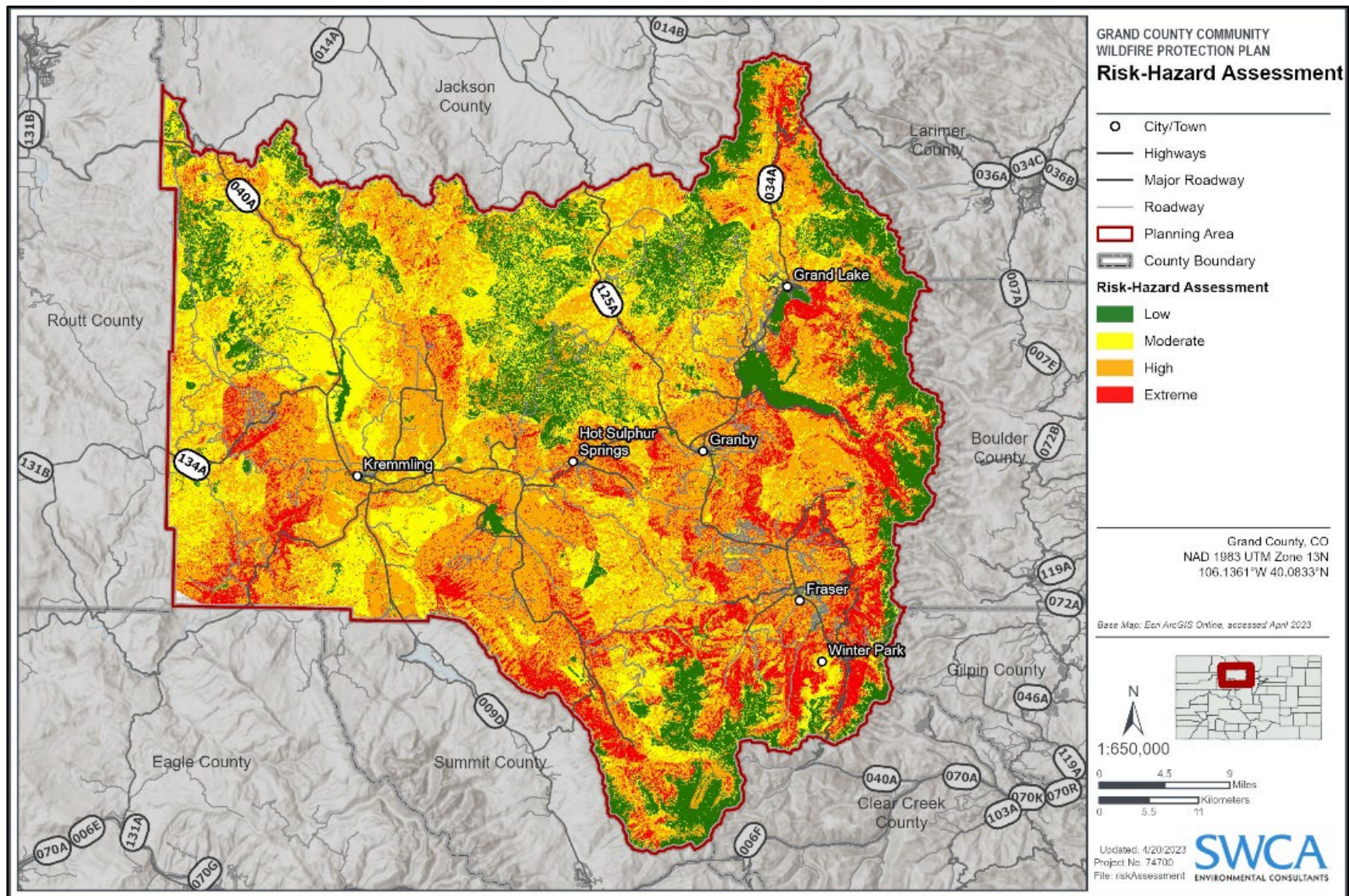


Figure 3.1. Composite Risk-Hazard Assessment for Grand County.

EVACUATION ROUTE RISK AND ROAD ENTRAPMENT ANALYSIS

EVACUATION ROUTE ANALYSIS

The results of SWCA's evacuation route analysis are shown in Figure 3.2. Excess fuel loads along escape routes may create challenges for evacuation in the planning area in the event of a wildfire. In addition, road grade, curvature (sinuosity), length, surface material (e.g., paved vs. unpaved), connectivity (e.g., local access road vs. main transportation corridor), stability (e.g., bridged vs. unbridged), and adjacent structure density contribute to potential evacuation complications. Our evacuation analysis involves assessing road features, including road curvature, grade, length, surface material, connectivity, stability (bridged vs. unbridged), and adjacent structure density to estimate to potential risk that the road may pose during an evaluation scenario. It should also be noted that analysis outputs were adjusted based on Core Team input. Our results show that the main transportation corridors, such as U.S Highway 40, U.S Highway 34, Colorado State Highway 134, Colorado State Highway 9, and Colorado State Highway 125, mostly received overall low risk ratings; however, parts of these roads received medium, high, or even extreme risk ratings. Generally, the higher risk areas on these major roads are typically in areas where the road is steep and surrounded by forests.

Many of the smaller roads in the county received high and extreme risk ratings. These roads are generally unpaved County or USFS roads and are likely of minor concern (unless they are popular with recreators). However, some of these high and extreme risk roads are residential and exurban roads. Of note are the roads surrounding Winter Park, Fraser, Granby, and Grand Lake. These roads are typically narrow, steep, frequently unpaved, and surrounded by overhanging trees. These roads could create high risk for effective evacuation in the event of wildfire.

Detailed information regarding the evacuation route risk analysis is provided in Appendix D, Fire Behavior Modeling/GIS Background and Methodology.

Road Entrapment Analysis

The results of SWCA's road entrapment analysis are shown in Figure 3.3. Extreme fire behavior can create hazardous conditions along roadsides and potentially entrap vehicles and communities and prevent effective evacuation. Overall, 3,275 miles of roadway within Grand County were analyzed, of which 38.5% (1,260.6 miles) were identified as likely to jeopardize evacuation activities and/or cause entrapment. Overall, the majority of the main transportation corridors, such as U.S Highway 40, U.S. Highway 34, Colorado State Highway 134, Colorado State Highway 9, and Colorado State Highway 125, would not create entrapment issues. However, portions of these roads, especially in areas where the road is surrounded by steep forests, have the potential for entrapment. Mitigation work, such as fuel reduction, should focus on these high potential entrapment areas. While many of the minor roads in the county have the potential for entrapment, the roads of greatest concern are the smaller residential roads surrounding the county's major municipalities and the residential roads in the county's exurban areas. Many of these roads are steep, narrow, and/or surrounded by forest conditions. Local land managers and residents in these areas should be proactive (e.g., practice fuel reduction treatments on their properties) in reducing the risk of entrapment during a wildfire for their roads.

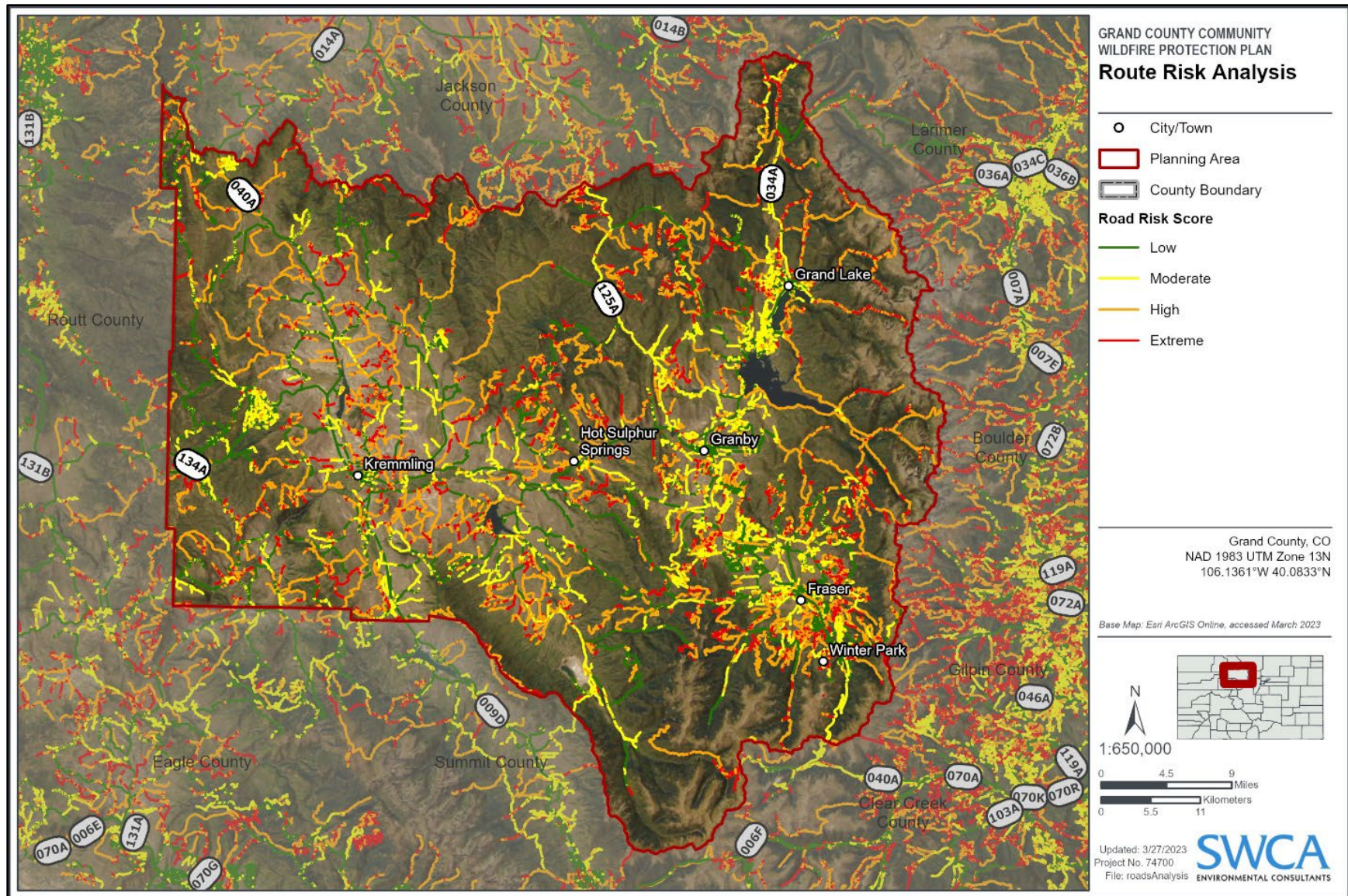


Figure 3.2. Route risk analysis for Grand County.

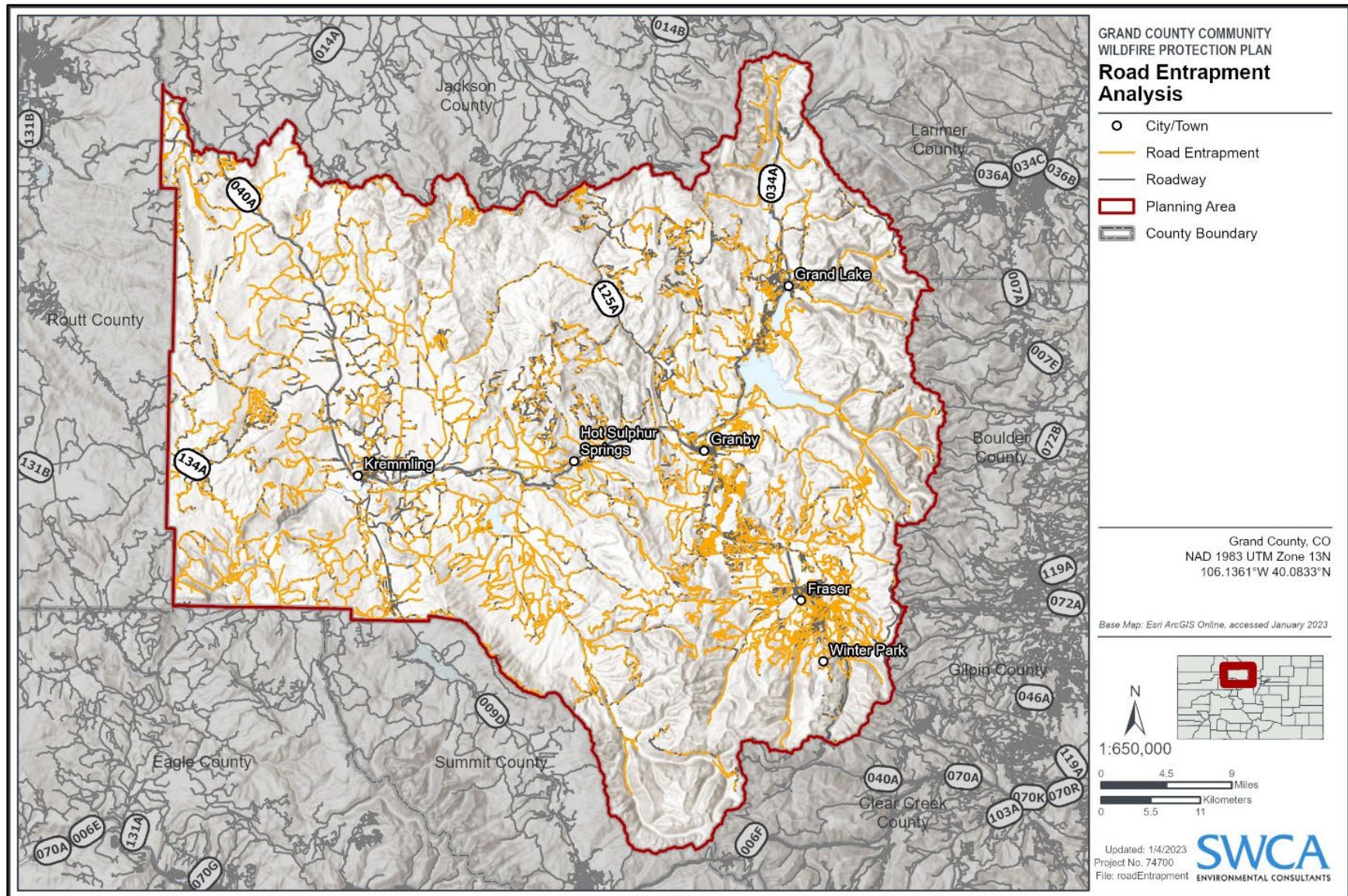


Figure 3.3. Road entrapment analysis for Grand County.

VALUES AT RISK

Earlier compilation of the critical infrastructure in the planning area, coupled with the community assessments, public outreach, and Core Team input, has helped in the development of a list of VARs from wildland fire. These data are also supplemented with HVRA data, which is a data set that is being gathered nationwide and available through the Interagency Fuel Treatment Decision Support System (IFTDSS) and county HVRAs. The public was encouraged to provide additional VARs during the public outreach period, via the story map survey link. Based on feedback provided, this section and the associated mapping was revised.

In addition to critical infrastructure (see Map J.9 in Appendix J), VARs can also include natural, cultural and socioeconomic resources (see Maps J.6, J.7, and J.8, respectively). It is important to note that although an identification of VARs can inform treatment recommendations, a number of factors must be considered in order to fully prioritize areas for treatment; these factors include appropriateness of treatment, land ownership constraints, locations of ongoing projects, available resources, and other physical, social, or ecological barriers to treatment.

The scope of this CWPP does not allow determination of the absolute natural, socioeconomic, and cultural values that could be impacted by wildfire in the planning area. In terms of socioeconomic values, the impact due to wildfire would cross many scales and sectors of the economy and call upon resources locally, regionally, and nationally.

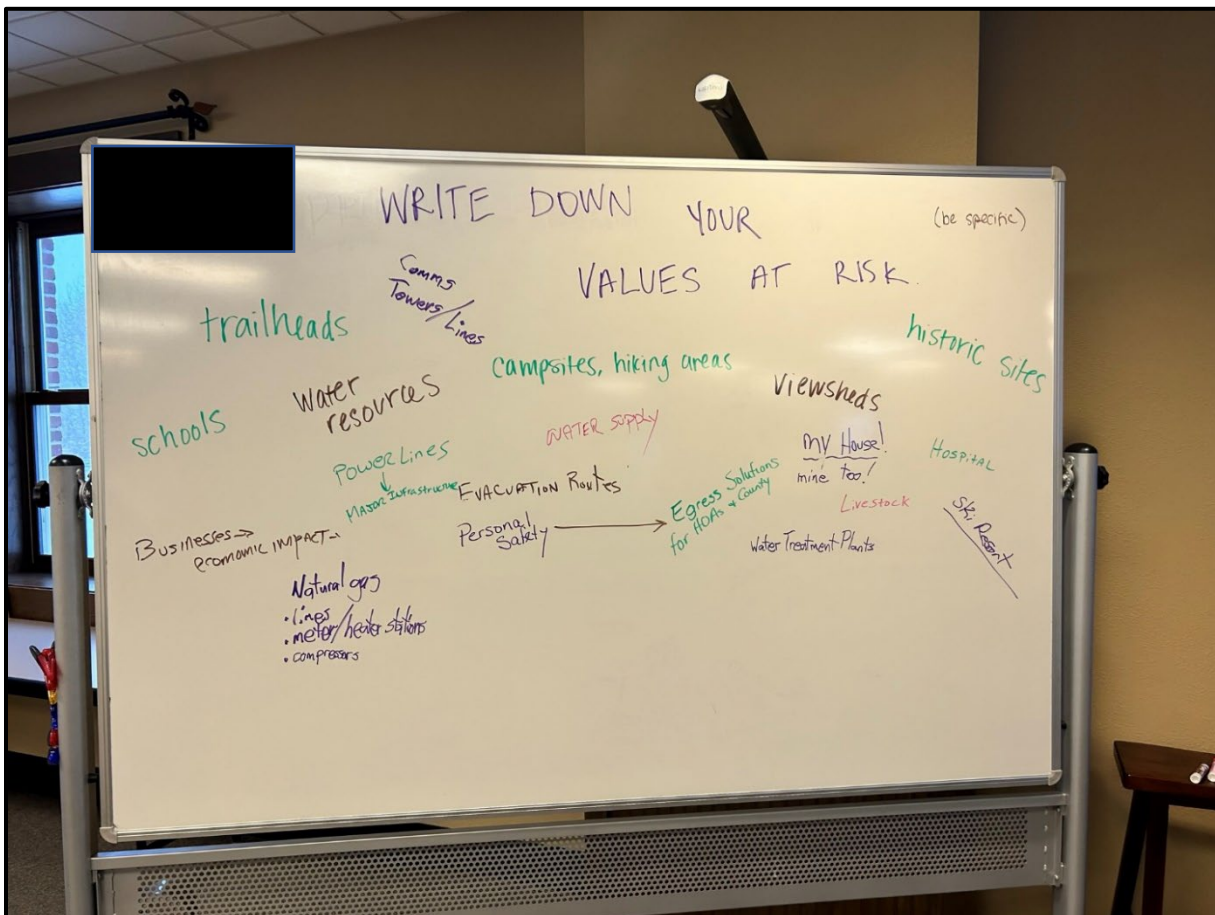


Figure 3.4. Examples of VARs in Grand County provided during a Core Team meeting.

NATURAL VALUES AT RISK

The CWPP planning area has a variety of natural resources of particular concern to land managers, such as rare habitats, surface water and aquatic resources, watersheds, and listed plant and wildlife species (see Map J.6 in Appendix J). Public outreach throughout the county has emphasized the importance of protecting natural/ecological values to the general public (Figure 3.4), and therefore, these resources are included among the prioritized actions for wildfire mitigation. Examples of natural values identified by the public and the Core Team include the following:

- Public land (e.g., Routt and Arapaho National Forests, BLM land, and Rocky Mountain National Park)
- Watershed protection (Colorado River, Fraser River, Grand Lake, Lake Granby) (Figure 3.5)
- Ski areas (Winter Park Ski Resort, Ski Granby Ranch)
- Trail systems (e.g., Continental Divide Trail)
- Agricultural and ranching lands
- Scenic viewsheds
- Wildlife habitat and sensitive species



Figure 3.5. Example of a natural VAR in Grand County, a waterbody.

SOCIOECONOMIC VALUES AT RISK

Social values include population, recreation, infrastructure, and the built environment (Figures 3.6 and 3.7; see Map J.8 in Appendix J). A large portion of housing in the county falls within the WUI. Examples include the following:

- Communications infrastructure (e.g., cell phone and radio towers)
- Tourism values (e.g., restaurants, recreational facilities, rental houses/cabins)
- Schools
- Public safety infrastructure
- Public works
- Highways
- Grocery and hardware stores
- Churches
- Care homes, senior housing, day care, and other group homes
- Water storage
- Recreation sites (e.g., hot springs, trails, parks)



Figure 3.6. Example of a socioeconomic VAR, recreation site.



Figure 3.7. Example of a socioeconomic VAR, a ski resort.

CULTURAL VALUES AT RISK

Many historical landmarks are scattered throughout county (see Map J.7 in Appendix J). Particular cultural VARs (Figures 3.8 and 3.9) that have been identified by the Core Team and the public in the CWPP planning area are the following:

- Snow Mountain Ranch
- Pioneer Village Museum
- Kaufmann House Museum
- Kremmling Heritage Park
- Cozen's Ranch Museum and Stage Stop
- Emily Warner Field Aviation Museum
- Heritage Park Museum
- Smith Eslick Cottage Court
- Moffat Road Railroad Museum
- Places of worship
- Morgan Mercantile



Figure 3.8. Example of a cultural VAR, Snow Mountain Ranch building, YMCA camp.



Figure 3.9. Example of a cultural VAR, a general store in Tabernash, Grand County.

DAMAGE COST MODELING

The East Troublesome Fire began on October 14, 2020, east of Troublesome Creek in Grand County, Colorado. It is widely recognized as one of the most destructive fires in Colorado history. It burned nearly 200,000 acres, leaving 378 homes and 189 other structures destroyed in its wake. The County's response cost was roughly \$352,000, including contract labor, logistics, and emergency protective actions (\$80,000), evacuation support (\$150,000), and overtime pay for Grand County employees (\$76,000) (Golden 2020). Total suppression costs reached approximately \$20 million. As these values indicate, damage cost modeling is a critical component of evaluating and displaying risk from wildfire.

Grand County has significant property value that is located within the 2.5-mile WUI buffer. The Grand County Assessor's Office (2015) estimates that the sum of the property value intersecting the 2.5-mile WUI buffer is 1,051,337,190. As such, large wildfires within the WUI could result in significant property damage and economic losses. Multiple properties within the WUI are valued at over \$500,000, in addition to several properties valued at over \$5 million. It is recommended community stakeholders implement mitigation measures to ensure their property is protected in the event of a wildfire.

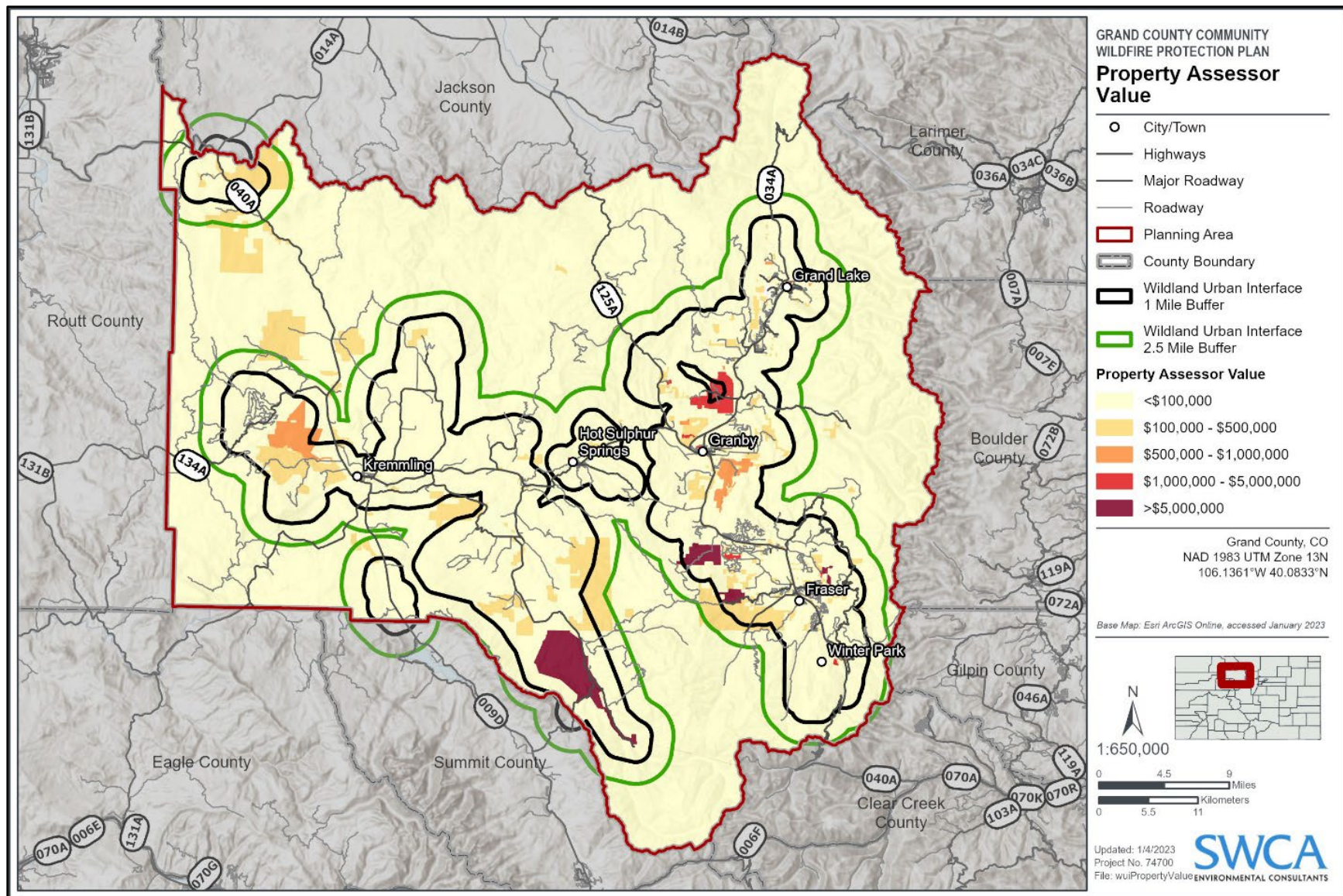


Figure 3.10. Property assessor parcel values within the 1-mile and 2.5-mile WUI buffers. Parcel values are relatively constant across individual neighborhoods.

According to the Future Avoided Cost Explorer tool, Grand County currently has an annual average of \$100,000 worth of damages caused by wildfires; however, GCOEM officials have suggested that this number could be much higher, based on their personal experiences and understandings of the value of local assets. For example, the Future Avoided Cost Explorer tool estimates the state of Colorado could face \$160 million in damages from wildfire. However, the 2021 Marshall Fire alone (located in Boulder County, Colorado) resulted in an estimated \$513 million in damages (Mulholland 2022). This estimate includes damage to structures as well as wildfire suppression costs (note: this is an annual average and takes into account years with no damages from wildfire and years with substantial damages from wildfire). Under a moderate climate change scenario with moderate population growth, by 2050, Grand County would be expected to have upwards of \$200,000 worth of wildfire damages annually. Under a severe climate change scenario with moderate population growth, by 2050 Grand County would experience \$210,000 worth of damages annually. Overall, by 2050, it is reasonable to expect that annual damages from wildfire to Grand County will at least double under a warmer climate (Colorado Department of Natural Resources 2022a). Additionally, average wildfire suppression costs are also expected to be around \$200,000 annually.

SOCIAL VULNERABILITY

The Federal Emergency Management Agency (FEMA) defines social vulnerability as the susceptibility of social groups to the negative impacts of natural hazards (e.g., wildfire), which include disproportionate death, injury, loss, or disruption of livelihood (FEMA 2022). A sole hazard occurrence can bring about considerably different impacts for distinct individuals, even if the magnitude of the hazard was the same for the entire community. Specific groups of individuals may be more susceptible to natural hazards because of socioeconomic status, physical state, or other factors. For instance, elderly individuals may have more difficulty in quickly evacuating during wildfire emergencies, and low-income individuals may not be able to harden their homes to reduce structural ignitability, indicating that they can face a higher probability of their home being damaged or destroyed should a wildfire event occur.

As defined by the USFS's *Wildfire Risk to Communities* (USFS 2022a) socially vulnerable populations include the following: families living in poverty, people with disabilities, people over 65 years of age, people who have difficulty with English, households with no car, and people living in mobile homes. Statistics on socially vulnerable populations in Grand County as estimated by the USFS's *Wildfire Risk to Communities* (USFS 2022a) is provided in Table 3.2 below. Populations particularly at risk from wildfire include people over 65, people with disabilities, and people dwelling in mobile homes. Visitors and non-local property owners may also be at higher risk if they are not familiar with local guidelines regarding property management (defensible space, fire-resistant vegetation, fire resistant building materials, etc.) and may not be registered or within reach of local emergency notifications. In addition, renters of these properties may not receive emergency alerts as they are not local residents.

Socially vulnerable populations may need additional support in regard to preparing for wildfire, evacuating from wildfire, and returning to their community post-fire. Specific considerations may be individualized evacuation plans, earlier notification, contact lists for these groups available for first responders, etc. For more ideas, please see the toolkits available on the "Prepare Your Family" webpage from Ready Set Go: <https://www.readyforwildfire.org/prepare-for-wildfire/get-set/prepare-your-family/>.

Table 3.2. Estimated Socially Vulnerable Populations at Risk from Wildfire in Grand County (USFS 2022a)

| Population at Risk | Number | Percent |
|--------------------------|------------|-------------|
| Families in poverty | 103 ± 60 | 2.80 ± 1.6 |
| People with disabilities | 877 ± 232 | 5.70 ± 1.5 |
| People over 65 years | 2711 ± 355 | 17.40 ± 2.3 |
| Difficulty with English | 89 ± 112 | 0.60 ± 0.7 |
| Households with no car | 234 ± 91 | 3.70 ± 1.4 |
| Mobile homes | 529 ± 171 | 8.40 ± 2.6 |

Wildland firefighters are also populations at risk from wildfire. Wildland firefighting is an inherently dangerous profession for which firefighters risk their health and lives while battling fires. During the 1994 South Canyon Fire in southern Colorado, 14 firefighters lost their lives (National Geographic 2014). More recently, a 2021 rural fire in eastern Colorado claimed the life of one firefighter (USFA 2021b). Wildland firefighters are especially vulnerable to medium- and long-term health and safety risks associated with smoke and chemical inhalation and other conditions while firefighting, as well as immediate risks that may endanger their lives due to the fire environment.

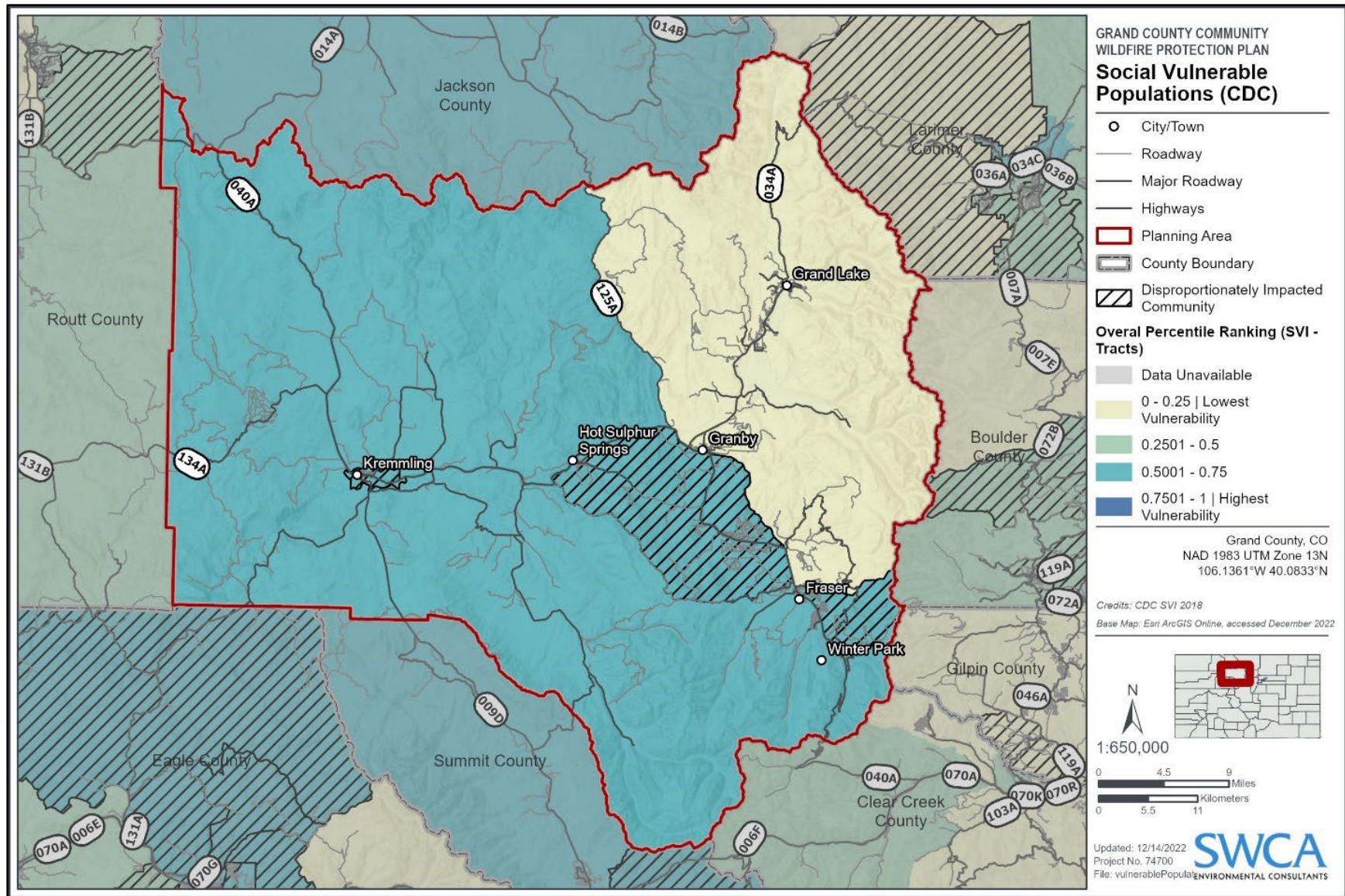


Figure 3.11. Vulnerable populations within Grand County.

RISK TO LIFELINES

FEMA has developed a Community Lifelines framework. FEMA defines a lifeline as something that “enables the continuous operation of critical government and business functions and is essential to human health and safety or economic security” (FEMA 2020). In other words, lifelines are “the most fundamental services in the community that, when stabilized, enable all other aspects of society to function” (FEMA 2020). The relevant FEMA lifelines in Grand County include those listed below. Note that many of these lifelines overlap with the county’s HVRAs, which have been incorporated into our Risk-Hazard Assessment.

- Safety and security
- Food, water, and shelter
- Health and medical
- Energy
- Communications
- Transportation

SAFETY AND SECURITY

These lifelines consist of the following components: law enforcement/security (police stations, law enforcement services, and site security), fire services (fire stations and firefighting resources), search & rescue, government services (emergency operation centers, essential government functions, government offices, schools, etc.), and community safety (FEMA 2019).

Grand County has safety and security lifelines dispersed throughout the county. Many of these lifelines are clustered around the county’s major towns/municipalities or along major highways (e.g., U.S. Highway 34). Many of Grand County’s safety and security lifelines fall within high and extreme risk fire zones within the Composite Risk-Hazard Assessment (especially those along U.S. Highway 40, U.S. Highway 34, and County Road 3) (Figure 3.12). To ensure that safety and security lifelines remain stable in the event of a wildfire, emergency planners in the county may want to invest in creating contingency response solutions to prepare for a potential hazardous wildfire event. A stabilization target through the contingency response solution should aim to ensure “threats to safety are no longer a concern for response personnel and communities; government essential functions are operational; sufficient search and rescue resources are on-scene to assist survivors/victims; and sufficient fire resources are accessible to support fire response efforts” (FEMA 2019).

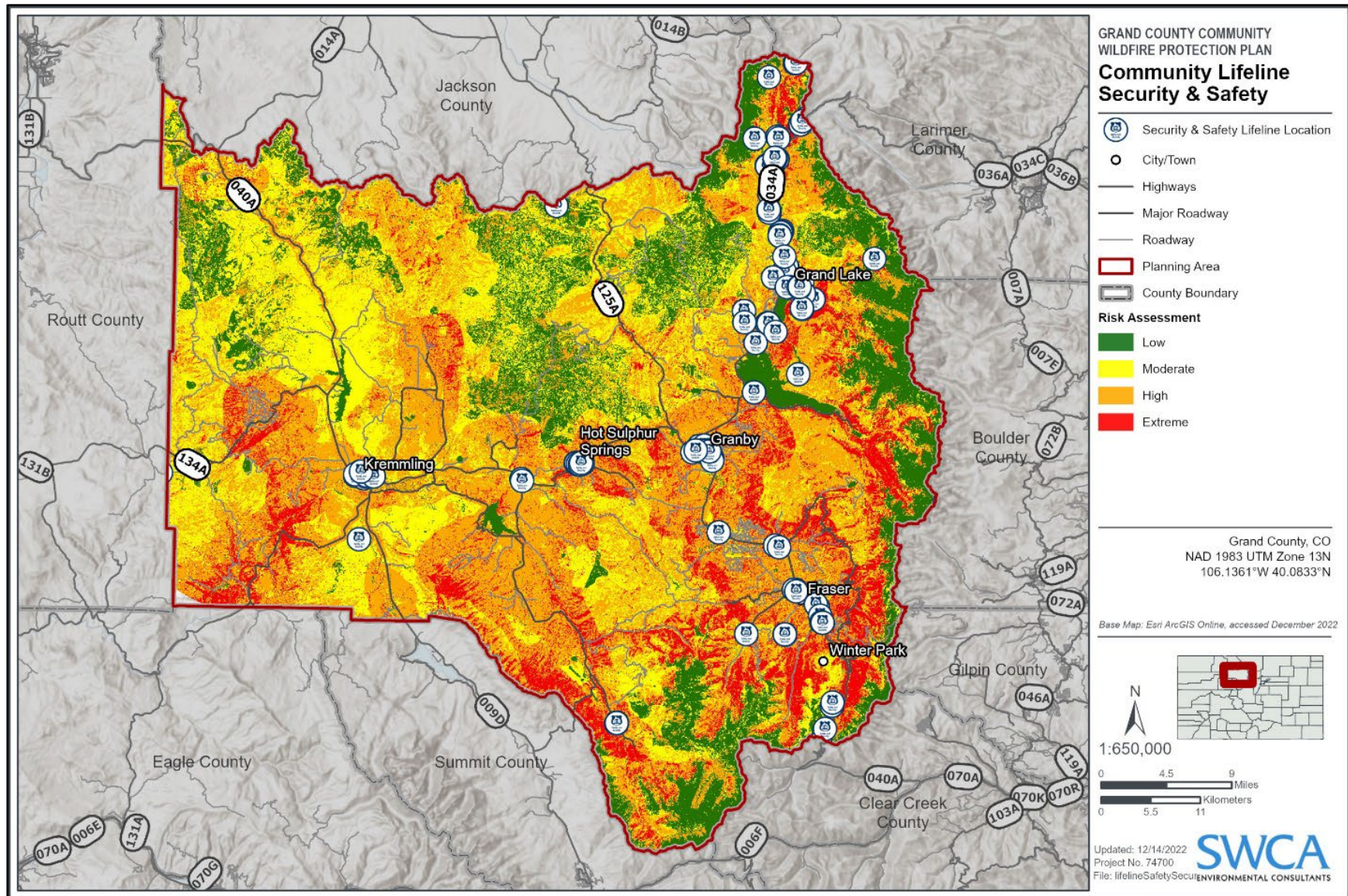


Figure 3.12. Wildfire risk to safety and security lifelines in Grand County.

FOOD, WATER, AND SHELTER

Food can consist of commercial food distribution, commercial food supply chains, and food distribution programs. Water can consist of drinking water utilities/infrastructure wastewater systems and commercial water supply chains. Shelter can consist of housing (homes and shelters) and commercial facilities (hotels/motels) (FEMA 2019).

Grand County has food, water, and shelter lifelines dispersed throughout the county. These lifelines are clustered around the county's major towns/municipalities and its major highways (e.g., U.S. Highway 34 and U.S. Highway 40). Many of Grand County's food, water, and shelter lifelines fall within high and extreme risk fire zones within the Composite Risk-Hazard Assessment (e.g., Winter Park, Fraser, Granby, and Grand Lake, among others) (Figure 3.13). To ensure that food, water, and shelter lifelines remain stable in the event of a wildfire, emergency planners in the county may want to invest in creating contingency response solutions to prepare for a potential hazardous wildfire event. A stabilization target through the contingency response solutions should aim to ensure that "all survivors, pets, and service animals have access to food, water, and sanitation; shelter resources can support the displaced population" (FEMA 2019).

HEALTH AND MEDICAL

The primary components of health and medical lifelines include medical care, patient movement (i.e., emergency medical services), fatality management (i.e., mortuary and post-mortuary services), public health, and medical supply chains. Medical care can include hospitals, dialysis, pharmacies, long-term care facilities, Veterans Affairs health systems, veterinary services, and home medical care. Public health can consist of labs, clinical guidance, treatments/assessments, human services, and behavioral/mental health. Medical supply chains can consist of blood/blood products and manufactured products (e.g., pharmaceuticals, raw medical products, sterilization supplies) (FEMA 2019).

Grand County has health and medical services primarily found in the county's larger towns and municipalities, such as Kremmling, Granby, Fraser, and Winter Park. These are primarily hospitals with emergency services and urgent care centers. Many of these health and medical lifelines are located in regions of the county that are at high to extreme risk from wildfire (Figure 3.14). To ensure that health and medical lifelines remain stable in the event of a wildfire, emergency planners in the county may want to invest in creating contingency response solutions to prepare for a potential hazardous wildfire event. A stabilization target through the contingency response solutions should aim to ensure the following: all "survivors, their pets, and service animals have access to necessary medical and veterinary care; emergency medical systems are capable of managing needed patient movement; public health services are accessible to all survivors; temporary fatality management support is capable of meeting and processing demand; and medical supply chains are able to resupply medical care providers and meet higher demand" (FEMA 2019).

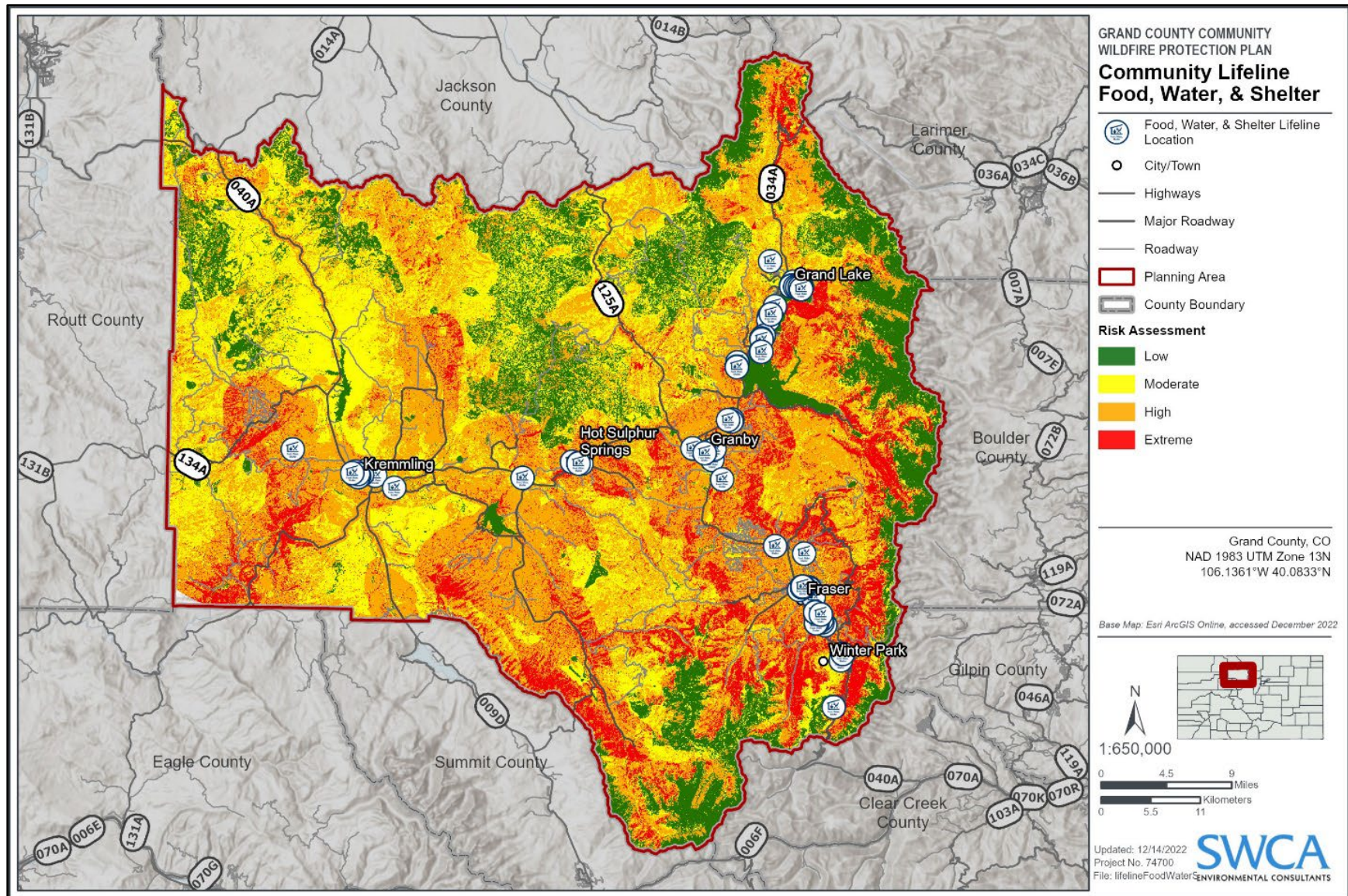


Figure 3.13. Wildfire risk to food, water, and shelter lifelines in Grand County.

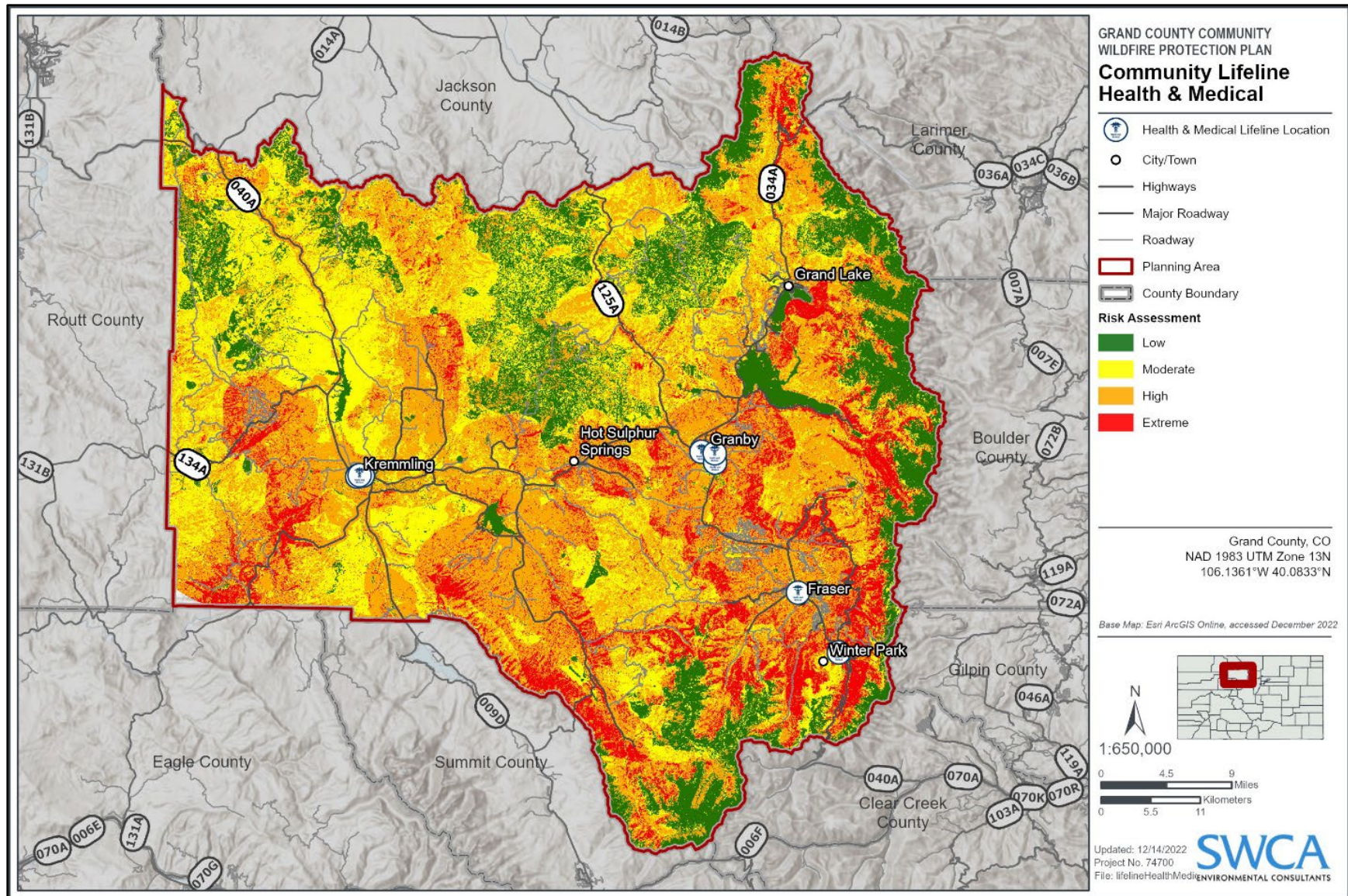


Figure 3.14. Health and medical lifelines in Grand County.

ENERGY

The primary components of the energy lifeline are the power grid and fuel. The power grid can consist of generation systems, transmission systems, and distribution systems. Fuel can consist of fuel storage (e.g., propane tanks), pipelines (natural gas and oil pipelines), and fuel distribution (e.g., gas stations) (FEMA 2019).

Grand County's energy lifelines (Figure 3.15) are primarily found near the county's major highways and mainly include larger gas stations, especially gas stations situated at highway intersections. To ensure that energy lifelines remain stable in the event of a wildfire, emergency planners in the county may want to invest in creating contingency response solutions to prepare for a potential hazardous wildfire event. A stabilization target through the contingency response solutions should aim to ensure the following: "generators can provide temporary emergency power at critical facilities and will stabilize other lifelines; fuel distribution is available for responders; and sufficient fuel distribution is available for survivors, including to support individuals dependent on power for critical medical care" (FEMA 2019).

COMMUNICATION

The primary components of the communications lifelines include infrastructure; alerts, warnings, and messages; 911 and dispatch; responder communications (e.g., land mobile radio [LMR] networks); and finance. Communication infrastructure typically consists of wireless communications; cable systems and wirelines; broadcast TV and radio services; satellite communications; and internet services. Alerts, warning, and messages typically consist of local alert/warning capabilities; access to the Integrated Public Alert and Warning System (IPAWS) (which can include wireless emergency alerts [WEA], emergency alert systems [EAS], and National Weather Service [NWS] alerts); and National Warning Service (NAWAS) terminals/capabilities (FEMA 2019).

Grand County's communication lifelines are primarily found near the county's major highways and mainly include telecommunications infrastructure (Figure 3.16). Many communication lifelines are located in regions of the county that are at high to extreme risk from wildfire. To ensure that communication lifelines remain stable in the event of a wildfire, emergency planners in the county may want to invest in creating contingency response solutions to prepare for a potential hazardous wildfire event. A stabilization target through the contingency response solutions should aim to ensure the following: "survivors have access to commercial communication infrastructure to contact or be contacted by emergency services; land mobile radio communications networks are operational; public safety answering points are available to the public; and survivors have access to financial services" (FEMA 2019).

TRANSPORTATION

The primary components of the transportation lifelines include highways, roadways, and motor vehicles; mass transit (e.g., buses and rails); railways; and aviation.

Grand County's major transportation lifelines primarily consists of the major highways and roads in the county. However, the county's railways, airports, and local airstrips would also be important lifelines in the event of a hazardous wildfire. Many of the transportation lifelines are located in regions of the county that are at high to extreme risk from wildfire (Figure 3.17). To ensure that transportation lifelines remain stable in the event of a wildfire, emergency planners in the county may want to invest in creating contingency response solutions to prepare for a potential hazardous wildfire event. A stabilization target through the contingency response solutions should aim to ensure that "multimodal routes (road, air, and rail) are clear of debris and accessible by normal or alternate means" (FEMA 2019).

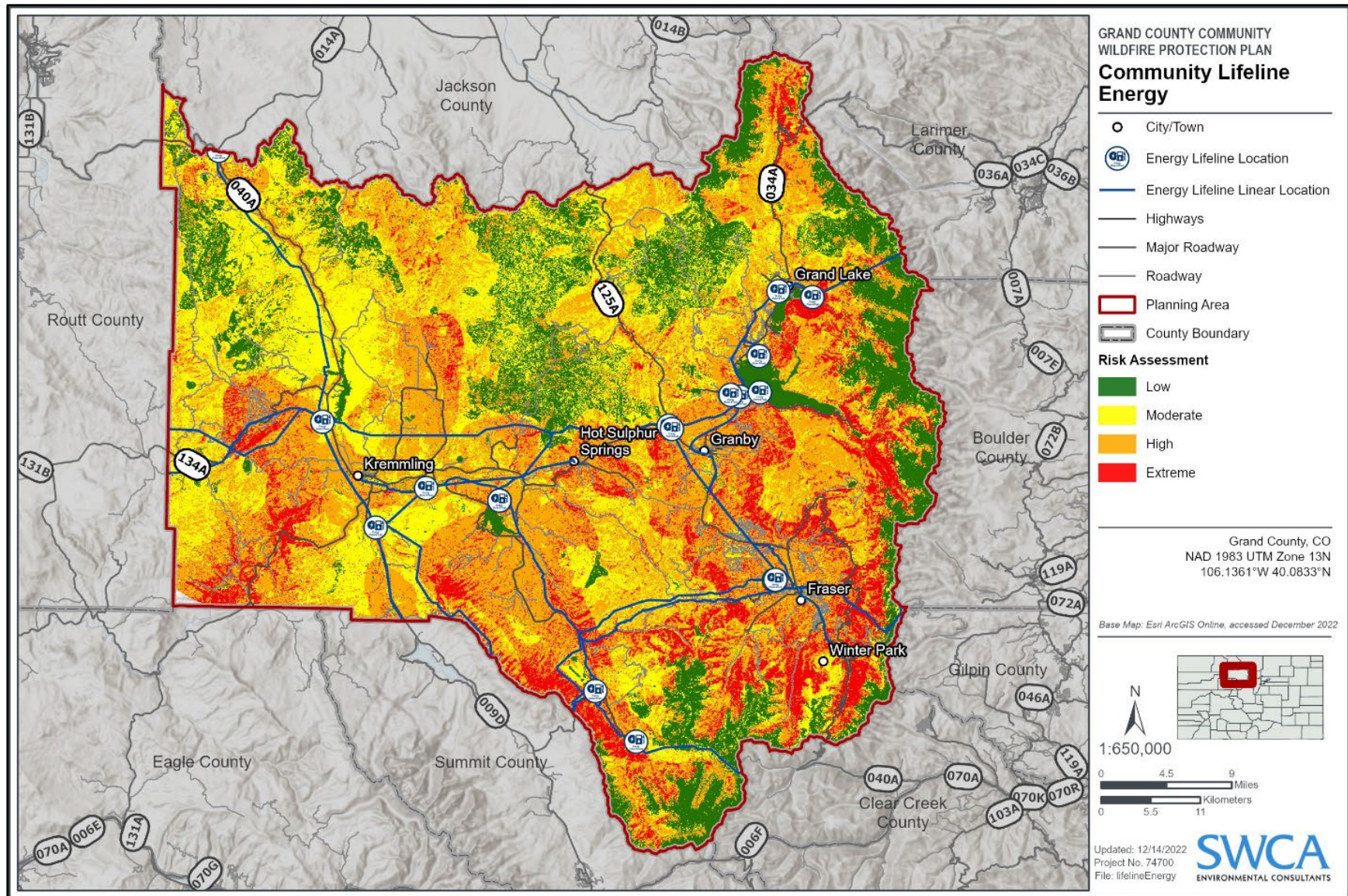


Figure 3.15. Energy lifelines in Grand County.

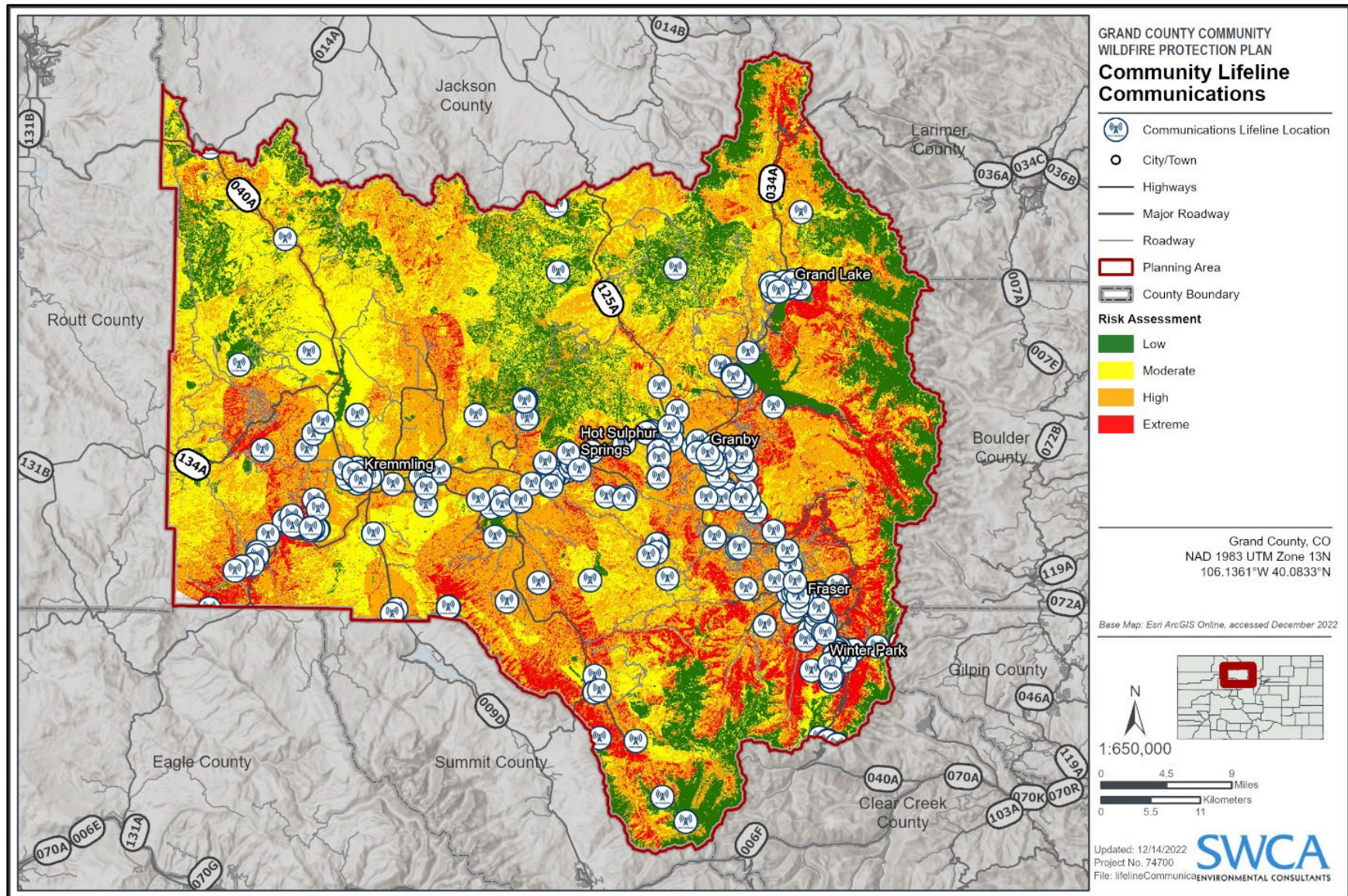


Figure 3.16. Communication lifelines in Grand County.

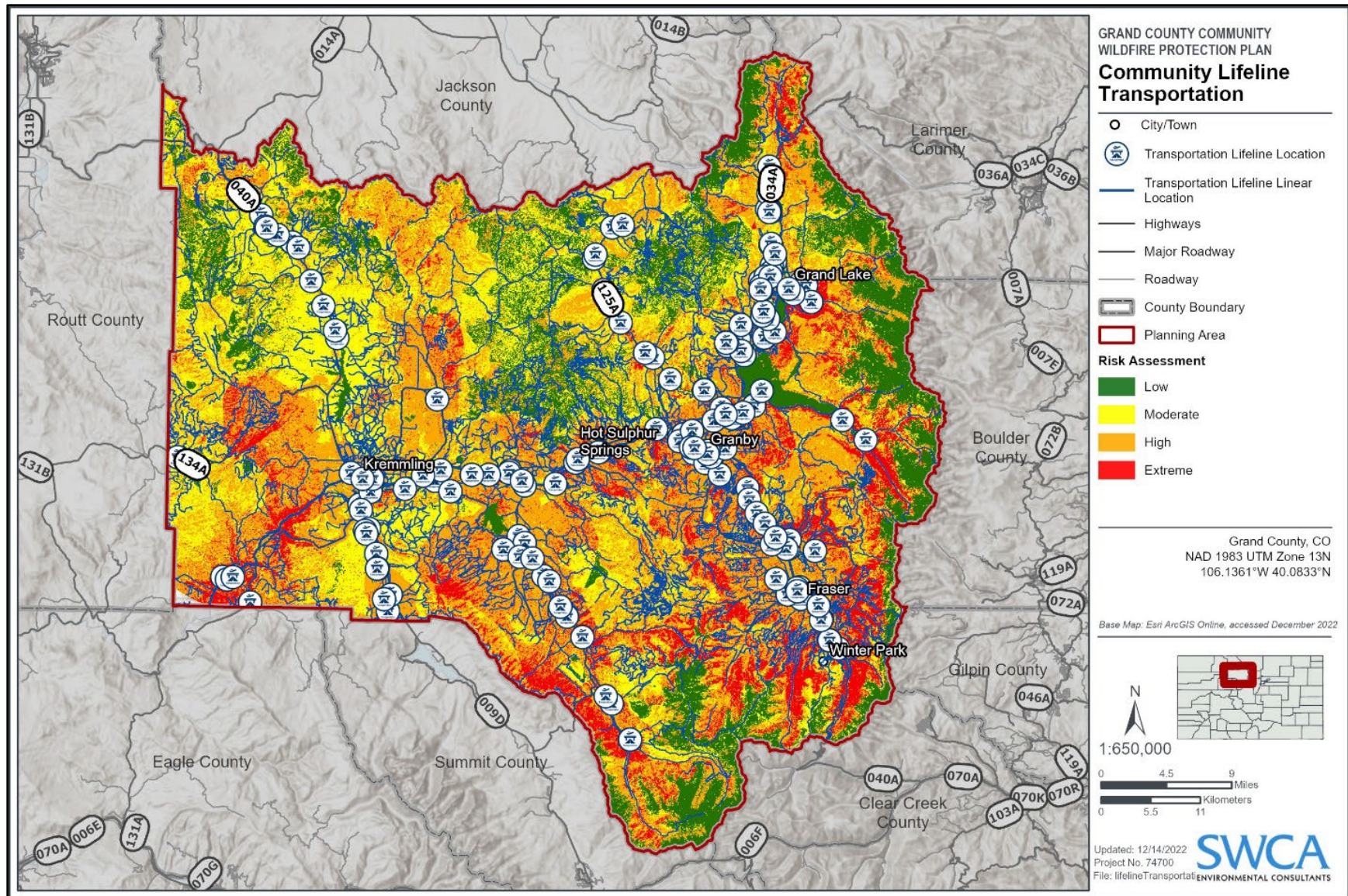


Figure 3.17. Transportation lifelines in Grand County.



CHAPTER 4 – MITIGATION STRATEGIES

This chapter provides project recommendations and implementation guidance. However, mitigation does not stop there. In addition to the recommendations, recognizing wildfire mitigation, preparedness, and resilience, means being prepared both pre- and post-fire. Post-fire response and rehabilitation information can be found at the end of this chapter.

This plan has been aligned with the Cohesive Strategy and its Phase III Western Regional Action Plan by adhering to the nationwide goal:

“To safely and effectively extinguish fire, when needed; use fire where allowable; manage our natural resources; and as a Nation, live with wildland fire.” (Forests and Rangelands 2014:3).

Thus, CWPP recommendations have been structured around the three main goals of the Cohesive Strategy: restoring and maintaining landscapes, fire-adapted communities, and wildfire response. Many of the recommendations listed can be implemented at the homeowner or community level. Projects requiring large-scale support can be prioritized based on the Composite Risk-Hazard Assessment.

Recommendation matrixes are used throughout this chapter to serve as an action plan for implementation. Recommendations have been aligned with the strategies in the 2020 Colorado Forest Action Plan (CSFS 2020) wherever possible.

COHESIVE STRATEGY GOAL 1: RESTORE AND MAINTAIN LANDSCAPES

Goal 1 of the Cohesive Strategy and the Western Regional Action Plan is Restore and Maintain Landscapes: Landscapes across all jurisdictions are resilient to fire and other disturbances in accordance with management objectives.

“Sustaining landscape resiliency and the role of wildland fire as a critical ecological process requires a mix of actions that are consistent with management objectives. The West will use all available methods and tools for active management of the landscape to consider and conserve a

diversity of ecological, social, and economic values. The West will coordinate with all partners and seek continued stakeholder engagement in developing market-based, flexible and proactive solutions that can take advantage of economies of scale. All aspects of wildland fire will be used to restore and maintain resilient landscapes. Emphasis will be placed on protecting the middle lands near communities.” (Western Regional Strategy Committee [WRSC] 2013:14).

In this CWPP, recommendations to restore and maintain landscapes focus on vegetation management and hazardous fuel reduction.

This region has been home to an active and committed fuel treatment program by land managers for many years. Figure 4.1 shows existing fuel treatments that have been completed or planned in and around the planning area. This information is derived from the Colorado Division of Fire Prevention and Control (DFPC), CSFS, Team Rubicon, and the USFS. The reader is referred to agency websites and the [Federal Register](#) for the latest information on planned or ongoing actions on adjacent public land (Figure 4.1). The treatment momentum already observed surrounding the planning area should be built upon in order to increase fuel treatment effectiveness across the landscape.



RECOMMENDATIONS FOR HAZARDOUS FUEL REDUCTION

Fuels management of public and private land in the WUI is key to the survival of homes during a wildfire event, as well as the means to meet the criteria of Goal 1. Research has shown how fuel treatments in the WUI can change fire behavior to support suppression activities and protect homes (Evans et al. 2015). The importance of fuels management is reflected in policy at the federal level, with the HFRA requiring that federal land management agencies spend at least 50% of their fuels reduction funds on projects in the WUI.

Fuels should be modified with a strategic approach to reduce the threat that high-intensity wildfires pose to lives, property, and other values. This section provides information on fuel treatment methodologies that can be applied to first protect structures (defensible space), then near community boundaries (fuel breaks, cleanup of adjacent open spaces), and finally in the wildlands beyond community boundaries (larger-scale forest health and restoration treatments). The emphasis of each of these treatment types is unique. Proximate to structures, the recommendations focus on reducing fire intensity consistent with Firewise and International Fire Code standards. Further into open space areas, treatments tend to emphasize forest health and increasing resiliency to catastrophic wildfire and other disturbances.

Table 4.1 summarizes the types of treatments recommended throughout the planning area. The majority of the treatments are focused on higher risk areas, as defined by the Composite Risk-Hazard Assessment and Core Team input. Many of these treatment recommendations are general across the communities because similar conditions occur in those areas. Tables 4.1, 4.2, and 4.3 also address the requirement for an action plan and assessment strategy by providing monitoring guidelines and a timeline for implementation. This timeline is obviously dependent on available funding and resources, as well as National Environmental Policy Act (NEPA) protocols for any treatments pursued on federal land. Recommendations were developed with consideration of protection of natural, cultural, and socioeconomic values at risk, as developed through public and Core Team discussions.

In addition, areas of concern (Figure 4.2) have been delineated based on the Composite Risk-Hazard Assessment and Core Team input. Areas of concern include regions of high concentrations of HVRA that coincide with high potential exposure to wildfire (see Figure 3.1), areas where fuel loading is high and could contribute to catastrophic wildfire in the WUI, and/or areas where land management agencies have ongoing vegetation management treatments that could be enhanced by adjacent projects. These areas were also developed using insect and disease data so that the delineated areas capture regions on the landscape that will experience increased fuel loading in the coming years.

The areas of concern are areas where land managers should consider employing mitigation measures to protect life, property, and other values. It is recommended that treatment plans be developed to execute mitigation measures in these areas. Treatment types will be site specific but should address a need to slow fire spread or mitigate potential extreme fire behavior parameters, such as high flame lengths or fireline intensity.

When applying fuel treatments, every effort should be made to align treatments with the Colorado State Forest Action Plan (CSFS 2020) with consideration of all appropriate best management practices and sound science. In addition, treatments should be strategically located in areas to maximize effectiveness of other existing and ongoing projects (Figure 4.1). A list and detailed descriptions of fuels treatment types and methods, including defensible space practices and larger-scale projects, is housed in Appendix E.

When possible, simultaneously planning for the management of multiple resources while reducing fuels will ensure that the land remains viable for multiple uses in the long term. The effectiveness of any fuel reduction treatment depends on the degree of maintenance and monitoring that is employed. Monitoring will also ensure that objectives are being met in a cost-effective manner.

The treatment list is by no means exhaustive and should be considered purely a sample of required projects for the future management of the planning area. Many projects may be eligible for grant funds available from federal and/or state sources. For a list of funding sources, please refer to Appendix L.

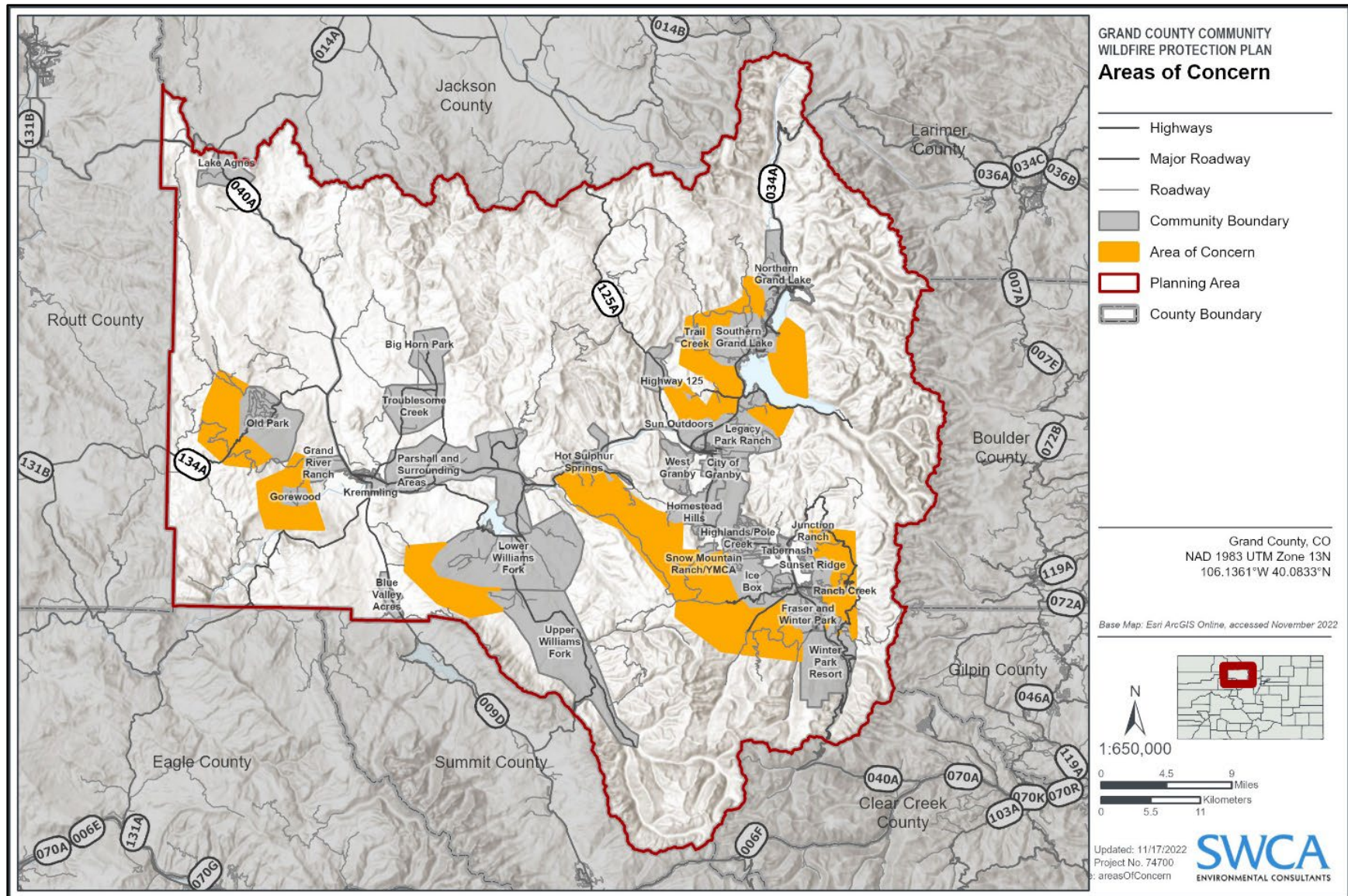


Figure 4.2. Landscape treatment areas of concern within Grand County.

Table 4.1 Recommendations to Create Resilient Landscapes (Fuel Treatments)*

*See Appendix A to consult relevant regulations and past planning efforts

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------|--------|------------------|---------------------|---|--|--|--|---|--|---|
| GC RL #1 | | H | 0–2 years | Mitigate wildfire hazards on private land | Highest risk communities identified in the assessment. This should be prioritized in areas of concern and along egress routes. | Private, county, local FPDs, CSFS, federal agencies, Grand County Wildfire Council | <p>Strategic placement of fuel breaks on private lands will help to limit the spread of wildland fire and increase access to difficult areas. Fuel break prescriptions should be site specific depending on the fuel type, topography, soils, adjacent land management practices and environmental regulations.</p> <ul style="list-style-type: none">Collaborate with local, state, and federal land management agencies, communities, and private landowners to link fuel treatments to increase effectiveness on a landscape scale (aligns with Colorado Forest Action Plan)Reduce fuel continuity where appropriate, focusing on high-risk areas and the WUIBreak down plans into high-risk communitiesUtilize mechanical and manual methods or consider biological controlsAim for 300-foot shaded fuel breaks around communitiesImplement and maintain shaded fuel breaks and reduce ladder fuelsUtilize the Good Neighbor Authority, as appropriate, to facilitate cross-boundary actions.Target vacant lots with accumulating vegetationProvide incentives for private landowners to engage in fuel reduction projects | <p>Protect life and property by mitigating fuels, providing defensible space for firefighters protecting structures.</p> <p>Create a fuel arrangement unlikely to support crown fire or fast rates of spread.</p> <p>Reduce the risk of home and structure ignitions.</p> | <p>Follow up with post-treatment stabilization practices.</p> <p>Frequent communication, collaboration, and cooperation with landowners.</p> <p>Regular maintenance to ensure the fuel break remains clear of vegetation.</p> <p>Monitor and treat for invasive species.</p> <p>Continued management of fire breaks maintained by grazing, brush breaking, controlled burns.</p> | <ul style="list-style-type: none">U.S. Endowment for Forestry and CommunitiesCommunity Wildfire Defense Grants (CWDG)Forest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS)National Fire Plan (NFP) GrantsBuilding Resilient infrastructure and Communities (BRIC)Congressionally Directed SpendingForm a "Forest Improvement Tax District" re. CO HB21-1008Modify Grand County "Open Lands, Rivers & Trails" sales tax to include wildfire mitigation and staffingCreate a Grand County real estate transfer fee to fund mitigation |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------|--------|------------------|---------------------|--|--|---|--|--|---|--|
| GC RL #2 | | H | 0–5+ years | Collaborate between private, state, and federal partners (especially the BLM, USFS and the NPS) to plan and conduct landscape-level fuel treatments. A focus should be to treat areas along egress routes. | County (private and local) and adjacent state and federally managed lands (i.e., public and private lands). This should be prioritized in areas of concern. <u>Priority areas:</u> West Fraser, Blue Ridge, East Fraser, East Lake Granby, Strawberry, South of Lake Granby, West 34, Copper Creek, Old Park, Kremmling Water | County, CSFS, federal agencies, non-profits (Grand County Wildfire Council) | <ul style="list-style-type: none">Locate parcels on private and public lands where targeted fuel treatments can be performed that will connect pre-existing treatments.Collaboratively identify vegetation and fuels management needs based on the risk/hazard assessment and input from local officials and land managers.Develop equipment needs to accomplish work (including maintenance) and seek funding for purchase.Create an educational tool/handout for land/property owners focused on various methods, techniques, and cost for various fuel treatments.Cultivate and support partnerships with NGOs and volunteer groups to support implementation of projects, for example, the Grand County Wildfire Council.Buffer roads, natural fuel breaks (rivers, creeks, and ridgelines), and designated ROWs to increase fuel break effectiveness.Consider fuel breaks around the boundaries of federally owned land.Create and maintain buffers around critical infrastructure.Develop long-term maintenance plan with each project, including funding sources. | Create resilient landscapes and address potential for extreme wildfire behavior in and around the WUI. Create and maintain accountability with local landowners/managers. | Arrange a standing multi-agency meeting each year to review accomplishments and address future needs. Consider the use of timber sales. Survey for regeneration annually. Perform defensible space inspections. Monitor and treat for invasive species annually. | <ul style="list-style-type: none">Forest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS)U.S. Endowment for Forestry and CommunitiesWestern Bark Beetle ProgramGSA Federal Excess Personal Property (FEPP)Firewise GrantsBRICRegional Catastrophic Preparedness (RCP) grantsFire Prevention and Safety (FP&S) Grants (FEMA)Community Wildfire Defense Grants (CWDG)National Urban and Community Forestry Challenge Cost Share Grant ProgramHealthy Forests and Vibrant Communities (CSFS)From Forests to Faucets (Denver Water)Community Assistance Funds Adjacent to USFS lands (CAFA) – CSFS |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------|--------|------------------|---------------------|---|---|--|---|--|--|---|
| GC RL #3 | | H | 0–10 years | Conduct post-wildfire mitigation work in areas impacted by the East Troublesome and Williams’s Fork fires | Regions impacted by fire. This should be prioritized in areas of concern. | USFS, NPS, BLM, private (Northern Water), and CSFS | <div>Efforts should focus on post-wildfire landscape rehabilitation in the WUI and important watersheds.</div> <ul style="list-style-type: none">Determine current status of completed BAER and BAR work and assess needs for future efforts.Work with a forest hydrologist to address restoration efforts in valued watersheds and WUI areas to accelerate forest recovery. Work such as revegetation and tree planting can reduce debris flow risk, flooding risk, erosion, sedimentation, and protect water quality.Conduct regular post-fire monitoring efforts. Track forest/vegetation recovery and succession. Utilize management interventions in degraded areas to ensure successful recovery (e.g., monitor and control for invasive plants, plant native plants in areas experiencing erosion).Consider fuel reduction projects in WUI areas with considerable slash and blow down to reduce potential for future wildfire as recovery is ongoing.Conduct public outreach and education concerning post-wildfire hazards (e.g., falling trees, heightened flooding risk, and higher likelihood of road washout). | Aid in restoration and rehabilitation of landscape impacted by wildfire. | <div>Regular monitoring of post-fire environment.</div> <div>Assessment of WUI and watersheds at risk in the post-fire environment</div> <div>Committed long-term effort to tracking post-wildfire recovery and assessing post-wildfire risks.</div> | <ul style="list-style-type: none">Forest Restoration & Wildfire Risk Mitigation (CSFS)U.S. Endowment for Forestry and CommunitiesColorado Healthy Forests and Vibrant Communities ActEnvironmental Quality Incentives Program (EQIP)2022 Infrastructure Investments and Jobs Act |
| GC RL #4 | | H | 0–5 years | Have local FPDs design, implement, and prioritize local fuel reduction projects within the WUI in their respective FPD. | County-wide. This should be prioritized in areas of concern. | Local FPDs, with CSFS support and private and federal cooperation. | <ul style="list-style-type: none">Implement prescribed fire program.Utilize either fuel pile burning or broadcast prescribed burns – implementation and methods should consider fire regimes, fuels, hazards, and community concerns.Design “hybrid projects” that remove fuel from critical areas and prescribed burns to clean out interior fuels. Implement mechanical fuel reduction projects.Utilize woodchippers, saw crews, selective timber harvests, and timber stand improvement projects to obtain goalsUtilize mechanical and chemical means (e.g., mowing and/or herbicide) to control problematic invasive species, which contribute to hazardous fine fuel loading | <div>Reduce wildfire risk in WUI.</div> <div>Provide local input in fuel treatments.</div> | <div>Yearly maintenance and monitoring of post-treatment conditions</div> | <ul style="list-style-type: none">Colorado Healthy Forests and Vibrant Communities ActForest Restoration & Wildfire Risk Mitigation (CSFS)Environmental Quality Incentives Program (EQIP)National Urban and Community Forest ProgramU.S. Endowment for Forestry and CommunitiesForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS)HOA assessments |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------|--------|------------------|---------------------|--|--|---|---|---|--|--|
| GC RL #5 | | M | 0–5 years | Reduce potential for wildfire ignitions along roadways, railway tracks, and ATV/OHV/Jeep trails. | County-wide. Focus on primary transportation corridors, popular recreational areas, and community egress routes. This should be prioritized in areas of concern. | CDOT, private, county, federal agencies | <p>Road ROW vegetation improvements:</p> <ul style="list-style-type: none">• Frequent maintenance of ROW vegetation• Focus fuel treatments in areas identified as high risk in evacuation analysis and with high likelihood of entrapment as identified in the entrapment analysis (i.e., steep and windy areas, or regions with hazardous fuel loading).• Treat surface fuels within a minimum of a 10-foot buffer and up to 30 feet where possible. Focus in fine/flashy fuels on roadsides, especially invasive plants.• Treat fuels in non-paved parking areas and pull-offs (e.g., trailheads, campgrounds, scenic views) to reduce potential for unintentional grass/weed fires.• Trim fuels (ladder fuels/overhanging vegetation) to allow safe passage of emergency vehicles and to prevent potential for entrapment.• Control for roadside invasive species that may contribute to rapid fire spread or ignitions (i.e., weeds and grasses). Consider the use of herbicide.• Monitor railway tracks for overgrown conditions. Create and maintain fuel buffers along tracks.• Consider targeted restrictions (use of gates) on ATV/OHV/JEEP use during periods of heightened wildfire risk, especially on overgrown backcountry trails. | <p>Reduce roadside wildfire risk and hazards</p> <p>Reduce number of human- caused wildfire ignitions</p> <p>Provide improved ingress/egress capabilities during wildfire</p> | Yearly maintenance and monitoring of roads | <ul style="list-style-type: none">• BRIC• NFP• RCP• Firewise Grants• 2022 Infrastructure Investments and Jobs Act• Forest Restoration & Wildfire Risk Mitigation (CSFS)• Wildfire Mitigation Incentives for Local Government (CSFS)• Wildfire Mitigation Resources & Best Practices (CSFS)• CDOT• Railroads• GC OLR&T Fund |
| GC RL #6 | | M | 0–5 years | Assess health and status of aspens stands. Look for occurrences of sudden aspen decline. | West Grand County (primarily) and county wide | USFS, BLM, Private, and CSFS | <p>Aspen decline has largely been attributed to multiple effects, but the interaction between drought, climate change, disease, and land use is likely the primary cause.</p> <ul style="list-style-type: none">• Conduct monitoring efforts in locally important aspen stands in the WUI and assess and document occurrence of aspen decline.• Conserve healthy aspen stands and limit anthropogenic development into them.• Consider elk enclosures and grazing restrictions (where appropriate) to increase aspen recruitment.• Consider prescribed fire in older aspen forests to promote new growth/clear out older and/or dead trees and understory conifer competition (note: standing aspen has low fire tolerance, this will only help with recruitment).• Look to reduce prevalence of insects/disease in locally important stands (e.g., mechanical and chemical treatments). | <p>Improve forest health</p> <p>Reduce wildfire risk within the WUI</p> <p>Maintain and preserve native landscapes</p> | Yearly maintenance and monitoring of locally important and high-elevation aspen stands | <ul style="list-style-type: none">• Colorado Healthy Forests and Vibrant Communities Act• Forest Restoration & Wildfire Risk Mitigation (CSFS)• EQIP• National Urban and Community Forest Program• U.S. Endowment for Forestry and Communities |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------|--------|------------------|---------------------|--|--|--|---|--|---|---|
| GC RL #7 | | M | 0–10 years | Create more open canopies in forests and utilize prescriptions and treatments to clear out downed timber | Private and federal lands. This should be prioritized in areas of concern. | Federal agencies, local, and private FPDs | <ul style="list-style-type: none">Utilize mechanical treatments and prescribed firesTreatments should have dual purpose (e.g., they can be used widen ingress/egress for all non-county roads)Look at mapped Potential Operational Delineations (PODs) and map out areas with needed prescription burns. | Create resilient landscapes, maintain/restore forest and rangeland health, and address potential for extreme wildfire behavior. Decrease wildfire risk to communities | Set up a standing multi-agency meeting every fall to review accomplishments and address future needs. | <ul style="list-style-type: none">National Urban and Community Forestry Challenge Cost Share Grant ProgramFirewise grantsU.S. Endowment for Forestry and CommunitiesNFPForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |
| GC RL #8 | | L | Ongoing | Promote to role of fire in ecological processes | County-wide | Private, county, state, and federal agencies | <ul style="list-style-type: none">Educate the population about the natural role that wildfire plays in Grand County's ecosystems.Restore natural fire regimes in Wilderness areas (RMNP and USFS areas) and in roadless forests and rangelands areas. Let wildfires burn in regions that pose low risk to human health and safety.Foster relationships among researchers, managers, practitioners, and emergency responders to facilitate knowledge transfer and resource sharing. Use these relationships to develop creative means of restoring forest health and natural fire regimes in manner that balances ecological health with community concerns.Identify areas to manage fire to reduce fuels and restore ecosystems. Coordinate with appropriate entities and integrate information into response plans and management actions.Integrate potential prescribed fire projects in planning efforts where ecologically appropriate. | Restore/conserv native landscapes Promote environmental awareness | Stakeholder outreach, communication, and cooperation | <ul style="list-style-type: none">National Urban and Community Forestry Challenge Cost Share Grant ProgramFirewise grantsU.S. Endowment for Forestry and CommunitiesWestern Bark Beetle ProgramForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS)Environmental Quality Incentives Program (EQIP)Leonardo DiCaprio Foundation Grants2022 Infrastructure Investments and Jobs Act |

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COHESIVE STRATEGY GOAL 2: FIRE-ADAPTED COMMUNITIES

Goal 2 of the Cohesive Strategy/Western Regional Action Plan is Fire-Adapted Communities: Human populations and infrastructure can withstand a wildfire without loss of life and property. The basic premise of this goal is:

“Preventing or minimizing the loss of life and property due to wildfire requires a combination of thorough pre-fire planning and action, followed by prudent and immediate response during a wildfire event. Post-fire activities can also speed community recovery efforts and help limit the long-term effects and costs of wildfire. CWPPs should identify high-risk areas and actions residents can take to reduce their risk. Fuels treatments in and near communities can provide buffer zones to protect structures, important community values and evacuation routes. Collaboration, self-sufficiency, acceptance of the risks and consequences of actions (or non-action), assisting those who need assistance (such as the elderly), and encouraging cultural and behavioral changes regarding fire and fire protection are important concepts. Attention will be paid to values to be protected in the middle ground (lands between the community and the forest) including watersheds, viewsheds, utility and transportation corridors, cultural and historic values, etc.” (WRSC 2013:15).

In this CWPP, recommendations for fire-adapted communities include public education and outreach actions and actions to reduce structural ignitability.

RECOMMENDATIONS FOR PUBLIC EDUCATION AND OUTREACH

Just as environmental hazards need to be mitigated to reduce the risk of fire loss, so do the human hazards. Lack of knowledge, lack of positive actions (e.g., failing to create adequate defensible space), and negative actions (e.g., keeping leaf litter and exposed propane tanks close to structures) all contribute to increased risk of loss in the WUI.

Methods to improve public education could include increasing awareness about home hardening; providing workshops at demonstration sites showing Firewise building and landscaping techniques or fuels treatment projects; organizing community cleanups to remove fuels; publicizing availability of government funds for treatments on private land; and, most importantly, improving communication between homeowners and local land management agencies to improve and build trust, particularly since the implementation of fuel treatments and better maintenance of existing treatments needs to occur in the interface between public and private land. Public education should also include significant involvement from town and local officials and civic groups.

The Grand County Wildfire Council and local Fire Protection Districts (FPDs) already carry out education activities throughout the County, such as public engagement open houses, barbecues, and youth events. Some FPDs also maintain website pages containing useful information and contacts regarding wildfire mitigation and wildfire prevention.

Please see Appendix B for a comprehensive list of local, statewide, and national educational resources.

Table 4.2 lists public education recommendations to be implemented in the county.

RECOMMENDATIONS FOR REDUCING STRUCTURAL IGNITABILITY

Table 4.2 provides a list of community-based recommendations to reduce structural ignitability that should be implemented throughout the Grand County CWPP planning area. Reduction of structural ignitability depends largely on public education that provides homeowners the information they need to take responsibility for protecting their own properties. A list of action items that individual homeowners can follow is provided below. Carrying out fuels reduction treatments on public land may only be effective in reducing fire risk to some communities; if owners have failed to harden their homes and structures and provide mitigation efforts on their own land, the risk of home ignition remains high, and firefighter lives are put at risk when they are forced to carry out structural defense.

Preparing for wildland fire by creating defensible space around the home is an effective strategy for reducing structural ignitability as discussed under Cohesive Strategy Goal 1: Resilient Landscapes. Studies have shown that burning vegetation beyond 120 feet of a structure is unlikely to ignite that property through radiant heat (Butler and Cohen 1996), but fire bands that travel independently of the flaming front have been known to destroy houses that had not been impacted by direct flame impingement. Hardening the home to ignition from embers, including maintaining vent coverings and other openings, is also strongly advised to protect a home from structural ignitability. Managing the landscape around a structure by removing weeds and debris within a 30-foot radius and keeping the roof and gutters of a home clean are two maintenance measures proven to limit combustible materials that could provide an ember bed and ignite the structure. In essence, reducing structural ignitability and creating defensible space are key for minimizing potential loss and damage such as that experienced during the 2020 East Troublesome Fire. Detailed information regarding defensible space practices as well as a list of actions for reducing structural ignitability can be found in Appendix F.

Table 4.2. Recommendations for Creating Fire-Adapted Communities (Public Education and Reducing Structural Ignitability)*

*See Appendix A to consult relevant regulations and past planning efforts

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------|--------|------------------|---------------------|--|--|---|---|---|--|--|
| GC FAC #1 | | H | 0–10 years | Public education for exurban communities in fire prone environments | West Fraser, East Fraser, East Lake Granby, Strawberry Ranch, Cooper Creek/South William's Fork, Old Park, Kremmling Water/North of Highway 134, Communities surrounding West U.S. Highway 34, and any other community located in high to extreme risk areas | Private, Town and County Planning Commissions, local FPDs, HOAs, Grand County Wildfire Council, and community leaders | <div>Increase public awareness of the fire environment:<ul style="list-style-type: none">Communicate the inherent risk to homes/property situated on steep slopes in fire prone landscapes.Communicate the fast rates of spread that can occur in grass-shrub and shrub fuels.Communicate that tall flame lengths can occur in timber-understory and timber-litter and fuels (i.e., forested areas).Increase education and assistance for homeowners on home hardening, defensible space, and hazardous fuel treatments.Develop and encourage adoption of model HOA covenants and architectural guidelines that support WUI risk reduction.Enact and enforce a Wildland-Urban Interface Code for development in high-risk landscapes as noted in the risk-hazard assessment.Enact a county-wide requirement for a real estate transfer WUI disclosure, inspection checklist, and local FPD contacts.Create opportunities for landowners/mangers to address wildfire risk reduction.Increase awareness that many residents live within an environment that historically experienced regularly mixed to high severity wildfire (spruce-fir and lodgepole pine forests).Create mailers and flyers with simple fire safety practices and resources to distribute to visitors and short-term rental properties. Post to the wildfire council web page.Issue press releases in the spring and fall to local papers including fire-safe information for the public and Firewise resources.Develop a Grand County consumer recommendation for homeowner insurance.</div> | <div>Create and maintain accountability with local landowners and real estate developers</div> <div>Improve public knowledge about wildfire risk for the environment they live in</div> | Regular public outreach and communications with HOAs, landowners, real estate agents, developers and architects. | <ul style="list-style-type: none">Wildfire Mitigation Incentive for Local Government (CSFS)Fire Prevention and Safety GrantsFire Wise GrantsFEMA FP&S Grants |
| GC FAC #2 | | H | 0–5 years | Identify funding sources for underserved homeowners and vulnerable populations | County wide. Prioritize high risk areas. | FPDs, HOAs, community leaders GCOEM Mtn Family Center Grand County Wildfire Council | <ul style="list-style-type: none">Identify vulnerable populations (elderly, disabled, low income) and underserved homeowners who may need additional help to mitigate home hazards and to evacuate during a wildfire.Seek grant opportunities to support assistance for relevant populations. | Protect life and property of the most vulnerable members of the community | Annual review of number of actions taken to address vulnerable populations and underserved homeowners | <ul style="list-style-type: none">BRICCommunity Development Block GrantsFirewise grantsNational Urban and Community Forest ProgramChallenge Cost Share Grant ProgramCommunity Wildfire Defense Grants |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------|--------|------------------|---------------------|---|---------------------------------|--|--|--|--|--|
| GC FAC #3 | | H | | Reduce potential for human caused wildfire ignitions along recreational trails. | County-wide | BLM and USFS | <ul style="list-style-type: none">Consider targeted restrictions (e.g., use of gates) on recreational trails use during periods of heightened wildfire risk, especially on backcountry trails with high fuel loads.Communicate heightened wildfire ignition risk when motorized vehicles travel off trail, especially during dry periods of the year (e.g., utilize flyers at trailheads).Communicate safe parking practices to reduce wildfire ignition risk (e.g., don't park in tall, dry grass or use a ground tarp when parking).Communicate and enforce campfire restrictions.Utilize temporary and/or permanent trail closures in high-to extreme- fire risk areas.Implement geofenced messaging for areas with high tourist densities. | Reduce recreation caused wildfire ignitions. Encourage responsible recreation. | Regular monitoring of recreational trail conditions. Regular public outreach. | <ul style="list-style-type: none">USFS Community Wildfire Defense GrantsWildfire Mitigation Incentive for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices Grants (CSFS)Firewise Communities Grants |
| GC FAC #4 | | H | | Update current fire and building codes. Develop, enact, and enforce WUI codes. Focus on land use plans, existing building codes, and subdivision codes. | County and local municipalities | County planning commission and town governments FPDs, GCOEM | <ul style="list-style-type: none">Strengthen municipal and county codes for home and structures located within the WUIProvide list, examples, and costs of acceptable building materials.Continue to develop and adopt the latest building standards and codes.Clearly define the WUI in the county code.Consider county-wide adoption of International WUI code.Provide HOA model covenants and architectural guidelinesPublic (esp. builders, agency staff, architects, realtors) education. | Reduce wildfire risk and loss of structures through effective regulation | Annual updates to codes as necessary. Perform regular inspections to ensure codes are being adhered to. | <ul style="list-style-type: none">Firewise grants National Urban and Community Forest ProgramFP&S (FEMA)Environmental Protection Grants (EPA)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |
| GC FAC #5 | | H | | Communicate fire risk to real estate agents, developers, architects, insurance agents, and potential sellers/buyers | County and local municipalities | County and town planning commissions, local government, Grand County Board of Realtors | <ul style="list-style-type: none">Develop and distribute information regarding how topography, slope, and vegetation all impact a home's risk level and defensible space needs.Have wildfire risk and WUI delineation for listed properties included as an element of the Master Listing Service (MLS) – the master listings for sale utilized by the real estate industry.Have MLS include link to county-wide CWPP/story map (with preferred navigation to community/region specific NFPA 1144)Include Firewise assessments and recommendations to potential buyersProvide link to county CWPP on real-estate websitesProvide link to Grand County Wildfire Council assessment program page on real-estate websites.Encourage realtor associations to include wildfire risk areas and WUI in maps. | Increase pre-purchase knowledge of fire environment and post-purchase action by new homeowner. Educate property owners. Reduce threats to life and property. | Assess and improve communication between real estate sellers/buyers and county emergency planning | <ul style="list-style-type: none">BRICFirewise GrantsFP&SEPA Environmental Education GrantsWildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------|--------|------------------|---------------------|--|-------------|--|---|--|---|--|
| GC FAC #6 | | H | | Expand the capacity of the Grand County Wildfire Council | County-wide | Town and county planning ,FPDs, residents, Grand County Wildfire Council | <ul style="list-style-type: none">• Develop local, sustainable funding sources• Engage additional groups with vested interest in wildfire risk reduction, e.g., builders, suppliers, realtors, insurance agents.• Continue to develop and distribute information regarding how topography, slope, and vegetation all impact a home's risk level and defensible space needs.• Apply for and acquire funding to hire a full-time paid director.• Apply for and acquire funding to hire a full-time wildland fire mitigations specialist and associated team.• Continue efforts bolstering Firewise programs, education, and training; grant writing capabilities; improved public outreach; and community chipping days.• Continue to build collaboration with state and federal agencies – focus on joint fuel reduction projects.• Provide more opportunities form community chipping days (i.e., chipping hazardous fuels).• Continue and expand property wildfire assessment program.• Continue to fund and implement cost-share programs for homeowners, focusing on HIZ areas and vulnerable households.• Coordinate with national non-profit efforts ongoing in Grand County.• Add a "hit count" to bewildfireready.org | Improve local government and community ownership of reducing wildfire risk Strengthen ties between federal and private landowners Reduce wildfire risk throughout the County | Assess capacity needs and acquire funding to support. Review/tracking of goals and projects. Assessment of wildfire council advancements in wildfire risk reduction using the project tracker and pivot based off lessons-learned annually. | <ul style="list-style-type: none">• Firewise Grants• Community Wildfire Defense Grant (CDWG)• FP&S• EPA Environmental Education Grants• Wildfire Mitigation Incentives for Local Government (CSFS)• Wildfire Mitigation Resources & Best Practices (CSFS)• Form a "Forest Improvement Tax District' re. CO HB21-1008• Modify Grand County "Open Lands, Rivers & Trails" sales tax to include wildfire mitigation and staffing• Create a Grand County real estate transfer fee to fund mitigation |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------|--------|------------------|---------------------|---|---|--|---|---|--|--|
| GC FAC #7 | | H | | Monitor and enforce defensible space standards. Encourage home hardening. Improve homeowner mitigation efforts and opportunities. | WUI, county-wide, high-risk areas as identified in the risk assessment. | Private, County Planning Commission, local FPDs, Grand County Wildfire Council, HOAs and community leaders | Strongly promote defensible space: <ul style="list-style-type: none">Consider adhering to CSFS recommended defensible space standards (e.g., enforce 100 feet of defensible space).Clean and maintain fuel buffers in ingress/egress routes.Ensure there are two ways out of a community.Consider landscaping methods across multiple properties that reduces fire potential (e.g., connect fuel treatments across different properties).Develop staffing plan to support enforcement and seek funding to implement the plan.Provide tax incentives for defensible space actions.Work with insurance commission and companies to determine the potential to provide incentives for defensible space associated with reduced insurance premiums.Consider fuels pickup/disposal options.Require notice in real transfer of home location in WUI, assessment checklist, and FPD contacts.Promote education of the reduction of structural ignitability and enact WUI codes.Educate homeowners on methods and resources to reduce their home's risk through defensible space improvements and structure hardening.Train home repair contractors to assess and harden homes to build local capacity and capability. | Reduce loss of life and structures through defensible space and home hardening. | Annual program evaluation and updates as necessary. Update the building code. | <ul style="list-style-type: none">FirewiseFP&S (FEMA)EPA Environmental Education GrantsCWDGBRICWildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |
| GC FAC #8 | | M | 0–5 years | Improve evacuation zone and route education and outreach to the public. | County wide | Federal, state, and local agencies. GC Sherriff and GCOEM FPDs Grand County Wildfire Council | <ul style="list-style-type: none">Publish primary and secondary evacuation route maps.Include evacuation zone and route info in required STR info packages.Complete traffic/scenario evacuation route models. | Ensure public and first responder safety in the event of a wildfire or other emergency. | Develop and distribute a survey to understand and adapt best practices for communication and teaching. Assess and adapt methodologies and current information annually to ensure information is up to date. | <ul style="list-style-type: none">FEMA Building Resilient Infrastructure and Communities GrantsUSFS Community Wildfire Defense GrantFEMA FP&S GrantsWildfire Mitigation Incentive for Local Government (CSFS)Firewise Communities Grants |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------|--------|------------------|---------------------|--|-------------|---|--|---|--|--|
| GC FAC #9 | | M | 0–5 years | Public education and law enforcement of local ordinances and regulations that reduce the occurrence of human-caused wildfire | County wide | County, state, and federal agencies Grand County Wildfire Council | <div>Inform and educate public about ordinances concerning wildfire and structure fire.</div> <ul style="list-style-type: none">Enact and education recreators on ordinance changes regarding campfire structure design.Communicate campfire regulations to common recreationist (e.g., distribute flyers at shops/agencies that sell hunting and fishing licenses or areas that give out backcountry/camping permits).Continue effective communication of fire bans and restrictions.Communicate regulations concerning county burn permits. Include pile burning, agricultural burning, ditch burning, and garbage burning.Enforce dispersed campfire regulations, especially on BLM and USFS lands. If federal law enforcement is understaffed/unavailable, consider an agreement with Sheriff's department and local law enforcement.Implement geofenced messaging. | <div>Recue risk of human-caused wildfire ignitions.</div> <div>Educate citizens about wildfire hazards.</div> <div>Empower local communities and visitors.</div> | <div>Conduct regular review of County ordinances and update outreach materials and efforts as needed.</div> <div>Maintain working relationship with local businesses and land management/wildlife agencies so materials can be disseminated to the public.</div> | <ul style="list-style-type: none">Community Planning Assistance for Wildfire (CPAW)BRICFP&SFirewise grantsNational Urban and Community Forest ProgramChallenge Cost Share Grant ProgramCommunity Wildfire Defense GrantsWildfire Mitigation Incentive for Local Government (CSFS) |
| GC FAC #10 | | M | | Public outreach and education aimed at reducing human-caused wildfire | County wide | Local, state, and federal agencies Grand County Wildfire Council Short-term rental and HOA managers | <div>Inform and educate the public about methods to reduce human-caused wildfire ignitions.</div> <ul style="list-style-type: none">Educate around sources of human-caused wildfire ignitions (e.g., target practice, driving through or parking in tall, dry vegetation; discarded cigarette butts; fireworks; campfires, etc.).Communicate hazardous conditions surrounding homes/structures (e.g., exposed propane tanks, electrical hazards, hazard trees, limited defensible place, etc.)Provide materials with resources for the public to understand how and with what funding they can take action to reduce risks.Integrate with tourism and STR advertising.Utilize Appendix G of the CWPP: Homeowner Resources | <div>Recue risk of human-caused wildfire ignitions.</div> <div>Educate citizens about wildfire hazards.</div> <div>Empower local communities and visitors.</div> | <div>Track successes and learnings from outreach campaigns and enact changes with each wildfire season.</div> <div>Assess and utilize current popular information sources such as Nextdoor, social media, news outlets, and more.</div> | <ul style="list-style-type: none">Wildfire Mitigation Incentive for Local Government (CSFS)Firewise Communities GrantsWildfire Mitigation Resources & Best Practices Grants (CSFS)EPA Environmental Education GrantsFEMA BRIC Grants |
| GC FAC #11 | | M | | Dedicate staff, funding, and other resources to Project Tracker tool updates and maintenance. | County wide | Grand County agencies Grand County Wildfire Council | <div>Inform and education partners, agencies, and the public on the progress being made to reduce wildfire risk and hazard in the County.</div> <div>Ensure mitigation efforts and the associated metrics and data are tracked collaboratively and often.</div> <ul style="list-style-type: none">Advertise to the public when data is updated in the project tracker through the GCWC page and other social media outlets.Dedicate staff GIS time at all agencies to periodically review and update data on progress made towards accomplishing these CWPP recommendations. | <div>Educate citizens about wildfire hazards and mitigation.</div> <div>Empower local communities and visitors.</div> <div>Ensure collaboration towards goals by all agencies and civic groups in the County.</div> | <div>Review and update data on project progress biannually.</div> | <ul style="list-style-type: none">USFS Community Wildfire Defense GrantsFEMA FP&S GrantsEPA Environmental Education GrantsState Farm GNC Grants |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------|--------|------------------|---------------------|--|--|--|---|--|--|---|
| GC FAC #12 | | M | | Increase Firewise (USA) support to communities throughout the County | County-wide | County, subdivisions. (HOAs, etc. organized homeowners), developers, realtors, Grand County Wildfire Council, FPDs | <div>Improve education and knowledge of Firewise practices<ul style="list-style-type: none">Continue current Firewise practices.Include Firewise information in short-term rental contracts.Conduct Firewise/Ready, Set, GO! Workshops. Offer hands-on workshops to highlight individual home vulnerabilities and how-to techniques to reduce ignitability of common structural elements.Conduct more public meetings to educate citizens about Firewise.Provide free neighborhood and property assessments and mitigation planning; website sign-ups.Provide wildfire assessor training.Provide home hardening resource lists/ examples/cost estimates.Provide links to Firewise websites, downloadable forms, and other resources (e.g., Grand County's Wildfire Council- bewildfireready.org) on any relevant materials distributed (flyers, emails, and/or texts) at meetings or workshops.Consider direct mailers.Distribute Firewise information to school children during Fire Prevention Week.Re-Establish a Firewise coordinator in the county, possible within GCWC</div> | <div>Reduce wildfire risk through greater adoption of Firewise and structure hardening measures.</div> | <div>Annual review of number of events implemented. Conduct regular surveys to assess effectiveness. Firewise: number of recognized communities, percentage of subdivisions in Grand County number of Firewise homes, percentage of homes in Grand County Total cost and hours spent by Firewise communities</div> | <div><ul style="list-style-type: none">Firewise grants National Urban and Community Forest ProgramFP&S (FEMA)Environmental Protection Grants (EPA)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS)</div> |
| GC FAC #13 | | M | | Mitigate risk to Community Lifelines through contingency planning and consideration of the risk-hazard assessment. | County-wide, local municipalities, state, and federal agencies | Municipal, county, state, and federal partners | <div><ul style="list-style-type: none">Consider adopting recommend strategies to protect community lifelines (further detailed in Chapter 3):Grand County emergency planners should consider contingency response solutions should lifelines become threatened during a wildfire event.Primary lifelines are communication, food, water, shelter, health, medical, energy, community, transportation, and safety and security.</div> | <div>Protect essential infrastructure, resources, and emergency services during a large and extreme wildfire</div> | <div>Assess and improve contingency planning and the current wildfire risk to community lifelines.</div> | <div><ul style="list-style-type: none">BRICFP&SCWDGWildfire Mitigation Incentives for Local Government (CSFS)</div> |
| GC FAC #14 | | L | | Utilize and improve existing wildfire risk signage | County-wide | County, state, and federal agencies FPDs | <div><ul style="list-style-type: none">Continue to spread seasonally adjusted fire prevention messages along highways and in public open space areas to reduce human ignitions and promote defensible space.Continue the use of existing electronic signs at firehouses and other locales to display fire prevention information, safety messages, and fire danger ratings linked to safety actions.</div> | <div>Reduce wildfire risk through public education and outreach. Reduce threats to life and property.</div> | <div>Assess current situation and determine where signage can be improved (e.g., increasingly popular recreation areas). Provide information on pertinent county webpages and webpages of local businesses. Assess and utilize current popular information sources (Nextdoor, social media, Twitter, etc.)</div> | <div><ul style="list-style-type: none">Community Planning Assistance for Wildfire (CPAW)BRICFP&SFirewise grantsNational Urban and Community Forest ProgramChallenge Cost Share Grant ProgramCDWDGWildfire Mitigation Incentive for Local Government (CSFS)</div> |

COHESIVE STRATEGY GOAL 3: WILDFIRE RESPONSE

Goal 3 of the Cohesive Strategy/Western Regional Action Plan is Wildfire Response: All jurisdictions participate in making and implementing safe, effective, efficient risk-based wildfire management decisions:

“A balanced wildfire response requires integrated pre-fire planning with effective, efficient, and coordinated emergency response. Pre-fire planning helps tailor responses to wildfires across jurisdictions and landscape units that have different uses and management objectives. Improved prediction and understanding of weather, burning conditions, and various contingencies during wildfire events can improve firefighting effectiveness, thereby reducing losses and minimizing risks to firefighter and public health and safety. Wildfire response capability will consider the responsibilities identified in the Federal Response Framework. Local fire districts and municipalities with statutory responsibility for wildland fire response are not fully represented throughout the existing wildland fire governance structure, particularly at the NWCG, NMAC, and GACC levels.” (WRSC 2013:15).

This section provides recommended actions that jurisdictions could undertake to improve wildfire response.

RECOMMENDATIONS FOR IMPROVING FIRE RESPONSE CAPABILITIES

Educating the public so they can reduce dependence on fire departments is essential because these resources are often stretched thin due to limited personnel. Education to enhance community preparedness is a key factor in supporting local fire departments in fire response, particularly educating residents about emergency notifications and evacuation protocols so that residents are able to safely evacuate an area while emergency responders prepare to protect life and property.

Table 4.3 provides recommendations for improving firefighting capabilities. Many of these recommendations are general in nature.

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Table 4.3. Recommendations for Safe and Effective Wildfire Response*

*See Appendix A to consult relevant regulations and past planning efforts

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------|--------|------------------|---------------------|--|---|--|---|---|---|---|
| GC FR #1 | | H | | Improve local wildfire response capabilities | Local, state, and federal lands | County and local governments, local FPDs, federal agencies | <ul style="list-style-type: none">• Increase number of persons on seasonal severity crew, increase number of local firefighters• Ensure local FPDs have a paid wildland division (jointly)• Obtain more equipment for wildfire mitigation (e.g., water tenders and woodchippers)• Leverage grants/funding opportunities to increase seasonal firefighting capacity (e.g., hire more seasonal employees and provide red card opportunities for volunteers)• Provide more NWCG based training/qualification/certification opportunities for county firefighters and county staff (e.g., provide year-round training, hire/retain training officers and instructors, obtain more NWCG task books)• Collaborate with the Northern Colorado Fireshed Collaborative to identify opportunities for funding and hiring• Prioritize funding, hiring, and mitigation work in local FPDs.• Apply for and obtain funding to increase number of water resources for suppression in more rural areas of the County.• Increase airport and helipad capacity for air assets during a wildfire.• Utilize mapped dead and downed fuel to focus fuel treatments to improve response time. | <p>Enhance public and firefighter safety and mitigate wildfire risk within the county</p> <p>Improve local ability and self-reliance of County to address its own wildfire concerns</p> | <p>Convene annually to assess and document status of county-specific firefighting capabilities.</p> <p>Maintain list of trained personnel and volunteers that can be utilized across all field and incident command positions.</p> <p>Regularly update the Incident Qualification Plan (IQP).</p> <p>Track career advancement of wildland firefighting personnel.</p> | <ul style="list-style-type: none">• Emergency Management Performance Grant (EMPG) (FEMA)• RCP• BRIC• Firewise grants• Forest Restoration & Wildfire Risk Mitigation (CSFS)• Wildfire Mitigation Incentives for Local Government (CSFS)• Wildfire Mitigation Resources & Best Practices (CSFS)• Volunteer Fire Assistance (VFA) Grant (Colorado DFPC)• Colorado House Bill 22-1194• Congressionally Directed Spending |
| GC FR #2 | | H | | Increase direct and ancillary wildfire personnel. Provide inhouse and online personnel training. | Local FPDs, state fire responders, and federal agencies | County and local governments, local FPDs, federal agencies | <ul style="list-style-type: none">• Increase number of firefighting jobs available and associated funding for these salaries.• Increase volunteer firefighting opportunities and associated necessary funding.• Improve collaboration/cooperation capabilities between firefighting agencies.• Train physically capable workers from other departments to fight fire on fire lines (e.g., roads, train workers from vegetation, wildlife, and weed crews)• Achieve funding through fundraising/grant applications (e.g., federal, state, local, and independent grants and private donations). | <p>Enhance public safety, improve wildfire response, and limit size of wildfires</p> <p>Increase capacity to address growth of new residential areas in the WUI</p> | <p>Provide annual red card training/refresher/pack test events before start of fire season.</p> <p>Provide annual online wildfire training classes/refresher courses.</p> <p>Annual assessment of personnel and equipment capacity.</p> | <p>FEMA, State funds, and private grants</p> <ul style="list-style-type: none">• Emergency Management Performance Grant (EMPG) (FEMA)• RCP• BRIC• Firewise grants• Volunteer Fire Assistance (VFA) Grant (Colorado DFPC)• Forest Restoration & Wildfire Risk Mitigation (CSFS)• Wildfire Mitigation Incentives for Local Government (CSFS)• Wildfire Mitigation Resources & Best Practices (CSFS) |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------|--------|------------------|---------------------|---|-------------|--|---|---|---|---|
| GC FR #3 | | H | | Pre-evacuation planning and evacuation planning | County-wide | Emergency planners, county planning commission, FPDs, state and federal agencies | <ul style="list-style-type: none">Identify evacuation routes. Fuel treatments adjacent to roads can reduce fire behavior along important travel routes used for ingress by emergency vehicles and egress by residents.Identify parcel-owners along primary evacuation routes.Seek grant opportunities to support priority project implementation.Evacuation PlanningHave emergency responders/planners practice IPAWS, the Emergency Alert System (EAS), and CodeRED (e.g., drills and test notifications)Provide handouts to visitors, STRs, and residents on preparing "Go Bags" – an emergency supply bag that can be accessed in cases of evacuationConstruct a livestock and pet evacuation and sheltering planUtilize Appendix B for guidance on pet evacuation planningUtilize USDA's disaster planning for animal facilities; CSU Extension's livestock resources webpage; and PetAid Colorado Disaster ServicesConsider a comprehensive evacuation plan for the county that includes a road risk analysis, traffic control, re-routing, and risk mitigation.Consider adopting evacuation modeling and planning into the County Emergency Operations Plan or other hazard mitigation planning documents.Consider the use of dynamic AI evacuation modeling to assess traffic movements, especially under a scenario where areas are inundated with tourists during peak fire season.Define emergency evacuation center and medical treatment support options.Identify vulnerable individuals and processes for their evacuation support. | Protect life by reducing high-risk fire behavior along important roads. Protect public and first responder life and safety | Annual maintenance Yearly updates to materials | <ul style="list-style-type: none">EMPGRCPBRICFirewise grants National Urban and Community Forest ProgramFP&S (FEMA) |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------|--------|------------------|---------------------|--|---|---|--|---|--|--|
| GC FR #4 | | M | | Identify and improve roadway access to WUI areas. Reduce risk in areas identified as high risk or high likelihood of road entrapment in roads and evacuation analysis. | County-wide. Primary transportation corridors, bypass routes, and community specific egress routes. This should be prioritized in areas of concern. | County, private (private roads), federal agencies and CDOT | Roadway improvements: <ul style="list-style-type: none">While increasing roadway width may not be feasible in many locations, creation of passing areas where possible should be prioritizedConsider roadway improvements that increase ingress/egress in popular recreation areas in case of emergencyGrade and maintain roads to reduce hazards to emergency apparatus (potholes and poor surfacing)Install proper signage and turn around points where appropriate.Perform roadside fuels treatments to reduce wildfire behavior along major ingress and egress routes. | Provides for safe and effective wildfire response capabilities Provides safe and effective means of evacuation in case of emergencies | Regular monitoring and maintenance to ensure roads are drivable for emergency response vehicles | <ul style="list-style-type: none">BRICNFPRCPFirewise Grants2022 Infrastructure Investments and Jobs ActForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |
| GC FR #5 | | M | | Increase National Wildfire Coordinating Group Training | County-wide | Grand County Wildfire Council | <ul style="list-style-type: none">Fund and implement year-round trainings and classes to improve public education and outreach, funding acquisition, and collaboration between all stakeholders. Trainings should focus on wildfire assessments, response, incident command, logistics coordination, and resource management. | Reduce risk of loss of life and property from wildfire. | Assess annual effectiveness and adjust approaches based off of current needs and lessons-learned. | <ul style="list-style-type: none">FEMA BRIC GrantsWildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS)FEMA RCP GrantsEPA Environmental Education Grants |
| GC FR #6 | | M | | Improve wildfire coordination efforts | Local FPDs, federal and state fire crews, Grand County Communications Center, and interagency dispatch centers | County and federal agencies | <ul style="list-style-type: none">Grade and maintain select roads to reduce hazards to emergency apparatus (potholes and poor surfacing).Engage in regular joint training and drill exercises (e.g., desktop exercises).Ensure up-to-date communications, equipment, and procedures between federal, state, and local wildland fire responders (e.g., regularly update employee phone and email lists)Regularly update mutual aid/cooperative agreements between local, state, and federal fire respondersClarify roles and responsibilities of fire responders and Incident Command pre-, during, and post-wildfire or emergency. | Improve efficiency and speed of wildfire response Reduce wildfire threats to life and property Clarify party responsibilities for wildfire response | Annually review and update cooperative and mutual aid agreements Training for new staff on roles and responsibilities Host pre-season coordination meetings between response agencies and other stakeholders | <ul style="list-style-type: none">Emergency Management Performance Grant (EMPG) (FEMA)BRICNFPRCP2022 Infrastructure Investments and Jobs ActForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |
| GC FR #7 | | M | | Continue and bolster pre-planning amongst all collaborating response jurisdictions | County-wide | Local FPDs, State and federal fire responders/land managers | <ul style="list-style-type: none">Guarantee access to lands for fire response. Map out gates or other potential access issues and gain agreements for access during emergencies.Map out and delineate regions for water intake for fire suppression. Guarantee access to water supply during wildfire (e.g., know how unlock access gates)Consider equipment caches strategic locations to improve wildfire response times | Provide reliable fire suppression resources Improve wildfire response times | Annual review of exiting access issues and concerns, lessons learned Annual review of agreements with landowners Annual assessment/review of water resources | <ul style="list-style-type: none">EMPGBRICNFPForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------|--------|------------------|---------------------|--|-------------|---|--|---|---|---|
| GC FR #8 | | M | | Clarify roles of fire responders and Incident Command (IC) | County-wide | Local FPDs, federal and state fire responders. Grand County Communications Center, and interagency dispatch centers | <ul style="list-style-type: none">• Clear communication on incident command and fire response for Type 3 and Type 4 wildfire incidents• Clarify regulations/operations for “pushing” a Type 4 wildfire incident to a Type 3 wildfire incident - consider making this “push” easier to accomplish. | Increase efficiency of wildfire response and incident command Reduce the potential small fires to develop into large wildfires | Review and update regulations agreements Communication on roles and responsibilities between all fire responders | <ul style="list-style-type: none">• EMPG• Wildfire Mitigation Incentives for Local Government (CSFS)• Wildfire Mitigation Resources & Best Practices (CSFS) |



Developing an action plan and an assessment strategy that identifies roles and responsibilities, funding needs, and timetables for completing highest-priority projects is an important step in organizing the implementation of the Grand County CWPP. The previous chapter identifies tentative timelines and monitoring protocols for project recommendations, the details of which are outlined below. Included below is the description of the 2023 Grand County CWPP Project Tracking System. The system is designed to be used by local land managers as a one-stop-shop multi-agency collaborative effort to track project progress for both planned and implemented projects. In addition, the tracking system will be able to provide quick stats such as acres treated, or dollars spent. Community members will be able to see the quick stat dashboard as a summary of wildfire mitigation work done in the county.

All stakeholders and signatories to this CWPP desire worthwhile outcomes. It is also known that risk reduction work on the ground, for the most part, is often not attainable in a few months—or even years. The amount of money and effort invested in implementing a plan such as this requires that there be a means to describe, quantitatively and/or qualitatively, if the goals and objectives expressed in this plan are being accomplished according to expectations.

Monitoring and reporting contribute to the long-term evaluation of changes in ecosystems, as well as the knowledge base about how natural resource management decisions affect both the environment and the people who live in it. Although the HFRA does not include specified requirements for CWPP project tracking, it is important that project outcomes are monitored and evaluated as a regular practice. Furthermore, as the CWPP evolves over time, there may be a need to track changes in policy, requirements, stakeholder changes, and levels of preparedness. These can be significant for any future revisions and/or addendums to the CWPP.

It is recommended that project monitoring be a collaborative effort. There are many resources for designing and implementing community-based, multi-party monitoring that could support and further inform a basic monitoring program for the CWPP (Egan 2013). Multi-party monitoring involves a diverse group consisting of community members, community-based groups, regional and national interest groups, and public agencies. Using this multi-party approach increases community understanding of the effects of restoration efforts and trust among restoration partners. Multi-party monitoring may be more time

consuming due to the collaborative nature of the work; therefore, a clear and concise monitoring plan must be developed.

Table 5.1 Identifies monitoring strategies for various aspects of all categories of CWPP recommendations and the effects of their implementation, both quantifiable and non-quantifiable, for assessing the progress of the CWPP and increase sustainability of projects. It must be emphasized that these strategies are 1) not exhaustive and 2) dependent on available funds and personnel to implement them.

Table 5.1. Recommended Monitoring Strategies

| Strategy | Task/Tool | Lead | Remarks |
|---|--|------------------|---|
| Project Tracking System | Online web app (https://grand-county-cwpp-gcgeo.hub.arcgis.com/pages/project-tracking) to track hazardous fuels projects spatially, integrating wildfire risk layer to show progress toward wildfire hazard and risk reduction. Web app includes attribute tables that outline project details | County | Interactive tool is easily updated and identifies areas that require additional efforts, update monthly if possible |
| Photographic record (documents pre- and post-fuels reduction work, evacuation routes, workshops, classes, field trips, changes in open space, treatment type, etc.) | Establish field GPS location; photo points of cardinal directions; keep photos protected in archival location. | Core Team member | Moderate cost, repeatable over time; used for programs and tracking objectives |
| Number of acres treated (by fuel type, treatment method) | GPS/GIS/fire behavior prediction system – this can be monitored within the Project Tracking System | Core Team member | Evaluating costs, potential fire behavior |
| Number and acres of home ignition zones/defensible space treated to reduce fuels Number and cost of home treatments to reduce ignitability | GPS – This can be monitored within the Project Tracking System | Homeowner | Fuels reduction Structure protection |
| Number of residents/citizens participating in any CWPP projects and events | Meetings, media interviews, articles | Core Team member | Evaluate culture change objective Annual lessons learned review encouraged among stakeholders |
| Number of homeowner contacts (brochures, flyers, posters, etc.) | Visits, phone | Core Team member | Evaluate objective Annual lessons learned review encouraged among stakeholders |
| Number of jobs created, contracts, grants | Project Tracking System | Core Team member | Evaluate local job growth |
| Education outreach: number, kinds of involvement | Workshops, classes, field trips, signage; Project Tracking System | Core Team member | Evaluate objectives Annual lessons learned review encouraged among stakeholders |

| Strategy | Task/Tool | Lead | Remarks |
|--|---|-----------------------|--------------------------------------|
| Emergency management: changes in agency response capacity | Collaboration, grants to fund fire department needs such as new personnel and equipment | Agency representative | Evaluate mutual aid Annual review |
| Codes and policy changes affecting CWPP | Qualitative | Core Team | CWPP changes |
| Number of stakeholders Number of Firewise communities and % of all County neighbors | Added or dropped | Core Team | CWPP changes |
| Wildfire acres burned, human injuries/fatalities, infrastructure loss, environmental damage, suppression, and rehabilitation costs | Wildfire records | FPDs | Compare with 5- or 10-year average |

FUELS TREATMENT MONITORING

It is important to evaluate whether fuel treatments have accomplished their defined objectives and whether any unexpected outcomes have occurred.

The strategies outlined in this section consider several variables:

- Do the priorities identified for treatment reflect the goals stated in the plan? Monitoring protocols can help address this question.
- Can there be ecological consequences associated with fuels work? Items to consider include soil movement and/or invasive species encroachment post-treatment. Relatively cost-effective monitoring may help reduce long-term costs and consequences.
- Vegetation will grow back. Thus, fuel break maintenance and fuels modification in both the home ignition zone and at the landscape scale require periodic assessment. Monitoring these changes can help decision-makers identify appropriate treatment intervals.
- Monitoring for all types of fuels treatment is recommended. For example, in addition to monitoring mechanical treatments, it is important to carry out comprehensive monitoring of burned areas to establish the success of pre-fire fuels reduction treatments on fire behavior, as well as monitoring for ecological impacts, repercussions of burning on wildlife, and effects on soil chemistry and physics. Adaptive management is a term that refers to adjusting future management based on the effects of past management. Monitoring is required to gather the information necessary to inform future management decisions. Economic and legal questions may also be addressed through monitoring. In addition, monitoring activities can provide valuable educational opportunities for students.

The monitoring of each fuels reduction project would be site-specific, and decisions regarding the timeline for monitoring and the type of monitoring to be used would be determined by project. Monitoring schedules will be developed utilizing knowledge of past projects that employed best practices to achieve similar goals. These schedules may also be adjusted to accommodate special requirements for the targeted landscape as well as the responsible party. The most important part of choosing a fuels project monitoring program is selecting a method appropriate to the people, place, and type of project. Several levels of monitoring activities meet different objectives, have different levels of time intensity, and are appropriate for different groups of people. They include the following:

Minimum—Level 1: Pre- and Post-project Photographs

Appropriate for many individual homeowners who conduct fuels reduction projects on their properties.

Moderate—Level 2: Multiple Permanent Photo Points

Permanent photo locations are established using rebar or wood posts, GPS-recorded locations, and photographs taken on a regular basis. Ideally, this process would continue over several years. This approach might be appropriate for more enthusiastic homeowners or for agencies conducting small-scale, general treatments.

High—Level 3: Basic Vegetation Plots

A series of plots can allow monitors to evaluate vegetation characteristics such as species composition, percentage of cover, and frequency. Monitors then can record site characteristics such as slope, aspect, and elevation. Parameters would be assessed pre- and post-treatment.

The monitoring agency should establish plot protocols based on the types of vegetation present and the level of detail needed to analyze the management objectives. This method is appropriate for foresters or other personnel monitoring fuel treatments on forested land.

Intense—Level 4: Basic Vegetation Plus Dead and Downed Fuels Inventory

The protocol for this level would include the vegetation plots described above but would add more details regarding fuel loading. Crown height or canopy closure might be included for live fuels. Dead and downed fuels could be assessed using other methods, such as Brown's transects (Brown 1974), an appropriate photo series (Ottmar et al. 2000), or fire monitoring (Fire Effects Monitoring and Inventory System [FIREMON]) plots. This method is ideal for foresters or university researchers tracking vegetation changes in forested lands.

IMPLEMENTATION

The Grand County CWPP makes recommendations for prioritized fuels reduction projects, measures to reduce structural ignitability, and methods with which to carry out public education and outreach. Implementation projects need to be tailored to the specific project and will be unique to the location depending on available resources and regulations. As aforementioned, on-the-ground implementation of the recommendations in the Grand County CWPP planning area will require development of an action plan and assessment strategy for completing each project. This step will identify the roles and responsibilities of the people and agencies involved, as well as funding needs and timetables for completing the highest-priority projects (SAF 2004). Information pertaining to funding is provided in Appendix L.

PROJECT TRACKER

Within the project's Hub Site, an interactive web-based tool designed to communicate CWPP components, is a project tracking system (<https://grand-county-cwpp-gcgeo.hub.arcgis.com/pages/project-tracking>) designed to provide real-time updates and the ability for multi-agency coordination and collaboration. The tracking system is available for internal use and comes with the following features:

- Project database
- Project entries and sub-entries into the database

- Funding tracking
- Milestone and goal tracking
- Project constraint/opportunity tracking
- Project progress tracking
- Agency delegation
- Attach images or other files to project records
- Spatially delineated project locations/working areas

Externally, the project tracker holds the ability to display statistics to the public, such as acres treated, dollars spent, or number of meetings held.

CWPP EVALUATION

CWPPs are intended to reduce the risk from wildfire for a community and surrounding environment. However, over time, communities change and expand, vegetation grows back, and forests and wildlands evolve. As such, the risk of wildfire to communities is constantly changing. The plans and methods to reduce risk must be dynamic to keep pace with the changing environment. An evaluation of the CWPP will gather information and identify whether the plans and strategies are on course to meet the desired outcomes or if modifications are needed to meet expectations.

Four general steps can be used to evaluate the CWPP:

| | |
|---|---|
| <p>6. Identify objectives: What are the goals identified in the plan? How are they reached? Is the plan performing as intended?</p> | <ul style="list-style-type: none"> a. Structural ignitability b. Fuel treatments (landscape and home ignition zone) c. Public education and outreach d. Multi-agency collaboration e. Emergency notifications/response |
| <p>2. Assess the changing environment: How have population characteristics and the wildfire environment changed?</p> | <ul style="list-style-type: none"> a. Population change <ul style="list-style-type: none"> i. Increase or decrease ii. Visitor levels iii. Demographics b. Population settlement patterns <ul style="list-style-type: none"> i. Distribution ii. Expansion into the WUI c. Vegetation <ul style="list-style-type: none"> i. Fuel quantity and type ii. Drought and disease impacts |

| | |
|--|--|
| 3. Review action items: Are actions consistent with the plan's objectives? | <ul style="list-style-type: none"> a. Check for status, i.e., completed/started/not started b. Identify completed work and accomplishments c. Identify lessons learned, challenges, and best practices d. Identify next steps |
| 4. Assess results: What are the outcomes of the action items? | <ul style="list-style-type: none"> a. Multi-agency collaboration <ul style="list-style-type: none"> i. Who was involved in the development of the CWPP? ii. Have partners involved in the development process remained involved in the implementation? iii. How has the planning process promoted implementation of the CWPP? iv. Have CWPP partnerships and collaboration had a beneficial impact to the community? b. Risk-hazard assessment <ul style="list-style-type: none"> i. How is the risk-hazard assessment utilized to make decisions about fuel treatment priorities? ii. Have there been new wildfire-related regulations? iii. Are at-risk communities involved in mitigating wildfire risk? c. Hazardous fuels <ul style="list-style-type: none"> i. How many acres have been treated? ii. How many projects are cross-boundary? iii. How many residents have participated in creating defensible space? d. Structural ignitability <ul style="list-style-type: none"> i. Have there been updates to fire codes and ordinances? ii. How many structures have been lost to wildfire? iii. Has the CWPP increased public implementation of structural ignitability and hazard reduction strategies? |

| | | |
|--|------|---|
| | e. | Public education and outreach |
| | i. | Has public awareness of wildfire and mitigation strategies increased? |
| | ii. | Have residents, visitors, and second homeowners been involved in wildfire mitigation activities? |
| | iii. | Has there been public involvement? |
| | iv. | Have vulnerable populations been involved? |
| | f. | Emergency response |
| | i. | Has the CWPP been integrated into relevant plans (e.g., hazard mitigation or emergency operations)? |
| | ii. | Is the CWPP congruent with other hazard mitigation planning efforts? |
| | iii. | Has availability and capacity of local fire departments changed since the CWPP was developed? |
| | iv. | Have egress routes been publicized and mitigated? |

TIMELINE FOR UPDATING THE CWPP

The HFRA allows for maximum flexibility in the CWPP planning process, permitting the Core Team to determine the time frame for updating the CWPP. However, it is suggested that a formal revision be made on the fifth anniversary of signing and every 5 years following. Furthermore, due to the dynamic nature of wildfire litigation and the natural landscape, there are several triggers that may warrant a CWPP update before the 5-year mark. Among these triggers are extensive wildfire or another disaster event, changes to the local planning outlook (e.g., significant update to Hazard Mitigation Plan), and local adoption of the international WUI code. The Core Team members are encouraged to meet on an annual basis to review the project list, discuss project successes, strategize regarding project implementation funding, and determine whether a plan revision is needed.

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ABBREVIATIONS AND ACRONYMS

| | |
|-------------------|---|
| °F | degrees Fahrenheit |
| AMMs | avoidance and minimization measures |
| ATV | all-terrain vehicle |
| BAER | Burned Area Emergency Rehabilitation |
| BLM | Bureau of Land Management |
| BMP | best management practice |
| CA GOPR | California Governor's Office of Planning and Research |
| CAR | community at risk |
| CDFPC | Colorado Division of Fire Prevention and Control |
| CE | categorical exemption |
| CERT | Community Emergency Response Team |
| ch/hr | chains per hour |
| CIDC | Craig Interagency Dispatch Center |
| CIG | Conservation Innovation Grants |
| Cohesive Strategy | National Cohesive Wildland Fire Management Strategy |
| county | Grand County |
| CRS | Congressional Research Service |
| CSFS | Colorado State Forest Service |
| CWA | Clean Water Act |
| CWPP | community wildfire protection plan |
| DEM | digital elevation model |
| DFPC | Colorado Division of Fire Prevention and Control |
| DHS | Department of Homeland Security |
| EAS | Emergency Alert System |
| EIR | Environmental Impact Report |
| EMS | Emergency Management System |
| EPA | U.S. Environmental Protection Agency |
| EQIP | Environmental Quality Incentives Program |
| ESRI | Environmental Systems Research Institute |
| FAC | fire-adapted community |
| FCIDC | Fort Collins Interagency Dispatch Center |
| FEMA | Federal Emergency Management Agency |
| FIREMON | Fire Effects Monitoring and Inventory System |

| | |
|--------|---|
| FLAME | Federal Land Assistance, Management and Enhancement Act |
| FP&S | Fire Prevention and Safety |
| FPD | Fire Protection District |
| FRA | Federal Responsibility Area |
| FRI | fire return interval |
| GACC | Geographic Area Coordination Centers |
| GAID | Geographic Area Interagency Division |
| GCOEM | Grand County Office of Emergency Management |
| GIS | geographic information system |
| GPS | global positioning system |
| HFRA | Healthy Forests Restoration Act of 2003 |
| HIZ | home ignition zone |
| HMP | hazard mitigation plan |
| HVRA | highly valued resource or asset |
| ICC | International Code Council |
| IFTDSS | Interagency Fuel Treatment Decision Support System |
| ISO | Insurance Services Office |
| JPA | Joint Powers Agreement |
| LRA | Local Responsibility Area |
| MFI | mean fire interval |
| MND | mitigated negative declaration |
| NCFC | Northern Colorado Fireshed Collaborative |
| NCFWRA | Northern Colorado Fireshed Wildfire Risk Assessment |
| NEPA | National Environmental Policy Act |
| ND | negative declaration |
| NFP | National Fire Plan |
| NFPA | National Fire Protection Association |
| NIFC | National Interagency Fire Center |
| NOAA | National Oceanic and Atmospheric Administration |
| NPS | National Park Service |
| NRCS | Natural Resources Conservation Service |
| NWCG | National Wildfire Coordinating Group |
| OES | Office of Emergency Services |
| OSCC | Southern California Geographic Coordination Center |
| PERI | Public Entity Risk Institute |

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| POD | Potential Operational Delineation |
| PPE | personal protective equipment |
| PRISM | PRISM Climate Group |
| RAWS | remote automated weather station |
| RFA | Rural Fire Assistance |
| SAF | Society of American Foresters |
| SAFER | Staffing for Adequate Fire and Emergency Response |
| SE | statutory exemption |
| SHPO | State Historic Preservation Office |
| SRA | State Responsibility Area |
| SWCA | SWCA Environmental Consultants |
| UCANR | University of California, Agriculture and Natural Resources |
| ULI | Urban Land Institute |
| USDA | U.S. Department of Agriculture |
| USDOJ | U.S. Department of the Interior |
| USFA | U.S. Fire Administration |
| USFS | U.S. Forest Service |
| USFWS | U.S. Fish and Wildlife Service |
| USGS | U.S. Geological Survey |
| VAR | value at risk |
| VCC | Vegetation Condition Class |
| VDEP | Vegetation Departure |
| WFDSS | Wildland Fire Decision Support System |
| WRSC | Western Regional Strategy Committee |
| WUI | wildland urban interface |

GLOSSARY

Aspect: Cardinal direction toward which a slope faces in relation to the sun (NWCG 2021b).

Active Crown Fire: A crown fire in which the entire fuel complex is involved in flame, but the crowning phase remains dependent on heat released from surface fuel for continued spread. An active crown fire presents a solid wall of flame from the surface through the canopy fuel layers. Flames appear to emanate from the canopy as a whole rather than from individual trees within the canopy. Active crown fire is one of several types of crown fire and is contrasted with **passive crown fires**, which are less vigorous types of crown fire that do not emit continuous, solid flames from the canopy (SWCA).

Available Canopy Fuel: The mass of canopy fuel per unit area consumed in a crown fire. There is no post-frontal combustion in canopy fuels, so only fine canopy fuels are consumed. It is assumed that only the foliage and a small fraction of the branchwood is available (Wooten 2021).

Available Fuel: The total mass of ground, surface, and canopy fuel per unit area available for a fire, including fuels consumed in postfrontal combustion of duff, organic soils, and large woody fuels (Wooten 2021).

Backfiring: Intentionally setting fire to fuels inside a control line to contain a fire (Wooten 2021).

Biomass: Organic material. Also refers to the weight of organic material (e. g. biomass roots, branches, needles, and leaves) within a given ecosystem (Wooten 2021).

Burn Severity: A qualitative assessment of the heat pulse directed toward the ground during a fire. Burn severity relates to soil heating, large fuel and duff consumption, consumption of the litter and organic layer beneath trees and isolated shrubs, and mortality of buried plant parts (SWCA).

Canopy: The more or less continuous cover of branches and foliage formed collectively by adjacent trees and other woody species in a forest stand. Where significant height differences occur between trees within a stand, formation of a multiple canopy (multi-layered) condition can result (SWCA).

Chain: Unit of measure in land survey, equal to 66 feet (20 m) (80 chains equal 1 mile). Commonly used to report fire perimeters and other fireline distances. Popular in fire management because of its convenience in calculating acreage (example: 10 square chains equal one acre) (New Mexico Future Farmers of America 2010).

Climate Adaptation: Adaptation is an adjustment in natural or human systems to a new or changing environment. Adaptation to climate change refers to adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities (CA GOPR 2020).

Climate Change: A change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods (CA GOPR 2020).

Community Assessment: An analysis designed to identify factors that increase the potential and/or severity of undesirable fire outcomes in wildland urban interface (WUI) communities (SWCA).

Communities at Risk: Defined by the HFRA as “Wildland-Urban Interface Communities within the vicinity of federal lands that are at high risk from wildfire.”

Community Emergency Response Team (CERT): The CERT program educates volunteers about disaster preparedness for the hazards that may impact their area and trains them in basic disaster response skills, such as fire safety, light search and rescue, team organization, and disaster medical operations. CERT offers a consistent, nationwide approach to volunteer training and organization that professional responders can rely on during disaster situations, allowing them to focus on more complex tasks (Ready 2021).

Community Wildfire Protection Plan (CWPP): A planning document that seeks to reduce the threat to life and property from wildfire by identifying and mitigating wildfire hazards to communities and infrastructure located in the WUI. Developed from the HFRA, a CWPP addresses issues such as wildfire response, hazard mitigation, community preparedness, or structure protection (SWCA).

Conditional Surface Fire: A potential type of fire in which conditions for sustained conditional surface fire active crown fire spread are met but conditions for crown fire initiation are not. If the fire begins as a surface fire, then it is expected to remain so. If it begins as an active crown fire in an adjacent stand, then it may continue to spread as an active crown fire (Wooten 2021).

Contain: A tactical point at which a fire's spread is stopped by and within specific containment features, constructed or natural; also, the result of stopping a fire's spread so that no further spread is expected under foreseeable conditions. For reporting purposes, the time and date of containment. This term no longer has a strategic meaning in federal wildland fire policy (Wooten 2021).

Control: To construct fireline or use natural features to surround a fire and any control spot fires therefrom and reduce its burning potential to a point that it no longer threatens further spread or resource damage under foreseeable conditions. For reporting purposes, the time and date of control. This term no longer has a strategic meaning in federal wildland fire policy (Wooten 2021).

Cover type: The type of vegetation (or lack of it) growing on an area, based on cover type minimum and maximum percent cover of the dominant species, species group or non-living land cover (such as water, rock, etc.). The cover type defines both a qualitative aspect (the dominant cover type) as well as a quantitative aspect (the abundance of the predominant features of that cover type) (Wooten 2021).

Creeping Fire: A low-intensity fire with a negligible rate of spread (Wooten 2021).

Crown Fire: A fire that advances at great speed from crown to crown in tree canopies, often well in advance of the fire on the ground (National Geographic 2021).

Defensible Space: An area around a structure where fuels and vegetation are modified, cleared, or reduced to slow the spread of wildfire toward or from a structure. The design and distance of the defensible space is based on fuels, topography, and the design/materials used in the construction of the structure (SWCA).

Duff: The layer of decomposing organic materials lying below the litter layer of freshly fallen twigs, needles, and leaves and immediately above the mineral soil (SWCA).

Ecosystem: An interacting natural system including all the component organisms together with the abiotic environment and processes affecting them (SWCA).

Environmental Conditions: That part of the fire environment that undergoes short-term changes: weather, which is most commonly manifest as windspeed, and dead fuel moisture content (Wooten 2021).

Escape Route: A preplanned and understood route firefighters take to move to a safety zone or other low-risk area. When escape routes deviate from a defined physical path, they should be clearly marked (flagged) (SWCA).

Evacuation: The temporary movement of people and their possessions from locations threatened by wildfire (SWCA).

Fire-Adapted Community: A fire-adapted community collaborates to identify its wildfire risk and works collectively on actionable steps to reduce its risk of loss. This work protects property and increases the safety of firefighters and residents (USFA 2021b).

Fire Behavior: The manner in which fuel ignites, flame develops, and fire spreads and exhibits other related phenomena as determined by the interaction of fuels, weather, and topography (Fire Research and Management Exchange System 2021).

Fire Break: Areas where vegetation and organic matter are removed down to mineral soil (SWCA).

Fire Environment: The characteristics of a site that influence fire behavior. In fire modeling the fire environment is described by surface and canopy fuel characteristics, windspeed and direction, relative humidity, and slope steepness (Wooten 2021).

Fire Frequency: A broad measure of the rate of fire occurrence in a particular area. For historical analyses, fire frequency is often expressed using the fire return interval calculation. For modern-era analyses, where data on timing and size of fires are recorded, fire frequency is often best expressed using fire rotation (SWCA).

Fire Hazard: Fire hazard is the potential fire behavior or fire intensity in an area, given the type(s) of fuel present—including both the natural and built environment—and their combustibility (CA GOPR 2020).

Fire History: The chronological record of the occurrence of fire in an ecosystem or at a specific site. The fire history of an area may inform planners and residents about the level of wildfire hazard in that area (SWCA).

Fire Intensity: A general term relating to the heat energy released in a fire (SWCA).

Fireline Intensity: Amount of heat release per unit time per unit length of fire front. Numerically, the product of the heat of combustion, quantity of fuel consumed per unit area in the fire front, and the rate of spread of a fire, expressed in kilowatts per minute (SWCA). This expression is commonly used to describe the power of wildland fires, but it does not necessarily follow that the severity, defined as the vegetation mortality, will be correspondingly high (Wooten 2021).

Fire Prevention: Activities such as public education, community outreach, planning, building code enforcement, engineering (construction standards), and reduction of fuel hazards that are intended to reduce the incidence of unwanted human-caused wildfires and the risks they pose to life, property, or resources (CA GOPR 2020).

Fire Regime: A measure of the general pattern of fire frequency and severity typical to a particular area or type of landscape: The regime can include other metrics of the fire, including seasonality and typical fire size, as well as a measure of the pattern of variability in characteristics (SWCA).

Fire Regime Condition Class: Condition classes are a function of the degree of fire regime condition class departure from historical fire regimes resulting in alterations of key ecosystem components such as composition structural stage, stand age, and canopy closure (Wooten 2021).

Fire Return Interval: Number of years (interval) between two successive fires in a designated area (SWCA).

Fire Severity: A qualitative measure of the immediate effects of fire on the fire severity ecosystem. It relates to the extent of mortality and survival of plant and animal life both aboveground and belowground and to loss of organic matter. It is determined by heat released aboveground and belowground. Fire severity is dependent on intensity and residence dependent of the burn. For trees, severity is often measured as percentage of basal area removed. An intense fire may not necessarily be severe (Wooten 2021).

Fire Risk: “Risk” takes into account the intensity and likelihood of a fire event to occur as well as the chance, whether high or low, that a hazard such as a wildfire will cause harm. Fire risk can be determined by identifying the susceptibility of a value or asset to the potential direct or indirect impacts of wildfire hazard events (CA GOPR 2020).

Flammability: The relative ease with which fuels ignite and burn regardless of the quantity of the fuels (SWCA).

Flame Length: The length of flames in the propagating fire front measured along the slant of the flame from the midpoint of its base to its tip. It is mathematically related to fireline intensity and tree crown scorch height (Wooten 2021).

Foliar Moisture Content: Moisture content (dry weight basis) of live foliage, foliar moisture content expressed as a percent. Effective foliar moisture content incorporates the moisture content of other canopy fuels such as lichen, dead foliage, and live and dead branchwood (Wooten 2021).

Forest Fire: Uncontrolled burning of a woodland area (National Geographic 2021).

Fuel Break: A natural or human-made change in fuel characteristics that affects fire behavior so that fires burning into them can be more readily controlled (NWCG 2021c).

Fuel Complex: The combination of ground, surface, and canopy fuel strata (Wooten 2021).

Fuel Condition: Relative flammability of fuel as determined by fuel type and environmental conditions (SWCA).

Fuel Continuity: A qualitative description of the distribution of fuel both horizontally and vertically. Continuous fuels readily support fire spread. The larger the fuel discontinuity, the greater the fire intensity required for fire spread (Wooten 2021).

Fuel Loading: The volume of fuel in a given area generally expressed in tons per acre (SWCA). Dead woody fuel loadings are commonly described for small material in diameter classes of 0 to 0.25, 0.25 to 1, and 1 to 3 inches and for large material greater than 3 inches (Wooten 2021).

Fuel Management/Fuel Reduction: Manipulation or removal of fuels to reduce the likelihood of ignition and to reduce potential damage in case of a wildfire. Fuel reduction methods include prescribed fire, mechanical treatments (mowing, chopping), herbicides, biomass removal (thinning or harvesting or trees, harvesting of pine straw), and grazing. Fuel management techniques may sometimes be combined for greater effect (SWCA).

Fuel Model: A set of surface fuel bed characteristics (load and surface-area-to-fuel model volume ratio by size class, heat content, and depth) organized for input to a fire model (Wooten 2021).

Fuel Modification: The manipulation or removal of fuels (i.e., combustible biomass such as wood, leaves, grass, or other vegetation) to reduce the likelihood of igniting and to reduce fire intensity. Fuel modification activities may include lopping, chipping, crushing, piling and burning, including prescribed burning. These activities may be performed using mechanical treatments or by hand crews. Herbicides and prescribed herbivory (grazing) may also be used in some cases. Fuel modification may also sometimes be referred to as “vegetation treatment” (CA GOPR 2020).

Fuel Moisture Content: This is expressed as a percent or fraction of oven dry fuel moisture content weight of fuel. It is the most important fuel property controlling flammability. In living plants, it is physiologically bound. Its daily fluctuations vary considerably by species but are usually above 80 to 100 percent. As plants mature, moisture content decreases. When herbaceous plants cure, their moisture content responds as dead fuel moisture content, which fluctuates according to changes in temperature, humidity, and precipitation (Wooten 2021).

Fuel Treatment: The manipulation or removal of fuels to minimize the probability of ignition and/or to reduce potential damage and resistance to fire suppression activities (NWCG 2021d). Synonymous with fuel modification.

Grazing: There are two types of grazing: traditional grazing and targeted grazing. Traditional grazing refers to cattle that are managed in extensive pastures to produce meat. Targeted grazing involves having livestock graze at a specific density for a given period of time for the purpose of managing vegetation. Even though both kinds of grazing manage fuel loading in range- and forested lands, targeted grazing is different in that its sole purpose is to manage fuels. Targeted grazing is done by a variety of livestock species such as sheep, goats, or cows (University of California, Agriculture and Natural Resources [UCANR] 2019).

Ground Fire: Fire that burns organic matter in the soil, or humus; usually does not appear at the surface (National Geographic 2021).

Ground Fuels: Fuels that lie beneath surface fuels, such as organic soils, duff, decomposing litter, buried logs, roots, and the below-surface portion of stumps (Wooten 2021).

Hazard: A “hazard” can be defined generally as an event that could cause harm or damage to human health, safety, or property (CA GOPR 2020).

Hazardous Areas: Those wildland areas where the combination of vegetation, topography, weather, and the threat of fire to life and property create difficult and dangerous problems (SWCA).

Hazardous Fuels: A fuel complex defined by type, arrangement, volume, condition, and location that poses a threat of ignition and resistance to fire suppression (NWCG 2021e).

Hazardous Fuels Reduction: Any strategy that reduces the amount of flammable material in a fire-prone ecosystem. Two common strategies are mechanical thinning and controlled burning (Wooten 2021).

Hazard Reduction: Any treatment that reduces the threat of ignition and spread of fire (SWCA).

Highly Valued Resources and Assets: Landscape features that are influenced positively and/or negatively by fire. Resources are naturally occurring, while Assets are human-made (IFTDSS 2021).

Ignition: The action of setting something on fire or starting to burn (SWCA).

Incident: An occurrence or event, either natural or person-caused, which requires an emergency response to prevent loss of life or damage to property or natural resources (Wooten 2021).

Influence Zone: An area that, with respect to wildland and urban fire, has a set of conditions that facilitate the opportunity for fire to burn from wildland fuels to the home and or structure ignition zone (NWCG 2021a).

Initial Attack: The actions taken by the first resources to arrive at a wildfire to protect lives and property, and prevent further extension of the fire (SWCA).

Invasive Species: An introduced, nonnative organism (disease, parasite, plant, or animal) that begins to spread or expand its range from the site of its original introduction and that has the potential to cause harm to the environment, the economy, or to human health (USGS 2021).

Ladder Fuels: Fuels that provide vertical continuity allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease (SWCA).

Litter: Recently fallen plant material that is only partially decomposed and is still discernible (SWCA).

Manual Treatments: Felling and piling of fuels done by hand. The volume of material generated from a manual fuel treatment is typically too small to warrant a biomass sale therefore collected material is disposed of by burning or chipping. The work can be performed by either a single individual or a large, organized crew with powered equipment (UCANR 2021a).

Mechanized Treatments: Mechanical treatments pulverize large continuous patches of fuel to reduce the volume and continuity of material. Mechanical treatments can be applied as either mastication or chipping treatments. Both treatments shred woody material, but mastication leaves residue on-site while chipping collects the particles for transportation off site. Similar to hand treatments, mechanical treatments can target specific areas and vegetation while excluding areas of concern. In addition, mechanical treatment is easily scalable to large areas (>30 acres) with little added cost. (UCANR 2021b).

Mitigation: Action that moderates the severity of a fire hazard or risk (SWCA).

Mutual Aid: Assistance in firefighting or investigation by fire agencies, irrespective of jurisdictional boundaries (NWCG 2021f).

Native Revegetation: The process of replanting and rebuilding the soil of disturbed land (e.g., burned) with native plant species (USDA 2005).

Native Species: A species that evolved naturally in the habitat, ecosystem, or region as determined by climate, soil, and biotic factors (USDA 2005).

National Cohesive Strategy: The National Cohesive Wildland Fire Management Strategy is a strategic push to work collaboratively among all stakeholders and across all landscapes, using best science, to make meaningful progress toward three goals:

- Resilient Landscapes
- Fire-Adapted Communities
- Safe and Effective Wildfire Response

Vision: To safely and effectively extinguish fire when needed; use fire where allowable; manage our natural resources; and as a nation, to live with wildland fire (Forests and Rangelands 2021).

Overstory: That portion of the trees in a forest which forms the upper or uppermost layer (SWCA).

Passive Crown Fire: A type of crown fire in which the crowns of individual trees or small groups of trees burn, but solid flaming in the canopy cannot be maintained except for short periods. Passive crown fire

encompasses a wide range of crown fire behavior, from occasional torching of isolated trees to nearly active crown fire. Passive crown fire is also called torching or candling. A fire in the crowns of the trees in which trees or groups of trees torch, ignited by the passing front of the fire. The torching trees reinforce the spread rate, but these fires are not basically different from surface (SWCA).

Prescribed Burning: Any fire ignited by management actions under specific, predetermined conditions to meet specific objectives related to hazardous fuels or habitat improvement. Usually, a written, approved prescribed fire plan must exist, and NEPA requirements must be met, prior to ignition.

Rate of Spread: The relative activity of a fire in extending its horizontal dimensions. It is expressed as rate of increase of the total perimeter of the fire, as rate of forward spread of the fire front, or as rate of increase in area, depending on the intended use of the information. Usually, it is expressed in chains or acres per hour for a specific period in the fire's history (NWCG 2021g).

Resilience: Resilience is the capacity of any entity – an individual, a community, an organization, or a natural system – to prepare for disruptions, to recover from shocks and stresses, and to adapt and grow from a disruptive experience (CA GOPR 2020).

Response: Movement of an individual firefighting resource from its assigned standby location to another location or to an incident in reaction to dispatch orders or to a reported alarm (SWCA).

Safety Element: One of the seven mandatory elements of a local general plan (a county plan that forms the foundation for future development), the safety element must identify hazards and hazard abatement provisions to guide local decisions related to zoning, subdivisions, and entitlement permits. The element should contain general hazard and risk reduction strategies and policies supporting hazard mitigation measures (CA GOPR 2020).

Slash: Debris left after logging, pruning, thinning, or brush cutting. Slash includes logs, chips, bark, branches, stumps, and broken trees or brush that may be fuel for a wildfire (SWCA).

Slope Percent: The ratio between the amount of vertical rise of a slope and horizontal distance as expressed in a percent. One hundred feet of rise to 100 feet of horizontal distance equals 100 percent (NWCG 2021h).

Suppression: The most aggressive fire protection strategy, it leads to the total extinguishment of a fire (SWCA).

Surface Fire: fire that typically burns only surface litter and undergrowth (National Geographic 2021).

Surface Fuel: Fuels lying on or near the surface of the ground, consisting of leaf and needle litter, dead branch material, downed logs, bark, tree cones, and low stature living plants (SWCA).

Structural Ignitability: The ability of structures (such as homes or fences) to catch fire (SWCA).

Topography: The arrangement of the natural and artificial physical features of an area (SWCA).

Total Fuel Load: The mass of fuel per unit area that could possibly be consumed in a hypothetical fire of the highest intensity in the driest fuels (Wooten 2021).

Tree Crown: The primary and secondary branches growing out from the main stem, together with twigs and foliage (SWCA).

Understory: Low-growing vegetation (herbaceous, brush or reproduction) growing under a stand of trees. Also, that portion of trees in a forest stand below the overstory (SWCA).

Understory Fire: A fire burning in the understory, more intense than a surface fire with flame lengths of 1 to 3 m (Wooten 2021).

Values and Assets at Risk: The elements of a community or natural area considered valuable by an individual or community that could be negatively impacted by a wildfire or wildfire operations. These values can vary by community and can include public and private assets (natural and manmade) – such as homes, specific structures, water supply, power grids, natural and cultural resources, community infrastructure-- as well as other economic, environmental, and social values (CA GOPR 2020).

Vulnerable Community: Vulnerable communities experience heightened risk and increased sensitivity to natural hazard and climate change impacts and have less capacity and fewer resources to cope with, adapt to, or recover from the impacts of natural hazards and increasingly severe hazard events because of climate change. These disproportionate effects are caused by physical (built and environmental), social, political, and/ or economic factor(s), which are exacerbated by climate impacts. These factors include, but are not limited to, race, class, sexual orientation and identification, national origin, and income inequality (CA GOPR 2020).

Wildfire: A “wildfire” can be generally defined as any unplanned fire in a “wildland” area or in the wildland-urban interface (WUI) (CA GOPR 2020).

Wildfire Exposure: During fire suppression activities, an exposure is any area/property that is threatened by the initial fire, but in National Fire Incident Reporting System (NFIRS) a reportable exposure is any fire that is caused by another fire, i.e., a fire resulting from another fire outside that building, structure, or vehicle, or a fire that extends to an outside property from a building, structure, or vehicle (USFA 2020).

Wildfire Influence Zone: A wildland area with susceptible vegetation up to 1.5 miles from the interface or intermix WUI (CA GOPR 2020).

Wildland: Those unincorporated areas covered wholly or in part by trees, brush, grass, or other flammable vegetation (CA GOPR 2020).

Wildland Fire: Fire that occurs in the wildland as the result of an unplanned ignition (CA GOPR 2020).

Wildland Fuels (aka fuels): Fuel is the material that is burning. It can be any kind of combustible material, especially petroleum-based products, and wildland fuels. For wildland fire, it is usually live, or dead plant material, but can also include artificial materials such as houses, sheds, fences, pipelines, and trash piles. In terms of vegetation, there are 6 wildland fuel types (Fuel Type: An identifiable association of fuel elements of distinctive species, form, size, arrangement, or other characteristics that will cause a predictable rate of spread or resistance to control under specified weather conditions.) The 6 wildland fuel types are (NWCG 2021i):

- Grass
- Shrub
- Grass-Shrub
- Timber Litter
- Timber-Understory
- Slash-Blowdown

Wildland Urban Interface (WUI): The WUI is the zone of transition between unoccupied land and human development. It is the line, area or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels (USFA 2021a). In the absence of a CWPP, Section 101 (16) of the Healthy Foresters Restoration Act defines the wildland urban interface as “ (I) an area extending ½ mile from the boundary of an at-risk community; (II) an area within 1 ½ miles of the boundary of an at-risk community, including any land that (1) has a sustained steep slope that creates the potential for wildfire behavior endangering the at-risk community; (2) has a geographic feature that aids in creating an effective fire break, such as a road or ridge top; or (3) is in condition class 3, as documented by the Secretary in the project-specific environmental analysis; (III) an area that is adjacent to an evacuation route for an at-risk community that the Secretary determines, in cooperation with the at-risk community, requires hazardous fuels reduction to provide safer evacuation from the at-risk community.” A CWPP offers the opportunity to establish a localized definition and boundary for the wildland urban interface (USFA 2020).



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APPENDIX A:

Planning and Policy Background

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PLANNING PROCESS

The SAF, in collaboration with the National Association of Counties and the National Association of State Foresters, developed a guide entitled *Preparing a Community Wildfire Protection Plan: A Handbook for Wildland-Urban Interface Communities* (SAF 2004) to provide communities with a clear process in developing a CWPP. The guide outlines eight steps for developing a CWPP, which have been followed in preparing the Grand County CWPP:

Step One: Convene Decision-makers. Form a Core Team made up of representatives from the appropriate local governments, local fire authorities, and state agencies responsible for forest management.

Step Two: Involve Federal Agencies. Identify and engage local federal representatives and contact and involve other land management agencies as appropriate.

Step Three: Engage Interested Parties. Contact and encourage active involvement in plan development from a broad range of interested organizations and stakeholders.

Step Four: Establish a Community Base Map. Work with partners to establish a base map(s) defining the community's WUI and showing inhabited areas at risk, wildland areas that contain critical human infrastructure, and wildland areas at risk for large-scale fire disturbance.

Step Five: Develop a Community Risk-Hazard Assessment. Work with partners to develop a community Risk-Hazard Assessment that considers fuel hazards; risk of wildfire occurrence; homes, businesses, and essential infrastructure at risk; other values at risk (VARs); and local preparedness capability. Rate the level of risk for each factor and incorporate this information into the base map as appropriate.

Step Six: Establish Community Priorities and Recommendations. Use the base map and Community Risk-Hazard Assessment to facilitate a collaborative community discussion that leads to the identification of local priorities for treating fuels, reducing structural ignitability and other issues of interest, such as improving fire response capability. Clearly indicate whether priority projects are directly related to the protection of communities and essential infrastructure or to reducing wildfire risks to other community values.

Step Seven: Develop an Action Plan and Assessment Strategy. Consider developing a detailed implementation strategy to accompany the CWPP as well as a monitoring plan that will ensure its long-term success.

Step Eight: Finalize Community Wildfire Protection Plan. Finalize the CWPP and communicate the results to community and key partners.

FIRE MANAGEMENT POLICY

The responsibility for WUI fire prevention and protection lies with property owners and state, county, and town governments. Property owners must comply with existing state statutes and local regulations. These responsibilities should be carried out in partnership with the federal government and the private sector. The current federal fire policy states that protection priorities are 1) life, 2) property, and 3) natural resources. These priorities often limit flexibility in the decision-making process, especially when a wildland fire occurs within the WUI.

LEGISLATIVE DIRECTION

Town Direction and Codes

Select FPDs and towns within Grand County have been examining adoption of local codes and directives to mitigate the risks of wildfire. Discussed options have included adopting the international WUI code, with appropriate amendments, or conducting short-term rental inspections that include exterior wildfire review. A WUI code would establish regulations within interface areas that are designed to prevent wildland fire from impacting local life, property, and natural resources, and inspections would ensure proper adherence to regulations.

County Direction

Fire Code

The Fire Code of the County is adopted from the 2015 International Fire Code Amendments as appropriate to suit the needs of the county. The Fire Code is effective within the boundaries of the County, including on private land, and implementation, administration, and enforcement of provisions are carried out at the county level. The Fire Code applies to all new construction and contains provisions for, but not limited to, water flushing, aboveground tanks, storage of flammables, and sprinkler system installation. You can find more information on the Fire Code here:

<https://www.co.grand.co.us/DocumentCenter/View/10891/2015-Fire-Code-Amendments>. Grand County does not currently have an established WUI code, but it is in development.

State Direction

Colorado Minimum CWPP Standards

The 2022 Colorado State Forest Service (CSFS) Minimum Standards for Developing CWPPs provide basic guidelines that have been updated per Colorado Senate Bill 09-001. The purpose of the described standards is to provide a foundation for supporting healthy, resilient, and fire-adapted communities. The plan has been developed into three overarching goals, which are broken down into sub-goals as well as related action items (CSFS 2022a). These goals include but are not limited to:

1. Promote Community Fire Adaptation: Through a deeper understanding of living with wildfire, facilitate social community adjustments, wildfire risk reduction through community enhancement, and an increase of pace and scale of wildfire risk reduction efforts.
2. Reduce the Risk of Uncharacteristic Wildfire: Reduction of wildfire severity through forest alteration, maintenance and enhancement of species and structural diversity, and revegetation of sites through species transitions before and after disturbances.
3. Promote the Role of Fire in Ecological Processes: Fundamental sustainability through ecological functions, Improving the understanding of the role of fire in Colorado's ecosystems, and increasing the use of managed and prescribed wildfire.

The standards specify that the planning process should be as inclusive as possible to address the needs of socially vulnerable populations and ensure all residents' concerns are represented in the plan. CSFS also requires mapping of the wildland urban interface, completion of a Risk-Hazard Assessment, and identification of priority projects to provide the community with actionable recommendations on risk

reduction and resilience. The USFS recommends updating CWPPs at 5-year intervals to ensure project objectives, demographics, and Risk-Hazard assessments are relevant (CSFS 2022a).

Colorado Strategic Wildfire Action Program

In 2021, Colorado Senate Bill 21-258 was signed by Governor Polis. This bill designates \$17.5 million to immediately address the wildfire crisis in Colorado through mitigation and community resilience work. This objective will be realized by increasing funding to the Forest Restoration and Wildfire Risk Mitigation Grant Program and other fire-related funding mechanisms, providing funds to hire additional mitigation and firefighting personnel, and establishing a hazard mitigation and capacity development fund. This bill marks a statewide recognition of the extreme hazards wildfires create and an investment in creating more fire-resilient landscapes (Colorado Department of Natural Resources 2022b). Although the scope of the bill is focused heavily on the counties lying on the eastern base of the Front Range and excludes Grand County, the bill opens opportunities for Grand County to work with the CSFS and the Colorado Department of Natural Resources to establish funding pipelines for locations with significant tourism/recreation and watersheds providing trans-basin diversions.

Colorado Forest Action Plan

In 2020, the CSFS developed Colorado's Forest Action Plan (CSFS 2020). The purpose of the plan was to provide a framework for addressing the "current conditions and trends in Colorado's forests, as well as the current threats and challenges the state's forests face across political, jurisdictional and ecological boundaries." Priorities of the Forest Action Plan include the following: "Conserve and manage working forest landscapes", "protect forests from threats", and "enhance public benefits from trees and forests". This plan is centered around six themes, but the four themes most important this CWPP are:

1. **Forest Conditions** focuses on the current conditions of Colorado's forests, including present and future pressures, are facing from climate change (e.g., longer fire seasons, and more uncharacteristic wildfires).
2. **Living with Wildfire** focuses on the natural role wildfire plays in Colorado's forests and rangelands. It emphasizes that fire exclusion and suppression efforts of the past are no longer appropriate and, when combined with the impacts of climate change, have put communities at heightened risk from wildfire. It also states that communities must practice wildfire risk reduction strategies as WUIs expand across the state.
3. **Watershed Protection** focuses on the risks that uncharacteristic droughts and wildfires pose to Colorado's watersheds. This theme emphasizes the link between forest health and watershed health.
4. **Forest Products** focuses on the importance of the logging industry in Colorado and describes the economic impact that declines in forest health (e.g., wildfire, overgrowth, and disease and insect associated mortality) have had on the industry.

This plan estimates that 10% of Colorado's 24 million acres of forest are in "urgent need of treatment to address forest health, wildfire risk and watershed protection threats, at a cost of approximately \$4.2 billion." This plan provides detailed direction for Colorado to meet its forest treatment goals.

HB22-1111 (Insurance Coverage for Loss Declared Fire Disaster)

In 2022, Colorado passed HB-1111 which increases the amount of lost property insurers must cover upfront and extends the time frame that victims of wildfire have to rebuild their homes. This bill was signed by Governor Polis in 2022 and outlines standards and restrictions for home insurers when

covering instances of total loss from wildfire events. This bill includes, but is not limited to, the following requirements:

- There will be a minimum of 24 months to collect additional living expense coverage with two extensions of 6 months
- Homeowners cannot be denied insurance payment if they decide to rebuild in a different location than their previous home or if building code updates will make rebuilding costs higher than the home value.
- If a policy requires repair or rebuild in order for the owner to collect payments, the owner shall be allowed 36 months to submit invoices.
- The right to use all available rebuild benefits to buy a replacement home.
- The right to collect 65% of contents benefits without having to inventory a lifetime of possession.
- The right to know how an insurer calculated depreciation.

Additional measures of this bill ensure homeowners can recoup money from furniture and other items lost in a fire and establishes a mandatory time that insurers must cover living expenses. This Bill only applies to future declared fire disasters (Colorado General Assembly 2022a).

Federal Direction

Federal wildfire planning has historically been guided by the U.S. Department of the Interior, who stated in their 1998 Wildland Fire Management Department Manual (U.S. Department of the Interior [USDOI] 1998) that all public lands with burnable vegetation must have a Fire Management Plan. However, more recent federal guidance has played an instrumental role in planning efforts. In response to a landmark fire season in 2000, the National Fire Plan (NFP) was established to develop a collaborative approach among various governmental agencies to actively respond to severe wildland fires and ensure sufficient firefighting capacity for the future. The NFP was followed by a report in 2001 entitled *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: A 10-year Comprehensive Strategy*, which was updated in 2002 to include an implementation plan. This plan was updated once more in 2006, with a similar focus on using a collaborative framework for restoring fire-adapted ecosystems, reducing hazardous fuels, mitigating risks to communities, providing economic benefits, and improving fire prevention and suppression strategies. The 2006 implementation plan also emphasizes information sharing and monitoring of accomplishments and forest conditions, a long-term commitment to maintaining the essential resources for implementation, a landscape-level vision for restoration of fire-adapted ecosystems, the importance of using fire as a management tool, and continued improvements to collaboration efforts (Forests and Rangelands 2006). Progress reports and lessons learned reports for community fire prevention are provided annually.

In 2003, the U.S. Congress recognized widespread declining forest health by passing the Healthy Forests Restoration Act (HFRA), and President Bush signed the act into law (Public Law 108–148, 2003). The HFRA was revised in 2009 to address changes to funding and provide a renewed focus on wildfire mitigation (H.R. 4233 - Healthy Forest Restoration Amendments Act of 2009). The HFRA expedites the development and implementation of hazardous fuels reduction projects on federal land and emphasizes the need for federal agencies to work collaboratively with communities. A key component of the HFRA is the development of Community Wildfire Protection Plans (CWPPs), which facilitate the collaboration between federal agencies and communities in order to develop hazardous fuels reduction projects and place priority on treatment areas identified by communities in a CWPP. A CWPP also allows communities to establish their own definition of the WUI, which is used to delineate priority areas for treatment.

In addition, priority is placed upon municipal watersheds, critical wildlife habitat, and areas impacted by wind throw, insects, and disease. Communities with an established CWPP are given priority for funding of hazardous fuels reduction projects carried out in accordance with the HFRA.

In 2014, the final stage of the development of a national cohesive strategy for wildfire was developed: *The National Strategy: The Final Phase in the Development of the National Cohesive Wildland Fire Management Strategy* (Forests and Rangelands 2014). The national strategy takes a holistic approach to the future of wildfire management:

To safely and effectively extinguish fire, when needed; use fire where allowable; manage our natural resources; and as a Nation, live with wildland fire.

In order to achieve this vision, the national strategy goals are:

1. **Restore and maintain landscapes:** Landscapes across all jurisdictions are resilient to fire-related disturbances in accordance with management objectives.
2. **Fire-adapted communities:** Human populations and infrastructure can withstand a wildfire without loss of life and property.
3. **Wildfire response:** All jurisdictions participate in making and implementing safe, effective, efficient risk-based wildfire management decisions (Forests and Rangelands 2014:3).

PAST PLANNING EFFORTS

Local, Town, and County

Grand County Wildland Fire Operating Plan: The Grand County Wildland Fire Operating Plan was developed by Grand County in conjunction with local land management agencies and most recently updated in 2022. The Plan establishes operating guidelines, procedures, and responsibilities for cooperatively protecting Grand County lands. Specifically, the Plan discusses approaches for interagency collaboration, identifies responsible authorities, outlines preparedness planning, and presents possible wildland fire response operations that can be implemented across the County (Grand County 2022a).

Grand County Multi-Hazard Mitigation Plan: The Grand County Multi-Hazard Mitigation Plan was originally developed in 2008, revised in 2013, and again in 2020. The overall purpose of the Plan is to better protect the people and property of Grand County from the effects of hazard events. The Plan provides modeled wildfire susceptibility across the County, modeled predicted fire intensity, and WUI risk mapping. It also identifies past fires and predicts that future catastrophic wildfires in Grand County are highly likely (GCOEM 2020).

Grand County Open Burning Management Plan: The Grand County Open Burning Management Plan was drafted by Grand County Division of Natural Resources in 2008 and amended in 2020. The purpose of the Plan is to provide guidelines for obtaining and utilizing open burn permits, with the goal of safely allowing residents to dispose of slash while mitigating associated wildfire risks. The Plan outlines how to identify, apply for, and receive necessary permits, identifies materials that may be legally burned, and discusses enforcement and penalties (Grand County Division of Natural Resources 2020).

Grand County Emergency Operations Plan: The Grand County Emergency Operations Plan was adopted in 2018. The plan provides a framework for how Grand County coordinates emergency responses by identifying general hazards, discussing organizations responsible for responding to incidents, and outlining necessary approaches and actions the organizations should take. The plan

includes a brief outline of wildfire responses that Grand County is capable of, and responses that should be coordinated with external assistance (Grand County Government 2018).

Grand FPD No. 1 Community Wildfire Protection Plan: The Grand FPD No. 1 CWPP was originally developed in 2009 and updated in 2015. The purpose of the CWPP is to identify wildfire risks within the District and strategies for hazard mitigation. The document presents wildfire hazards of specific communities along with preventative actions taken and recommendations of additional wildfire mitigation tasks that should be completed (Grand FPD No. 1 2015). Information in the document was cooperatively produced by local organizations and state and federal land management agencies.

Grand Lake FPD No. 2 Community Wildfire Protection Plan: The Grand Lake FPD No. 2 CWPP was originally developed in 2006, was updated in 2013, and was updated again in 2015. The purpose of the CWPP is to identify wildfire risks within the District and strategies for hazard mitigation. The document presents wildfire hazards of specific zones along with objectives, recommended preventative projects, and organizations responsible for implementing them (Grand Lake FPD No. 2 2015). Information in the document was cooperatively produced by local organizations and state and federal land management agencies.

East Grand FPD No. 4 Community Wildfire Protection Plan: The East Grand FPD No. 4 CWPP was originally developed in 2007 and updated in 2013. The purpose of the CWPP is to identify wildfire risks within the District and strategies for hazard mitigation. The document presents wildfire hazards of specific communities, completed and recommended fuel treatments, and fire behavior modeling of the entire District (East Grand FPD No. 4 2013). Information in the document was cooperatively produced by local organizations and state and federal land management agencies.

Hot Sulphur Springs/Parshall FPD No. 3 Community Wildfire Protection Plan: The Hot Sulphur Springs/Parshall FPD No. 3 CWPP was implemented in 2011 by the Hot Sulphur Springs/Parshall FPD No. 3. The purpose of the CWPP is to identify wildfire risks within the District and strategies for hazard mitigation. Planning encompassed by the document includes identifying local community boundaries and response personnel, a risk assessment, and recommendations for reducing wildfire dangers (Hot Sulphur Springs/Parshall FPD No. 3 2011). Information in the document was cooperatively produced by local Parshall and Hot Sulphur Springs organizations and state and federal land management agencies.

Kremmling FPD No. 5 Community Wildfire Protection Plan: The Kremmling CWPP was implemented in 2011 by the Kremmling FPD No. 5. The purpose of the CWPP is to identify wildfire risks within the District and strategies for hazard mitigation. Planning encompassed by the document includes identifying values at risk and local firefighting capabilities, providing risk mitigation recommendations for specific local communities, and establishing actionable preventative tasks (Kremmling FPD No. 5 2011). Information in the document was cooperatively produced by local organizations and state and federal land management agencies.

Grand County Master Plan: The Grand County Department of Planning and Zoning originally developed the Grand County Master Plan in 1998 and revised it in 2011. The Plan's purpose is to guide and accomplish a coordinated, adjusted, and harmonious development of the County. The Plan includes a series of goals to effectively continue guiding land use in Grand County, including emergency management and wildfire mitigation (Grand County Department of Planning and Zoning 2011).

Grand County Community Wildfire Protection Plan: The previous Grand County CWPP was written in 2006. The document was developed through coordination between local government, local organizations, and state and federal land management agencies. The purpose of the Plan is to identify wildfire risks within Grand County and strategies for hazard mitigation. Specific sections of the Plan focus on preparing

wildfire ready homes, fuel reduction projects, incident response capabilities, and wildfire suppression procedures (Grand County Division of Natural Resources 2006).

Community Mitigation Assistance Team Mitigation Action Plan: In 2021, following the East Troublesome Fire of 2020, the Grand County Wildfire Council asked the Community Mitigation Assistance Team (CMAT), a national interagency wildfire mitigation planning resource, to help develop a Mitigation Action Plan that outlines recommendations intended to increase collaborative mitigation activities and establish more concrete roles and responsibilities for implementing mitigation measures within Grand County. To enhance collaborative planning efforts, CMAT recommended the development of a partnership agreement between the USFS and the Grand County Wildfire Council, as well as establishing County-wide accountability agreements, and dedicating additional departmental and organizational staff to projects. CMAT also developed recommendations for landscape and watershed scale mitigation measures, including focusing mitigation efforts around WUI communities, water infrastructure, and USFS priority land, developing extensive GIS planning, developing an updated CWPP, and retaining year-round fire-response staff. CMAT further recommended that significant steps be taken to address homeowner-scale mitigation (CMAT 2021).

State

2022 Wildfire Preparedness Plan: The 2022 Wildfire Preparedness Plan was prepared by the Colorado Division of Fire Prevention and Control and provides an overview of the Division's wildfire response capabilities. Specific numbers and types of ground, aviation, and other support resources are outlined, along with additional needs and considerations (DFPC 2022a).

Colorado State Forest Action Plan: The Colorado State Forest Action Plan was developed by the CSFS in 2020. The Plan provides a framework for identifying forest stewardship priorities within the state by accounting for forest constraints, threats, trends, and jurisdictional boundaries. The Plan breaks forest management into six categories: conditions, living with wildfire, watershed protection, wildlife, urban and community forestry, and forest products. Strategies for cooperatively addressing these categories while achieving healthy forest goals are also discussed. Key wildfire priorities outlined in the Plan include promoting community wildfire adaptation, reducing risks of severe wildfires, and promoting the ecological role of wildfires (CSFS 2020).

State Emergency Operations Plan: The State Emergency Operations Plan was implemented in 2019 by the Colorado Division of Homeland Security and Emergency Management. The purpose of the Plan is to establish guidelines on how Colorado provides response and recovery actions for emergencies and disasters. The Plan provides a single framework for response, with specific details of response varying based on the type and severity of incident. For wildfire, the plan emphasizes the importance of preparedness, coordinated interagency response, and clear assignment of responsibilities (Colorado Division of Homeland Security and Emergency Management 2019).

2018-2023 Colorado Hazard Mitigation Plan: The 2018–2023 Colorado Hazard Mitigation Plan was developed by the Colorado Department of Public Safety in 2023. The Plan is designed to maintain a framework for implementing hazard mitigation actions and minimizing the impacts of hazards across the State. The Plan breaks down planning into categories regarding identifying hazards, implementation and response capabilities, planning at local levels, and maintaining plans. Wildfire is identified as a high annual hazard with large associated economic losses. Recommended mitigation actions include developing and maintaining CWPPs (Colorado Department of Public Safety 2018).

Northwest Colorado Fire Program Area Fire Management Plan: The Northwest Colorado Fire Program Area Fire Management Plan was produced by the Northwest Colorado Fire Management Unit in

2016 and provides wildfire management guidance for BLM and USFWS managed lands. The Plan is designed to ease the development and implementation of wildfire management strategies by consolidating relevant information into a single, accessible document. The Plan includes discussions of land management policy, Fire Management Unit characteristics, and wildland fire operational guidance (Northwest Colorado Fire Management Unit 2016).

Federal

The National Cohesive Wildland Fire Management Strategy: The Strategy outlines a holistic approach to the future of wildfire management, with the goal of managing forests to coexist with wildland fire but containing incidents when necessary. The Strategy maintains that this goal will be achieved by restoring and maintaining landscapes, developing fire-adapted communities, and maintaining sufficient wildfire response capabilities (Forests and Rangelands 2021).

Kremmling Field Office Resource Management Plan: The BLM's 2016 Kremmling Field Office Resource Management Plan describes the goals and objectives of wildland fire management on BLM managed lands. The plan recognizes the importance of wildfire as a natural ecological process and prioritizes structure protection, firefighter safety, and public safety when responding to incidents. The Plan also prioritizes integrating fuels management into the office's fire program (BLM 2015).

A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: A 10-year Implementation Strategy: This Plan was most recently updated in 2006 and focuses on using a collaborative framework for restoring fire-adapted ecosystems, reducing hazardous fuels, mitigating risks to communities, providing economic benefits, and improving fire prevention and suppression strategies. The Plan also emphasizes information sharing and monitoring of accomplishments and forest conditions, a long-term commitment to maintaining the essential resources for implementation, a landscape-level vision for restoration of fire-adapted ecosystems, the importance of using fire as a management tool, and continued improvements to collaboration efforts (Forests and Rangelands 2006).

National Fire Plan: The National Fire Plan (Managing the Impact of Wildfires on Communities and the Environment) was implemented by the US Department of the Interior and the USFS in 2000. The Plan was established to develop a collaborative approach among various governmental agencies to actively respond to severe wildland fires and ensure sufficient firefighting capacity for the future. Focuses of the Plan are on firefighting preparedness and accountability, forest restoration, hazardous fuels reduction, community assistance, and research (Forests and Rangelands 2000).

Arapahoe and Roosevelt National Forests and Pawnee National Grassland Land and Resource Management Plan: The Plan was revised in 1997, last updated in 2019, and is the guiding land management document for the Arapahoe National Forest. The Plan recognizes the natural role and importance of wildfire in mountain ecosystems and outlines that significant efforts should be made to reduce wildfire hazards. These efforts include fuel management such as targeted timber harvest, wildfire-habitat improvement, and invasive species control to reduce risk to lives and property while improving forest health. Public education around wildfire protection is also emphasized in the Plan (USFS 2019a).

Routt National Forest Land and Resource Management Plan: The Routt National Forest Land and Resource Management Plan was developed in 1997 and guides the management of Routt National Forest Lands. The Plan focuses on maintaining wildfire as a natural ecological process and directing resources towards reducing hazards. These include hazardous fuel reduction/treatment (e.g., prescribed burns and mechanical thinning), targeted timber harvest, wildfire-habitat improvement, and invasive species control (USFS 1997).

Rocky Mountain National Park Final Master Plan: The Rocky Mountain National Park Final Master Plan was developed in 1976 and states that wildfires should be allowed to burn naturally within the Park where they do not threaten roads, structures, scenic areas, or trails (National Park Service 1976). The Park has since taken a more proactive wildfire fighting approach and now maintains a fuels reduction program and a strong firefighting force (National Park Service 2022).

PUBLIC LAND MANAGEMENT

LAND MANAGEMENT STRATEGIES

Local and State Land

Local land in Grand County is managed with regard to guidance provided in the County's 2006 CWPP and FPD CWPPs developed in subsequent years. The documents recommend strategies for developing parcel-level and landscape scale wildfire mitigation projects that can be completed on public (and private) land throughout the County to develop resilient ecosystems and fire adapted communities (Grand County Division of Natural Resources 2006).

Public land in the County is also managed with regard to state guidance. In 2020, the CSFS published a Forest Action Plan with the overarching goal of maintaining forest ecosystems and improving the health of local watersheds. Under this goal, the plan emphasizes the need for fuel reduction treatments in high priority regions. The plan aims to provide guidance on how federal, state, and private funds should be used to maximize their impact. The foundation of the plan is built on six central themes: forest conditions, living with wildfire, watershed protection, forest wildlife, urban and community forestry, and forest products (CSFS 2020).

Colorado law requires the Director of the Division of Fire Prevention and Control to develop an annual Wildfire Preparedness Plan. Yearly average temperatures and precipitation forecasts play a large role in wildfire outlook and greatly dictate the tone of the plan. The 2022 Wildfire Preparedness Plan acknowledges the contribution of above average temperature and below average precipitation forecasts to the current drought conditions and future wildfire risks. The plan aims to forecast yearly wildfires and determine the amount and availability of aerial firefighting resources, state wildfire engines, wildfire hand crews, and modify the dispatching process/mobilization plan as needed. It also provides a breakdown of the hierarchy of local, County, and State jurisdictions when dealing with fires as well as any additional needs or important information based on the yearly conditions (DFPC 2022a).

The state of Colorado has joined forces with major federal agencies, namely the Bureau of Land Management (BLM), U.S. Fish and Wildlife Service (USFWS), U.S. Department of Agriculture, Bureau of Indian Affairs, and National Park Service, to form the Colorado Cooperative Wildland Fire Management and Stafford Act Response Agreement. The agreement focuses on interagency cooperation, the use of interagency fire resources, operations, and preparedness (DFPC 2021).

Federal Land

Rocky Mountain National Park

Rocky Mountain National Park is managed by the National Park Service and is considered the primitive core of Colorado's Front Range, spanning 265,807 acres, including the headwaters of the Colorado River. High mountain peaks and alpine forest characterize much of the National Park. Most of the park

has been federally designated as Wilderness. This Park is an extremely popular tourist destination, especially due to its close proximity to the metropolitan areas of the Front Range. In 2019 the Park receive an estimated 4.67 million visitors (NPS 2020). A portion of the Park lies in the northeast corner of Grand County near the town of Grand Lake and encompasses approximately 8 % of the County.

The 1976 Final Master Plan for Rocky Mountain National Park is guiding management policy for the National Park. However, the park has taken a more proactive approach with fire and fuels management. The park has recognized that wildfire is inevitable and also plays an essential role in the Park's ecosystem. There are two main elements of the wildland fire management program – wildland fire response and a comprehensive fuels program. The goals of the Park's fire program are to reduce fire risk to park visitors and employees, reduce fire risk to nearby communities, and restore and maintain fire-adapted ecosystems. Common activities can include fuel treatments (e.g., mechanical thinning and prescribed burns) to reduce the volume of hazardous fuels. The Park Service has also adapted a "let it burn" Management strategy, when safe and appropriate. The Park Service states that "naturally ignited fires" in Rocky Mountain National Park "that are not threatening people, homes, or valuable natural or cultural resources may be allowed to burn, a strategy called wildland fire use, to fulfill planned objectives for restoring and maintaining fire-adapted ecosystems" (National Park Service 2019a).

Arapahoe National Forest (USFS)

The Arapaho and Roosevelt National Forests and Pawnee National Grassland is located in north central Colorado. These forests and grassland encompass 1.5 million acres and are managed by the USFS. Within Grand County, the primary national forest is the Arapahoe National Forest. The Arapahoe and Roosevelt National Forests exemplify Colorado's mountain ecosystems along the Continental divide. The glacially carved peaks, snowfields, lakes, alpine tundra, and dramatic changes in vegetation over altitudinal gradients that characterize this national forest has created a created complex environment that provides habitat for numerous species. The Arapahoe and Roosevelt National Forests are recreational hotspots due to their beauty and proximity to the metropolitan areas of the front range. Currently the Arapahoe and Roosevelt National Forests are home to ten federally designated wilderness areas and share a substantial border with Rock Mountain National Park (USFS 2022b). The Forests lie within the central and eastern regions of Grand County.

The 1997 Revision of the Land and Resource Management Plan (last revised in 2019) for The Arapahoe and Roosevelt National Forests and Pawnee National Grassland is the guiding land management document for Arapahoe National Forest (USFS 2019a). Wildfire is managed according to the management goals of the various geographic areas that comprise the National Forests and grasslands, but generally, managers recognize the natural role and importance of wildfire in the mountain ecosystems. Wildfire is generally managed to reduce wildfire hazards. Efforts include fuel management to reduce risk to lives and property while improving forest health. Example of efforts can include hazardous fuel reduction/treatment (e.g., prescribed burns and mechanical thinning), targeted timber harvest, wildfire-habitat improvement, and invasive species control. The plan also emphasizes human caused fire prevention, community protection, collaborative fire and fuel efforts (between federal, state, local, and private land managers), and public education concerning wildfire. Mountain ranges, montane and subalpine forests, alpine tundra, and vast expanses of prairie characterize these landscapes (USFS 2022c).

Routt National Forest

There is also a small portion of Routt National Forest within the northwestern region of Grand County. The Routt National Forest is jointly managed with the Medicine Bow National Forest and Thunder Basin

National Grassland. Together, these two Forests and the Grassland span approximately 2.9 million acres. The Routt National Forest primarily occurs in Northern Colorado, while the Medicine Bow National Forest and Thunder Basin National Grassland primarily occurs in southern and central Wyoming. Mountain ranges, montane and subalpine forests, alpine tundra, and vast expanses of prairie characterize these landscapes (USFS 2022d).

The 1997 Routt National Forest Land and Resource Management Plan guides the management of the Routt National Forest. Similar to the Arapahoe National Forest, wildfire is managed according to the management goals of the various geographic areas within the Forest. Managers recognize the natural role and importance of wildfire in mountain ecosystems. Wildfire is generally managed to reduce wildfire hazards. Efforts include fuel management to reduce risk to lives and property while improving forest health. Example of efforts can include hazardous fuel reduction/treatment (e.g., prescribed burns and mechanical thinning), targeted timber harvest, wildfire-habitat improvement, and invasive species control (USFS 1997).

Kremmling Field Office (BLM)

The Wildland Fire Management Section of the Kremmling Field Office Resource Management Plan (BLM 2015) described the goals and objectives wildland fire management on BLM managed lands. Within Grand County, these lands primarily fall within the Colorado River corridor west of Granby and along the Muddy Creek corridor north of Kremmling. The plan recognizes the role and ecological importance of unplanned natural wildfire and allows natural wildfire to persist where and/or when it can help meet the BLM's resource objectives. The primary goals of the plan are to prioritize public and fire fighter safety when responding to wildfire, while providing protection of property from wildfire. The plan also emphasizes integrating fire and fuels management to meet public health safety goals, while also meeting natural and cultural resources objectives across landscapes, agencies, and political boundaries.

Overall, the BLM's plan allows for planned and unplanned ignitions and utilizes a wide range wildland fire management options. These can include allowing natural fire, full suppression (when deemed necessary), and various types of fuel treatments (e.g., mechanical thinning, herbicide application and prescribed burns). Typically, wildland fire management is managed to align with other goals and objectives for other resources, such as invasive plant management, rangeland management, and timber management (BLM 2016).

Currently wildfire response and suppression efforts for the Kremmling Field Office is outlined in the Northwest Colorado Fire Program Area Fire Management Plan (FMP) (BLM 2016). This plan details policy, land management planning, partnerships, and wildland fire operational guidance. Lands within Grand County fall within the East Initial Attack Zone of the Northwest Fire Management Unit.

STEWARDSHIP AGREEMENTS

For all wildfire hazards that are, or may become, declared as emergencies or major disasters under the Stafford Act, the state of Colorado (specifically the CSFS and the DFPC) has entered into a cooperative wildland fire management agreement with multiple federal agencies (e.g., the BLM, the USFS, the NPS, the U.S Fish and Wildlife Service, and the Bureau of Indian Affairs). The purpose of this agreement is to improve wildfire response and management efficiency by facilitating the coordination and exchange of equipment, personnel, supplies, services, and funds among the parties in the agreement. The details of this agreement are described in the "Colorado Cooperative Wild Land Fire Management and Stafford Act Response Agreement" (available at: <https://gacc.nifc.gov/rmcc/administrative/docs/COAgreement.pdf>).

Additionally, in 2018 the USFS released its national Shared Stewardship strategy that contains the following main goals: determine management needs on a state level, do the right work in the right places at the right scale, and use all available tools for active management. The strategy is based on the USFS seeking out state, tribal, and local input to best determine land management needs. The Shared Stewardship agreement was formalized in Colorado in 2019, establishing a Shared Stewardship framework between CSFS, Department of Natural Resources, Division of Fire Prevention Control, and other state agencies (Colorado Department of Natural Resources 2022a).



APPENDIX B:

Community Background and Resources

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TABLES

Table B.1. Breakdown of Land Ownership in Grand County..... B-1

LOCATION AND GEOGRAPHY

Grand County is 1,846 square miles (1,195,851 acres) and is bordered by eight Colorado counties: Jackson to the north, Larimer to the northeast, Gilpin and Boulder to the east, Clear Creek to the southeast, Summit and Eagle to the south, and Routt to the west. Grand County encompasses mountains, meadows, and river valleys. Key features include the Front Range, The Rabbit Ears Range, Middle Park, Lake Granby, Grand Lake, and the Colorado River (the river itself, its headwaters, and various tributaries). The county contains substantial portions of federally managed lands. These include the Medicine Bow-Routt and Arapahoe and Roosevelt National Forests as well as Rocky Mountain National Park and BLM lands. Many of the federal lands have portions with special protections. These include the western side of Rocky Mountain National Park and federally designated Wilderness areas in Arapahoe and Routt National Forests. Federally designated wilderness areas in the County include: the Indian Peaks Wilderness, the Never Summer Wilderness, the Vasquez Peak Wilderness, the Byers Peak Wilderness, and a small portion of the Sarvis Creek Wilderness. A summary breakdown of land ownership in Grand County is provided in table B.1. Land ownership data was provided by Grand County.

Table B.1. Breakdown of Land Ownership in Grand County.

| Land Ownership | Acres | % of County |
|------------------------------------|---------------------|-------------|
| Arapaho-Roosevelt National Forest | 398,919.30 | 33.36% |
| Private\Unknown | 309,284.27 | 25.86% |
| Medicine Bow-Routt National Forest | 163,470.02 | 13.67% |
| Bureau of Land Management | 142,683.45 | 11.93% |
| Rocky National Park | 96,492.73 | 8.07% |
| State | 50,319.53 | 4.21% |
| Arapaho National Recreation Area | 34,589.78 | 2.89% |
| Bureau of Reclamation | 92.18 | 0.01% |
| Total | 1,195,851.26 | 100% |



Figure B.1. Typical landscape in Grand County



Figure B.2. Typical landscape in Grand County.

ROADS AND TRANSPORTATION

Grand County (Figure 1.2) contains 2 main transportation corridors including U.S. Highway 34 and U.S. Highway 40. Highway 34 begins in the northeast corner of the County as Trail Ridge Road and runs north to south until it reaches Granby, where it intersects Highway 40. One branch of Highway 40 continues south and east until it intersects the southeast edge of the County. The other branch of Highway 40 runs west from Granby until it reaches Kremmling, where it turns north until it intersects the northwest corner of the County. Other local transportation corridors include State Highway 125 (north-south starting in the central northern border of Grand County until it merges with Highway 40); State Highway 9 (north-south from the southwest border of the County until it connects with Highway 40); and State Highway 134 (east-west starting on the western border of the County until it merges with Highway 40)]. Access to other county lands consists of narrow, winding roads, including maintained two-lane roads, some one-lane gravel roads, numerous four wheel-drive dirt/OHV roads, and multiple dead-end roads. Grand County also contains a portion of trans-mountain railroad track that receives significant use for transportation of goods, including hazardous materials.



Figure B.3. Photograph showing an unsurfaced road.

TOPOGRAPHY

The topography of Grand County is complex and variable and reflects its montane ecosystem. There are five mountain ranges within Grand County, including sections of the Gore Range, Williams Fork Mountains, Park Range, Rabbit Ears Range, and Front Range. The entire Never Summer Range is contained within Grand County. Lower elevations in the county are characterized by rangelands, mid and higher elevations are characterized by coniferous forest, and the highest elevations are characterized by alpine tundra. Notable peaks include Apache Peak (13,441 feet), Byers Peak (12,804 feet), and Vasquez Peak (12,947 feet) (USFS 2023).

The mountain ranges of Grand County serve as the headwaters for the Colorado River, arguably the most important river in the southwestern U.S., and many of its tributaries. Key hydrological features along the Colorado River's headwaters include the natural Grand Lake and the artificial Lake Granby.

The central portion of Grand County is dominated by Middle Park, a large mountain basin where the Colorado River flows through from Lake Granby to Kremmling. West of Kremmling, the Colorado River cuts through the northern terminus of the Gore Range to form Gore Canyon. The county is also home to multiple protected areas, including Rocky Mountain National Park and portions of Arapaho National Forest.

POPULATION

The following information is drawn primarily from U.S. census data (U.S. Census Bureau 2021). In 2021, the population estimate of Grand County was 15,860 persons, an increase of 6.9% over the 2010 census numbers of 14,843. Between 2016 and 2020, there were 6,315 households in the County. The County has a population density of 8.5 people per square mile. According to the 2019 population estimate, over half of Grand County residents, 8,462 people, live in unincorporated areas (GCOEM 2020). Grand County also experiences extreme seasonal influxes of visitors, including an estimated 4.5 million visit-days annually (Summit Economics 2017). Additionally, the majority of homes (up to 80% in some regions) are second homes for individuals who are not residents (GCOEM 2020).

Grand County has experienced moderate population gains since the 2006 countywide CWPP. As of 2006, the Grand County population was estimated at 14,003 individuals (U.S. Census Bureau 2021). Grand County's population has increased by 1,857 persons (or 13%) since the last countywide CWPP was written. Most of the population growth has been associated with the towns of Fraser, Granby, and Winter Park, which have collectively grown by 1,187 persons since 2006 (U.S. Census Bureau 2021). This population has resulted in increased development in the WUI and expansion of the WUI.

RECREATION

Outdoor recreation is extremely popular in Grand County, with Rocky Mountain National Park, Routt and Arapaho National Forests, Wilderness Areas, BLM lands, Scenic Trails, and cultural attractions throughout the county attracting millions of visitors each year. Hiking, biking, camping, hunting, fishing, skiing, snowmobiling, boating, and other activities are all popular throughout the county (GCOEM 2020). Some of the most notable skiing/snowboarding facilities include the popular Winter Park Resort, Ski Granby Ranch, and Berthoud Pass for backcountry touring (Grand County Colorado Tourism Board 2022). Grand Lake and Lake Granby provide a multitude of water activities including fishing, boating, paddleboarding, and other leisure activities.

In 2019 more than 2 million people visited Grand County and put approximately \$590 million dollars into Grand County's economy. It is estimated that 56% of the visitors came during the summer months to experience Grand County's public lands and numerous outdoor attractions, while many more visited during ski season during the winter and spring months (Sky-Hi News 2021). During peak visitation times, a significant number of people can congregate in relatively small areas, which results in large populations potentially needing to evacuate should an emergency occur.



Figure B.4. Recreation Infrastructure in Grand County.

WILDLIFE

Vegetation management treatments are commonly applied throughout the County to benefit habitat for general wildlife species or game habitat. Most native wildlife species found in the region evolved with a frequent fire regime. However, impacts to wildlife should still be considered when planning fuel treatments. Grand County is also widely known for its big and small game hunting opportunities, which significantly benefit the local economy.

THREATENED AND ENDANGERED SPECIES

Several Federal and State threatened and endangered species reside in and around Grand County in the various parks, forests, and wilderness areas. These include Canada lynx (*Lynx canadensis*), Gray wolf (*Canis lupus*), Wolverine (*Gulo gulo*), Mexican Spotted Owl (*Strix occidentalis lucida*), Burrowing Owl (*Athene cunicularia*), Piping Plover (*Charadrius melodus*), Whooping Crane (*Grus americana*), Yellow-billed Cuckoo (*Coccyzus americanus*), Bonytail (*Gila elegans*), Colorado Pikeminnow (*Ptychocheilus lucius*), Humpback Chub (*Gila cypha*), Pallid Sturgeon (*Scaphirhynchus albus*), Razorback Sucker (*Xyrauchen texanus*), and Boreal Toad (*Anaxyrus boreas* pop. 1) (CNHP 2022). In addition to mammals, birds, fishes and amphibians, there are also listed plants in this County such as Osterhout Milkvetch

(*Astragalus osterhoutii*), Penland Beardtongue (*Penstemon penlandii*), and Western Prairie Fringed Orchid (*Platanthera praeclara*) (U.S. Fish and Wildlife Service [USFWS] 2022). Recommendations for fuel treatments should be developed in alignment with all required compliance, and when possible, treatment approaches should be aligned with actions that provide for habitat enhancement for threatened and endangered species.

FOREST HEALTH CONSIDERATIONS

INSECTS

In Grand County, forest health is most strongly defined by what is locally known as the “beetle kill” episode. Beginning in the early 2000s, the mountain pine beetle, a species native to the western United States but previously relatively benign, along with other species, began attacking local forests. By 2010, the beetles had taken a devastating toll on the County, killing hundreds of thousands of acres of previously healthy timber stands (USFS 2022e). The destruction was not isolated locally; across the state, the beetles killed millions of acres of spruce, pine, and fir forests (CSFS 2022b). The aftermath of the brief but highly destructive run of the insects can be seen across the County today, where entire stands of dead lodgepole pine lie scattered across the landscape.

Aside from the intensive visual and economic losses associated with the epidemic, the beetle kill episode has since proven to be massive forest health detriment. Research has shown that the associated losses of forest canopy take significant tolls on nutrient cycling and hydrologic processes essential for forest health (NSF 2013). Of even graver significance is the extreme fire risks posed by the trail of destruction left behind by the beetles and which only in recent years is being realized (USFS 2019b). In the decade since the heart of mortality occurred, acres of forest have transformed into loaded fuel beds, with dangerous mosaics of dense and downed timber and standing dead timber spread throughout the County. On top of extreme quantities of what is by now extraordinary dry timber, shrub fuels are growing in significant quantities within understory environments, creating an easily combustible connected fuel profile. Under hot and dry conditions, these light shrubs and flashy fuels, in conjunction with downed lodgepole pine fuels, can quickly turn even small ignitions into large crown fire events. As was unfortunately demonstrated in the 2020 East Troublesome Fire, suppression of these events is extremely difficult, not only due to the extreme fire behavior but because of the massive quantities of 100- and 1,000-hour fuels that retain intensive heat and bear the potential to emit short- and long-range firebrands long after initial burn over.

Compounding the extreme risk is the fact that much of Grand County’s WUI lies within areas of heavy beetle kill. Without proper defensible space and fuel treatments of surrounding forests, structures can quickly fall victim to fire events in these post-beetle landscapes. As such, Grand County’s WUI faces risks beyond those typical of WUI, highlighting the need for implementation of wildfire mitigation strategies outlined in this CWPP.

Additional information on tree mortality and beetle infestations can be found in the Tree Mortality section of Appendix B

Insects that have infested or have the potential to infect the forests within and around the Grand County CWPP planning area include (Grand County 2023b; USFS 2020):

- Ips Beetles (*Ips* spp.)
- Mountain Pine Beetle (*Dendroctonus ponderosae*)

- Spruce Beetle (*Dendroctonus rufipennis*)
- Twig Beetles (*Pityophthorus* spp. and *Pityogenes* spp.)
- Western Balsam Bark Beetle (*Dryocoetes confuses*)
- Western Spruce Budworm (*Choristoneura freeman*)
- Roundheaded Pine Beetle (*Dendroctonus adjunctus*)

DISEASES

Diseases of trees, such as parasitic plants, fungi, and bacteria, can also affect forests in the Grand County CWPP planning area. These diseases impact forest systems by degrading the productivity and health of the forest. Some of the more common forest diseases that are found in Colorado are listed below. Trees that are killed by disease have the similar potential to increase fire hazards.

- White Pine Blister Rust (*Cronartium ribicola*)
- Comandra Blister Rust (*Cronartium comandrae*)
- Armillaria Root Disease (*Armillaria* spp.)
- Spruce Broom Rust (*Chrysomyxa arctostaphyli*)
- Western Gall Rust (*Peridermium harknessii*)
- Diplodia Shoot Blight and Canker Disease (*Diplodia sapinea*)
- Dothistroma or Red-Band Needle-Blight (*Mycosphaerella pini*)
- Mistletoe (*Arceuthobium* spp., *Phoradendron* spp.)

Treatments on federal land would be subject to the National Environmental Policy Act (NEPA) and associated analysis of impacts to these species. Treatments in areas that may impact threatened and endangered species would require application of certain mitigation measures to prevent degradation to habitat.

ENVIRONMENTAL CHALLENGES

DROUGHT AND CLIMATE

Frequent drought, tree mortality, and climate change have all worked together to increase wildfire likelihood and community vulnerability to wildfire (CSFS 2020). These factors have interacted to increase the risk of uncharacteristically large high-severity fires (CSFS 2020). In the past few years, fires have grown to record sizes in Colorado and are burning longer, hotter, and more intensely than they have in the past (CSFS 2021).

According to the National Interagency Fire Center (NIFC), the occurrence of catastrophic wildfires in the western United States has greatly increased over the last 20 years. Westerling et al. (2006) demonstrate that large (>1,000 acres) wildfires throughout the western United States for the period of 1970 to 2003 saw a pronounced increase in fire frequency since the mid-1980s (1987–2003 fires were four times more frequent than the 1970–1986 average). In addition, the length of the fire season increased by 78 days (comparing 1970–1986 data with that from 1987–2003). An update to Westerling et al.'s 2006 work found

that the frequency of large wildfires has continued to increase with each decade since 1970 (Westerling 2016).

Within just the last 10 years, a record number of acres have burned, and numbers are continually increasing (National Interagency Coordination Center [NIFC] 2020). In 2020, 58,950 fires were reported nationwide, burning 10.1 million acres (NIFC 2020). In Colorado, wildfires burned 665,454 acres of land in 2020, making it the largest and most destructive season recorded in Colorado's history (Colorado Sun 2020). It is estimated that wildfire suppression efforts in Colorado cost over \$266 million in 2020. Grand County was no exception as the East Troublesome Fire and the Williams Fork Fire burned more than 200,000 acres of land in Grand County. It is estimated that suppression costs for the East Troublesome and Williams Fork fires were over \$15 million and \$27 million, respectively (NIFC 2020). The wildfire season in 2020 corresponded with a period extreme drought and warm growing season temperatures brought on by climate change (CSFS 2021).

In Grand County, wildfire impacts from the 2020 wildfire resulted in substantial property and infrastructure destruction and damage, power outages, and impacts to water supplies. Estimates for property damages from the 2020 wildfires in Grand County are at over \$200 million (Sky-Hi News 2020). The recent trend of large and destructive wildfires across the country and in Colorado has caused insurance home and auto insurance rates to increase, especially in wildfire prone environments (KOAA News 5 [KOAA] 2022).

The shifting climate, particularly rising temperatures, changing wind patterns, and increasing temporal and spatial variability of water availability, are considerably escalating wildfire risk across the state. Since 1990, mean annual temperatures in Colorado have increased by 2°F. Climate change projections predict that these trends will continue and possibly accelerate, depending on CO₂ emission scenarios. By the mid-twenty-first century, Colorado is expected to have 40 fewer days when the temperature in the high elevation areas drops below 32°F (CSFS 2020).

Furthermore, Colorado has experienced and is expected to experience more extreme and prolonged drought in the coming decades. Warm drought periods in Colorado have already significantly increased the risk from wildfire across the state, especially in Grand County (CSFS 2020). Taken together, these impacts mean smaller and more ephemeral winter and spring snowpacks, longer and warmer growing seasons (i.e., longer and more hazardous fire seasons), increased drought stress on forests and rangelands, and continued tree mortality in forested areas. Colorado has been no stranger to catastrophic wildfire in recent years. The degradation of Colorado's forests combined with increased development in the WUI and impacts from climate change suggest that large destructive fires, such as the East Troublesome Fire, will become more likely throughout Colorado, including Grand County.

It is important to note that fire is a natural part of Colorado's diverse landscapes and is essential to many ecosystems across the state. Almost all of Colorado's diverse ecosystems are fire-dependent or fire-adapted (CSFS 2020). Frequent, uncharacteristically large, high-severity wildfires are the primary source of the catastrophic damage listed above (CSFS 2020). Wildfire, when not directly or indirectly intensified by human actions, works to balance ecosystems, and restore their natural functions.

ECOSYSTEM SERVICES

Ecosystem services are the benefits to humans provided by natural resources. Grand County's diverse high alpine tundra, montane forest, aquatic, and intermountain sagebrush basin environments provide many ecosystem services whose benefits are reaped both at the County-scale and by inhabitants of the broader region. With stunning vistas and ample fishing, hunting, wildlife viewing, photography, and OHV use opportunities, millions of visitors travel to the County annually (GCOEM 2020) to enjoy natural

landscapes, which results in critical seasonal influxes of money into the local economy. As the headwaters of the Colorado River, Grand County's ecosystems also function to provide clean water to residents, the Front Range, and many user-groups further downstream. Additionally, Grand County's forest ecosystems play important roles in sequestering carbon, providing clean air, and providing material goods (dimensional lumber, posts and poles, specialty wood products). Subterranean resource extraction within the County also functions to create consumer products and local jobs (Brown et al. 2011; Grand County 2023a; Semmens et al. 2008). Large and uncharacteristic wildfires directly jeopardize these important ecosystem services and have the potential to impact the quality of life and economic robustness of the County (GCOEM 2020).

In addition to direct damage (e.g., structure and property damage) caused by high-severity wildfires, there are indirect impacts on the environment and ecosystem services. High-severity wildfires are known to deteriorate local and regional air quality, pollute waterways, displace native species (animal and plant), and increase carbon dioxide emissions. The increased carbon dioxide emissions are of special concern as carbon dioxide is a greenhouse gas. Greenhouse gases are implicated in climate change, and climate change is a critical factor exacerbating frequency and severity of wildfires.

However, it is important to note that mixed and high-severity stand replacing wildfires are a normal and essential component of Grand County's forest ecology. While low-severity fire has been championed as component of healthy forests, this concept only applies to select areas in Grand County, primarily in the rangelands (see Fire Regimes in Chapter 2). The lodgepole and spruce-fir forests in Northern Colorado traditionally experienced mixed and/or high severity fire that are commonly stand replacement events at 50-500 year intervals (see Fire Regimes in Chapter 2 for additional detail). These fires typically burned extensive patches of forests; occurred at varying time intervals across the landscape, and are responsible for some of the forest age, structure, and heterogeneity observed in Grand County's forests (Sibold et al. 2006). Some of the heterogeneity (i.e., habitat diversity) created by these fires is essential to the plant and wildfire diversity of these forests. In other words, these fires are an essential component in the maintenance of the County's native forest ecology. Note: lodgepole pine forests can display low severity fire regimes, but this usually occurs when there is a small, isolated patch of forest surrounded by low severity vegetation community (e.g., a lodgepole patch surrounded by sage-brush steppe) (Anderson 2003).

There is increasing evidence that recent beetle outbreaks (which have been exacerbated by climate change) and the resulting tree mortality are increasing the likelihood and potential size of high severity wildfire in Colorado to uncharacteristic levels (see Tree Mortality section below). As such, residents living within these forests should be well aware of the region's inherent wildfire risk. Since high severity wildfire within the WUI is not acceptable, residents should adopt other management practices that both reduce wildfire risks and maintain native forest ecology. Within the WUI, these can include targeted fuel reduction/fuel removal treatments; creating, maintaining, and re-enforcing fuel breaks; slash pile burning during wet periods, targeted logging projects (to mimic forest fire landscape heterogeneity); control of invasive plant species; and targeted prescribed burns (during the wet season) to clear fine fuels. These can all help eliminate hazardous fuel build up, help maintain defensible spaces, and maintain healthy forests.

TREE MORTALITY

Widespread tree mortality due to rising temperatures, droughts, extreme wildfires, and insect outbreaks is a natural process in forest ecosystems. However, if these occur at a higher frequency due to compound disturbances, forest health may be negatively affected. In addition to disrupting ecosystem functions,

widespread tree mortality near developed or recreational areas may present hazards as trees can fall and potentially endanger the public and infrastructure.

Tree mortality throughout Colorado is strongly correlated with extreme and prolonged drought and subsequent bark beetle attacks (USFS 2022e). While bark beetle attacks have historically been a normal and healthy components of Northern Colorado's forests (Anderson 2003), climate change is increasing amount of mortality observed in Northern Colorado's forests and allowing the beetle attacks to occur in forests would have historically been unaffected (Mitton and Ferrenberg 2012). Stands of trees that have been killed by insects have varying degrees of associated fire danger depending on the time lapse following an insect attack and structure of the dead fuels that remain (Kulakowski and Veblen 2007; USFS 2019b). Considering that deceased trees pose an increased risk of intense wildfire, fuel reduction treatments within the WUI, such as thinning and targeted prescribed fire, not only reduce the risk of catastrophic wildfire but can also reduce the severity of future bark beetle outbreaks (Goodwin et al. 2020).

The USFS conducts a yearly aerial survey to map tree mortality and beetle kill across nearly 44 million acres of Colorado forest land. In 2021, there was a documented increase in roundhead, western, spruce, and mountain pine beetle infestations throughout the state. Of the greatest concern are spruce beetles (affecting nearly 53,000 acres of land in 2021) and Western balsam bark beetles (29,000 acres), both of which have been documented in Grand County and the surrounding areas (USFS 2022e). Spruce beetles are responsible for tree mortality of over 2 million acres within the state, with the greatest hit to forests within the Rockies of Northern Colorado (Rodman et al. 2021).

In 2020 the Cameron Peak Fire burned more than 200,000 acres near Rocky Mountain National Park, becoming the largest wildfire in Colorado history. Researchers at the University of NM found that prior to the fire, there was an approximated 55% increase in the fuel load within the fire's perimeter due to previous beetle kill and rising temperatures that strained forest survival. These combined effects that cause tree mortality are known to cause wildfires of greater intensity, can increase wildfire spread, and may make fires difficult to control (Goodwin et al. 2021). Colorado has an unprecedented number of record-breaking wildfires as temperatures have risen and as beetle kill has increased across the landscape. These include the Pine Gulch fire that burned through 139,007 acres and the East Troublesome Fire that burned 192,560 acres, both catalyzed during the 2020 fire season. The fact that there have been four record-breaking fires in the state during a single fire season is cause for concern, and tree mortality rates, rising temperatures, drought, and increased infestations explain and predict these increasing trends in the state's wildfires.

FIRE RESPONSE CAPABILITIES

Fire management in Colorado is a cooperative interagency partnership among federal, state, and local entities. Wildland fire response for large fires is typically supported and coordinated by regional interagency dispatch centers in Colorado. These dispatch centers are part of the larger Rocky Mountain Area Coordination Center. The dispatch centers in Colorado include the Fort Collins, Craig, Grand Junction, Montrose, Durango, and Pueblo Interagency Dispatch Centers. Wildfire response in Grand County is mostly an interagency cooperative effort (GACC 2022). The Fort Collins and Craig Interagency Dispatch Centers serve lands located in Grand County.

INCIDENT MANAGEMENT

When an incident is reported on lands within Grand County, the Grand County Communications Center (GCC) will be notified as soon as possible. The primary method for the public to report incidents is to call 911. The GCC will act as dispatch for initial attack on ignitions falling inside county and local FPD jurisdictions. If the incident does not fall within their dispatch jurisdiction, GCC will notify the Fort Collins Interagency Dispatch Center (FCIDC) for initial attack dispatch concerning all Rocky Mountain National Park and Arapaho and Roosevelt National Forest resources, or the Craig Interagency Dispatch Center (CIDC) for initial attack dispatch concerning all Medicine Bow Routt National Forest and BLM managed lands. The DFPC will also be notified if a wildland fire on non-federal land escapes initial attack, threatens structures, or requires air resources. Upon response to an incident, the assigned initial attack incident commander will size up the wildland fire and communicate with the appropriate dispatch center to ensure that adequate resources are deployed (Grand County 2022b).

The USFS, National Park Service, and Bureau of Land Management are ultimately responsible for all management and incident response on their lands within Grand County (Grand County 2022a). Incident management will also adhere to operational procedure guidelines set forth in interagency cooperative agreements for the region, such as the Northwest Colorado Fire Management Unit Fire Management Plan (Northwest Colorado Fire Management Unit 2016). Specific response protocol to local incidents within FPD boundaries and unincorporated county regions is detailed in the following “Local Response” section, and response management for state and federal agencies is detailed in the following “State Response” and “Federal Response” sections, respectively.

In the event of an emergency, always call 911. The 911 dispatcher will send the appropriate response resource to the incident. 911 calls reporting suspicious smoke or clouds are highly valued as they can help locate unknown fires.

LOCAL RESPONSE

Grand County has five local FPDs serving the county (Figure B.5): East Grand FPD No. 4, Grand FPD No. 1, Grand Lake FPD No. 2, Hot Sulphur Springs/Parshall FPD No. 3, and Kremmling FPD No. 5 (Grand County 2022c). If a local FPD’s capability to fight a fire has been exceeded, or if the incident occurs in an unincorporated region, it is up to the County Sheriff to coordinate fire suppression efforts with other local FPDs (Grand County 2016). There is currently a Mutual Aid and Assistance Agreement between all Grand County FPDs that allows resources to be dispatched anywhere in the county at the request of an FPD representative acting as incident commander (Grand County 2016). The Grand County Communications Center (GCC) in Hot Sulphur Springs acts as dispatch for Grand County and its local FPD’s initial attack response (Grand County 2016). If the acting incident commander has determined that there is need for additional resources that is beyond the scope of the County, then the necessary resources will be ordered through the appropriate interagency dispatch center. If the County’s capability to fight a fire has been exceeded, then it is up to the local sheriff to coordinate with DFPC to seek and approve state assistance (Grand County 2016). Approximately 90% of all fire starts in Grand County are managed and suppressed locally by FPDs without external interagency support.

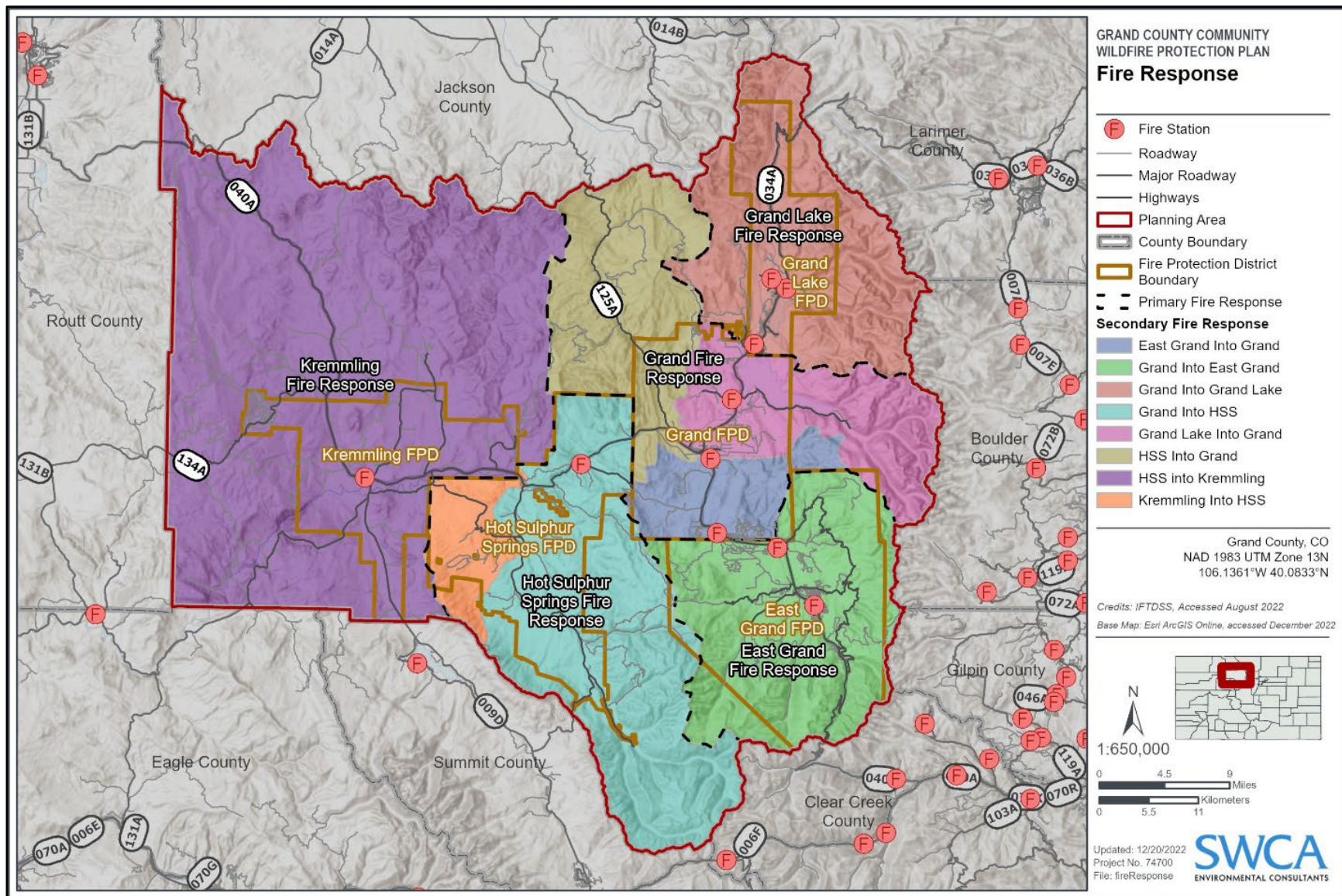


Figure B.5. Primary (First) and Secondary Fire response zones and fire station locations.

STATE RESPONSE

Colorado Division of Fire Prevention and Control

The DFPC is the lead state agency for fire. DFPC's Wildland Fire Management Section (WFMS) is responsible for wildland fire management on local and state lands and aids in the coordination of wildfire management across local, state, and federal agencies. DFPC states that its priority wildland fire mission is "to assist and support local agencies and counties with a range of wildfire management programs including administrative, technical, preparedness and planning, funding, response, and prescribed fire functions" (DFPC 2022b).

On non-federal lands, wildfire management follows a hierarchy of local jurisdiction, to County Sheriff, and, finally, to the State of Colorado. The Chief of a local FPD is responsible for fires that occur within the boundaries of their district. If a fire is outside of the chief's ability to manage, then it is the duty of the County Sheriff to assume the responsibility for coordinating fire suppression efforts and requesting assistance from the DFPC. The County Sheriff is also responsible for coordinating fire suppression efforts in unincorporated areas of the County. In the event that the County Sheriff and DFPC have determined that the County capacity has been exceeded, then the DFPC director will approve state assistance based on the assessment of capacity and availability of funds. If state assistance is approved, then the fire becomes a state responsibility area and DFPC assumes cost and management responsibility, along with ongoing involvement from local and County partners (DFPC 2022b).

Grand County falls in the Headwaters Region of the Northwest District of DFPC. The Craig Interagency Dispatch Center is responsible for dispatching the initial attack resources of state responsibility areas in the DFPC Northwest district (Grand County 2016).

In Colorado the state can either provide assistance for fighting fires or can be responsible for fighting fires.

State Assistance for Fires includes the following management strategies and resources (DFPC 2022a):

- Seeks to encourage rapid initial attack actions where fire is unwanted to reduce the size, duration, costs, and impacts of wildfires.
- Can provide personnel, enabling local agencies to respond to their next incident, and volunteer firefighters to return to their regular jobs.
- Provides funding and resources for local and County responsibility fires. The fire does not have to exceed the capacity of the Fire Department or the County for a county to receive funding.
 - This can include funding and reimbursement for aviation and handcrew resources during the initial attack phase of fires on non-federal lands. Ordered resources are based on the Closest Forces concept, whether they are State or Federal agency resources to reduce response times.
- Resource support can include DFPC engines, module, and overhead resources, as well as technical assistance from DFPC Fire Management staff.

State Responsibility for Wildfire covers the following conditions and scenarios (DFPC 2022a):

- The state is responsible if the County requests assistance from DFPC.

- DFPC and Sheriff have conducted an assessment and have determined that the County capacity has been exceeded.
- DFPC Director approves the State's responsibility based on assessment of capacity and availability of funds.
- If approved for State Responsibility, DFPC assumes cost and management responsibility, along with ongoing involvement from local and County partners.

FEDERAL RESPONSE

Rocky Mountain National Park

Fire response for the National Park is a multiagency effort with primary response being the responsibility of the Alpine Hotshot crew (National Parks Service 2019a). The crew is stationed in the Park but provides response capacity nationwide. Response for the Park is dispatched through the Fort Collins Interagency Dispatch center (National Park Service 2019b). Additional wildfire response is provided by the Rocky Mountain National Interagency Hotshot Crew which consists of BLM, NPS, and USFS crews. Response notifications for the Park are dispersed for Larimer and Grand County through the Larimer Emergency Telephone Authority and CodeRed, respectively (National Park Service, 2019a). It should be noted that all local National Park resources are located on the east side of the Continental Divide.

Arapahoe National Forest

The USFS is responsible for wildfire response and management of Arapahoe and Roosevelt National Forests. The USFS coordinates with the FCIDC to dispatch initial response attacks in the forest. FCIDC's region is divided into 45 fire response areas with Grand county falling into regions 41, 42, 443, 44, and 45 (FCIDC 2018). Cross jurisdictional coordination occurs through dispatch center with Rocky Mountain National Park. The USFS maintains a 20-person hotshot crew in Fort Collins and coordinates response with an interagency Northern Colorado helitack crew, and the Jeffco Airtanker Base to provide multifaceted response options to fires (USFS 2022c). The Forest also stations one engine in Grand County, but the majority of resources are located along the east side of the Continental Divide.

Routt National Forest

The USFS provides management and wildfire response for over 1 million acres of Routt National Forest. Initial response attacks are dispatched by the Craig Interagency Dispatch Center which provides dispatching services for 3 Fire Danger Rating Areas (FDRA) encompassing north-west Colorado and includes both USFS lands and Bureau of Land Management jurisdiction (USFS 2022f). Grand county falls within the east FDRA for the group, and under the South Fire Zone of the Medicine Bow-Routt National Forests and thunder Basin Grasslands management zone. The South Zone maintains two ten-person fire response modules, the Storm Peak and Silver creek Fire Modules, as well as a five-person engine crew (USFS 2022f). The Forest does not station any crews in Grand County.

BLM Kremmling Field Office

The Kremmling field office is responsible for management and coordination of initial response attack for all Bureau of Land Management lands in Grand County. BLM lands in Grand County fall under the jurisdiction of the Northwest Colorado Fire Management Unit. Fire management for this area, including

wildland fire response, is guided by the “Northwest Colorado Fire Program Area Fire Management Plan” (BLM, USFWS, NPS, and USFS 2016). The Craig Interagency Dispatch Group dispatches initial attack resources for all BLM land in the county and fire response is an interagency cooperative operation that includes response resources from NPS, USFS, BLM, and USFWS. Responding agency crews are typically not stationed in Grand County but must come from surrounding regions.

INTERAGENCY RESPONSE

For Federally Managed Lands, the Fort Collins Interagency Dispatch Center is responsible for dispatching the initial attack Resources of Rocky Mountain National Park and Arapaho and Roosevelt National Forests; while the Craig Interagency Dispatch Center is responsible for dispatching the initial attack resources for lands managed by the BLM and Routt National Forest (Grand County 2016).

POTENTIAL OPERATIONAL DELINEATIONS (PODS)

Potential Operational Delineations (PODs) are fire management/planning units that are spatially delineated based from potential control features (such as roads, rivers, waterbodies, major fuel changes, etc.) which can potentially be used as a fire containment feature. PODs are developed collaboratively by a variety of fire managers, scientists, and stakeholders (USFS 2022f).

Click here to learn more about PODs: <https://www.fs.usda.gov/rmrs/potential-operational-delineations-pods>

Click here to view a *PODs at a Glance* summary sheet:

https://www.fs.usda.gov/rmrs/sites/default/files/documents/PODs-at-a-glance_RMRS_Jan2022.pdf

MUTUAL AID

The wildland fire community is well known for its development of mutual aid agreements at the federal, state, and local levels. Such automatic aid agreements allow for the closest forces to respond to an incident as quickly as possible regardless of jurisdiction. Figure B.5 depicts the primary response agency, along with which agency would provide immediate support if necessary (secondary fire response). Such agreements may also describe how reimbursement will be conducted; state resources responding to wildfires on federal land may have their associated costs reimbursed by the responsible federal agency, and the reverse is true for federal resources suppressing a wildfire on state land.

There is currently a Mutual Aid and Assistance Agreement between all Grand County FPDs that allows resources to be dispatched anywhere in the county at the request of a FPD representative acting as incident commander (Grand County 2016). The FPDs in Grand County are also party to the Mountain Area Mutual Aid compact, allowing them to mobilize fire resources from neighboring counties as available.

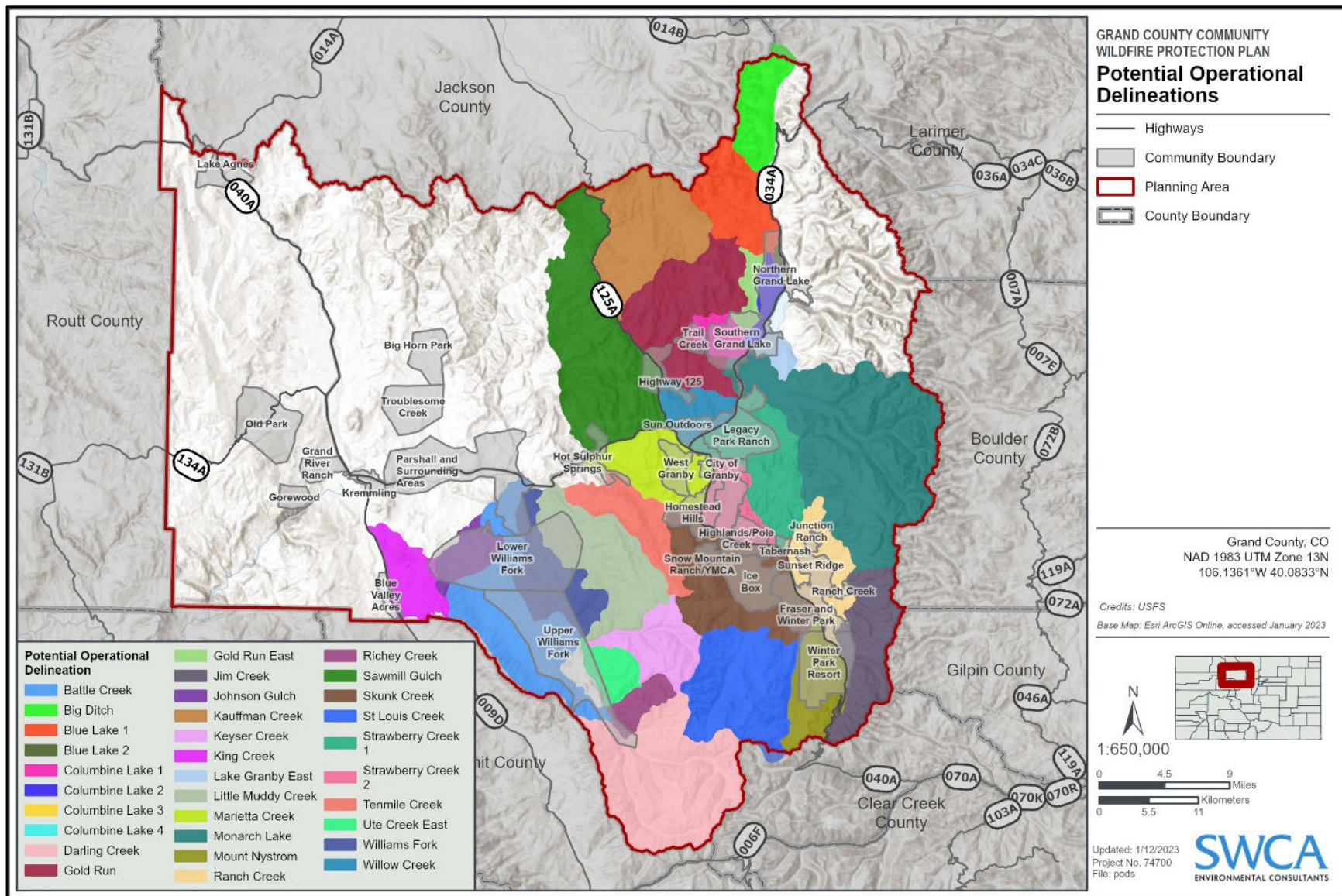


Figure B.6. PODs within Grand County.

EVACUATION RESOURCES

Evacuation relies on both cooperative planning and the capability of residents to effectively implement plans. Grand County's Multi-Hazard Mitigation Plan identifies wildfire evacuation planning for publicly and privately maintained public access roads as the responsibility of GCOEM, Grand County FPDs, and the Grand County Department of Road and Bridge. Provisions for an effective wildfire evacuation plan outlined in the Plan include pre-planned evacuation zones, evacuation centers, staffing and logistical needs plans, public information plans, and readily available publications and information (GCOEM 2020). The Grand County Emergency Operations Plan (Grand County Government 2018) provides additional information on specific organizations responsible for roles in the evacuation planning and implementation process. You can view the Hazard-Mitigation plan and Emergency Operations Plan here:

<https://co.grand.co.us/1340/Program-Plans#:~:text=The%20Grand%20County%20Emergency%20Operations%20Plan%20%28GC-EOP%29%20describes,of%20local%20government%2C%20private%20sector%2C%20and%20non-governmental%20organizations.>

In the event of a wildfire incident that requires evacuation, the acting incident commander is responsible for initiating the process through appropriate dispatch center communication pathways (see Emergency Notification Methods section for additional information on this procedure). Incident command falls to FPD Fire Chiefs when an incident falls within one of the County's five FPDs. However, if an incident exceeds the capacity of a District or occurs in an unincorporated area outside of a District, incident command defaults to the County Sheriff. The Sheriff may also turn incident command and evacuation declaration power over to external resources. Said authority of fire chiefs and the Sheriff is derived from the Colorado Revised Statutes (Colorado General Assembly 2022b) and defined in the County's Wildland Fire Operating Plan (Grand County 2022a). If an incident occurs on land managed by the USFS, BLM or NPS, the respective managing agency is responsible for response and establishment of an incident commander who bears the power of declaring evacuations (Grand County 2022a).

Public information regarding evacuation in Grand County is currently available via multiple avenues. Grand County's Sheriff's Office, in cooperation with local FPDs has developed an interactive evacuation map resource that allows residents to view their evacuation zones and their current evacuation status in the event of a wildfire incident (see Map 11 in Appendix J). The map is also accessible here:

<https://gcgeo.maps.arcgis.com/apps/webappviewer/index.html?id=ca4f74421b69416da9be1b9b92166534>

The Grand County Wildfire Council has also published numerous informational guidelines for residents detailing necessary actions for evacuation preparedness and execution. These outreach documents include the Wildfire Prevention, Preparedness, and Survival Guide (Grand County Wildfire Council [GCWC] 2022a), which provides a checklist of pre- and during-evacuation tasks, and is accessible here:

https://bewildfireready.org/wp-content/uploads/2022/06/Wildfires_white_FINAL_web.pdf

Please note that the public should follow the latest guidance from trusted sources, such as official government agencies, in regard to evacuation orders, especially as emergency response plans change rapidly. Current evacuation orders should always be adhered to and supersede all information presented in the CWPP.

Road Systems

The majority of communities in Grand County are accessed only via unsurfaced roads through forested areas, which are often narrow, long, and windy with many dead-ends and blind corners. These access roads are particularly hazardous during emergency evacuation, especially where they are lined by thick, dense vegetation. Fuel treatment may be needed along some roads where vegetation is overhanging and

could prevent safe evacuation of residents or safe access by emergency responders (See Chapter 3 or Appendix D for more information regarding roads hazard analysis). In addition, access to many communities are limited to one major road in and out which may prove hazardous during emergency evacuation.

People

The safe and efficient evacuation of people from wildfire requires several factors, including:

Emergency notification methods:

Grand County utilizes multiple notification systems to alert residents of emergencies, and it is the responsibility of an incident commander to notify the Grand County Communications Center (GCCC) of the need for wildfire related alerts. The most efficient means utilized to reach broad audiences during incidents is through CodeRED, a reverse 911 public safety alerting system. Residents must register their numbers in the system, but it can deliver time-sensitive, geo-targeted information using voice messaging via cell or landline, text messaging, or email.

- See the following URL to sign up for emergency alerts: <https://co.grand.co.us/193/Sign-Up-for-Emergency-Alerts>

Grand County can also utilize their Emergency Alert System (EAS), the same system commonly used by state and local authorities to deliver weather and AMBER alerts. The EAS relies on radio and television broadcasters, cable systems, satellite radio and television providers, and wireline video providers (radio, television) to voluntarily deliver information via their platforms. Only residents who utilize the services provided by EAS partners volunteering to push incident notifications will receive the alerts. The County's Wireless Emergency Alert System (WEA) can also be used and relies on local public safety officials employing FEMA's Integrated Public Alert and Warning System (IPAWS) network to have wireless providers voluntarily push alerts from local cell towers to mobile devices. Alerts from this system appear much like text messages on devices.

Grand County also provides residents with notifications and alerts on the GCOEM website, as well as through media releases, social media site updates, and mobile sign trailers, such as those commonly seen in construction areas. (GCOEM 2021).

Beyond alert systems utilized by the County, word of mouth also plays a role in emergency notification, especially in more rural areas where residents may not be subscribers to EAS partner content. When safe to do so, residents should call or text friends, neighbors, and contacts to ensure that they are aware of active alerts.

It is important to note temporary residents or tourists may not be signed up for emergency alert notifications. It is recommended the county work with short-term rental owners and hotels to ensure the applicable emergency notification sign up resources are provided to all who rent a property within the county.

Preplanning by the public about how to evacuate and where to go:

Locked gates, poor or missing signage, and conflicts with emergency vehicles driving into communities versus the public trying to leave can complicate evacuation. Uncertainty about where to find temporary refuge can cause also families to become separated and delay reunions, and some individuals without transportation or with limited mobility may be accidentally left behind. Always make sure to have an evacuation plan and go bag(s) ready, know your evacuation routes and rallying

points, and make sure you are signed up to receive emergency notifications. Be sure to bring important belongings such as prescriptions, documentation, or other life-dependent items.

Only help your local community members if it is safe to do so. It's also important to note that if a wildfire is in your area, you do NOT need to wait for government evacuation orders to evacuate. Please see Appendix G, Homeowner Resources, or the Story Map, for links to resources mentioned above.

Public awareness:

Safe and effective evacuation will only occur if residents are aware of planning efforts and notification methods. Therefore, public education and outreach on these topics should be part of all efforts conducted by agencies such as fire departments in a wide variety of venues.

Community Emergency Response Team

Developed by the Federal Emergency Management Agency (FEMA), the Community Emergency Response Team (CERT) training is a program that educates community members about disaster preparedness for hazards that may impact their area and trains them in basic disaster response skills, such as fire safety, light search and rescue, team organization, and disaster medical. Supplemental training modules are available to better assist professional responders in a variety of emergency situations. Advance training includes such topics as animal response, emergency communications, traffic and crowd management, and flood response. If Grand County is searching for additional avenues to increase preparedness of individuals within the community, it is recommended that officials consider implementing the CERT program.

For more information, visit FEMA's CERT webpage: <https://www.fema.gov/emergency-managers/individuals-communities/preparedness-activities-webinars/community-emergency-response-team>



Figure B.7. Example of a narrow road.



Figure B.8. Example of a narrow road system with an access gate.

Animals and Livestock

In the event of a wildfire, it is important that residents, fire responders, and the GCOEM have a plan for evacuation of pets and livestock. Evacuation planning often neglects to describe how animals will be evacuated and where they will be taken. The loading of horses, for example, during a fire and smoke situation, and transport of stock vehicles down narrow roads under stressful situations, can be very difficult. Some public education regarding livestock in the event of an evacuation is included in the Grand County Wildfire Council's Wildfire Prevention, Preparedness, and Survival Guide (GCWC 2022a), which is available here: https://bewildfireready.org/wp-content/uploads/2022/06/Wildfires_white_FINAL_web.pdf

The Colorado State University has additional resources for livestock and animals, you can view those resources here: <https://extension.colostate.edu/disaster-web-sites/fire-resources/fire-livestock-resources/> However, additional public education could emphasize the need for individuals to have a plan for the evacuation of pets and horses in addition to their family, ensuring a lack of planning doesn't slow or prevent evacuation.

WATER AVAILABILITY AND SUPPLY

Most wildland fire incident responses require the use of local water supplies, and potential source waterbodies are found throughout the Grand County. These include ~7,250 surface acre Lake Granby, ~1,600 surface acre Williams Fork Reservoir, ~1,500 surface acre Wolford Mountain Reservoir, ~1,300 surface acre Shadow Mountain Reservoir, ~500 surface acre Grand Lake, and ~300 surface acre Willow Creek Reservoir. The Colorado River and its tributaries, including Willow Creek, Muddy Creek, the Williams Fork River, the Blue River, and the Fraser River connect the County's many standing waterbodies in a network that runs throughout the region. A sophisticated system of pumping infrastructure that delivers water to the east side of the Continental Divide also exists in Grand County. This includes the Willow Creek Pump Canal, Granby Pump Canal, Moffat Water Tunnel, and Adams Tunnel (Figure B.9) (GCOEM 2020).

Due to the complex nature of the water rights associated with Grand County's extensive water resources, it is important that wildland fire incident commanders ensure that their water supply aligns with all local agreements, planning, regulation, and laws. Grand County also has multiple underground water storage tanks available, providing a consistent water supply to incorporated and unincorporated towns via fire hydrants.

PUBLIC EDUCATION AND OUTREACH PROGRAMS

Public education and outreach programs are a common factor in virtually every agency and organization involved with wildfire. A primary goal in Grand County Wildfire Council's prevention plan is "through collaboration, education and action, engage in wildfire prevention, preparedness, mitigation, and survival" (GWCG 2022b).

LOCAL AND STATE PROGRAMS

Grand County Office of Emergency Management

Grand County maintains a robust and responsive Office of Emergency Management. The office offers emergency notification support, mitigation and preparedness information, evacuation maps, up-to-date fire restrictions, and other effective services for residents to help prevent or recover from a disaster. The GCOEM website can be accessed here: <https://www.co.grand.co.us/156/Office-of-Emergency-Management>

Grand County Wildfire Council

The Grand County Wildfire Council is a non-profit outreach program focused on collaborative education and action on wildfire prevention, mitigation, and community preparedness. The organization supports various activities, programs, and events to improve community knowledge of fire prevention and defensible space, and to provide a reference of current restrictions, emergency notifications, and fire conditions. Some of the supported programs include: a Chipping Days program to ease the burden of clearing a fire safe perimeter around homes; an address sign program to phase in concise, uniform home and street signage to help emergency services; and a fuels reduction cost share program to incentivize defensible space and reduce the county fuel load (GCWC 2022b). The GCWC website also provides preparedness guides and checklists, Firewise resources, and findings from the recent East Troublesome Fire. The council website can be accessed here: bewildfireready.org

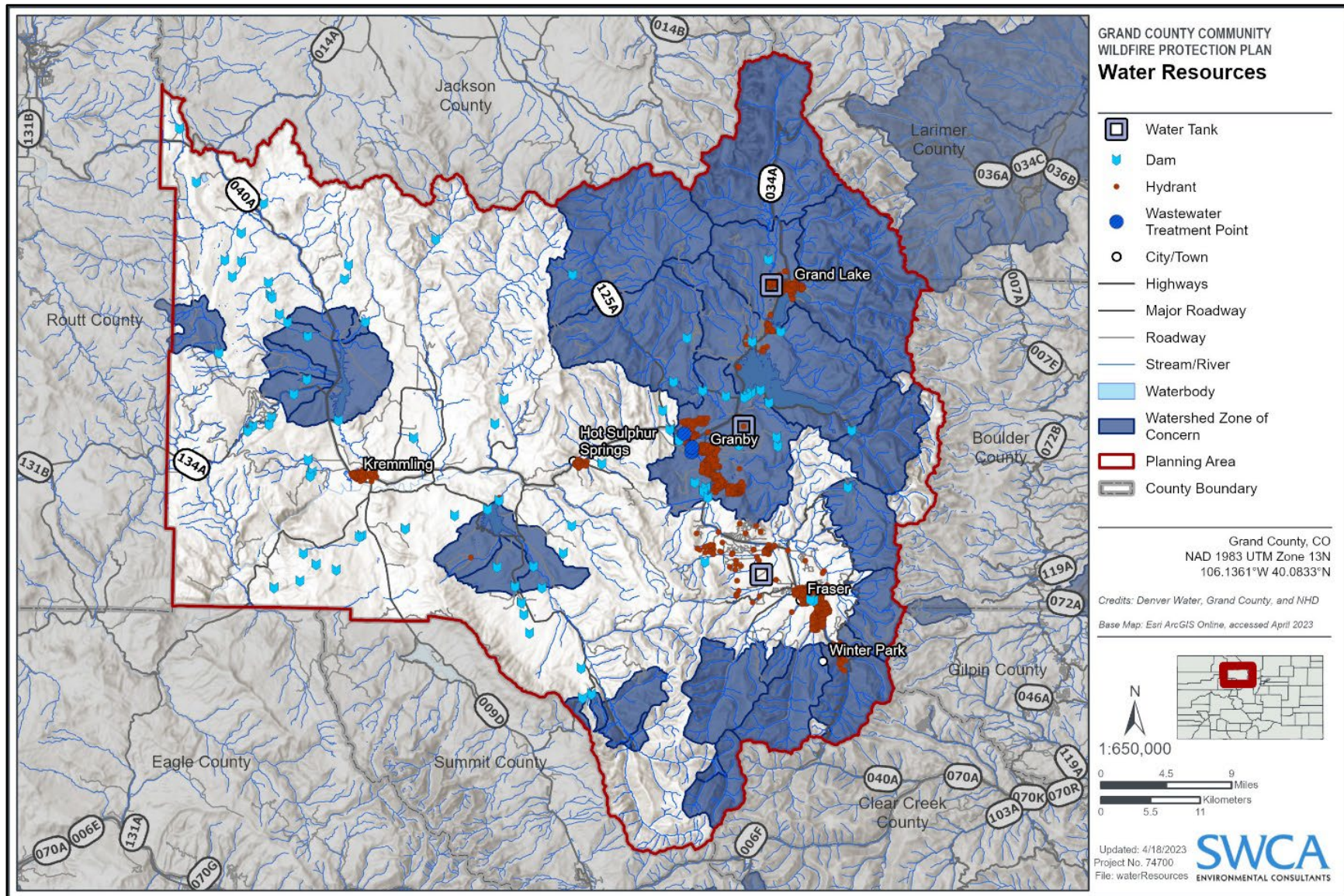


Figure B.9. Water resources within Grand County.

Grand County Fire Protection Districts

Most of Grand County's FPDs maintain websites that contain outreach pages designed to increase community wildfire awareness and preparedness. These pages provide residents with a wealth of knowledge on living with wildland fire risks and appropriate actions for mitigating dangers. Links point users towards information on active burn bans, emergency preparedness, evacuation procedures, maintaining home-ignition-zones, responsibly recreating in fire-prone forests, and accessing state and federal planning guidelines. The FPD website pages can be accessed here:

- East Grand FPD No. 4: <https://eastgrandfire.com/links/>
- Grand FPD No. 1: <https://grandfire.org/prevention-education>
- Grand Lake FPD No. 2: <https://www.grandlakefire.org/prevention-education>
- Kremmling FPD No. 5: <https://www.kremmlingfire.org/faqs>
- Hot Sulphur Springs/Parshall FPD No. 3: <http://www.hotsulphurfire.com/>

The FPDs also host community events designed to engage local fire protection officials with community members. These include bingo and game nights, open houses, and barbeques. The FPDs' Facebook pages provide regular updates on upcoming events in Grand County and can be accessed here:

- East Grand FPD No. 4: <https://www.facebook.com/EastGrandFire/>
- Grand FPD No. 1: <https://www.facebook.com/grandfire1/>
- Grand Lake FPD No. 2: <https://www.facebook.com/GrandLakeFire/>
- Kremmling FPD No. 5: <https://www.facebook.com/KremmlingFire/>
- Hot Sulphur Springs/Parshall FPD No. 3: <https://www.facebook.com/HSSFPD/>

Colorado Division of Homeland Security and Emergency Management

The Colorado Division of Homeland Security and Emergency Management offers numerous services, including those geared toward prevention, protection, mitigation, response, and recovery. In addition, the Division can provide pre- and post-disaster funding to local governments. Its emergency management website can be accessed here: <https://dhsem.colorado.gov/emergency-management-office>

Colorado Division of Fire Prevention and Control (DFPC)

The Colorado Division of Fire Prevention and Control (DFPC) offers various resources for topics such as building safety, fire prevention, community risk reduction, firework safety, vehicle safety, and the fire safety evaluation system (FSES) (DFPC 2022c). In addition, the DFPC has its own Wildland Fire Management Communications and Outreach Specialist. Contact information is available here: <https://dfpc.colorado.gov/home/public-information>.

In addition, the DFPC hosts building safety month, Fire Prevention Week, Community Risk Reduction Week, and more. You can find more information on the DFPC Campaigns and Public Education webpage located here: <https://dfpc.colorado.gov/FLScampaigns?web=1&wdLOR=c61B38F2B-6998-4994-BC02-E114F1CDA5E3>

NATIONAL PROGRAMS

Ready, Set, Go!

The Ready, Set, Go! Program, managed by the International Association of Fire Chiefs, was launched in 2011 at the WUI conference. The program seeks to develop and improve the dialogue between fire departments and residents, providing teaching for residents who live in high-risk wildfire areas—and the WUI—on how to best prepare themselves and their properties against fire threats. The County utilizes the Ready, Set, Go Program for their public outreach with a focus on making communities “fire adapted”.

The tenets of Ready, Set, Go! as included on the website (<http://www.wildlandfirersg.org>) are:

Ready – Take personal responsibility and prepare long before the threat of a wildland fire so your home is ready in case of a fire. Create defensible space by clearing brush away from your home. Use fire-resistant landscaping and harden your home with fire-safe construction measures. Assemble emergency supplies and belongings in a safe place. Plan escape routes and ensure all those residing within the home know the plan of action.

Set – Pack your emergency items. Stay aware of the latest news and information on the fire from local media, your local fire department, and public safety.

Go – Follow your personal wildland fire action plan. Doing so will not only support your safety but will allow firefighters to best maneuver resources to combat the fire.

National Fire Protection Association

The NFPA is a global non-profit organization devoted to eliminating death, injury, property, and economic loss due to fire, electrical, and related hazards. Its 300 codes and standards are designed to minimize the risk and effects of fire by establishing criteria for building, processing, design, service, and installation around the world.

The NFPA develops easy-to-use educational programs, tools, and resources for all ages and audiences, including Fire Prevention Week, an annual campaign that addresses a specific fire safety theme.

The NFPA's Firewise Communities program (www.firewise.org) encourages local solutions for wildfire safety by involving homeowners, community leaders, planners, developers, firefighters, and others in the effort to protect people and property from wildfire risks.

The NFPA is a premier resource for fire data analysis, research, and analysis. The Fire Analysis and Research division conducts investigations of fire incidents and produces a wide range of annual reports and special studies on all aspects of the nation's fire problem.

National Interagency Fire Center

The National Interagency Fire Center (NIFC) provides a wide array of fire resources and services.

The National Interagency Coordination Center offers communication assistance to over 32,000 firefighters and 50 major events at one given time (NIFC 2022). The Predictive Services Group creates wildfire forecasts and predictions from fuel and weather data. The NIFC has a Remote Automated Weather Base with over 2,000 weather stations which help inform the Predictive Services Group.

The National Wildfire Coordinating Group, which is nested under the NIFC, provides operational coordination to federal, state, local, tribal, and territorial partners (NWCG 2022). The NIFC also has a

training branch where training curriculums are developed to be used across the nation. For those too young to participate in the standard trainings, the NIFC offers FireWorks, an educational program designed for kids K-12. The program teaches children topics such as wildland fire science, ecosystem fluctuations, human interaction on the environment, and other environmental science topics. The NIFC also provides public education resources:

- Wildfire Readiness – Home (<https://disastersafety.org/wildfire/wildfire-ready/>)
- Wildfire Readiness – Business (<https://disastersafety.org/wildfire/wildfire-ready-business/>)
- Wildfire Readiness – Farm and Ranch (<https://disastersafety.org/wildfire/farm-and-ranch-wildfire-guidance/>)
- Weekend Wildfire Preparedness (<https://disastersafety.org/wildfire/weekend-wildfire-preparedness-projects/>)
- What to Do if a Wildfire is Approaching (<https://disastersafety.org/wildfire/what-to-do-if-a-wildfire-is-approaching/>)
- Wildfire Risk – Community (<https://wildfirerisk.org/reduce-risk/>)
- Prepare and Protect Your Home (<https://www.nifc.gov/fire-information/fire-prevention-education-mitigation/wildfire-mitigation/home>)
- Prepare Your Community (<https://www.nifc.gov/fire-information/fire-prevention-education-mitigation/wildfire-mitigation/community>)
- One Less Spark, One Less Wildfire (<https://www.readyforwildfire.org/prevent-wildfire/one-less-spark-campaign/>)
- Only You Can Prevent Wildfires (<https://smokeybear.com/>)

U.S. Fire Administration's WUI Toolkit

The U.S. Fire Administration (USFA) is an entity of the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) that aids in the preparation for and response to fire. Their WUI toolkit consists of a list of websites and other information regarding risk assessments, public outreach, and community training. Find the toolkit here: <https://www.usfa.fema.gov/wui/>.

Wildfire Research Center (WiRē)

Wildfire Research Center (WiRē) is a non-profit organization that works with local wildfire services to achieve community-tailored pathways which reduce risk to wildfire while simultaneously promoting pathways to fire adaptation. WiRē's mission states that fire adaptation is “about living with fire”, while “creating safe and resilient communities that reduce wildfire risk on their properties before a fire, and supporting effective response when fires threaten a community.” WiRē states that wildfire is an integral component of many ecosystems, and that fire must be allowed, when safe, as to ensure the health of forests. Core to WiRē's approach are four main concepts: residents are critical actors in the WUI wildfire problem, action is central to adaptation, people and their decisions are complex, and decisions are not made in a vacuum.

To achieve its goals and serve communities, WiRē will typically conduct a “rapid wildfire risk assessment,” which assesses what contributes to wildfire risk, such as, building materials, vegetation near homes, background fuels, local topography, and access to emergency fire services. Additionally, they also

conduct social surveys, assessing residents' perceptions about wildfire, wildfire risk, risk mitigation behavior, and their willingness to take action to reduce wildfire risk.

For more information, please visit <https://wildfireresearchcenter.org/>.



APPENDIX C:

Community Risk-Hazard Assessments for WUI Communities

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WUI BUFFERS

According to the HFRA, the WUI can be defined by a CWPP. In this CWPP, the WUI (see Figure 2.1 in Chapter 2) is defined as:

- an area extending 1 mile from the boundary of an at-risk community.
 - In the event a strategic fuel project enhances community protection, the WUI boundary may extend beyond the traditional 1-mile buffer to include said areas where the strategic project would be completed. For example, sustained slopes and ridgelines may continue beyond the 1-mile buffer. However, it is still important that project work is completed in those high-risk areas. Therefore, the entire strategic planning area would be considered as WUI, not just the sections within the 1-mile buffer.
 - In Figure 2.1, a 2.5-mile buffer is shown to depict risk related to floating embers, which are one of the leading causes of home ignition with regard to wildfire.

Figure C.1 illustrates the community polygons, which were delineated by the Core Team and visited in the field during the NFPA assessments.

ROUTE RISK ANALYSIS

Route risk analysis maps depicting the level of risk of the roads present within the community are shown with each community summary. Please see Appendix D, Fire Behavior Modeling/GIS Background and Methodology, for more information.

COMMUNITY ASSESSMENT SUMMARIES

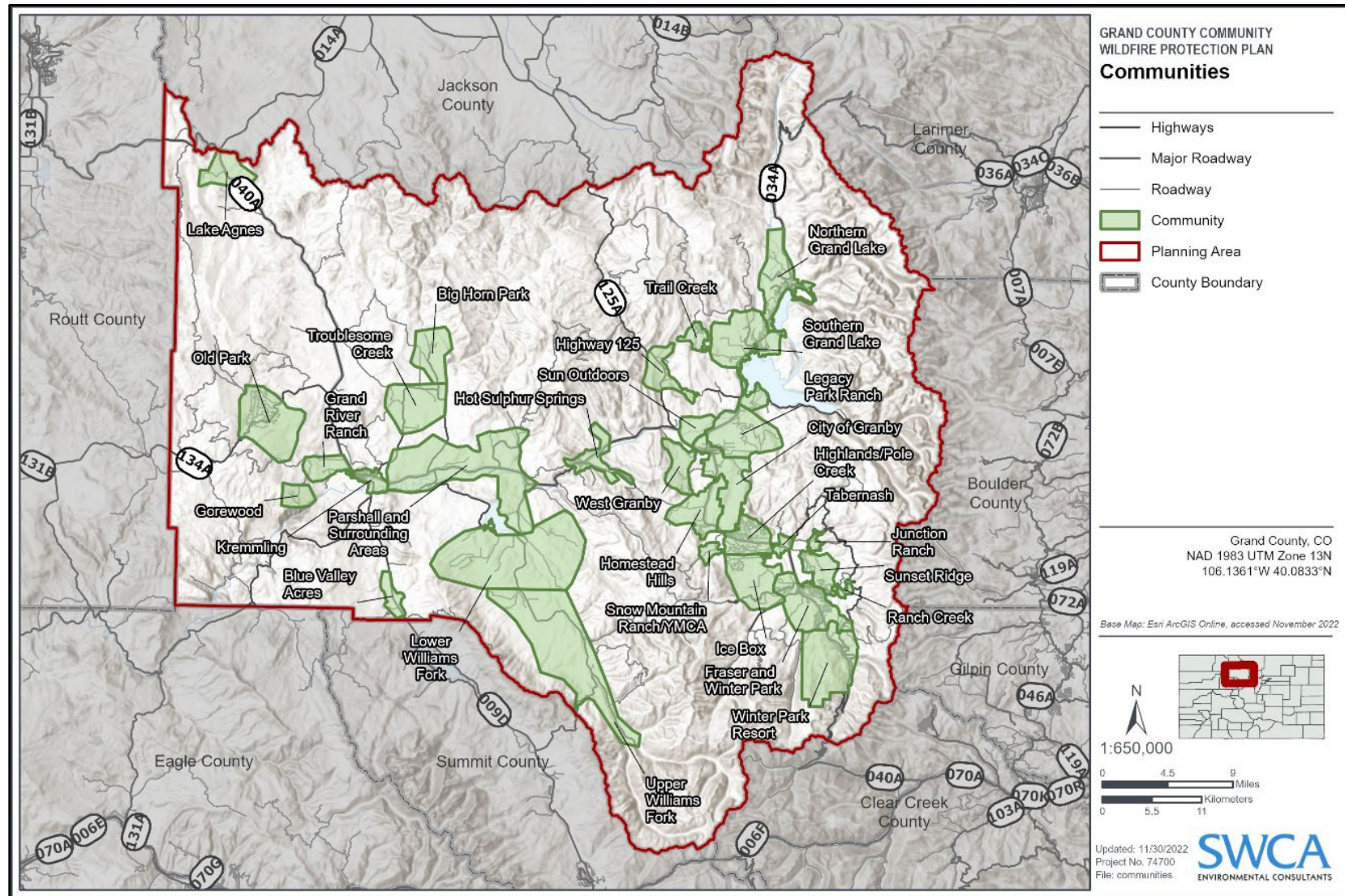


Figure C.1. Grand County WUI community polygon delineations.

SUNSET RIDGE WILDLAND URBAN INTERFACE COMMUNITY

SUNSET RIDGE POLYGON SUMMARY STATISTICS

| Community Polygon Background | | |
|--|--------------------------------|-------------------------------|
| <u>Community Polygon Name:</u> Sunset Ridge | <u>Total Score:</u> 121 | <u>Rating:</u> Extreme |
| Area (Square Miles): 4.8 | | |
| Building Count: 371 | | |
| Building Density (Building Units per square mile): 77.0 | | |

| Percent of Community by Risk Assessment | | | |
|---|----------------------------------|------------------------------|---------------------------------|
| <u>Low:</u> 7.0% | <u>Moderate:</u> 22.2% | <u>High:</u> 55.8% | <u>Extreme:</u> 15.0% |

| Dominant Fuel Type | | | | |
|---------------------|----------------------------------|---------------------|---------------------------------|-----------------------------|
| <u>Grass</u> | <u>Grass/Shrub</u> GS2 | <u>Shrub</u> | <u>Timber Understory</u> | <u>Timber Litter</u> |

| Percent of Community by Modeled/Calculated Wildfire Risk Inputs | |
|---|--|
| <u>Flame Length</u> | <u>Drive Time from Fire Station</u> |
| 0-4 (ft): 44.3% | 0-0.5 (min.): 5.2% |
| 4-8 (ft): 15.4% | 0.5-1.0 (min.): 35.1% |
| 8-12 (ft): 18.4% | 1.0-1.5 (min.): 59.7% |
| >12 (ft): 21.9% | >1.5 (min.): 0.0% |

| 1144 Survey Summary Highlights | |
|---|--|
| <u>Positive Attributes (Low Scores)</u> | <u>Negative Attributes (High Scores)</u> |
| <ul style="list-style-type: none"> • Active fuels reduction visible • Reflective street signs • Reflective house numbers • Metal roof or asphalt shingle throughout | <ul style="list-style-type: none"> • High fuel loads • Limited water sources for suppression • Combustible building materials • Houses built near slopes • One road in and out of some neighborhoods • Limited turnaround for fire trucks • Limited defensible space • >5 miles from a fire station |

| Recent Fires within the polygon |
|--|
| <ul style="list-style-type: none"> • None |

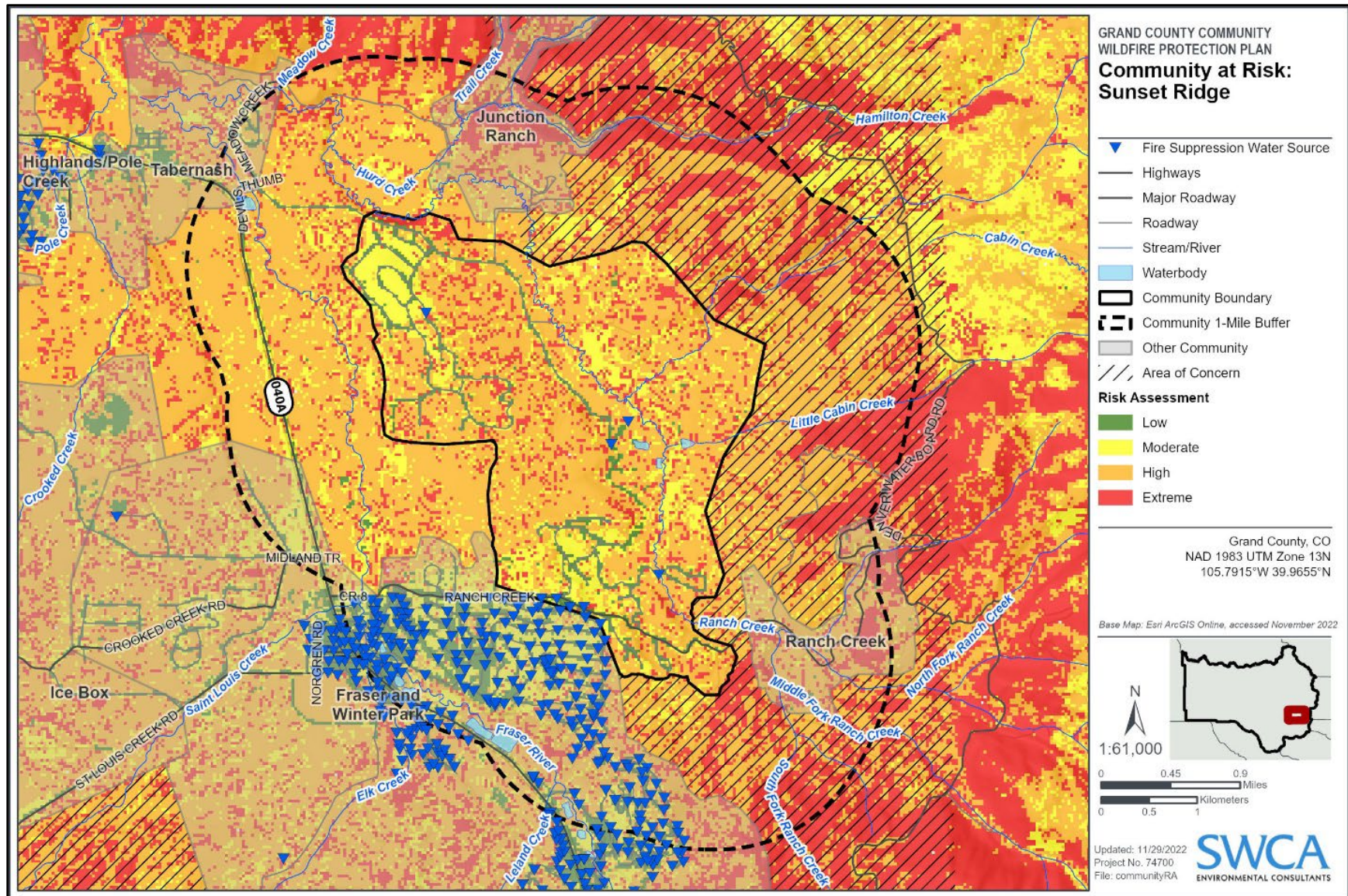


Figure C.2. Sunset Ridge Risk-Hazard Assessment.

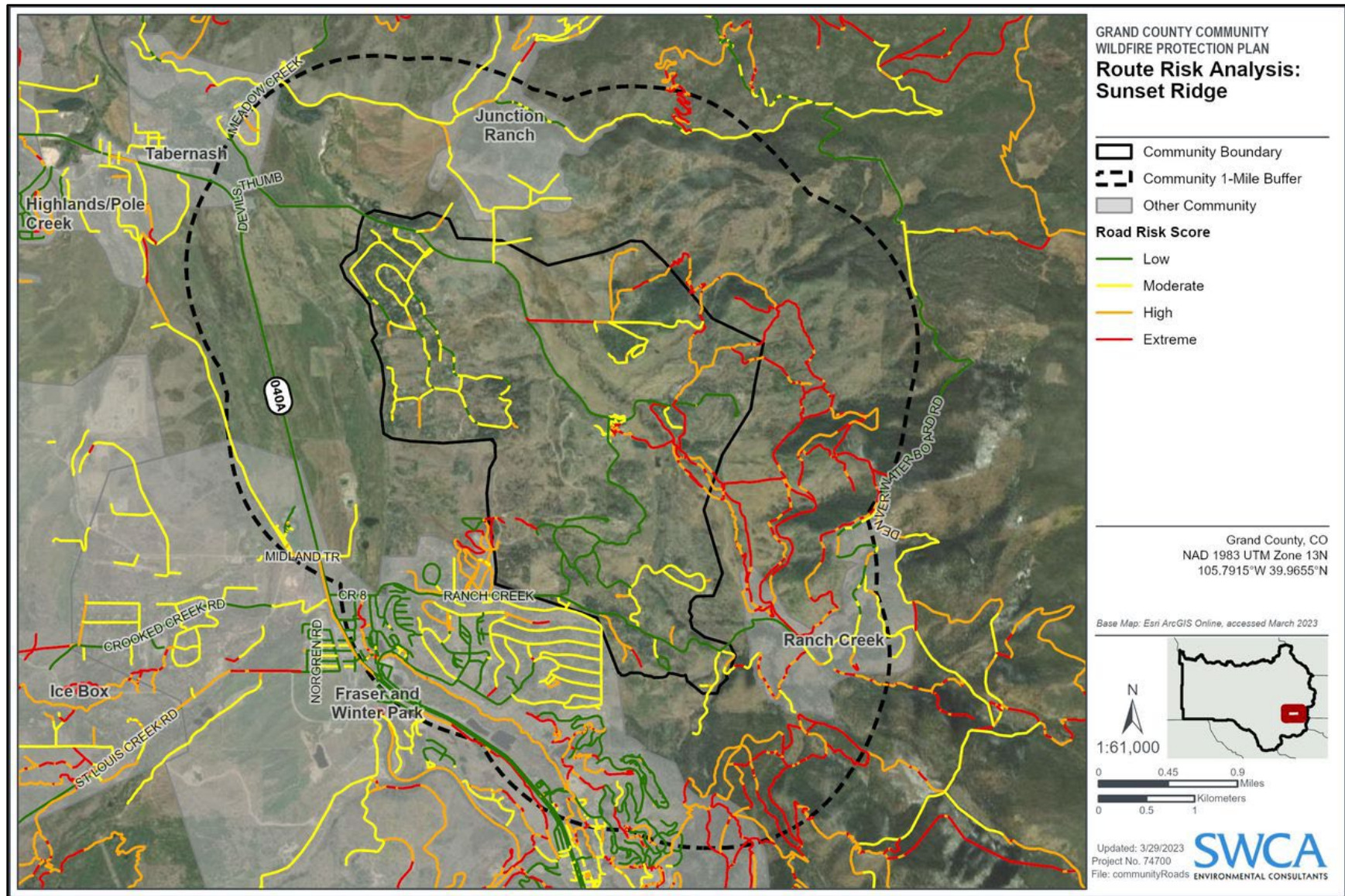


Figure C.3. Sunset Ridge Route Risk Analysis.

FRASER AND WINTER PARK WILDLAND URBAN INTERFACE COMMUNITY

FRASER AND WINTER PARK POLYGON SUMMARY STATISTICS

| Community Polygon Background | | |
|--|------------------------|---------------------|
| Community Polygon Name: Fraser and Winter Park | Total Score: 97 | Rating: High |
| Area (Square Miles): 12.16 | | |
| Building Count: 2506 | | |
| Building Density (Building Units per square mile): 206.17 | | |

| Percent of Community by Risk Assessment | | | |
|---|------------------|--------------|-----------------|
| <u>Low:</u> | <u>Moderate:</u> | <u>High:</u> | <u>Extreme:</u> |
| 14% | 17.1% | 50.4% | 18.4% |

| Dominant Fuel Type | | | | |
|--------------------|--------------------|--------------|--------------------------|----------------------|
| <u>Grass</u> | <u>Grass/Shrub</u> | <u>Shrub</u> | <u>Timber Understory</u> | <u>Timber Litter</u> |
| | GS2 | | | |

| Percent of Community by Modeled/Calculated Wildfire Risk Inputs | |
|---|-------------------------------------|
| <u>Flame Length</u> | <u>Drive Time from Fire Station</u> |
| 0-4 (ft): 51.2% | 0-0.5 (min.): 26.2% |
| 4-8 (ft): 16.6% | 0.5-1.0 (min.): 28.3% |
| 8-12 (ft): 11.8% | 1.0-1.5 (min.): 11.5% |
| >12 (ft): 20.4% | >1.5 (min.): 34% |

| 1144 Survey Summary Highlights | |
|--|--|
| <u>Positive Attributes (Low Scores)</u> | <u>Negative Attributes (High Scores)</u> |
| <ul style="list-style-type: none"> • Fire hydrants throughout • Many structures >30 ft from slopes • 2+ roads in and out • Metal and asphalt shingle roofs throughout | <ul style="list-style-type: none"> • Some narrow access to homes with no turnarounds • Combustible building materials • Limited defensible space • High fuel loads |

| Recent Fires within the polygon |
|--|
| <ul style="list-style-type: none"> • None |



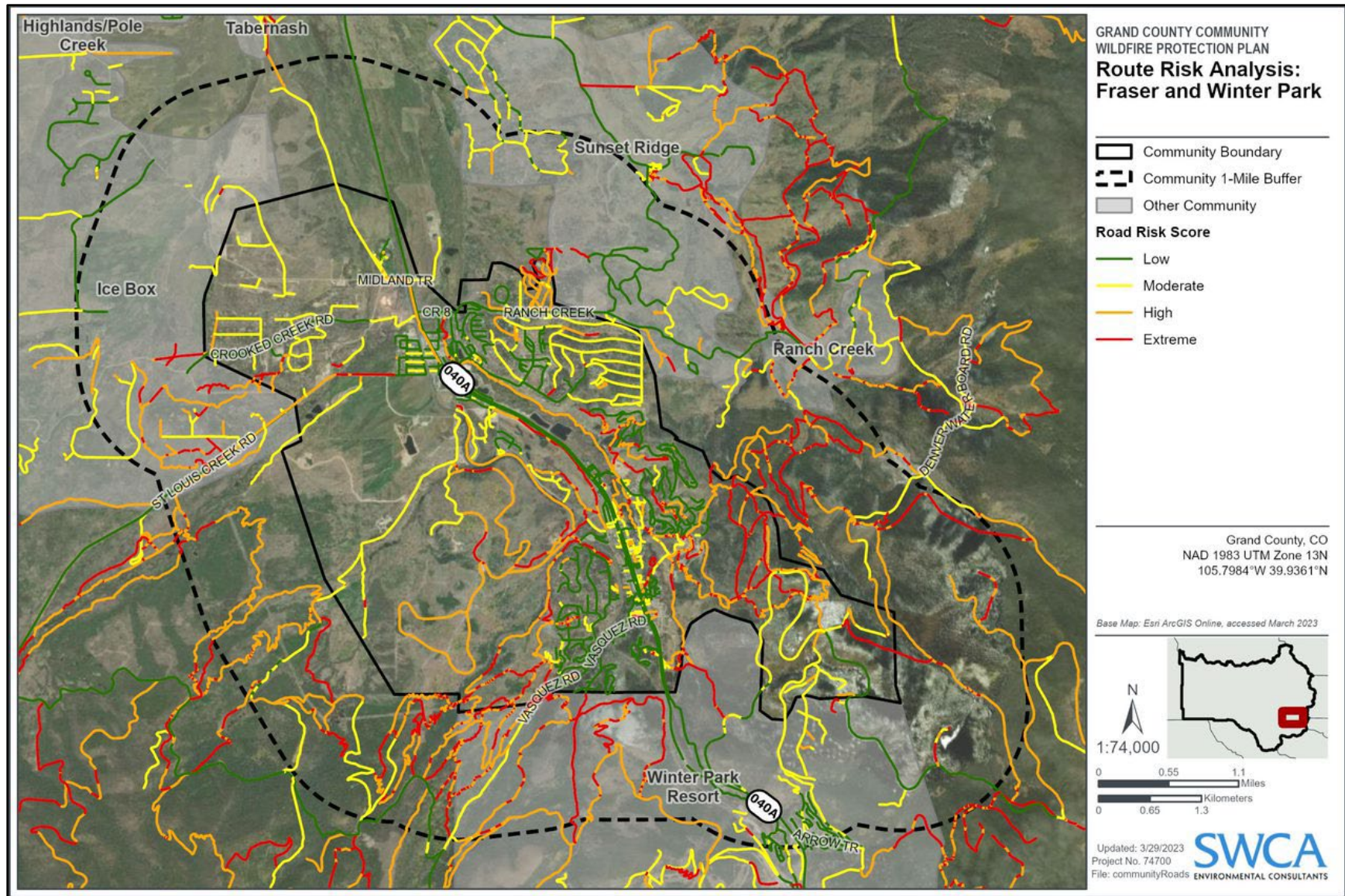


Figure C.5. Fraser and Winter Park Route Risk Analysis.

RANCH CREEK WILDLAND URBAN INTERFACE COMMUNITY

RANCH CREEK POLYGON SUMMARY STATISTIC

| Community Polygon Background | | |
|--|--------------------------------|-------------------------------|
| <u>Community Polygon Name:</u> Ranch Creek | <u>Total Score:</u> 120 | <u>Rating:</u> Extreme |
| Area (Square Miles): 0.78 | | |
| Building Count: 38 | | |
| Building Density (Building Units per square mile): 48.5 | | |

| Percent of Community by Risk Assessment | | | |
|---|-------------------------------|------------------------------|---------------------------------|
| <u>Low:</u> 0.67% | <u>Moderate:</u> 5% | <u>High:</u> 61.6% | <u>Extreme:</u> 32.8% |

| Dominant Fuel Type | | | | |
|---------------------|---------------------------|---------------------|---------------------------------|------------------------------------|
| <u>Grass</u> | <u>Grass/Shrub</u> | <u>Shrub</u> | <u>Timber Understory</u> | <u>Timber Litter</u> TL5 |

| Percent of Community by Modeled/Calculated Wildfire Risk Inputs | |
|---|--|
| <u>Flame Length</u> | <u>Drive Time from Fire Station</u> |
| 0-4 (ft): 46% | 0-0.5 (min.): N/A |
| 4-8 (ft): 12% | 0.5-1.0 (min.): 37.25% |
| 8-12 (ft): 7.6% | 1.0-1.5 (min.): 62.8% |
| >12 (ft): 34.4% | >1.5 (min.): 0.0% |

| 1144 Survey Summary Highlights | |
|---|---|
| <u>Positive Attributes (Low Scores)</u> | <u>Negative Attributes (High Scores)</u> |
| <ul style="list-style-type: none"> • 2 or more roads in and out • Structures spaced further apart | <ul style="list-style-type: none"> • House numbering inconsistent and non-reflective • Steep, narrow roads in places • High fuel loads • Houses built near slopes • Limited water sources for suppression • Limited defensible space • Limited turnarounds for fire trucks |

| Recent Fires within the polygon |
|--|
| <ul style="list-style-type: none"> • None |

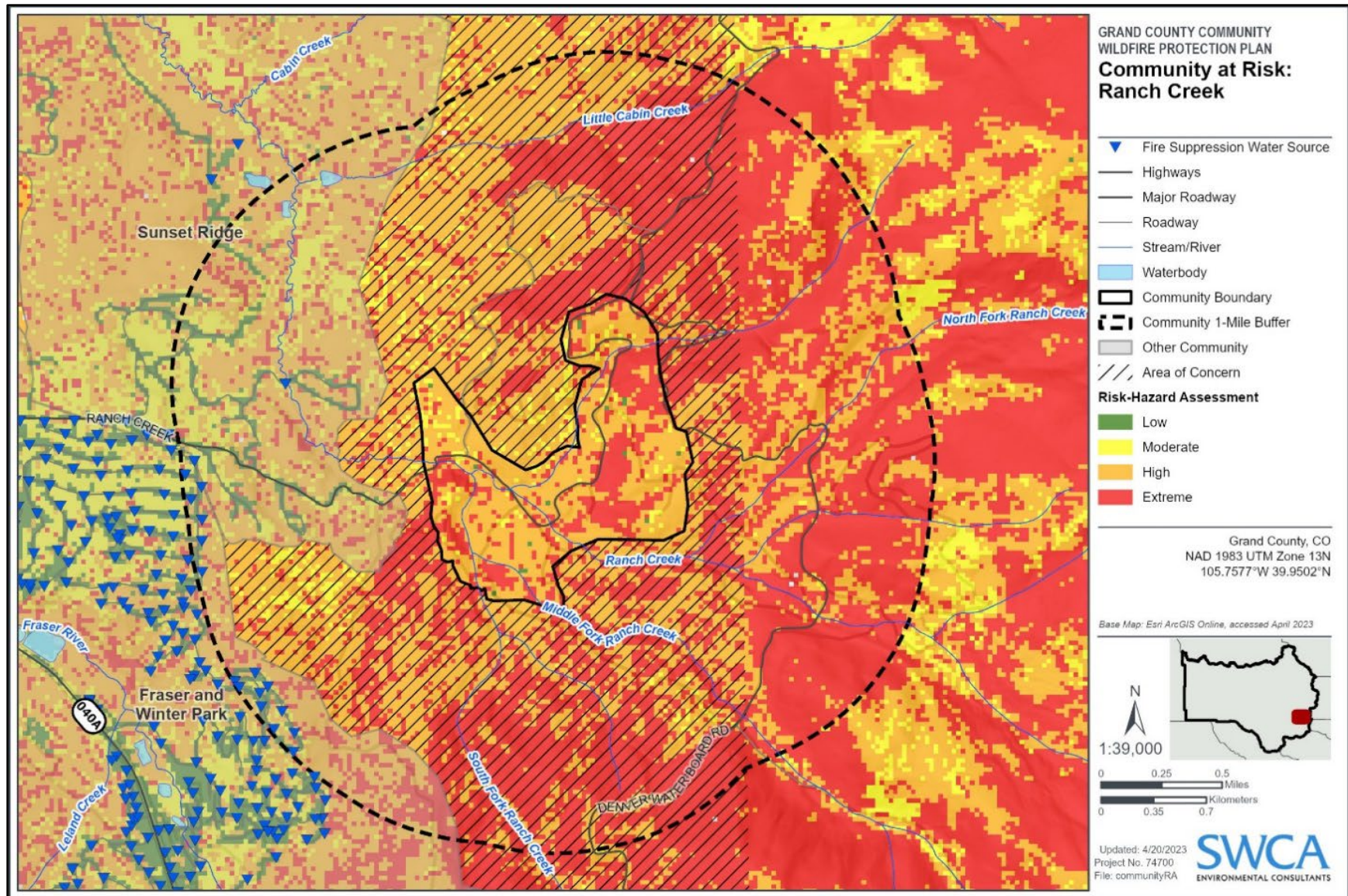


Figure C.6. Ranch Creek Risk-Hazard Assessment.

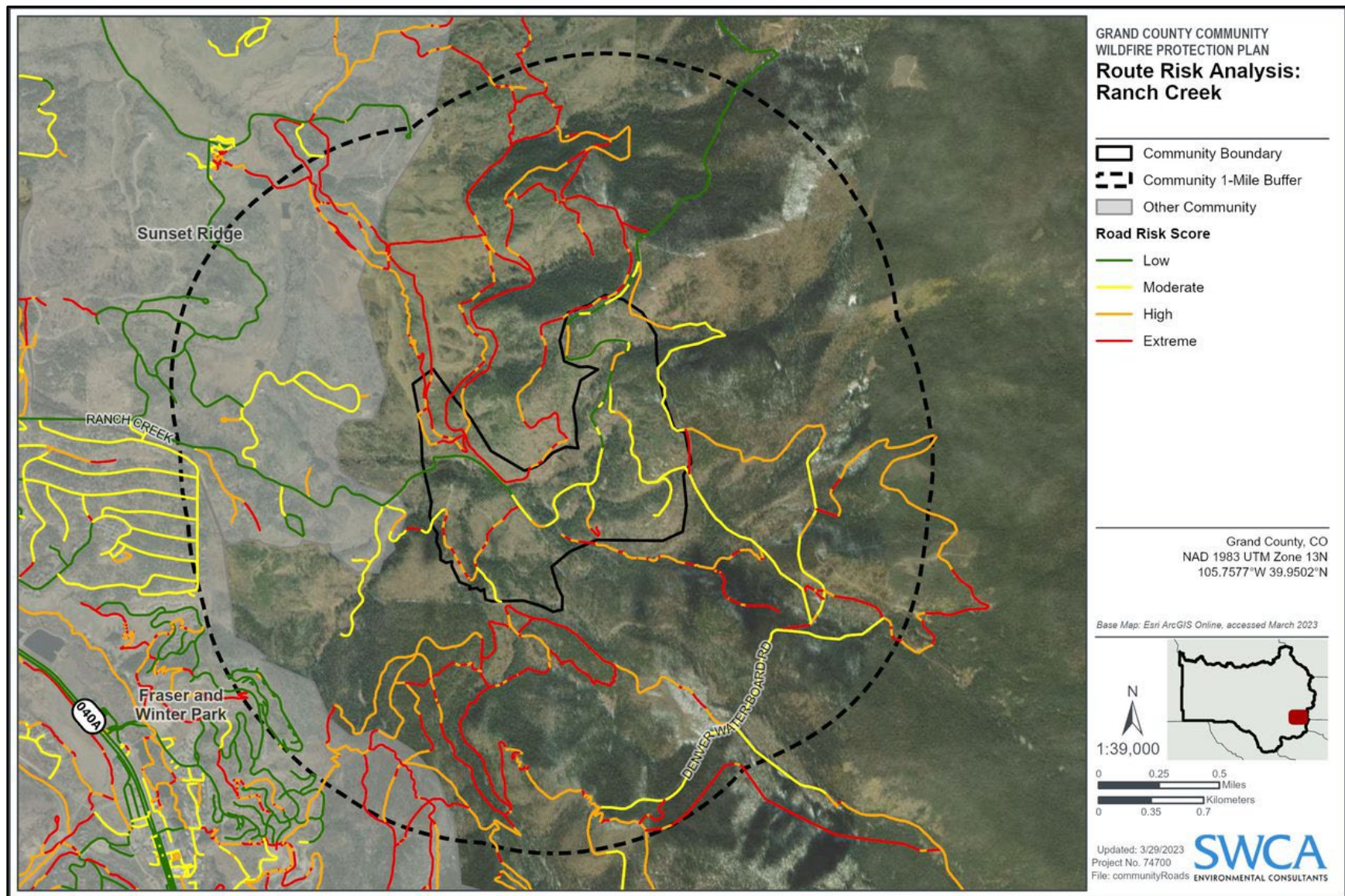


Figure C.7. Ranch Creek Route Risk Analysis.

WINTER PARK RESORT WILDLAND URBAN INTERFACE COMMUNITY

WINTER PARK RESORT POLYGON SUMMARY STATISTICS

| Community Polygon Background | | |
|---------------------------------------|--|--------------------------------|
| <u>Community Polygon Name:</u> | Winter Park Resort | <u>Total Score:</u> 106 |
| | | <u>Rating:</u> High |
| | Area (Square Miles): 16.98 | |
| | Building Count: 265 | |
| | Building Density (Building Units per square mile): 15.6 | |

| Percent of Community by Risk Assessment | | | |
|---|-------------------------|---------------------|------------------------|
| <u>Low:</u> | <u>Moderate:</u> | <u>High:</u> | <u>Extreme:</u> |
| 4.9% | 24.7% | 31.4% | 15% |

| Dominant Fuel Type | | | | |
|---------------------|---------------------------|---------------------|---------------------------------|-----------------------------|
| <u>Grass</u> | <u>Grass/Shrub</u> | <u>Shrub</u> | <u>Timber Understory</u> | <u>Timber Litter</u> |
| | | | TU5 | |

| Percent of Community by Modeled/Calculated Wildfire Risk Inputs | |
|---|--|
| <u>Flame Length</u> | <u>Drive Time from Fire Station</u> |
| 0-4 (ft): 54.8% | 0-0.5 (min.): 1.4% |
| 4-8 (ft): 5% | 0.5-1.0 (min.): 8% |
| 8-12 (ft): 2.3% | 1.0-1.5 (min.): 8% |
| >12 (ft): 38% | >1.5 (min.): 82.6% |

| 1144 Survey Summary Highlights | |
|---|--|
| <u>Positive Attributes (Low Scores)</u> | <u>Negative Attributes (High Scores)</u> |
| <ul style="list-style-type: none"> • Reflective street signs • Visible fire hydrants • Metal roof or asphalt shingle throughout • 2+ roads in and out | <ul style="list-style-type: none"> • Homes built on slopes • High fuel loads • Limited defensible space • Limited turnarounds for fire trucks • Combustible building materials • >5 miles from a fire station |

| Recent Fires within the polygon |
|--|
| <ul style="list-style-type: none"> • None |

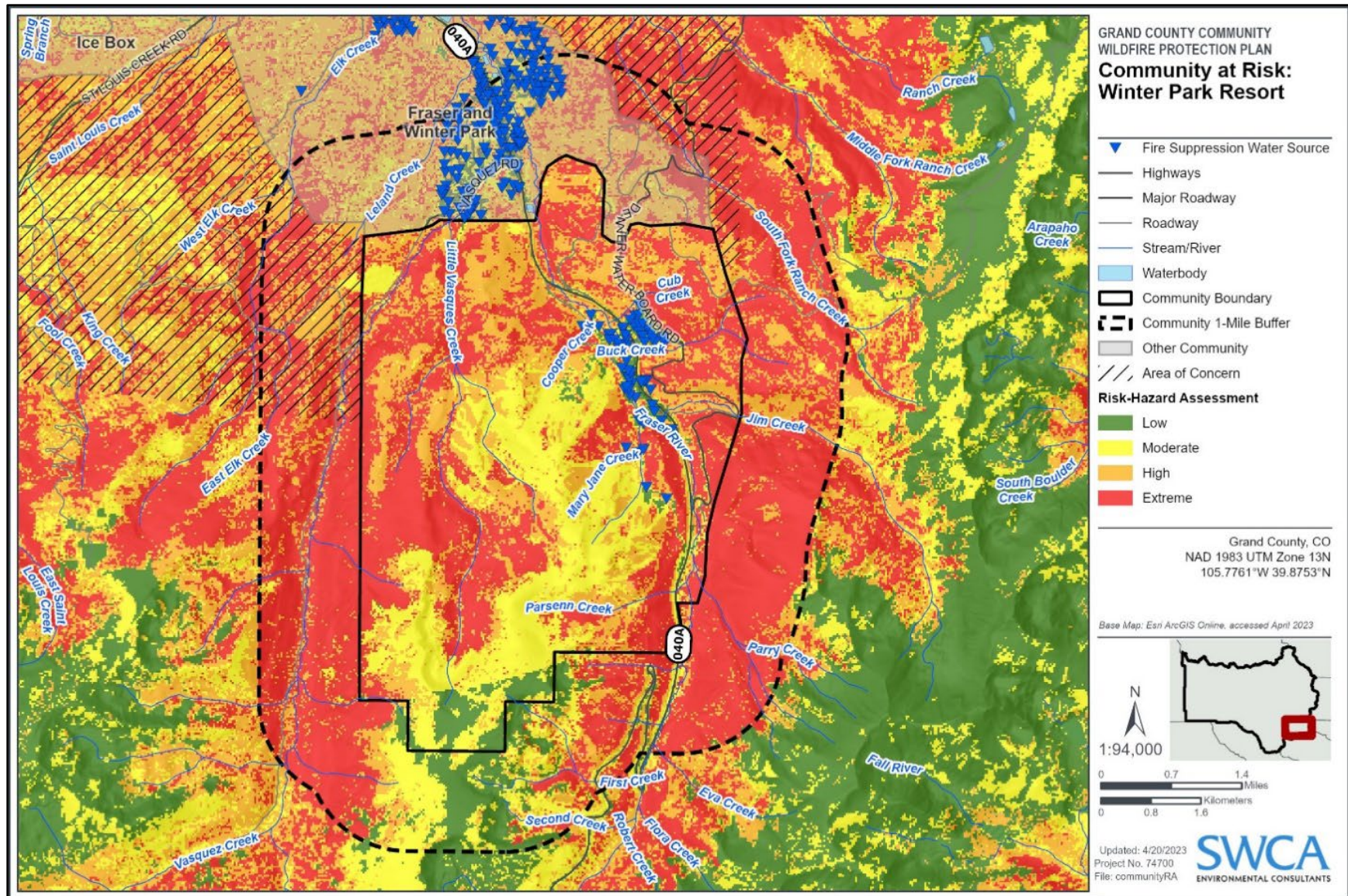


Figure C.8. Winter Park Resort Risk-Hazard Assessment.

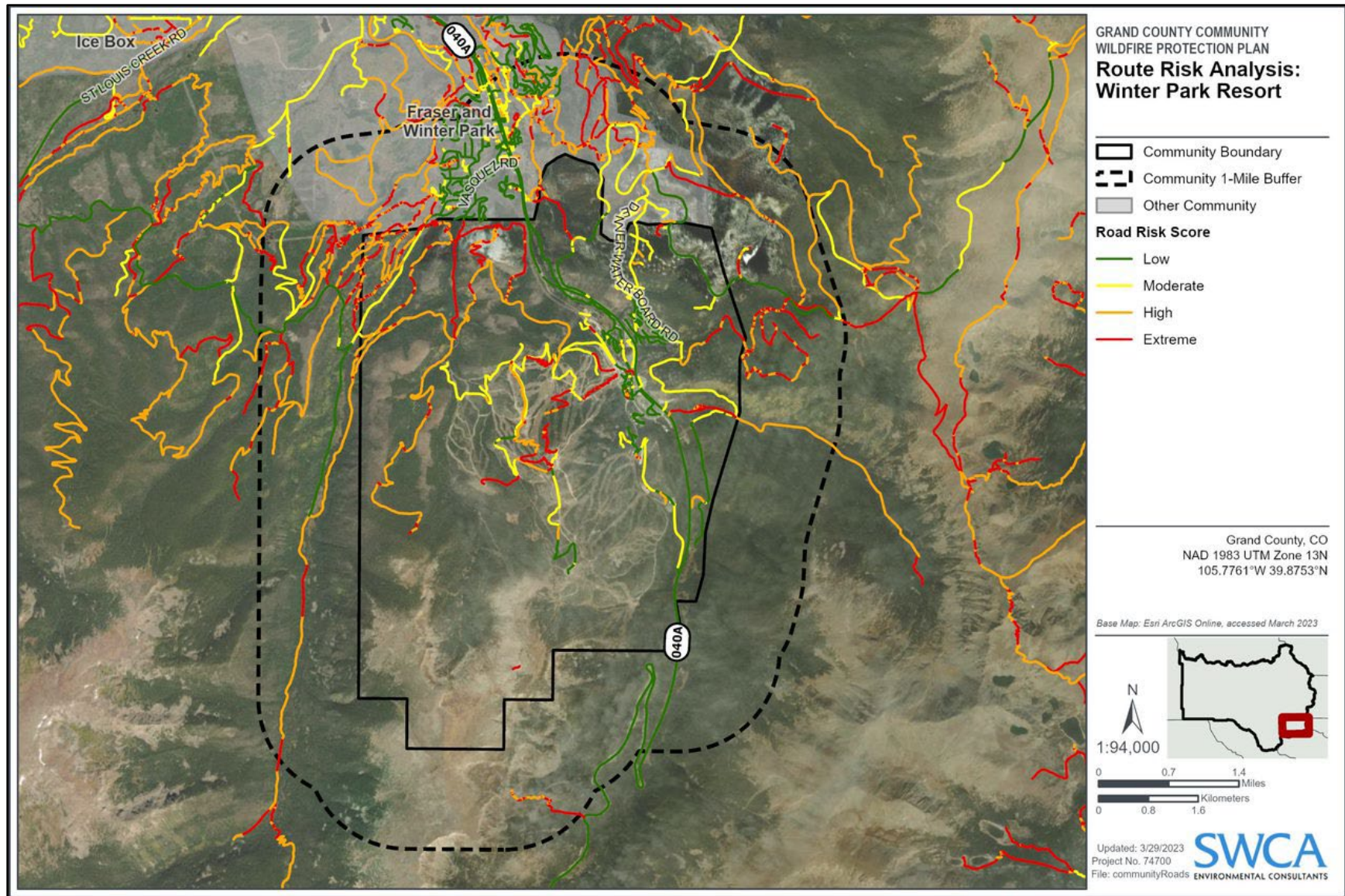


Figure C.9. Winter Park Resort Route Risk Analysis.

WEST GRANBY WILDLAND URBAN INTERFACE COMMUNITY

WEST GRANBY POLYGON SUMMARY STATISTICS

| Community Polygon Background | | | | |
|--|--|--------------------------------|--|----------------------------|
| <u>Community Polygon Name:</u> West Granby | | <u>Total Score:</u> 105 | | <u>Rating:</u> High |
| Area (Square Miles): 5.2 | | | | |
| Building Count: 118 | | | | |
| Building Density (Building Units per square mile): 22.7 | | | | |

| Percent of Community by Risk Assessment | | | |
|---|-------------------------|---------------------|------------------------|
| <u>Low:</u> | <u>Moderate:</u> | <u>High:</u> | <u>Extreme:</u> |
| N/A | 6.1% | 70.5% | 23.4% |

| Dominant Fuel Type | | | | |
|---------------------|---------------------------|---------------------|---------------------------------|-----------------------------|
| <u>Grass</u> | <u>Grass/Shrub</u> | <u>Shrub</u> | <u>Timber Understory</u> | <u>Timber Litter</u> |
| | GS2 | | | TL5 |

| Percent of Community by Modeled/Calculated Wildfire Risk Inputs | |
|---|--|
| <u>Flame Length</u> | <u>Drive Time from Fire Station</u> |
| 0-4 (ft): 36.5% | 0-0.5 (min.): 0.9% |
| 4-8 (ft): 14.8% | 0.5-1.0 (min.): 17% |
| 8-12 (ft): 27.2% | 1.0-1.5 (min.): 4.8% |
| >12 (ft): 21.7% | >1.5 (min.): 77.4% |

| 1144 Survey Summary Highlights | |
|--|---|
| <u>Positive Attributes (Low Scores)</u> | <u>Negative Attributes (High Scores)</u> |
| <ul style="list-style-type: none">• Reflective road signs• Metal roof or asphalt shingle throughout• Some defensible space around structures | <ul style="list-style-type: none">• Limited roads in and out• Limited turnarounds for fire trucks• Combustible building materials• Limited visible water sources for suppression• Fire station >5 mi from portions of community• Gas and electric utilities both above ground• Many houses <30 ft to slope• Prone to lightning strikes |

| Recent Fires within the polygon |
|--|
| <ul style="list-style-type: none">• 8 mile/ 55 fire (2016) |

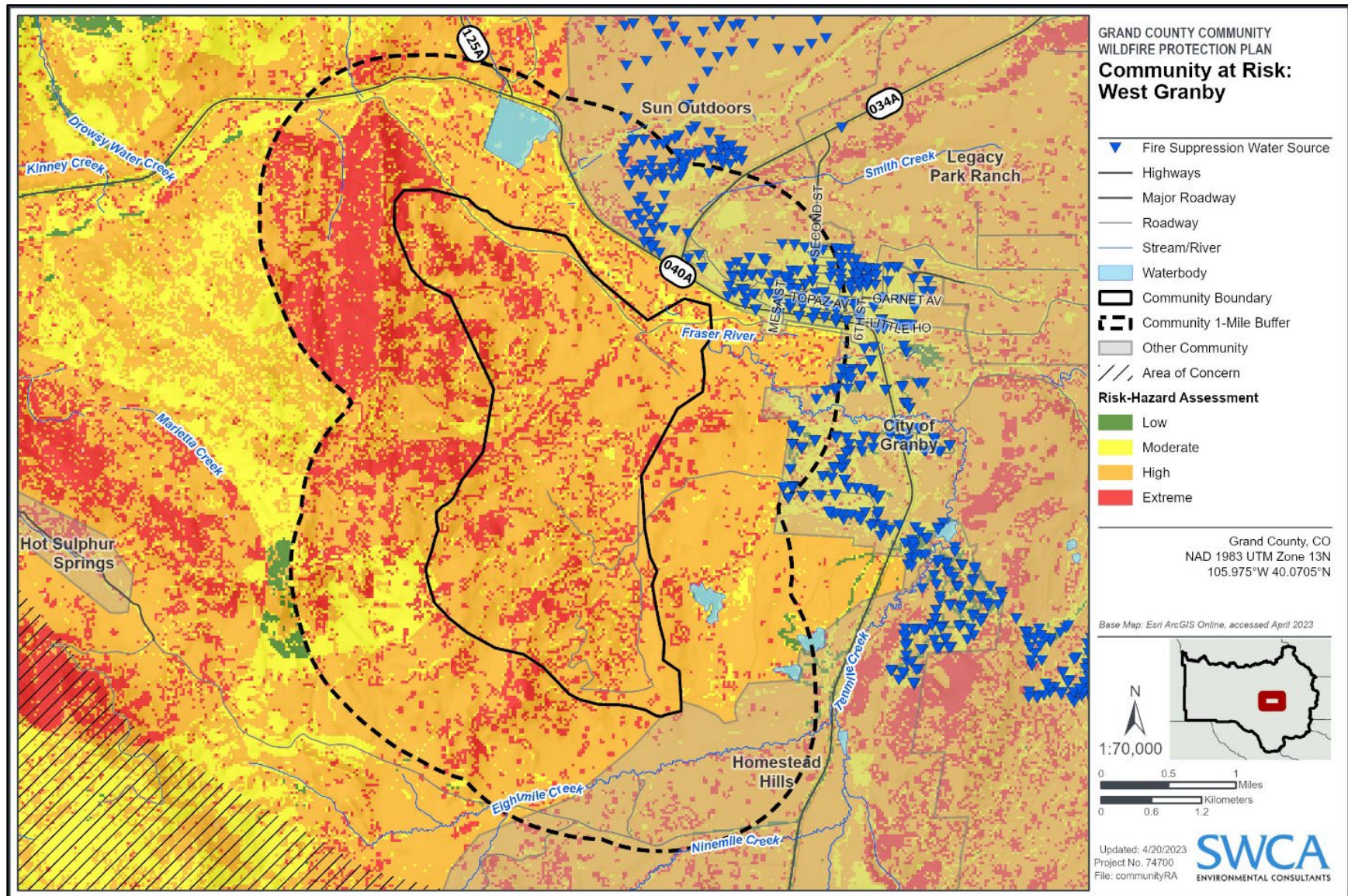


Figure C.10. West Granby Risk-Hazard Assessment.

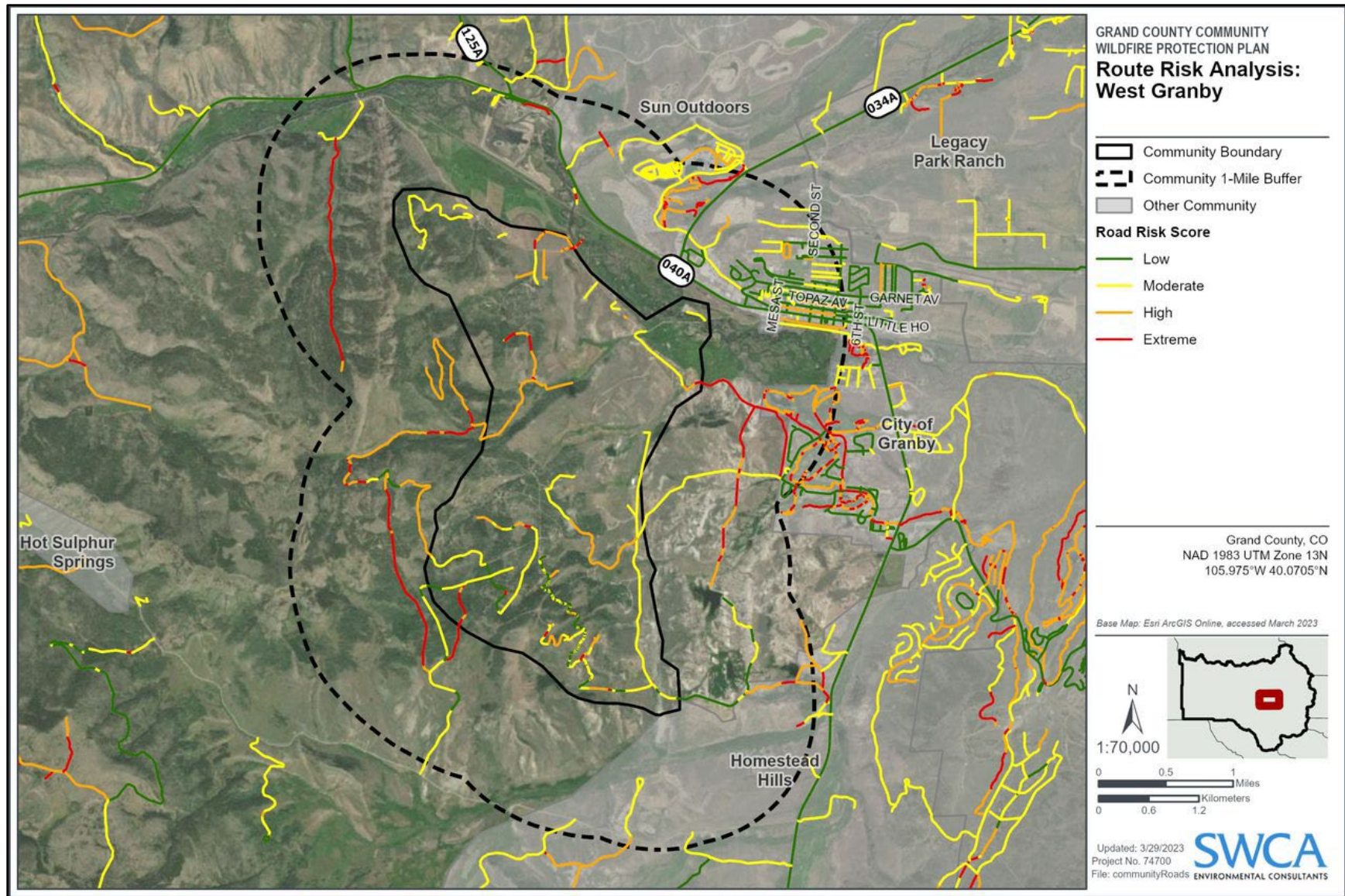


Figure C.11. West Granby Route Risk Analysis.

HOMESTEAD HILLS WILDLAND URBAN INTERFACE COMMUNITY

HOMESTEAD HILLS POLYGON SUMMARY STATISTICS

| Community Polygon Background | | |
|--|--------------------------------|----------------------------|
| <u>Community Polygon Name:</u> Homestead Hills | <u>Total Score:</u> 110 | <u>Rating:</u> High |
| Area (Square Miles): 8.6 | | |
| Building Count: 419 | | |
| Building Density (Building Units per square mile): 48.8 | | |

| Percent of Community by Risk Assessment | | | |
|---|----------------------------------|------------------------------|---------------------------------|
| <u>Low:</u> 3.9% | <u>Moderate:</u> 12.2% | <u>High:</u> 64.3% | <u>Extreme:</u> 19.7% |

| Dominant Fuel Type | | | | |
|---------------------|----------------------------------|---------------------|---------------------------------|------------------------------------|
| <u>Grass</u> | <u>Grass/Shrub</u> GS2 | <u>Shrub</u> | <u>Timber Understory</u> | <u>Timber Litter</u> TU5 |

| Percent of Community by Modeled/Calculated Wildfire Risk Inputs | |
|---|--|
| <u>Flame Length</u> | <u>Drive Time from Fire Station</u> |
| 0-4 (ft): 29.6% | 0-0.5 (min.): 16.8% |
| 4-8 (ft): 25.4% | 0.5-1.0 (min.): 38% |
| 8-12 (ft): 25.7% | 1.0-1.5 (min.): 2.9% |
| >12 (ft): 19.3% | >1.5 (min.): 42.3% |

| 1144 Survey Summary Highlights | |
|---|--|
| <u>Positive Attributes (Low Scores)</u> | <u>Negative Attributes (High Scores)</u> |
| <ul style="list-style-type: none"> • Reflective street signs • Metal roof or asphalt shingle throughout • Fire hydrants • <5 miles from fire station | <ul style="list-style-type: none"> • Challenging ingress/egress • Limited fire truck turnarounds • Homes built near slopes • Combustible siding • Limited defensible space • Prone to lighting strikes |

| Recent Fires within the polygon |
|---|
| <ul style="list-style-type: none"> • Orr Fire (2014) |

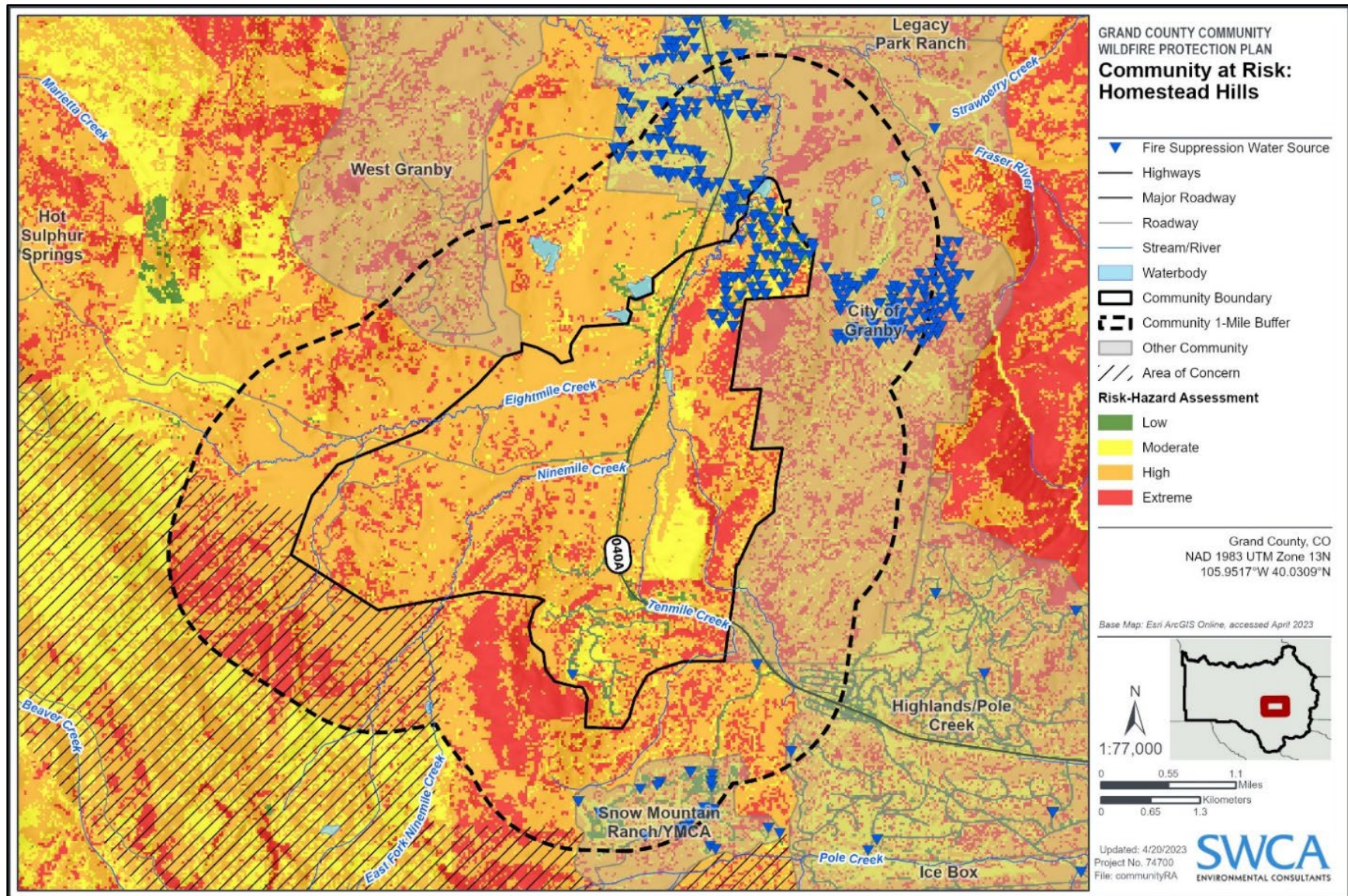


Figure C.12. Homestead Hills Risk-Hazard Assessment.

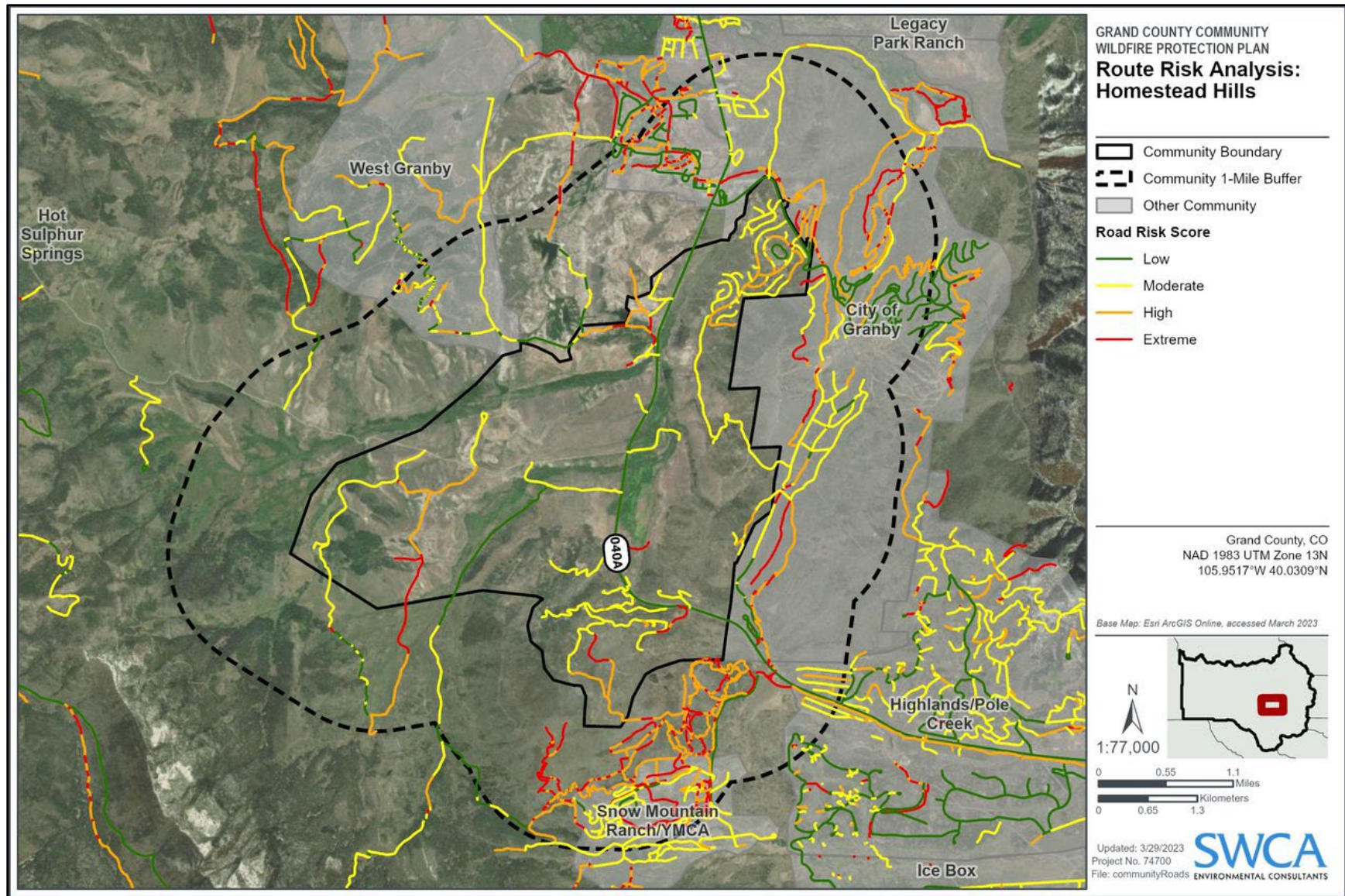


Figure C.13. Homestead Hills Route Risk Analysis.

SNOW MOUNTAIN RANCH/YMCA WILDLAND URBAN INTERFACE COMMUNITY

SNOW MOUNTAIN RANCH/YMCA POLYGON SUMMARY STATISTICS

| Community Polygon Background | | |
|---|------------------------|---------------------|
| Community Polygon Name: Snow Mountain Ranch/YMCA | Total Score: 79 | Rating: High |
| Area (Square Miles): 1.4 | | |
| Building Count: 157 | | |
| Building Density (Building Units per square mile): 112.8 | | |

| Percent of Community by Risk Assessment | | | |
|---|---------------------------|-----------------------|--------------------------|
| <u>Low:</u> 12.8% | <u>Moderate:</u> 17.3% | <u>High:</u> 54.7% | <u>Extreme:</u> 15.2% |

| Dominant Fuel Type | | | | |
|--------------------|--------------------|--------------|--------------------------|----------------------|
| <u>Grass</u> | <u>Grass/Shrub</u> | <u>Shrub</u> | <u>Timber Understory</u> | <u>Timber Litter</u> |
| | | | TU1 | |

| Percent of Community by Modeled/Calculated Wildfire Risk Inputs | |
|---|-------------------------------------|
| <u>Flame Length</u> | <u>Drive Time from Fire Station</u> |
| 0-4 (ft): 51.2% | 0-0.5 (min.): 51.2% |
| 4-8 (ft): 15.7% | 0.5-1.0 (min.): 5.6% |
| 8-12 (ft): 13.8% | 1.0-1.5 (min.): 0.5% |
| >12 (ft): 18.9% | >1.5 (min.): 42.8% |

| 1144 Survey Summary Highlights | |
|--|--|
| <u>Positive Attributes (Low Scores)</u> | <u>Negative Attributes (High Scores)</u> |
| <ul style="list-style-type: none"> • Visible fuels mitigation work • Ingress/egress • Fire station <5 mi from location • Fire hydrants throughout • Metal roof or asphalt shingle throughout • Underground gas and electric utilities | <ul style="list-style-type: none"> • Limited turnarounds for fire trucks • Combustible building materials • Non-reflective street signs |

| Recent Fires within the polygon |
|--|
| <ul style="list-style-type: none"> • YMCA Fire (2007) |

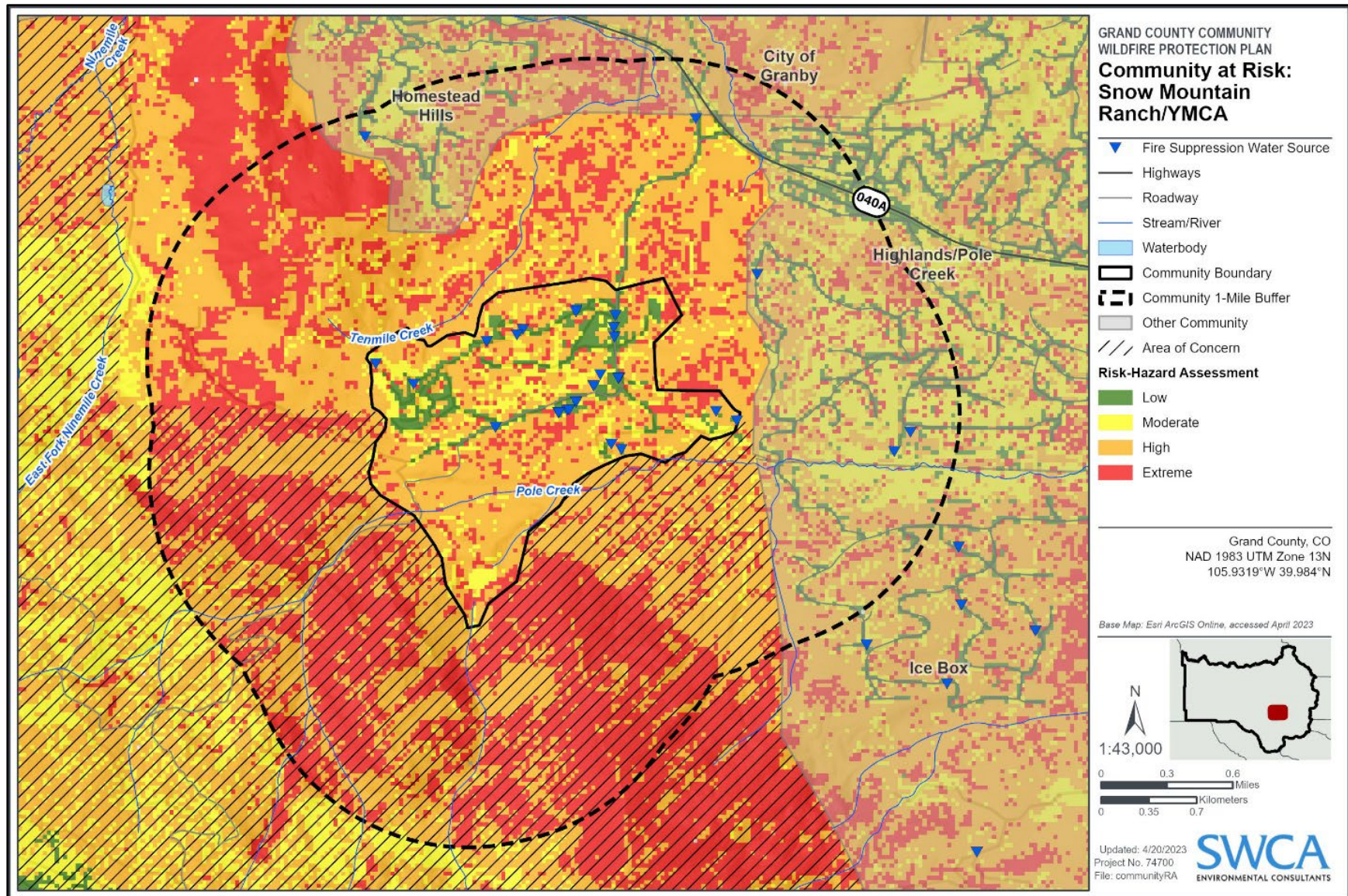


Figure C.14. Snow Mountain Ranch/YMCA Risk-Hazard Assessment.

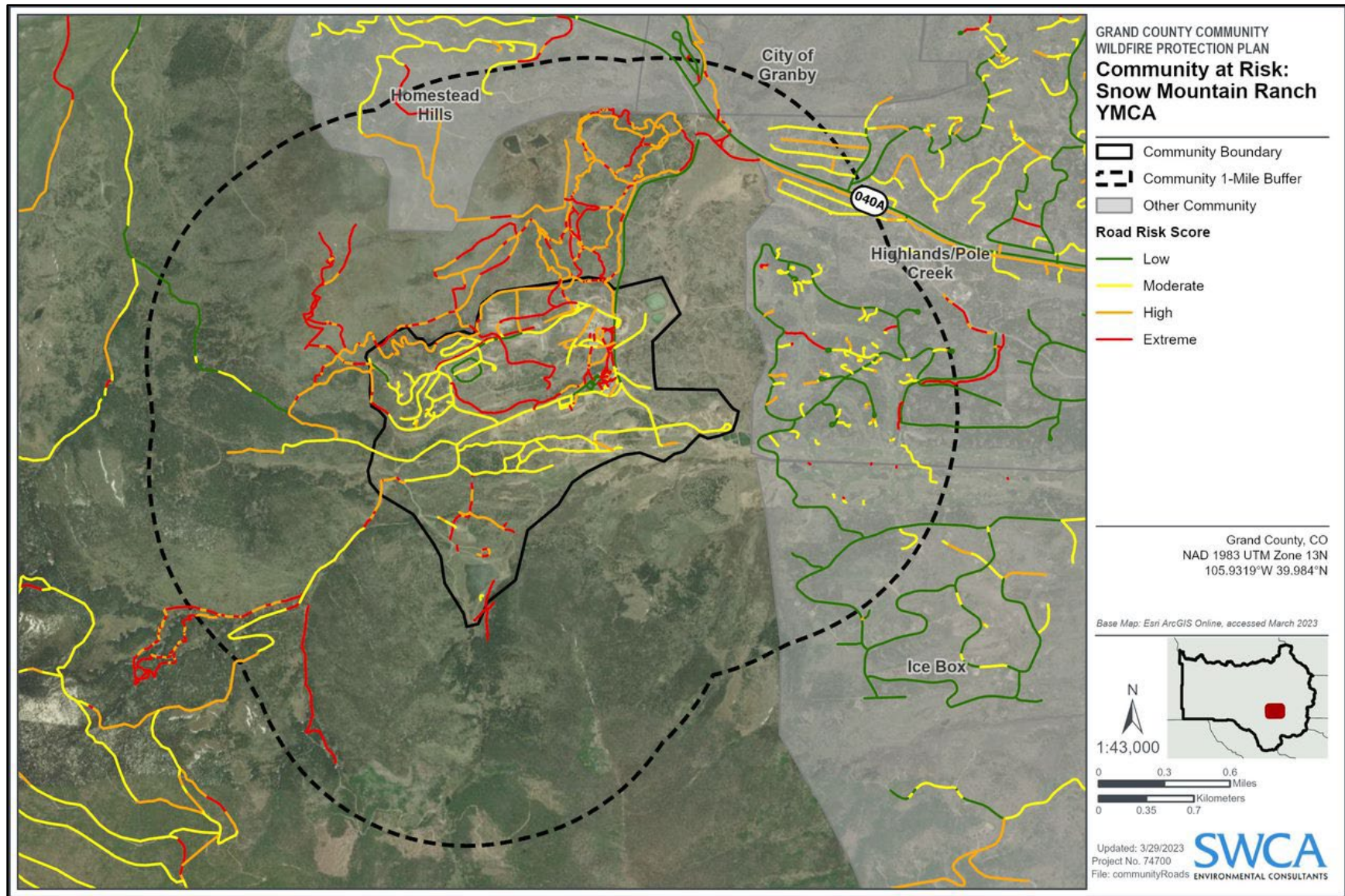


Figure C.15. Snow Mountain Ranch/YMCA Route Risk Analysis.

HIGHLANDS/POLE CREEK WILDLAND URBAN INTERFACE COMMUNITY

HIGHLANDS/POLE CREEK POLYGON SUMMARY STATISTICS

| Community Polygon Background | | | |
|---------------------------------------|---|----------------------------|------|
| <u>Community Polygon Name:</u> | Highlands/Pole Creek | <u>Total Score:</u> | 111 |
| | | <u>Rating:</u> | High |
| | Area (Square Miles): 6.8 | | |
| | Building Count: 959 | | |
| | Building Density (Building Units per square mile): 140.6 | | |

| Percent of Community by Risk Assessment | | | |
|---|-------------------------|---------------------|------------------------|
| <u>Low:</u> | <u>Moderate:</u> | <u>High:</u> | <u>Extreme:</u> |
| 13% | 26.5% | 41.9% | 18.6% |

| Dominant Fuel Type | | | | |
|---------------------|---------------------------|---------------------|---------------------------------|-----------------------------|
| <u>Grass</u> | <u>Grass/Shrub</u> | <u>Shrub</u> | <u>Timber Understory</u> | <u>Timber Litter</u> |
| | GS2 | | TU5 | |

| Percent of Community by Modeled/Calculated Wildfire Risk Inputs | |
|---|--|
| <u>Flame Length</u> | <u>Drive Time from Fire Station</u> |
| 0-4 (ft): 51.2% | 0-0.5 (min.): 60% |
| 4-8 (ft): 10.7% | 0.5-1.0 (min.): 27.7% |
| 8-12 (ft): 13% | 1.0-1.5 (min.): 0.1% |
| >12 (ft): 24.6% | >1.5 (min.): 12.1% |

| 1144 Survey Summary Highlights | |
|---|---|
| <u>Positive Attributes (Low Scores)</u> | <u>Negative Attributes (High Scores)</u> |
| <ul style="list-style-type: none"> • Reflective street signs • Visible fuels mitigation • Metal roof or asphalt shingle throughout • Fire station <5 mi from community | <ul style="list-style-type: none"> • Difficult to navigate • Limited turnarounds for fire trucks • Narrow, steep roads in places • Combustible building materials • Limited defensible space • Homes built near, on, and above slopes |

| Recent Fires within the polygon |
|--|
| <ul style="list-style-type: none"> • YMCA Fire (2007) |

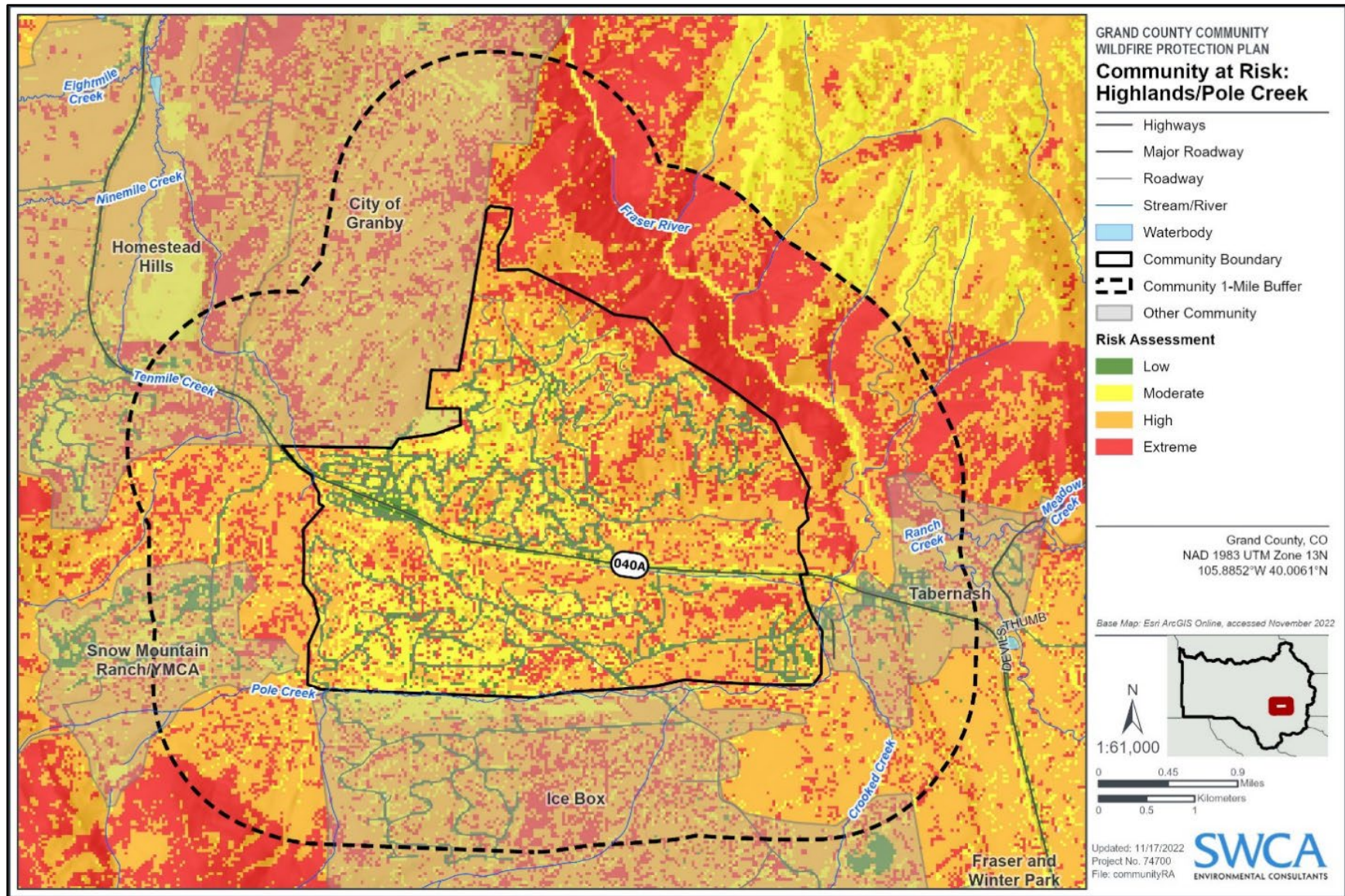


Figure C.16. Highlands/Pole Creek Risk-Hazard Assessment.

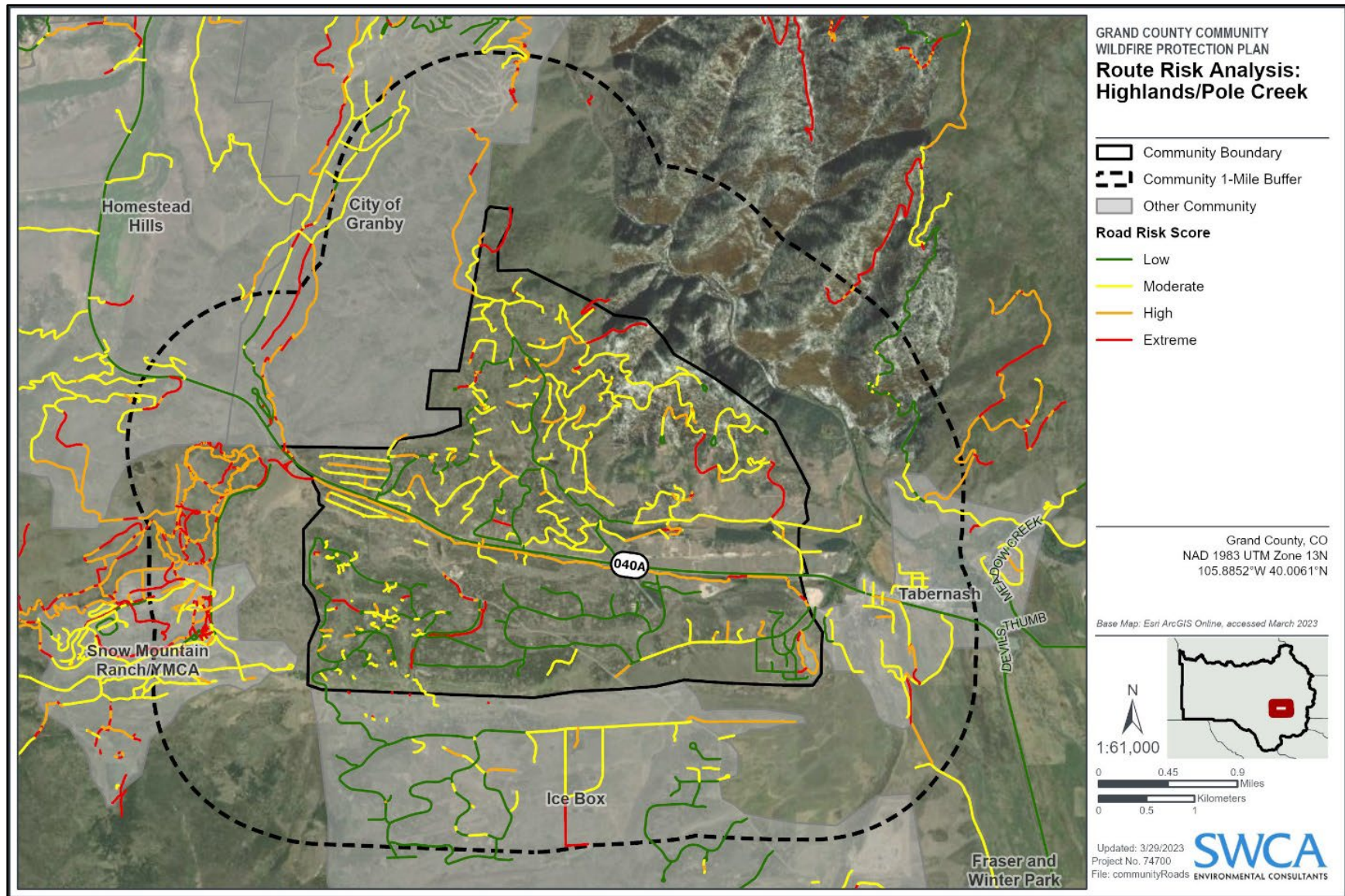


Figure C.17. Highlands/Pole Creek Route Risk Analysis.

TABERNASH WILDLAND URBAN INTERFACE COMMUNITY

TABERNASH POLYGON SUMMARY STATISTICS

| Community Polygon Background | | |
|---|-------------------------------|----------------------------|
| <u>Community Polygon Name:</u> Tabernash | <u>Total Score:</u> 70 | <u>Rating:</u> High |
| Area (Square Miles): 1.3 | | |
| Building Count: 364 | | |
| Building Density (Building Units per square mile): 283.6 | | |

| Percent of Community by Risk Assessment | | | |
|---|-------------------------|---------------------|------------------------|
| <u>Low:</u> | <u>Moderate:</u> | <u>High:</u> | <u>Extreme:</u> |
| 11.3% | 9.6% | 60.5% | 18.5% |

| Dominant Fuel Type | | | | |
|---------------------|---------------------------|---------------------|---------------------------------|-----------------------------|
| <u>Grass</u> | <u>Grass/Shrub</u> | <u>Shrub</u> | <u>Timber Understory</u> | <u>Timber Litter</u> |
| | GS2 | | | |

| Percent of Community by Modeled/Calculated Wildfire Risk Inputs | |
|---|--|
| <u>Flame Length</u> | <u>Drive Time from Fire Station</u> |
| 0-4 (ft): 25.7% | 0-0.5 (min.): 54.8% |
| 4-8 (ft): 21.1% | 0.5-1.0 (min.): 19.7% |
| 8-12 (ft): 30.2% | 1.0-1.5 (min.): N/A |
| >12 (ft): 23.1% | >1.5 (min.): 25.5% |

| 1144 Survey Summary Highlights | |
|---|--|
| <u>Positive Attributes (Low Scores)</u> | <u>Negative Attributes (High Scores)</u> |
| <ul style="list-style-type: none"> • Ingress/egress • Reflective street signs • Visible fuels reduction efforts • Metal roof or asphalt shingle throughout • Fire hydrants • <5 mi to fire station | <ul style="list-style-type: none"> • Limited turnarounds for fire trucks • Combustible building materials • 2+ roads in and out |

| Recent Fires within the polygon |
|--|
| <ul style="list-style-type: none"> • None |

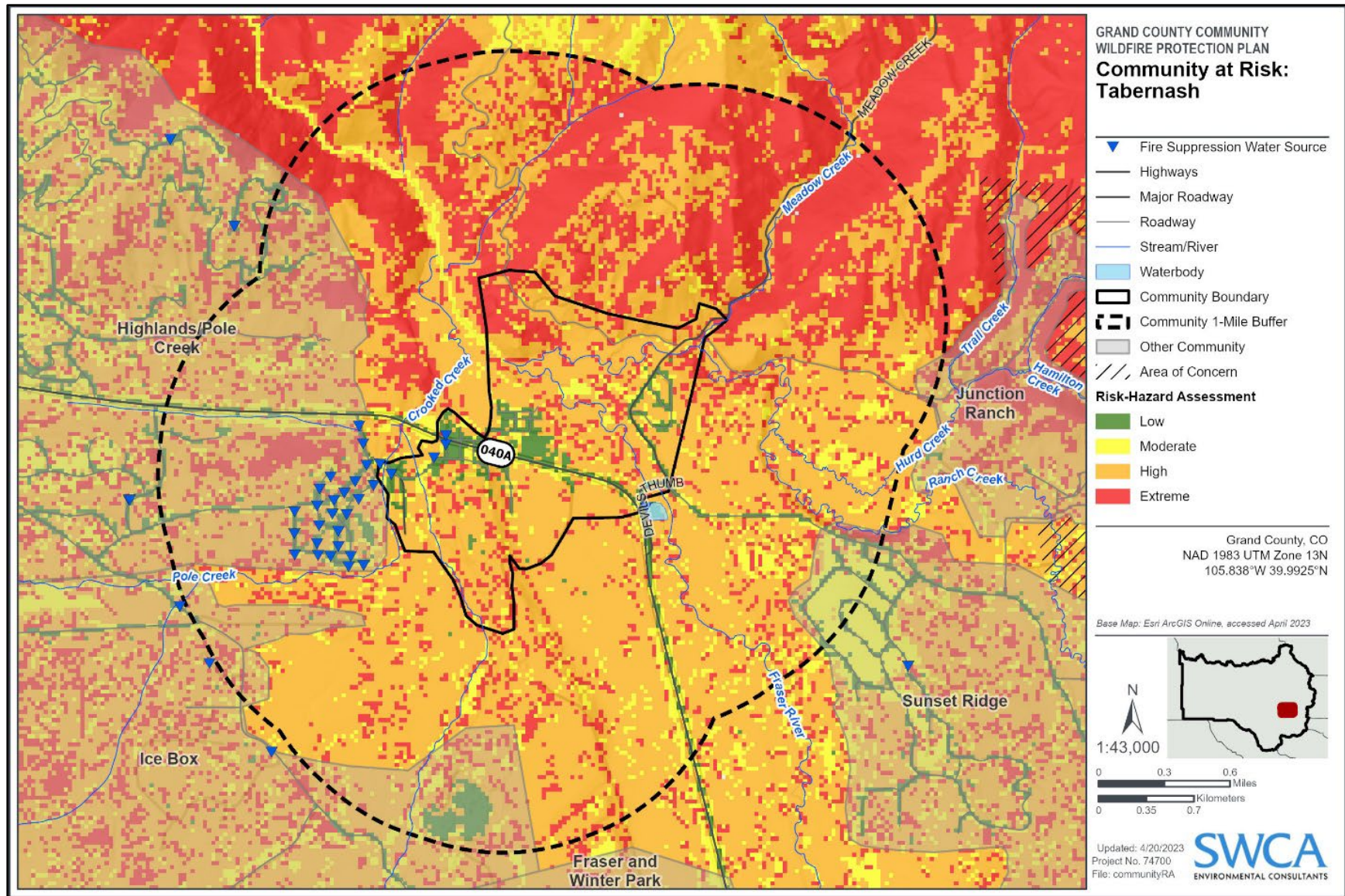


Figure C.18. Tabernash Risk-Hazard Assessment.

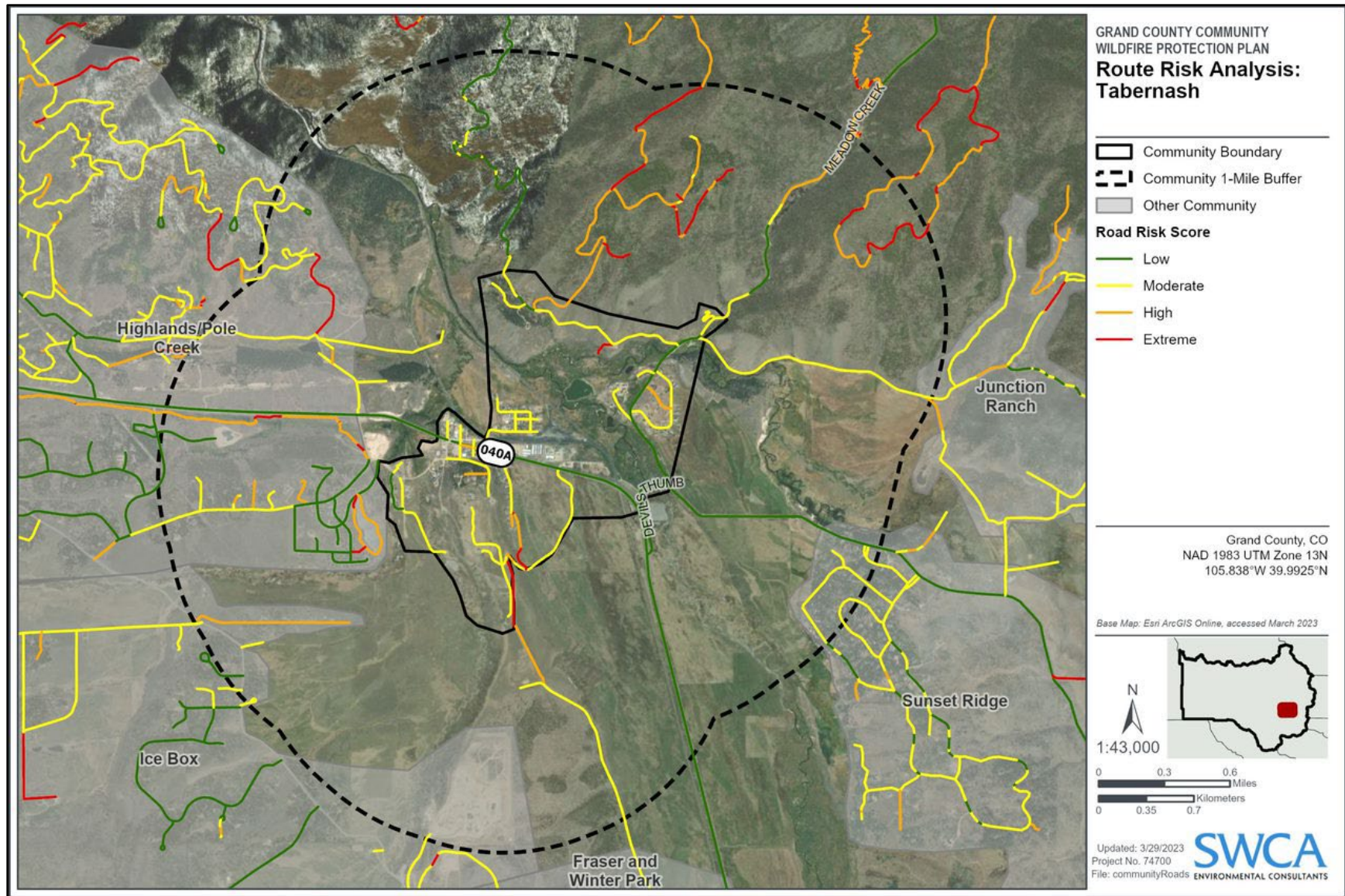


Figure C.19. Tabernash Route Risk Analysis.

JUNCTION RANCH WILDLAND URBAN INTERFACE COMMUNITY

JUNCTION RANCH POLYGON SUMMARY STATISTICS

| Community Polygon Background | | | | |
|--|--|--------------------------------|--|-------------------------------|
| <u>Community Polygon Name:</u> Junction Ranch | | <u>Total Score:</u> 121 | | <u>Rating:</u> Extreme |
| Area (Square Miles): 0.9 | | | | |
| Building Count: 103 | | | | |
| Building Density (Building Units per square mile): 115.4 | | | | |

| Percent of Community by Risk Assessment | | | |
|---|------------------|--------------|-----------------|
| <u>Low:</u> | <u>Moderate:</u> | <u>High:</u> | <u>Extreme:</u> |
| 0.7% | 7% | 50.3% | 42% |

| Dominant Fuel Type | | | | |
|--------------------|--------------------|--------------|--------------------------|----------------------|
| <u>Grass</u> | <u>Grass/Shrub</u> | <u>Shrub</u> | <u>Timber Understory</u> | <u>Timber Litter</u> |
| | | | | TL5 |

| Percent of Community by Modeled/Calculated Wildfire Risk Inputs | |
|---|-------------------------------------|
| <u>Flame Length</u> | <u>Drive Time from Fire Station</u> |
| 0-4 (ft): 34.9% | 0-0.5 (min.): N/A |
| 4-8 (ft): 10.7% | 0.5-1.0 (min.): 64.9% |
| 8-12 (ft): 13.2% | 1.0-1.5 (min.): 35% |
| >12 (ft): 41.2% | >1.5 (min.): 0.0% |

| 1144 Survey Summary Highlights | |
|--|---|
| <u>Positive Attributes (Low Scores)</u> | <u>Negative Attributes (High Scores)</u> |
| <ul style="list-style-type: none">• 2+ roads in and out• Reflective street signs• Metal roof or asphalt shingle throughout• Visible fuels mitigation work | <ul style="list-style-type: none">• Limited turnarounds for fire trucks• Limited defensible space• Limited water sources for suppression• Fire station >5 mi from community• Narrow, steep roads in places |

| Recent Fires within the polygon |
|--|
| <ul style="list-style-type: none">• None |

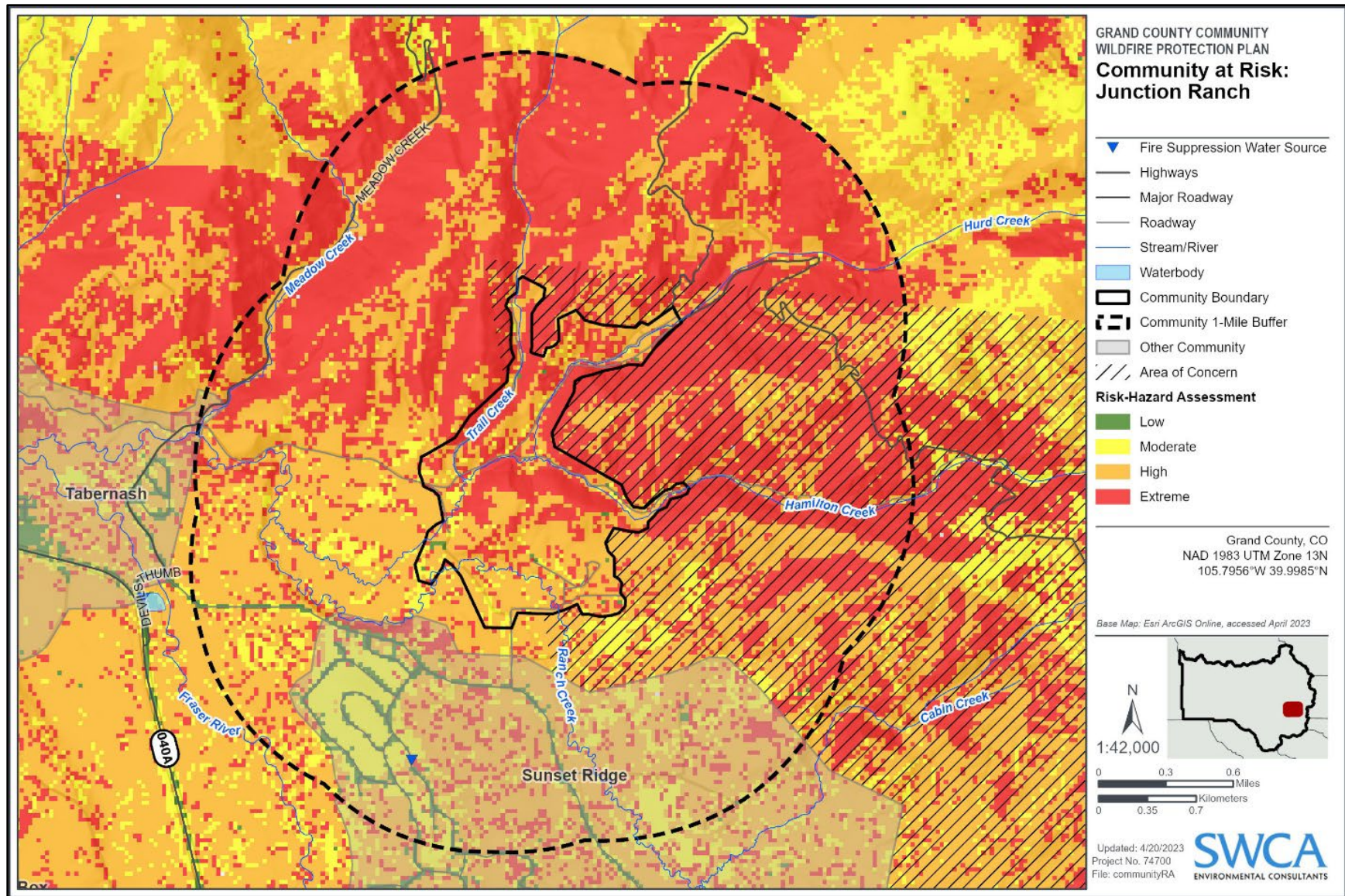


Figure C.20. Junction Ranch Risk-Hazard Assessment.

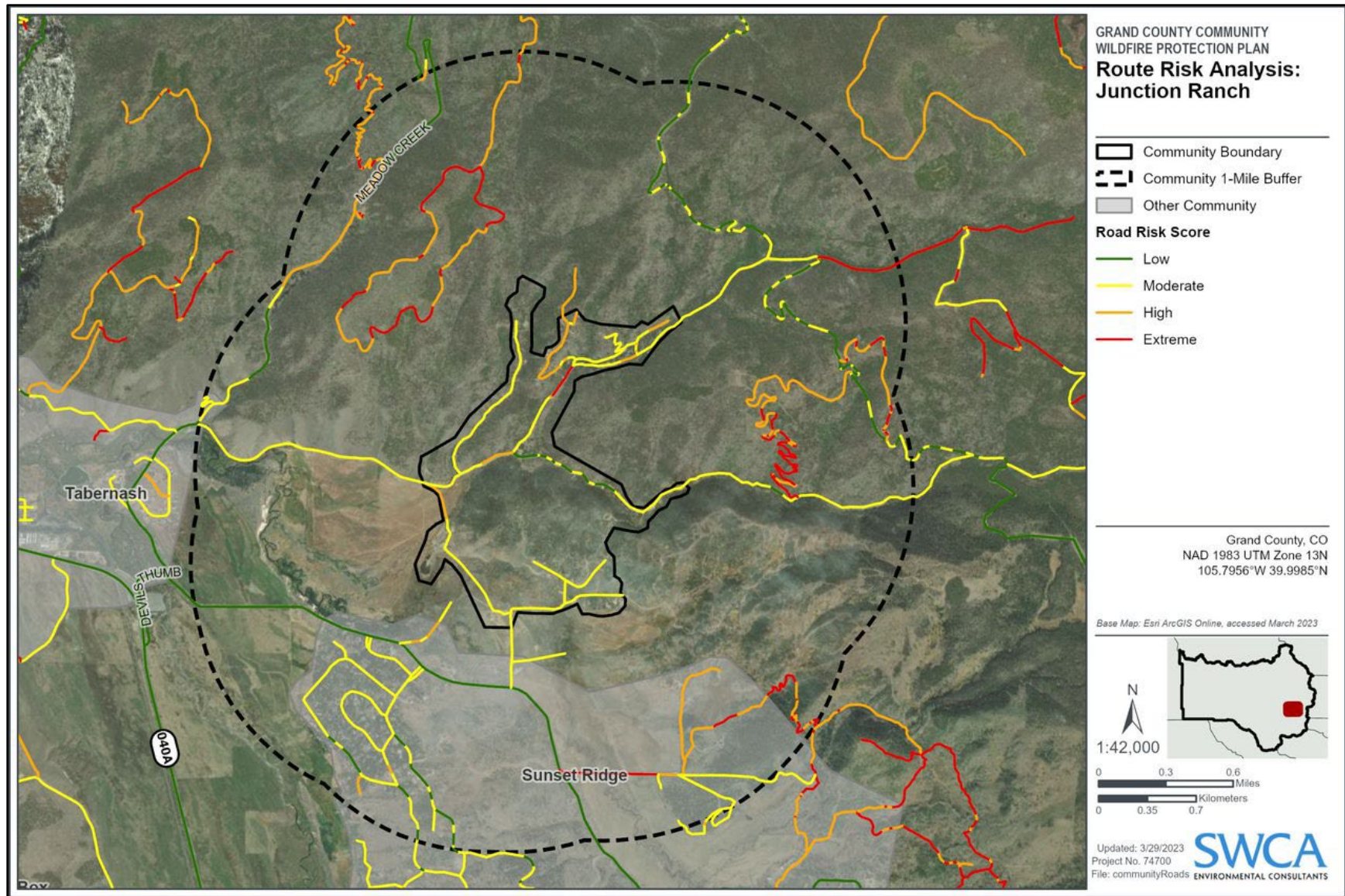


Figure C.21. Junction Ranch Route Risk Analysis.

ICE BOX WILDLAND URBAN INTERFACE COMMUNITY

ICE BOX POLYGON SUMMARY STATISTICS

| Community Polygon Background | | |
|--|--------------------------------|----------------------------|
| <u>Community Polygon Name:</u> Ice Box | <u>Total Score:</u> 106 | <u>Rating:</u> High |
| Area (Square Miles): 11.1 | | |
| Building Count: 275 | | |
| Building Density (Building Units per square mile): 24.9 | | |

| Percent of Community by Risk Assessment | | | |
|---|-------------------------|---------------------|------------------------|
| <u>Low:</u> | <u>Moderate:</u> | <u>High:</u> | <u>Extreme:</u> |
| 2.7% | 14.3% | 64% | 19.1% |

| Dominant Fuel Type | | | | |
|---------------------|---------------------------|---------------------|---------------------------------|-----------------------------|
| <u>Grass</u> | <u>Grass/Shrub</u> | <u>Shrub</u> | <u>Timber Understory</u> | <u>Timber Litter</u> |
| | | | TU1 | |

| Percent of Community by Modeled/Calculated Wildfire Risk Inputs | |
|---|--|
| <u>Flame Length</u> | <u>Drive Time from Fire Station</u> |
| 0-4 (ft): 47.5% | 0-0.5 (min.): 0.7% |
| 4-8 (ft): 17.4% | 0.5-1.0 (min.): 38.8% |
| 8-12 (ft): 14.1% | 1.0-1.5 (min.): 6.9% |
| >12 (ft): 21.1% | >1.5 (min.): 53.7% |

| 1144 Survey Summary Highlights | |
|---|--|
| <u>Positive Attributes (Low Scores)</u> | <u>Negative Attributes (High Scores)</u> |
| <ul style="list-style-type: none"> • Ingress/egress • Reflective street signs • Metal roof or asphalt shingle throughout | <ul style="list-style-type: none"> • Limited turnarounds for fire trucks • Limited defensible space • Combustible building materials • Limited water sources for suppression • Fire station >5 mi from the community |

| Recent Fires within the polygon |
|--|
| <ul style="list-style-type: none"> • None |

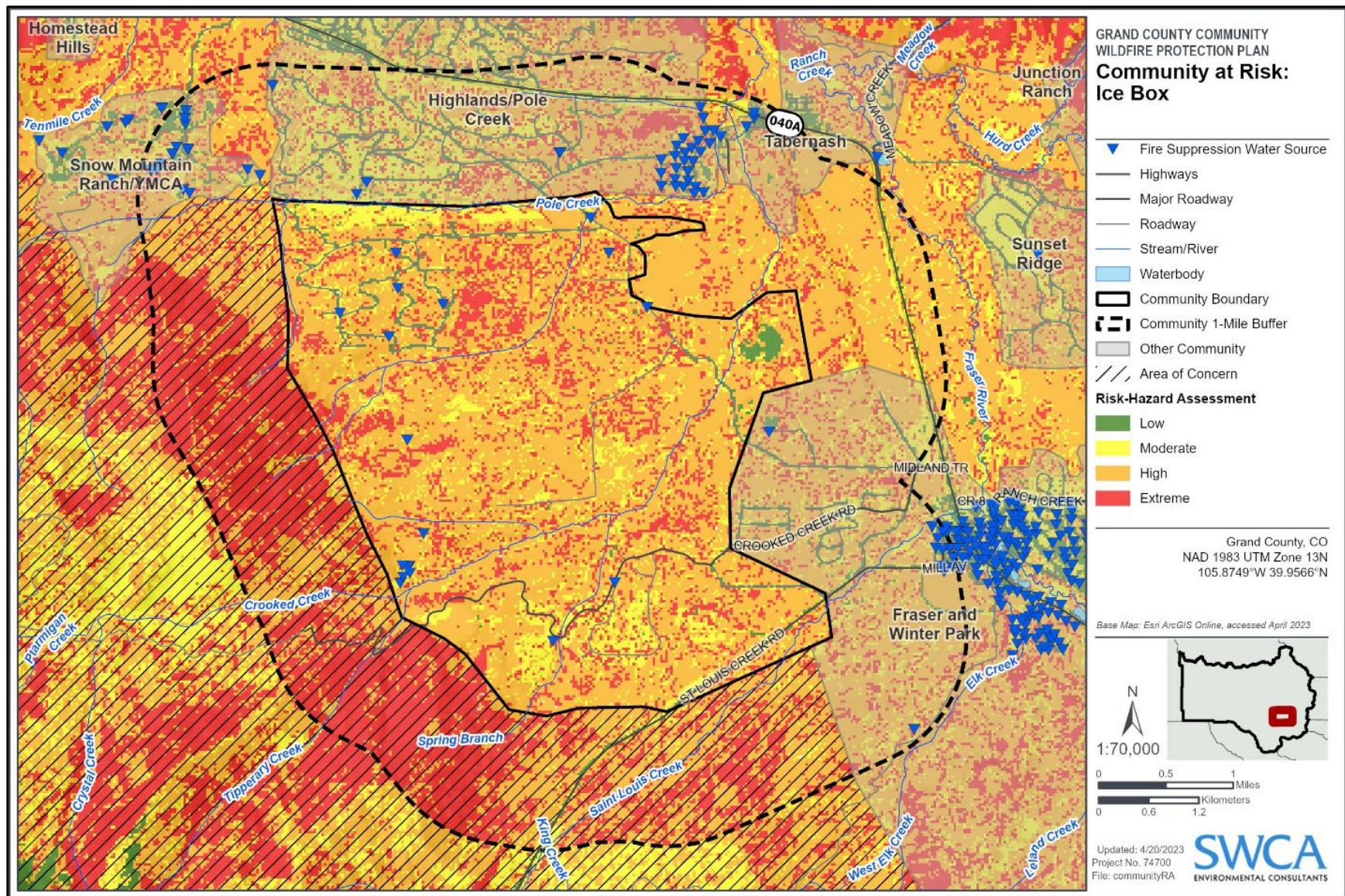


Figure C.22. Ice Box Risk-Hazard Assessment.

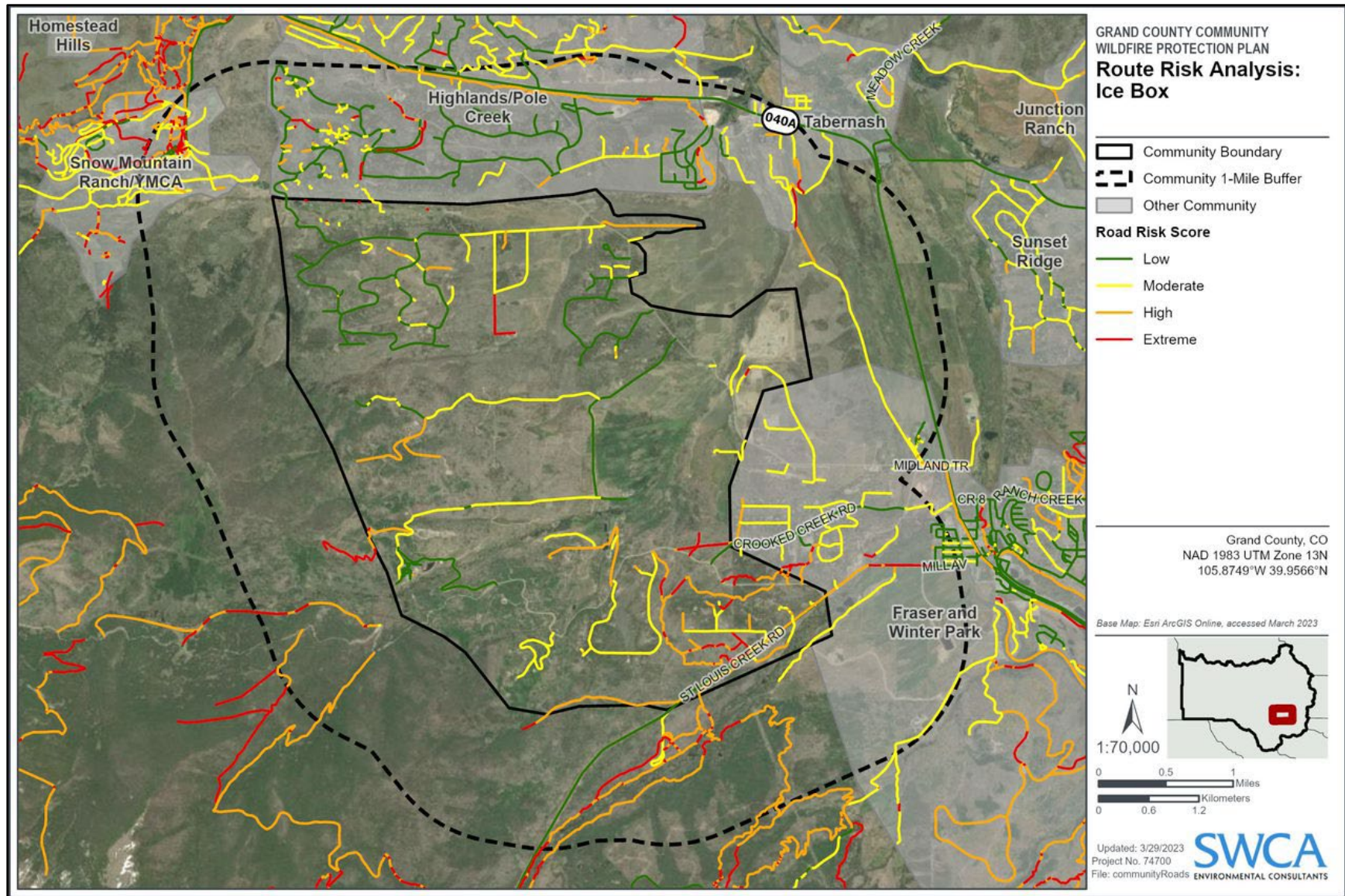


Figure C.23. Ice Box Route Risk Analysis.

HOT SULPHUR SPRINGS WILDLAND URBAN INTERFACE COMMUNITY

HOT SULPHUR SPRINGS POLYGON SUMMARY STATISTICS

| Community Polygon Background | | |
|--|--------------------------------|----------------------------|
| <u>Community Polygon Name:</u> Hot Sulphur Springs | <u>Total Score:</u> 102 | <u>Rating:</u> High |
| Area (Square Miles): 5.3 | | |
| Building Count: 410 | | |
| Building Density (Building Units per square mile): 77.1 | | |

| Percent of Community by Risk Assessment | | | |
|---|----------------------------------|------------------------------|---------------------------------|
| <u>Low:</u> 7.7% | <u>Moderate:</u> 11.3% | <u>High:</u> 65.8% | <u>Extreme:</u> 15.2% |

| Dominant Fuel Type | | | | |
|---------------------|----------------------------------|---------------------|---------------------------------|-----------------------------|
| <u>Grass</u> | <u>Grass/Shrub</u> GS2 | <u>Shrub</u> | <u>Timber Understory</u> | <u>Timber Litter</u> |

| Percent of Community by Modeled/Calculated Wildfire Risk Inputs | |
|---|--|
| <u>Flame Length</u> | <u>Drive Time from Fire Station</u> |
| 0-4 (ft): 29.4% | 0-0.5 (min.): 34.6% |
| 4-8 (ft): 20.7% | 0.5-1.0 (min.): 6.7% |
| 8-12 (ft): 34.9% | 1.0-1.5 (min.): 14% |
| >12 (ft): 15% | >1.5 (min.): 44.7% |

| 1144 Survey Summary Highlights | |
|--|---|
| <u>Positive Attributes (Low Scores)</u> | <u>Negative Attributes (High Scores)</u> |
| <ul style="list-style-type: none"> • 2+ roads in and out • Metal roof or asphalt shingle throughout • Fire hydrants • <5 mi from a fire station | <ul style="list-style-type: none"> • Limited turnarounds for fire trucks • Non-reflective street signs • Limited defensible space • Combustible housing materials |

| Recent Fires within the polygon |
|---|
| <ul style="list-style-type: none"> • East Troublesome (2020) |

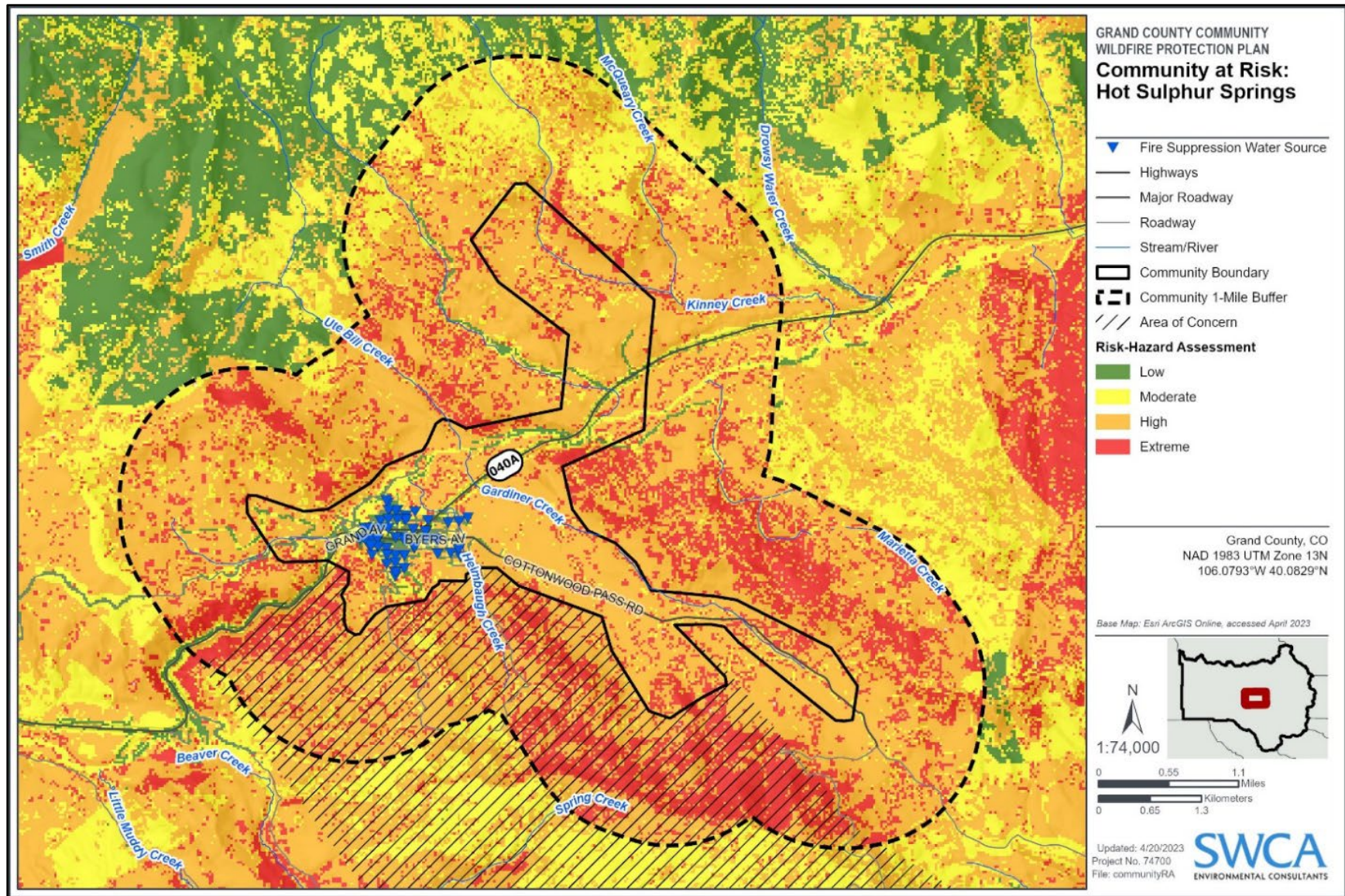


Figure C.24. Hot Sulphur Springs Risk-Hazard Assessment.

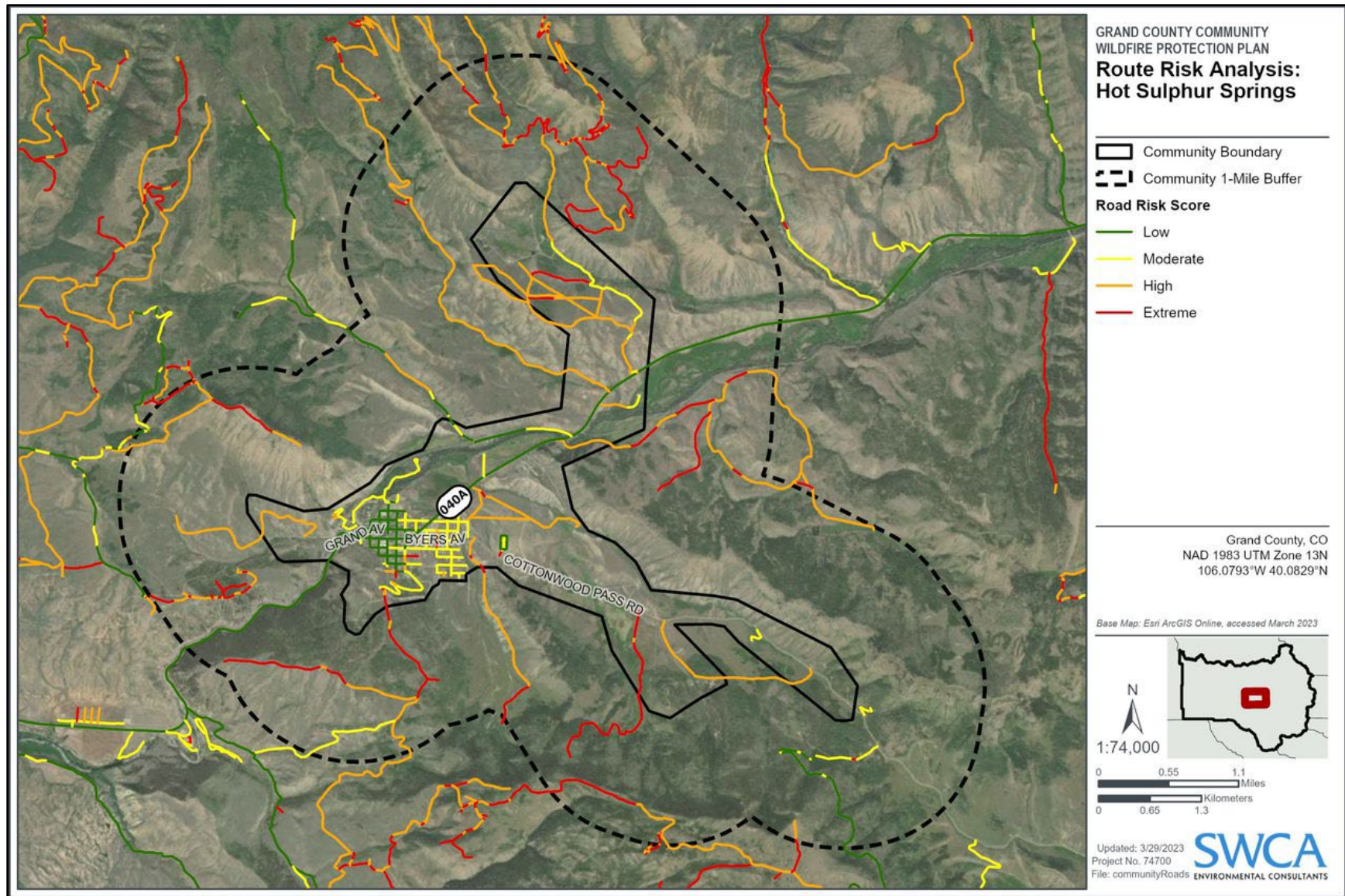


Figure C.25. Hot Sulphur Springs Route Risk Analysis.

UPPER WILLIAMS FORK WILDLAND URBAN INTERFACE COMMUNITY

UPPER WILLIAMS FORK POLYGON SUMMARY STATISTICS

| Community Polygon Background | | |
|---|--------------------------------|-------------------------------|
| <u>Community Polygon Name:</u> Upper Williams Fork | <u>Total Score:</u> 127 | <u>Rating:</u> Extreme |
| Area (Square Miles): 35.5 | | |
| Building Count: 88 | | |
| Building Density (Building Units per square mile): 2.5 | | |

| Percent of Community by Risk Assessment | | | |
|---|----------------------------------|------------------------------|---------------------------------|
| <u>Low:</u> 1.7% | <u>Moderate:</u> 15.8% | <u>High:</u> 56.4% | <u>Extreme:</u> 26.1% |

| Dominant Fuel Type | | | | |
|---------------------|----------------------------------|---------------------|---------------------------------|-----------------------------|
| <u>Grass</u> | <u>Grass/Shrub</u> GS2 | <u>Shrub</u> | <u>Timber Understory</u> | <u>Timber Litter</u> |

| Percent of Community by Modeled/Calculated Wildfire Risk Inputs | |
|---|--|
| <u>Flame Length</u> | <u>Drive Time from Fire Station</u> |
| 0-4 (ft): 42% | 0-0.5 (min.): N/A |
| 4-8 (ft): 14.7% | 0.5-1.0 (min.): N/A |
| 8-12 (ft): 18.7% | 1.0-1.5 (min.): N/A |
| >12 (ft): 24.6% | >1.5 (min.): 100% |

| 1144 Survey Summary Highlights | |
|---|--|
| <u>Positive Attributes (Low Scores)</u> | <u>Negative Attributes (High Scores)</u> |
| <ul style="list-style-type: none"> • Visible fuels mitigation work • Metal roof or asphalt shingle throughout | <ul style="list-style-type: none"> • Ingress/egress • Limited turnarounds for fire trucks • Limited street signs • Limited defensible space • Combustible building materials • Limited water sources for suppression • Fire station >5 mi from community |

| Recent Fires within the polygon |
|--|
| <ul style="list-style-type: none"> • Williams Fork (2020) • Sugar Loaf Fire (2018) |

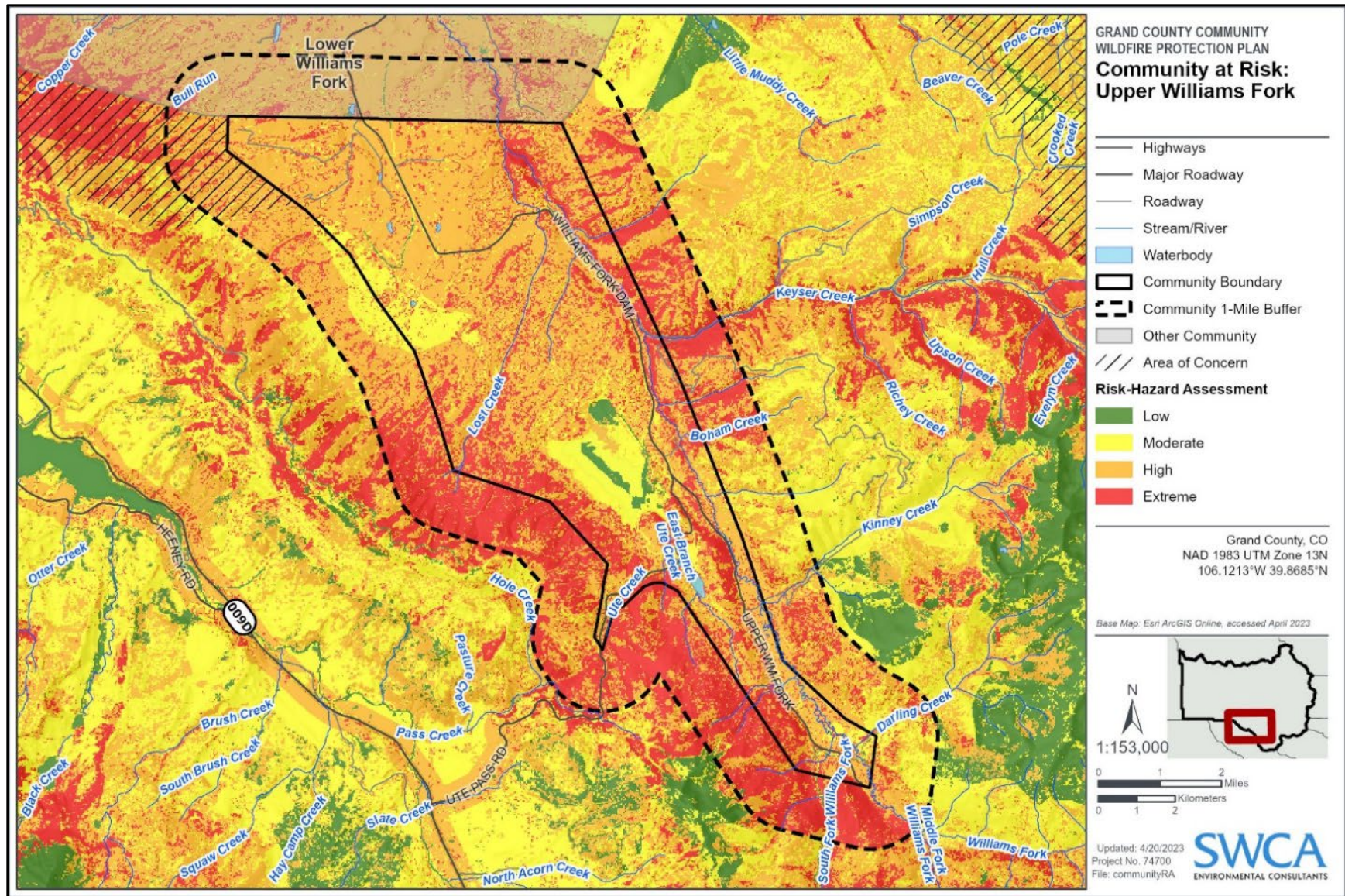


Figure C.26. Upper Williams Fork Risk-Hazard Assessment.

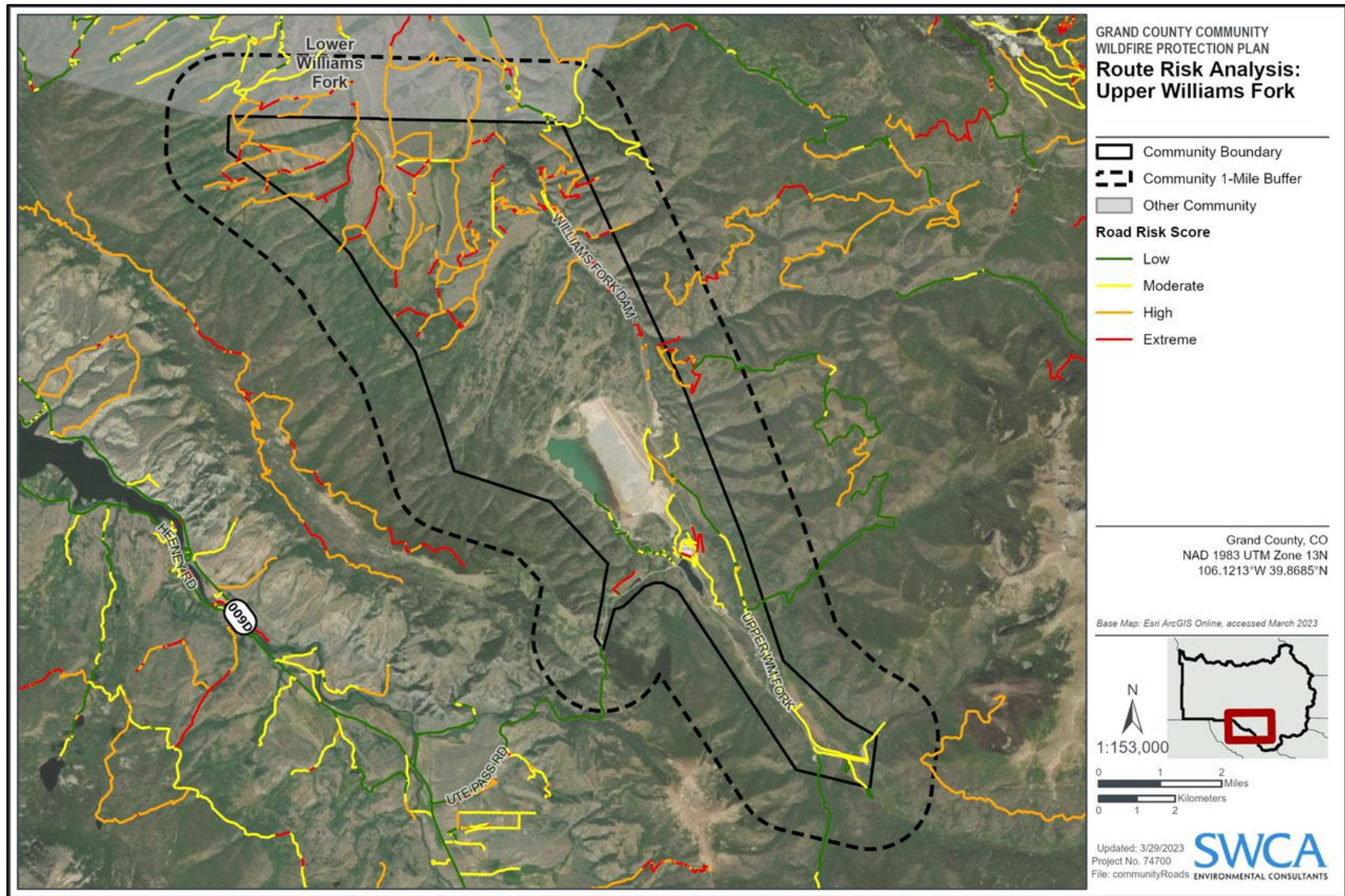


Figure C.27. Upper Williams Fork Route Risk Analysis.

LOWER WILLIAMS FORK WILDLAND URBAN INTERFACE COMMUNITY

LOWER WILLIAMS FORK POLYGON SUMMARY STATISTICS

| Community Polygon Background | | |
|---|-------------------------|------------------------|
| Community Polygon Name: Lower Williams Fork | Total Score: 125 | Rating: Extreme |
| Area (Square Miles): 39.8 | | |
| Building Count: 154 | | |
| Building Density (Building Units per square mile): 3.9 | | |

| Percent of Community by Risk Assessment | | | |
|---|--------------------------|-----------------------|--------------------------|
| <u>Low:</u> 0.6% | <u>Moderate:</u> 9.5% | <u>High:</u> 74.5% | <u>Extreme:</u> 15.4% |

| Dominant Fuel Type | | | | |
|--------------------|---------------------------|--------------|--------------------------|----------------------|
| <u>Grass</u> | <u>Grass/Shrub</u> GS2 | <u>Shrub</u> | <u>Timber Understory</u> | <u>Timber Litter</u> |

| Percent of Community by Modeled/Calculated Wildfire Risk Inputs | |
|---|-------------------------------------|
| <u>Flame Length</u> | <u>Drive Time from Fire Station</u> |
| 0-4 (ft): 23.8% | 0-0.5 (min.): N/A |
| 4-8 (ft): 16.5% | 0.5-1.0 (min.): N/A |
| 8-12 (ft): 44% | 1.0-1.5 (min.): 0.7% |
| >12 (ft): 15.7% | >1.5 (min.): 99.3% |

| 1144 Survey Summary Highlights | |
|---|---|
| <u>Positive Attributes (Low Scores)</u> | <u>Negative Attributes (High Scores)</u> |
| <ul style="list-style-type: none"> • Reflective street signs • Structures well-spaced • Metal roof or asphalt shingle throughout • Visible fuels mitigation efforts | <ul style="list-style-type: none"> • Ingress/egress • Limited housing numbering • Combustible housing materials • Limited water sources for suppression • Fire station >5 mi from community • Above ground gas and electric utilities • This area is prone to small lightning ignitions |

| Recent Fires within the polygon |
|--|
| <ul style="list-style-type: none"> • None |

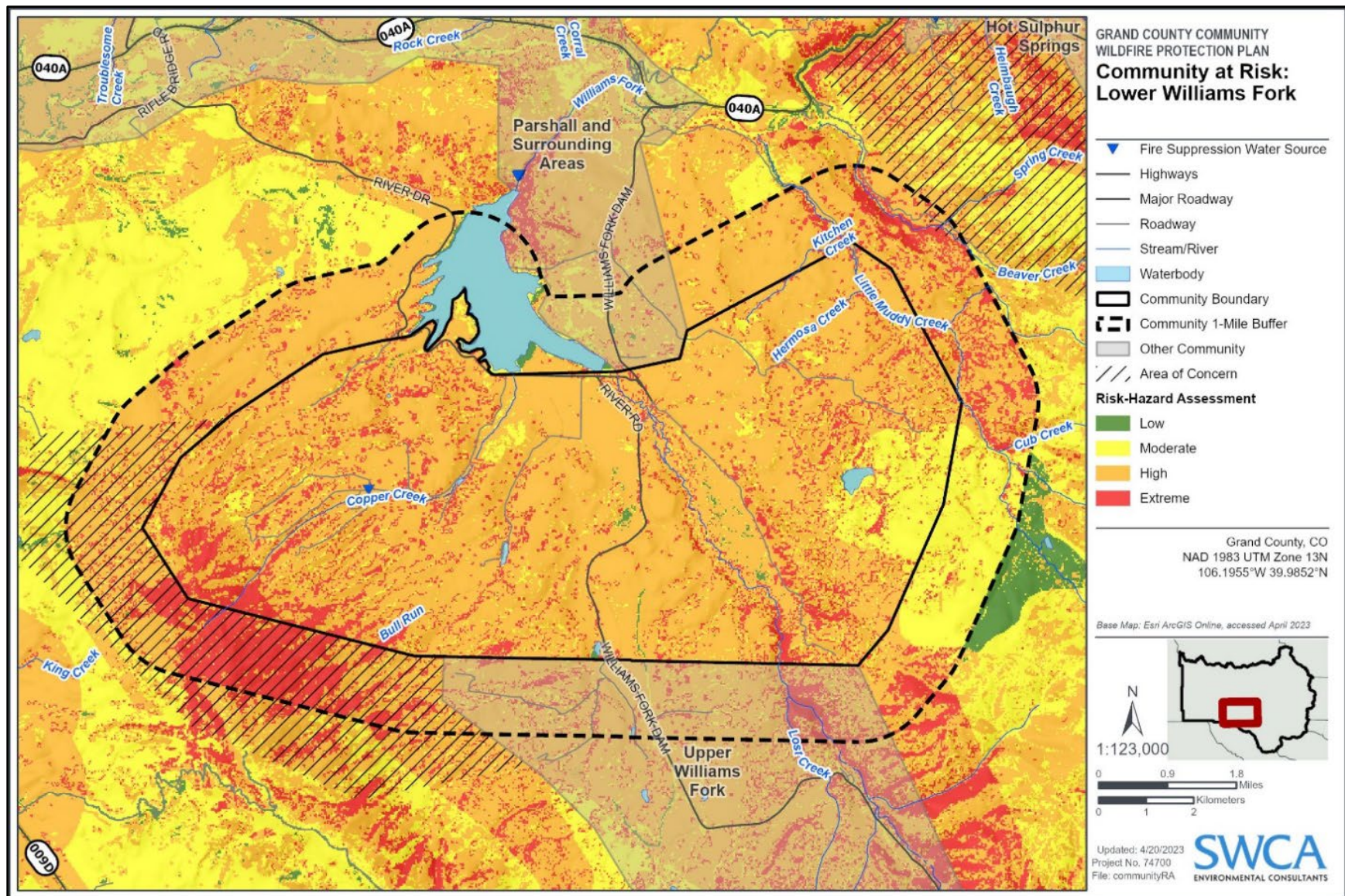


Figure C.28. Lower Williams Fork Risk-Hazard Assessment.

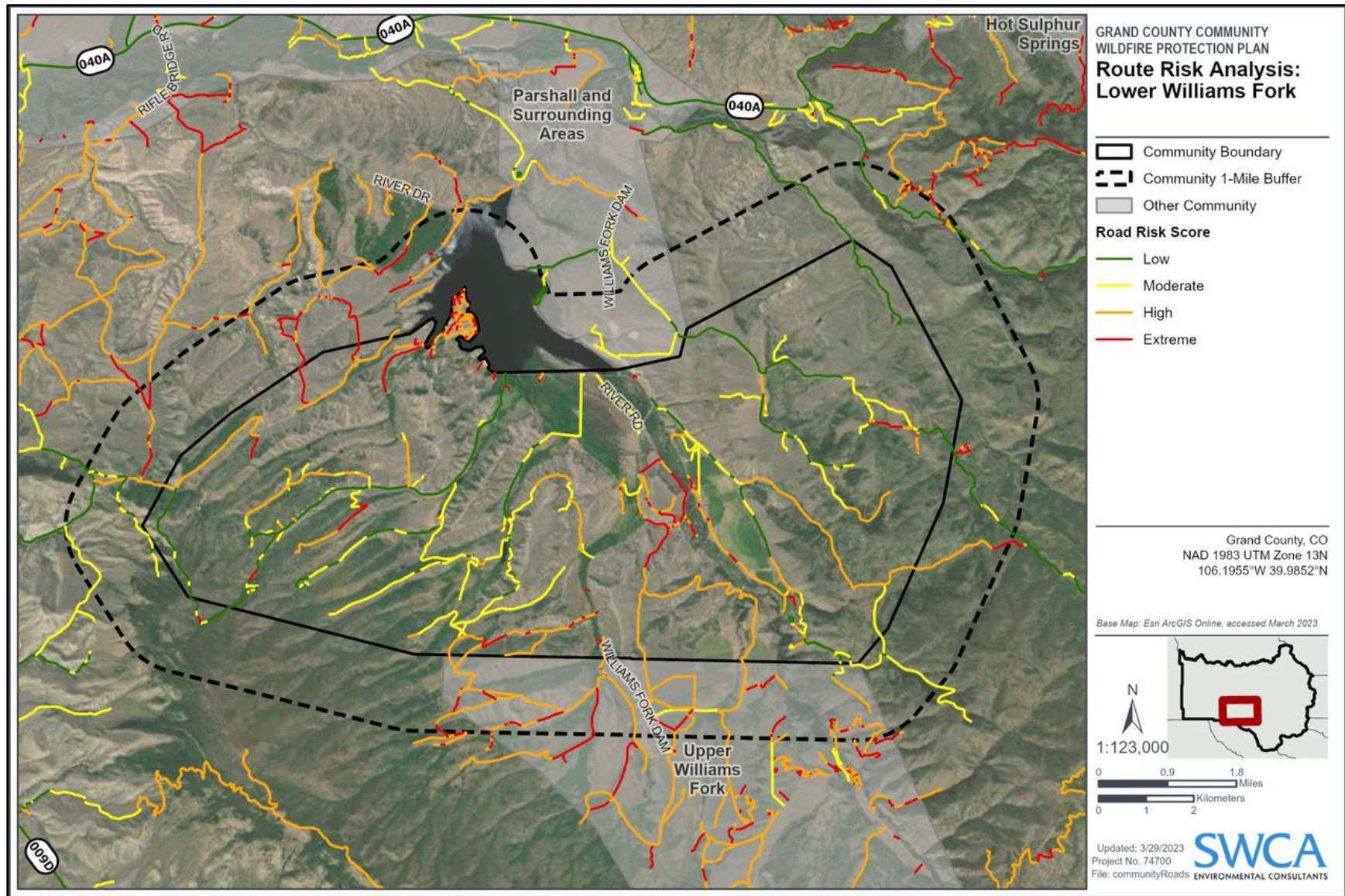


Figure C.29. Lower Williams Fork Route Risk Analysis.

PARSHALL AND SURROUNDING AREAS WILDLAND URBAN INTERFACE COMMUNITY

PARSHALL AND SURROUNDING AREAS POLYGON SUMMARY STATISTICS

| Community Polygon Background | | |
|--|--------------------------------|----------------------------|
| <u>Community Polygon Name:</u> Parshall and Surrounding Areas | <u>Total Score:</u> 107 | <u>Rating:</u> High |
| Area (Square Miles): 34.6 | | |
| Building Count: 221 | | |
| Building Density (Building Units per square mile): 6.4 | | |

| Percent of Community by Risk Assessment | | | |
|---|----------------------------------|------------------------------|--------------------------------|
| <u>Low:</u> 3.6% | <u>Moderate:</u> 26.7% | <u>High:</u> 63.5% | <u>Extreme:</u> 6.3% |

| Dominant Fuel Type | | | | |
|---------------------|----------------------------------|---------------------|---------------------------------|-----------------------------|
| <u>Grass</u> | <u>Grass/Shrub</u> GS2 | <u>Shrub</u> | <u>Timber Understory</u> | <u>Timber Litter</u> |

| Percent of Community by Modeled/Calculated Wildfire Risk Inputs | |
|---|--|
| <u>Flame Length</u> | <u>Drive Time from Fire Station</u> |
| 0-4 (ft): 13.6% | 0-0.5 (min.): 4.9% |
| 4-8 (ft): 56.4% | 0.5-1.0 (min.): 17.9% |
| 8-12 (ft): 21.5% | 1.0-1.5 (min.): 33.6% |
| >12 (ft): 8.5% | >1.5 (min.): 43.6% |

| 1144 Survey Summary Highlights | |
|--|---|
| <u>Positive Attributes (Low Scores)</u> | <u>Negative Attributes (High Scores)</u> |
| <ul style="list-style-type: none"> • 2+ roads in and out • Reflective street signs • Visible fuels mitigation efforts • Metal roof or asphalt shingle throughout • Houses located on flat surfaces rather than slopes | <ul style="list-style-type: none"> • Limited turnarounds for fire trucks • Limited defensible space • Combustible housing materials • Limited water sources for suppression • Fire station >5 mi from community |

| Recent Fires within the polygon |
|--|
| <ul style="list-style-type: none"> • Byers Canyon Fire (2015) • Misc. Rifle Range Fires over the years |

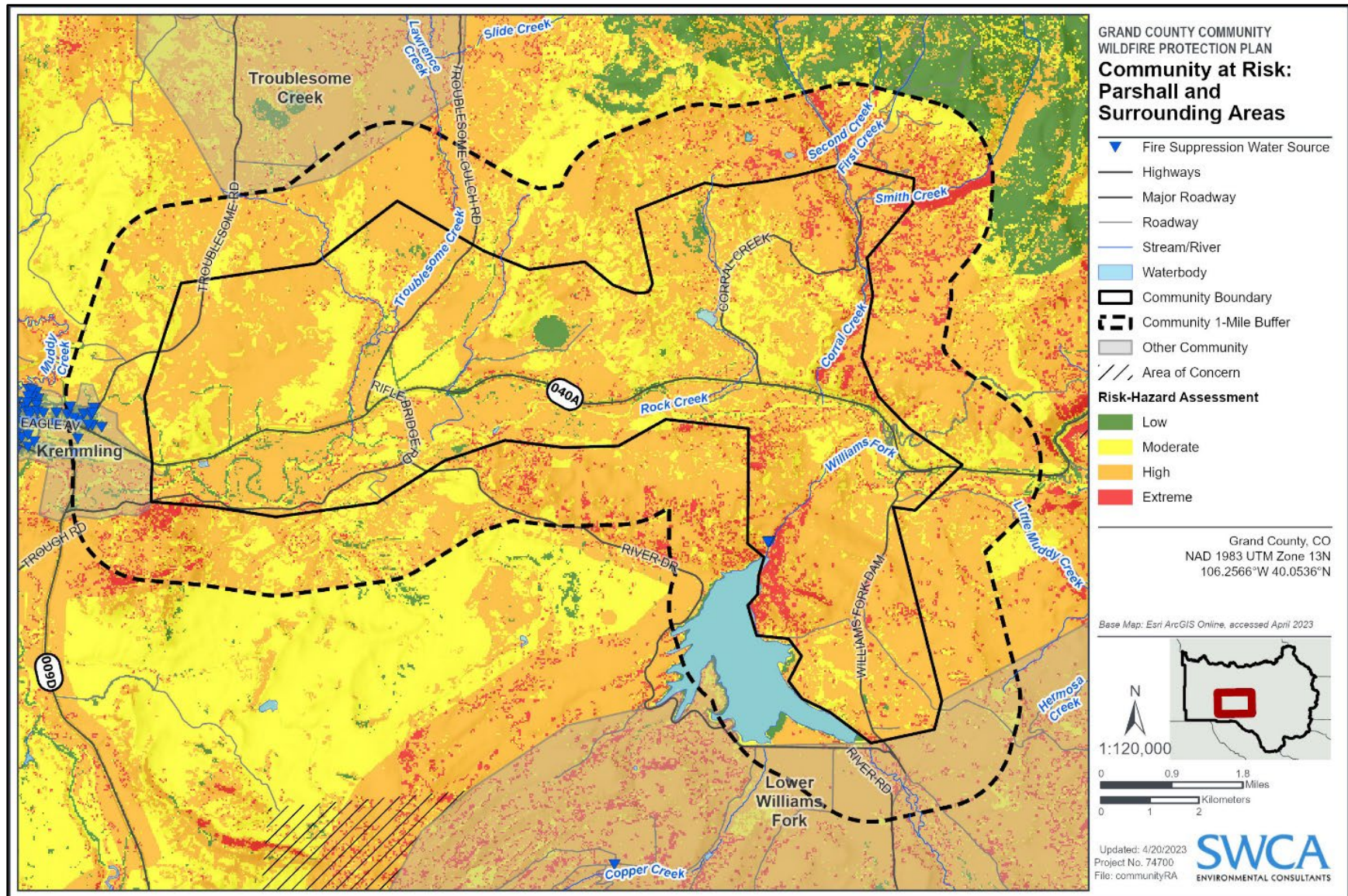


Figure C.30. Parshall and surrounding areas Risk-Hazard Assessment.

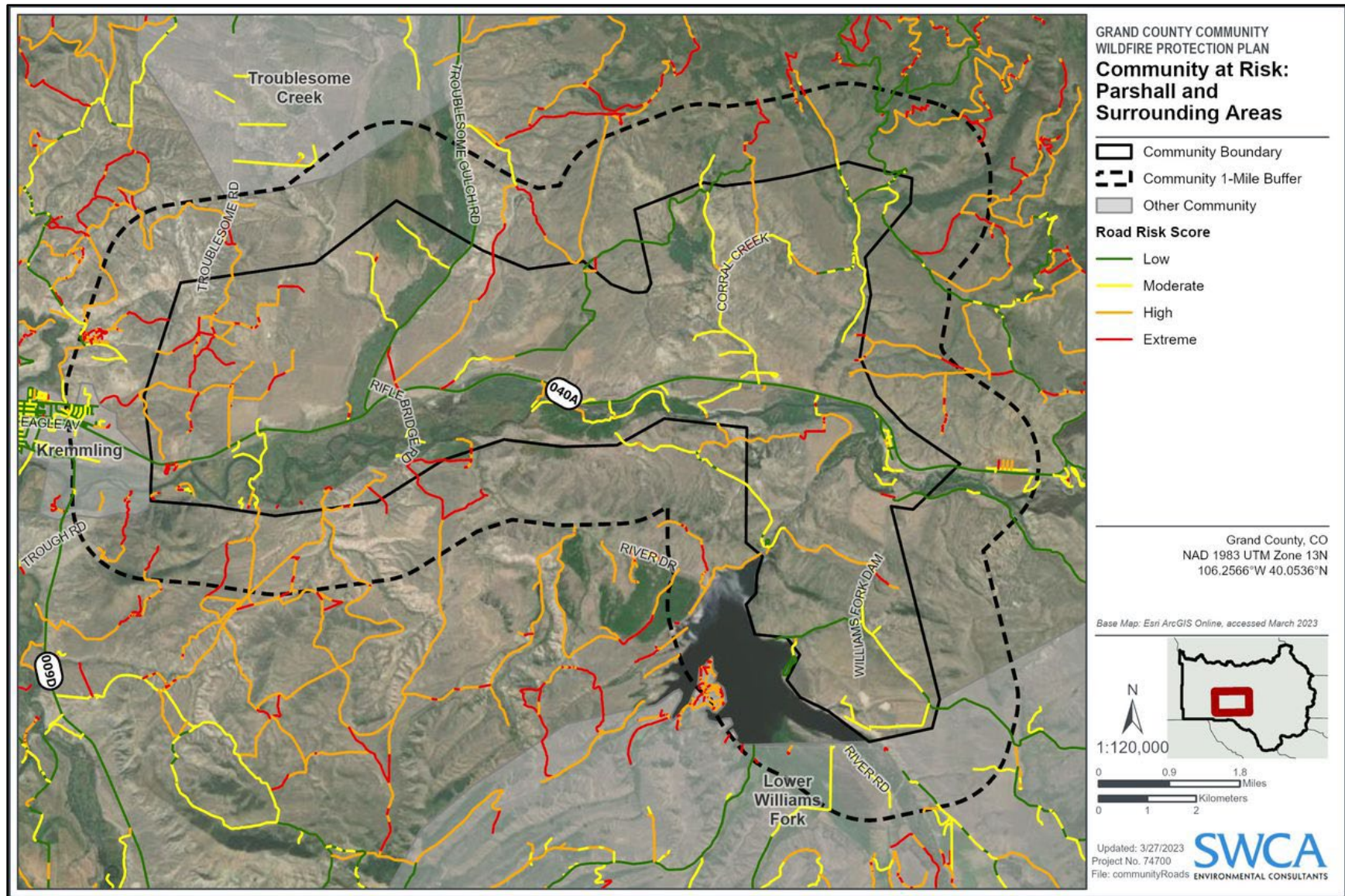


Figure C.31. Parshall and surrounding areas Route Risk Analysis.

BIG HORN PARK WILDLAND URBAN INTERFACE COMMUNITY

BIG HORN PARK POLYGON SUMMARY STATISTICS

| Community Polygon Background | | | | |
|---|--|--------------------------------|--|-------------------------------|
| <u>Community Polygon Name:</u> Big Horn Park | | <u>Total Score:</u> 132 | | <u>Rating:</u> Extreme |
| Area (Square Miles): 7.6 | | | | |
| Building Count: 139 | | | | |
| Building Density (Building Units per square mile): 18.3 | | | | |

| Percent of Community by Risk Assessment | | | |
|---|-------------------------|---------------------|------------------------|
| <u>Low:</u> | <u>Moderate:</u> | <u>High:</u> | <u>Extreme:</u> |
| 0.1% | 7.9% | 74.8% | 17.2% |

| Dominant Fuel Type | | | | |
|---------------------|---------------------------|---------------------|---------------------------------|-----------------------------|
| <u>Grass</u> | <u>Grass/Shrub</u> | <u>Shrub</u> | <u>Timber Understory</u> | <u>Timber Litter</u> |
| GR2 | | | | |

| Percent of Community by Modeled/Calculated Wildfire Risk Inputs | |
|---|--|
| <u>Flame Length</u> | <u>Drive Time from Fire Station</u> |
| 0-4 (ft): 19.3% | 0-0.5 (min.): N/A |
| 4-8 (ft): 43.1% | 0.5-1.0 (min.): N/A |
| 8-12 (ft): 15.8% | 1.0-1.5 (min.): N/A |
| >12 (ft): 21.8% | >1.5 (min.): 100% |

| 1144 Survey Summary Highlights | |
|---|---|
| <u>Positive Attributes (Low Scores)</u> | <u>Negative Attributes (High Scores)</u> |
| <ul style="list-style-type: none">Some visible fuels mitigation efforts around homesMetal roof or asphalt shingle throughout | <ul style="list-style-type: none">Road width <20 ftLimited turnarounds for fire trucksNon-reflective street signsLimited defensible spaceCombustible housing materialsBuildings <30 ft to slope, many built on slopesLimited water sources for suppressionFire station >5 mi from communityAbove ground gas and electric utilities |

| Recent Fires within the polygon |
|---|
| <ul style="list-style-type: none">Bighorn Fire (2020) |

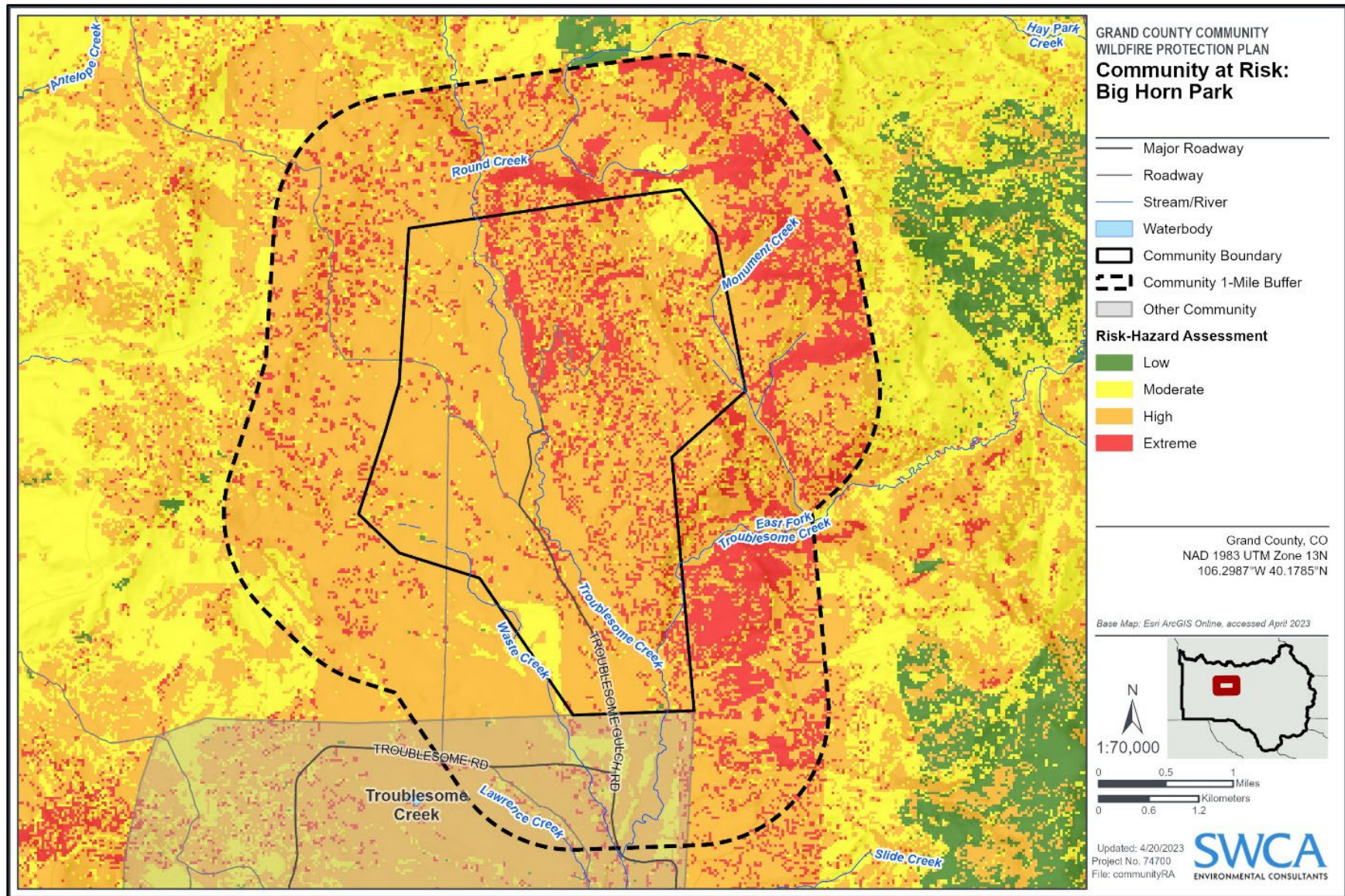


Figure C.32. Big Horn Park Risk-Hazard Assessment.

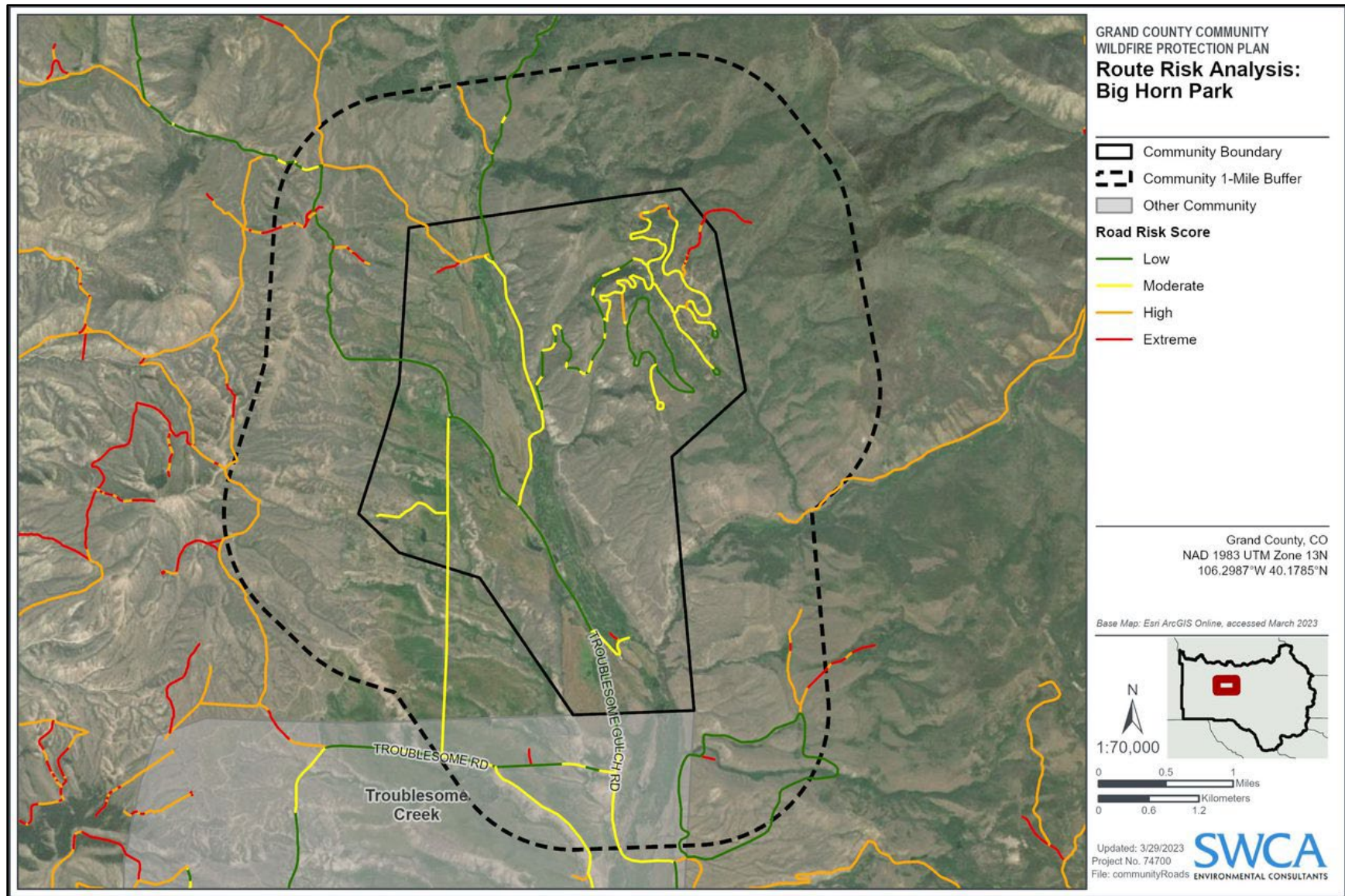


Figure C.33. Big Horn Park Route Risk Analysis.

KREMMLING WILDLAND URBAN INTERFACE COMMUNITY

KREMMLING POLYGON SUMMARY STATISTICS

| Community Polygon Background | | |
|---|-------------------------------|----------------------------|
| <u>Community Polygon Name:</u> Kremmling | <u>Total Score:</u> 76 | <u>Rating:</u> High |
| Area (Square Miles): 2.7 | | |
| Building Count: 921 | | |
| Building Density (Building Units per square mile): 345.6 | | |

| Percent of Community by Risk Assessment | | | |
|---|-------------------------|---------------------|------------------------|
| <u>Low:</u> | <u>Moderate:</u> | <u>High:</u> | <u>Extreme:</u> |
| 35.4% | 19.2% | 40.9% | 4.5% |

| Dominant Fuel Type | | | | |
|---------------------|---------------------------|---------------------|---------------------------------|-----------------------------|
| <u>Grass</u> | <u>Grass/Shrub</u> | <u>Shrub</u> | <u>Timber Understory</u> | <u>Timber Litter</u> |
| | GS2 | | | |

| Percent of Community by Modeled/Calculated Wildfire Risk Inputs | |
|---|--|
| <u>Flame Length</u> | <u>Drive Time from Fire Station</u> |
| 0-4 (ft): 46% | 0-0.5 (min.): 63.5% |
| 4-8 (ft): 31.7% | 0.5-1.0 (min.): 27.5% |
| 8-12 (ft): 16.5% | 1.0-1.5 (min.): N/A |
| >12 (ft): 5.9% | >1.5 (min.): 9% |

| 1144 Survey Summary Highlights | |
|---|--|
| <u>Positive Attributes (Low Scores)</u> | <u>Negative Attributes (High Scores)</u> |
| <ul style="list-style-type: none"> Ingress/egress Available turnarounds for fire trucks Reflective street signs Metal roof or asphalt shingle throughout Fire hydrants | <ul style="list-style-type: none"> Limited defensible space |

| Recent Fires within the polygon |
|--|
| <ul style="list-style-type: none"> None |

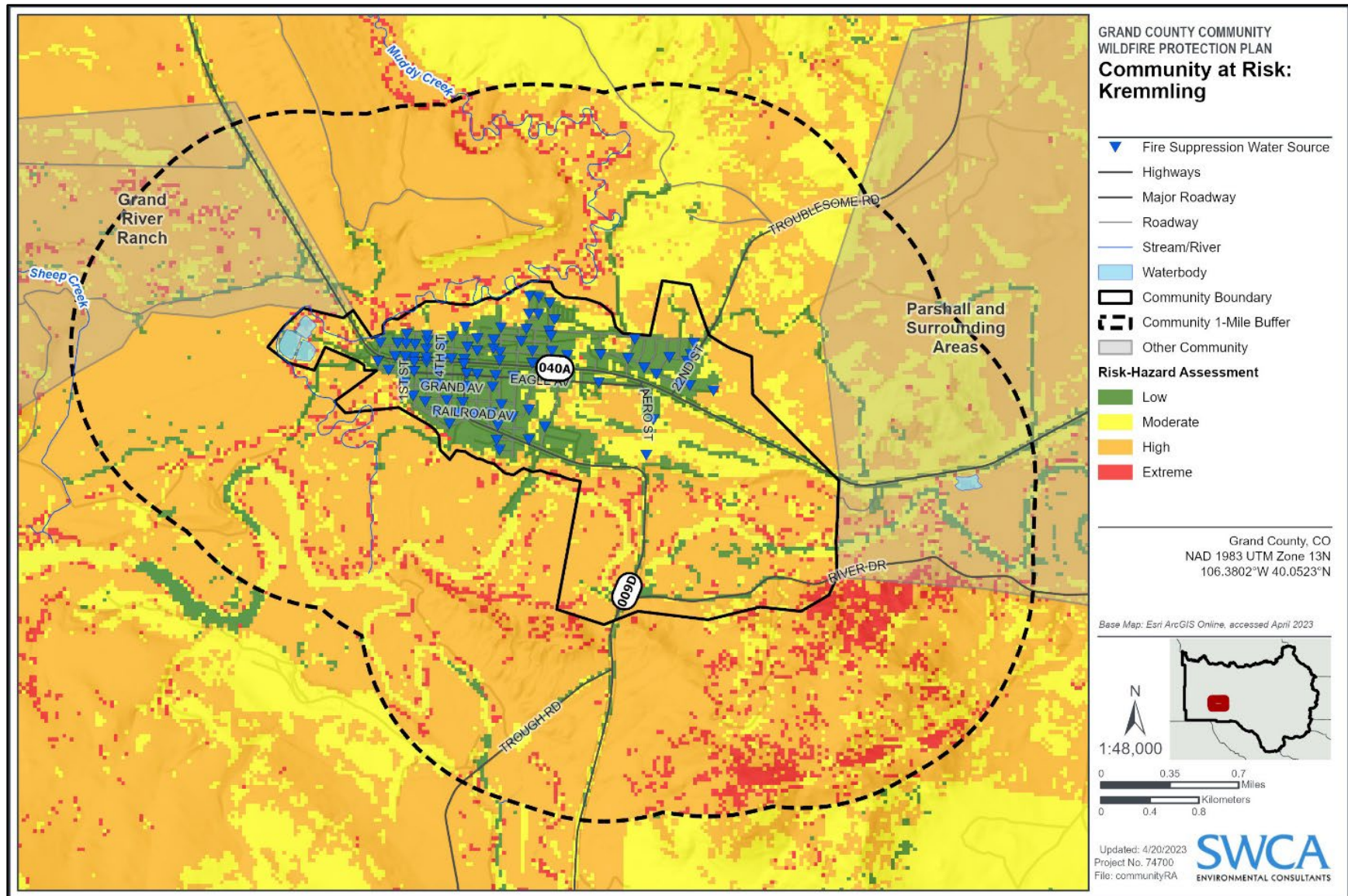


Figure C.34. Kremmling Risk-Hazard Assessment.

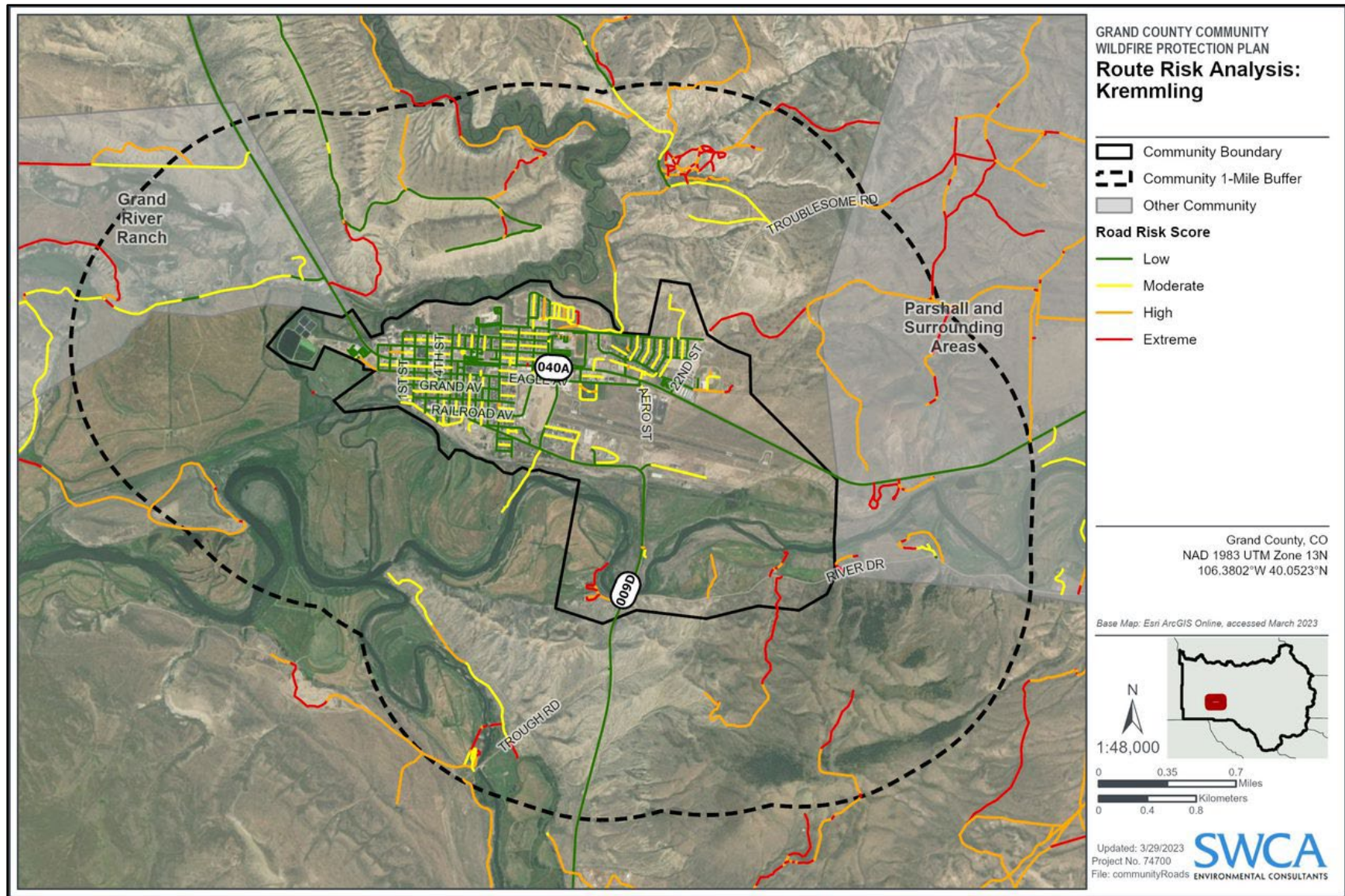


Figure C.35. Kremmling Route Risk Analysis.

GOREWOOD WILDLAND URBAN INTERFACE COMMUNITY

GOREWOOD POLYGON SUMMARY STATISTICS

| Community Polygon Background | | |
|---|--------------------------------|-------------------------------|
| <u>Community Polygon Name:</u> Gorewood | <u>Total Score:</u> 125 | <u>Rating:</u> Extreme |
| Area (Square Miles): 3.2 | | |
| Building Count: 16 | | |
| Building Density (Building Units per square mile): 5.1 | | |

| Percent of Community by Risk Assessment | | | |
|---|-------------------------|---------------------|------------------------|
| <u>Low:</u> | <u>Moderate:</u> | <u>High:</u> | <u>Extreme:</u> |
| N/A | 8.5% | 63.8% | 27.7% |

| Dominant Fuel Type | | | | |
|---------------------|---------------------------|---------------------|---------------------------------|-----------------------------|
| <u>Grass</u> | <u>Grass/Shrub</u> | <u>Shrub</u> | <u>Timber Understory</u> | <u>Timber Litter</u> |
| | | | TU1 | |

| Percent of Community by Modeled/Calculated Wildfire Risk Inputs | |
|---|--|
| <u>Flame Length</u> | <u>Drive Time from Fire Station</u> |
| 0-4 (ft): 48.2% | 0-0.5 (min.): N/A |
| 4-8 (ft): 11.8% | 0.5-1.0 (min.): 0.7% |
| 8-12 (ft): 14.1% | 1.0-1.5 (min.): 24.7% |
| >12 (ft): 25.9% | >1.5 (min.): 74.7% |

| 1144 Survey Summary Highlights | |
|--|---|
| <u>Positive Attributes (Low Scores)</u> | <u>Negative Attributes (High Scores)</u> |
| <ul style="list-style-type: none"> • Reflective street signs • Some visible fuels mitigation efforts • Metal roof or asphalt shingle throughout | <ul style="list-style-type: none"> • <2 roads in and out • Road width <20 ft • Limited turnarounds for fire trucks • Limited defensible space • Combustible building materials • Limited water sources for suppression • Above ground gas and electric utilities • Dense fuel loads |

| Recent Fires within the polygon |
|--|
| <ul style="list-style-type: none"> • Gorewood Fire (2015) |

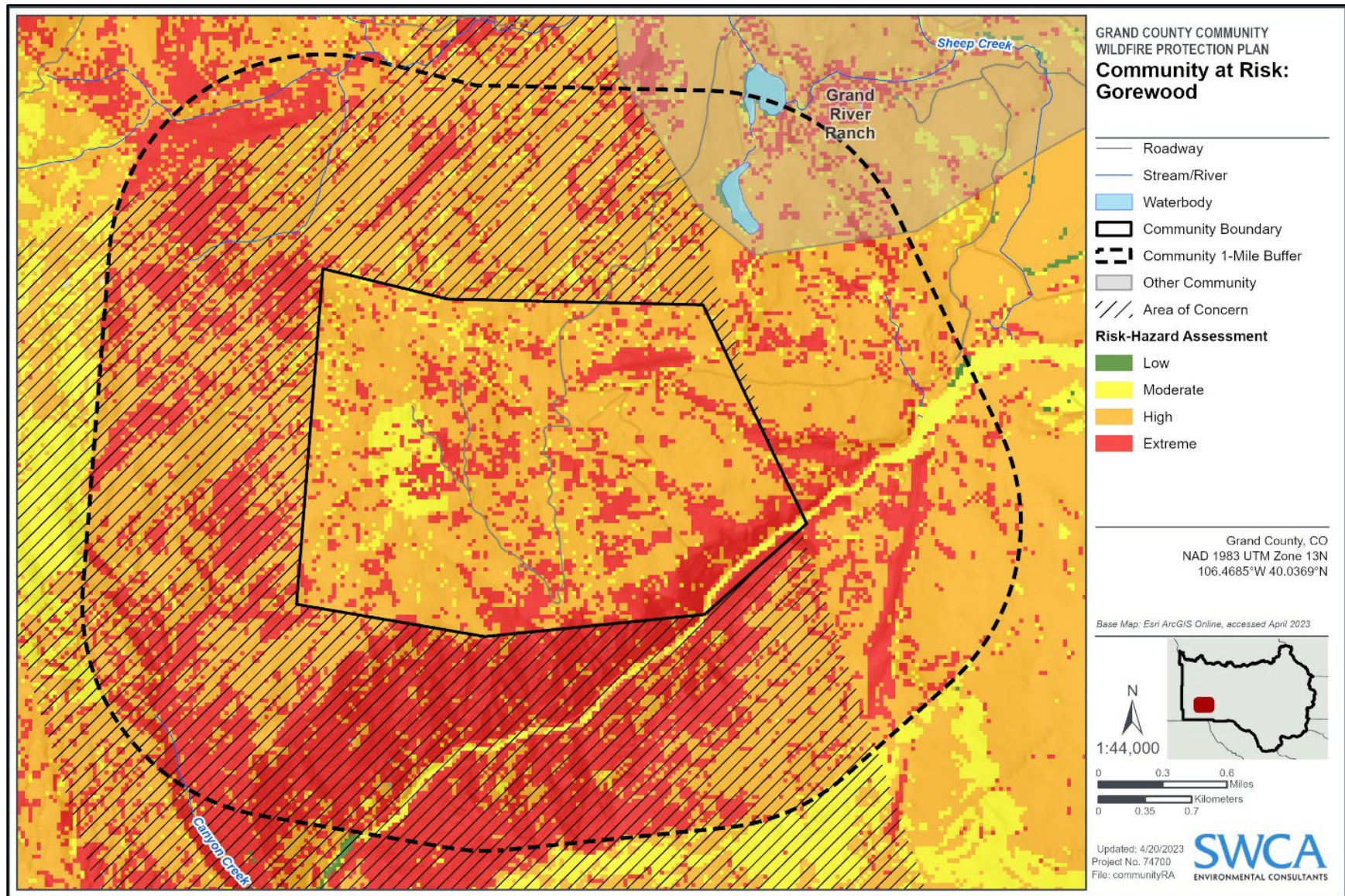


Figure C.36. Gorewood Risk-Hazard Assessment.

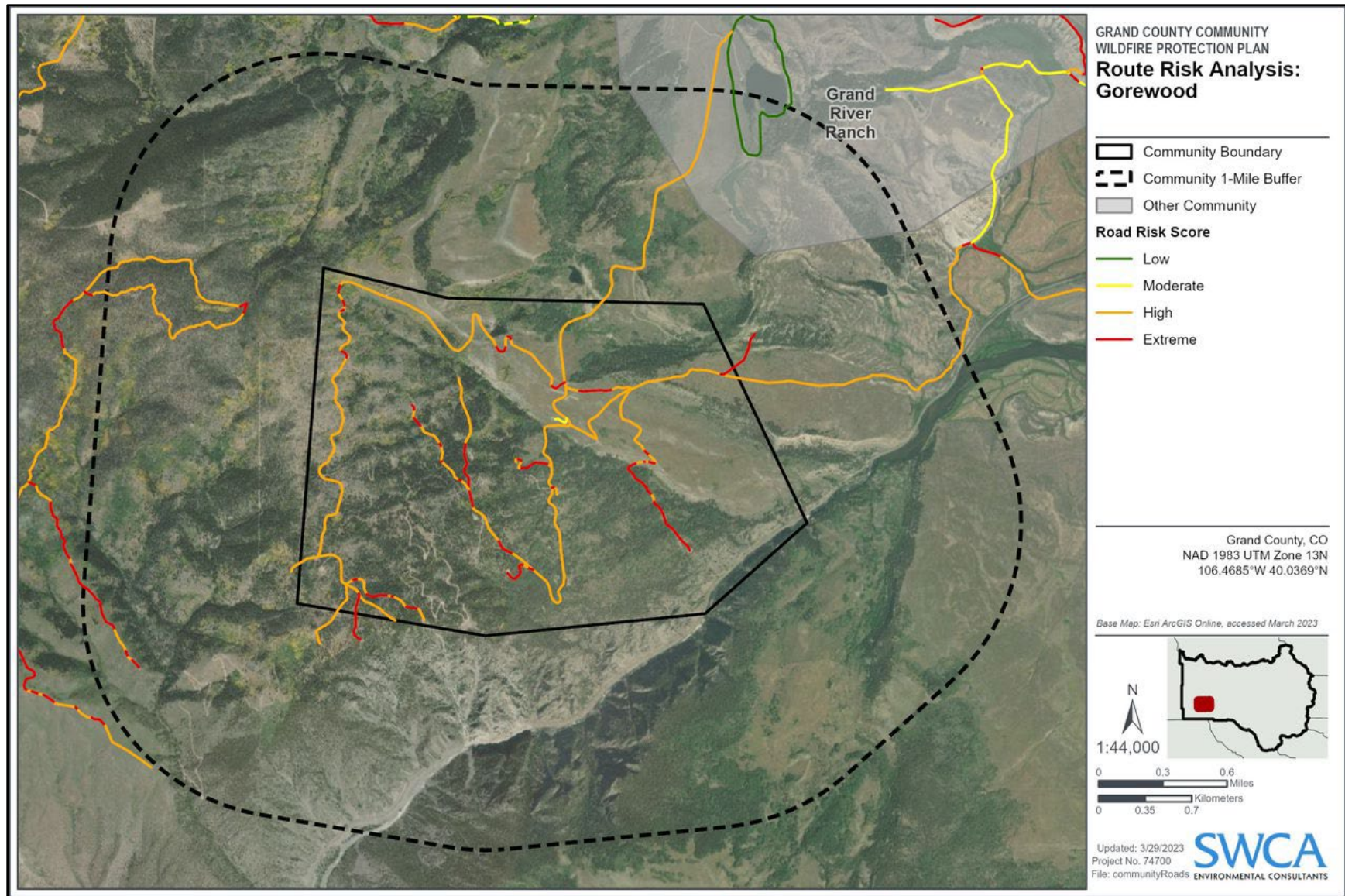


Figure C.37. Gorewood Route Risk Analysis.

OLD PARK WILDLAND URBAN INTERFACE COMMUNITY

OLD PARK POLYGON SUMMARY STATISTICS

| Community Polygon Background | | |
|--|--------------------------------|----------------------------|
| <u>Community Polygon Name:</u> Old Park | <u>Total Score:</u> 107 | <u>Rating:</u> High |
| Area (Square Miles): 15.8 | | |
| Building Count: 341 | | |
| Building Density (Building Units per square mile): 21.6 | | |

| Percent of Community by Risk Assessment | | | |
|---|-------------------------|---------------------|------------------------|
| <u>Low:</u> | <u>Moderate:</u> | <u>High:</u> | <u>Extreme:</u> |
| 0.2% | 8.8% | 62.6% | 28.5% |

| Dominant Fuel Type | | | | |
|---------------------|---------------------------|---------------------|---------------------------------|-----------------------------|
| <u>Grass</u> | <u>Grass/Shrub</u> | <u>Shrub</u> | <u>Timber Understory</u> | <u>Timber Litter</u> |
| | | | TU1 | |

| Percent of Community by Modeled/Calculated Wildfire Risk Inputs | |
|---|--|
| <u>Flame Length</u> | <u>Drive Time from Fire Station</u> |
| 0-4 (ft): 44% | 0-0.5 (min.): N/A |
| 4-8 (ft): 12.9% | 0.5-1.0 (min.): N/A |
| 8-12 (ft): 16% | 1.0-1.5 (min.): 9.3% |
| >12 (ft): 27.1% | >1.5 (min.): 90.7% |

| 1144 Survey Summary Highlights | |
|--|--|
| <u>Positive Attributes (Low Scores)</u> | <u>Negative Attributes (High Scores)</u> |
| <ul style="list-style-type: none"> • Reflective street signs • Some defensible space • Metal roof or asphalt shingle throughout • Many homes built on flat terrain | <ul style="list-style-type: none"> • Ingress/egress • Limited turnarounds for fire trucks • Combustible building materials • Limited water sources for suppression • Fire station >5 mi from community • Both gas and electric utilities above ground |

| Recent Fires within the polygon |
|--|
| <ul style="list-style-type: none"> • Silver Creek Fire (2018) |

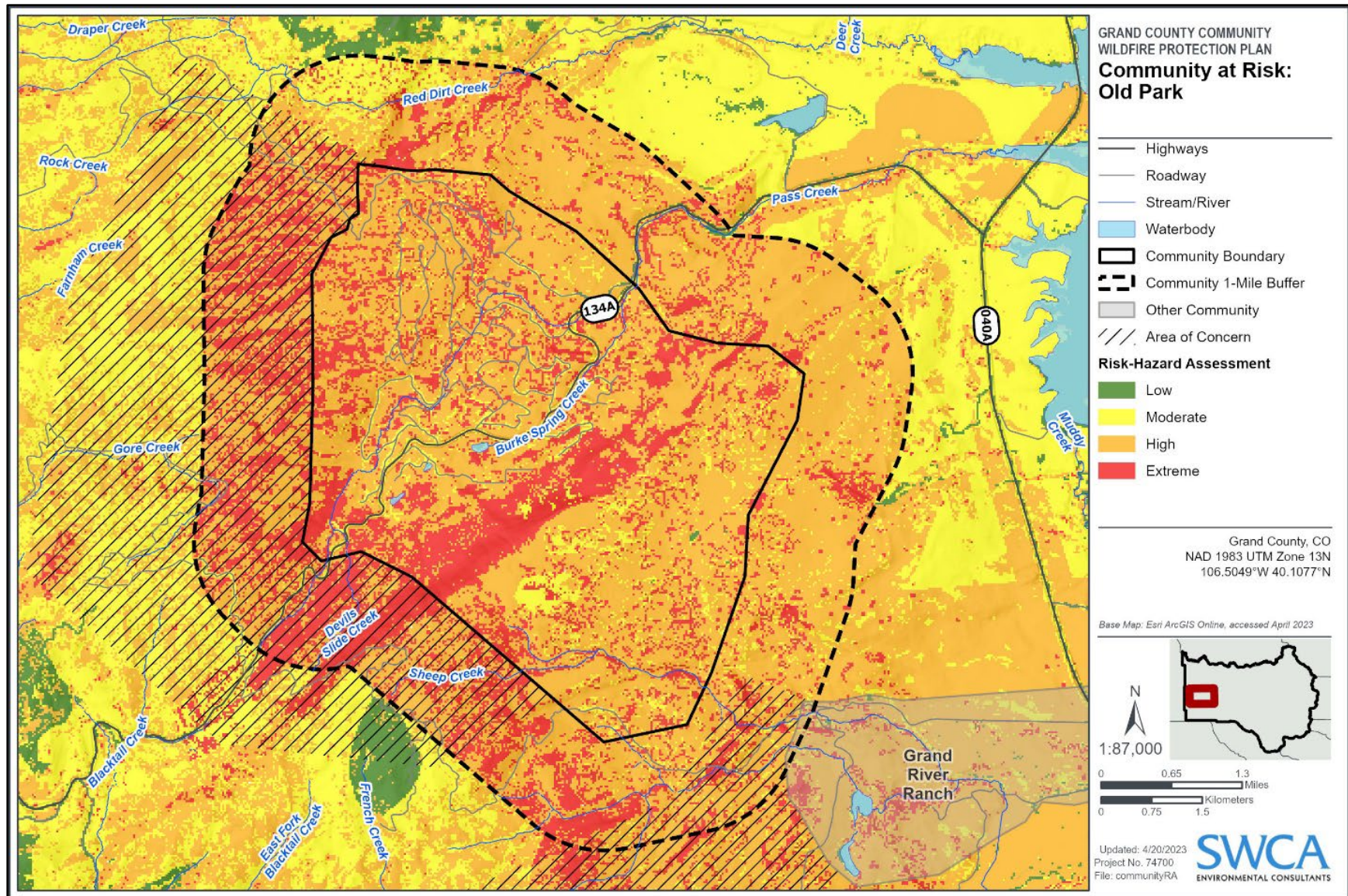


Figure C.38. Old Park Risk-Hazard Assessment.

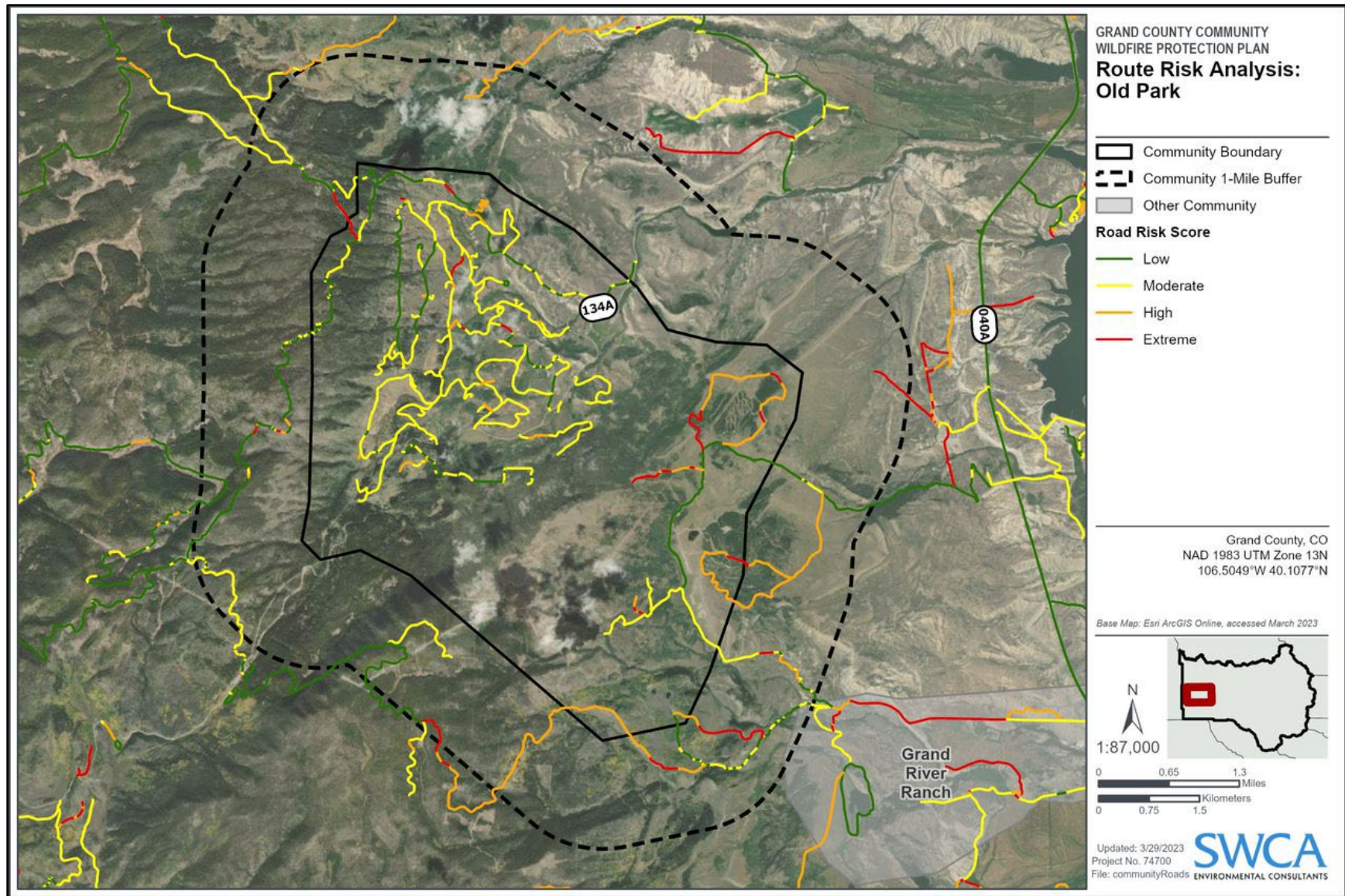


Figure C.39. Old Park Route Risk Analysis.

SUN OUTDOORS WILDLAND URBAN INTERFACE COMMUNITY

SUN OUTDOORS CROSSING POLYGON SUMMARY STATISTICS

| Community Polygon Background | | |
|---|-------------------------------|----------------------------|
| <u>Community Polygon Name:</u> Sun Outdoors | <u>Total Score:</u> 79 | <u>Rating:</u> High |
| Area (Square Miles): 3.4 | | |
| Building Count: 31 | | |
| Building Density (Building Units per square mile): 9.2 | | |

| Percent of Community by Risk Assessment | | | |
|---|---------------------------------|------------------------------|--------------------------------|
| <u>Low:</u> 0.02% | <u>Moderate:</u> 9.2% | <u>High:</u> 82.3% | <u>Extreme:</u> 8.4% |

| Dominant Fuel Type | | | | |
|----------------------------|---------------------------|---------------------|---------------------------------|-----------------------------|
| <u>Grass</u> GR2 | <u>Grass/Shrub</u> | <u>Shrub</u> | <u>Timber Understory</u> | <u>Timber Litter</u> |

| Percent of Community by Modeled/Calculated Wildfire Risk Inputs | |
|---|--|
| <u>Flame Length</u> | <u>Drive Time from Fire Station</u> |
| 0-4 (ft): 25.8% | 0-0.5 (min.): 0.04% |
| 4-8 (ft): 39% | 0.5-1.0 (min.): 12.3% |
| 8-12 (ft): 27.8% | 1.0-1.5 (min.): 0.06% |
| >12 (ft): 7.4% | >1.5 (min.): 87.6% |

| 1144 Survey Summary Highlights | |
|---|--|
| <u>Positive Attributes (Low Scores)</u> | <u>Negative Attributes (High Scores)</u> |
| <ul style="list-style-type: none"> • Reflective street signs • Metal roof or asphalt shingle throughout • Fire hydrants throughout • Fire station <5 mi from community • Underground gas and electric utilities | <ul style="list-style-type: none"> • Limited turnarounds for fire trucks • <u>Narrow roads with large vehicle traffic</u> • Limited defensible space • Combustible housing materials |

| Recent Fires within the polygon |
|---|
| <ul style="list-style-type: none"> • East Troublesome (2020) |

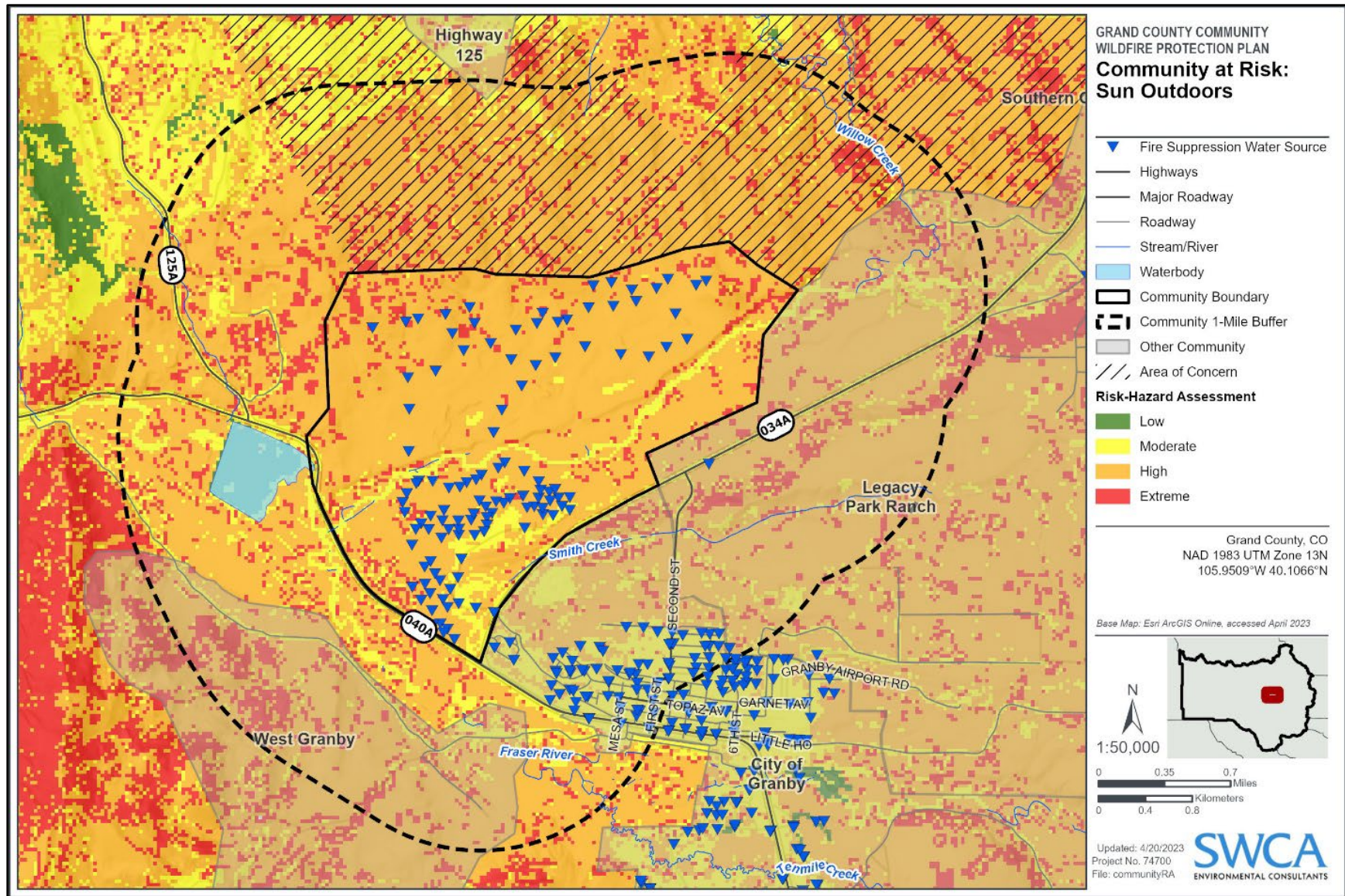


Figure C.40. Sun Outdoors Risk-Hazard Assessment.

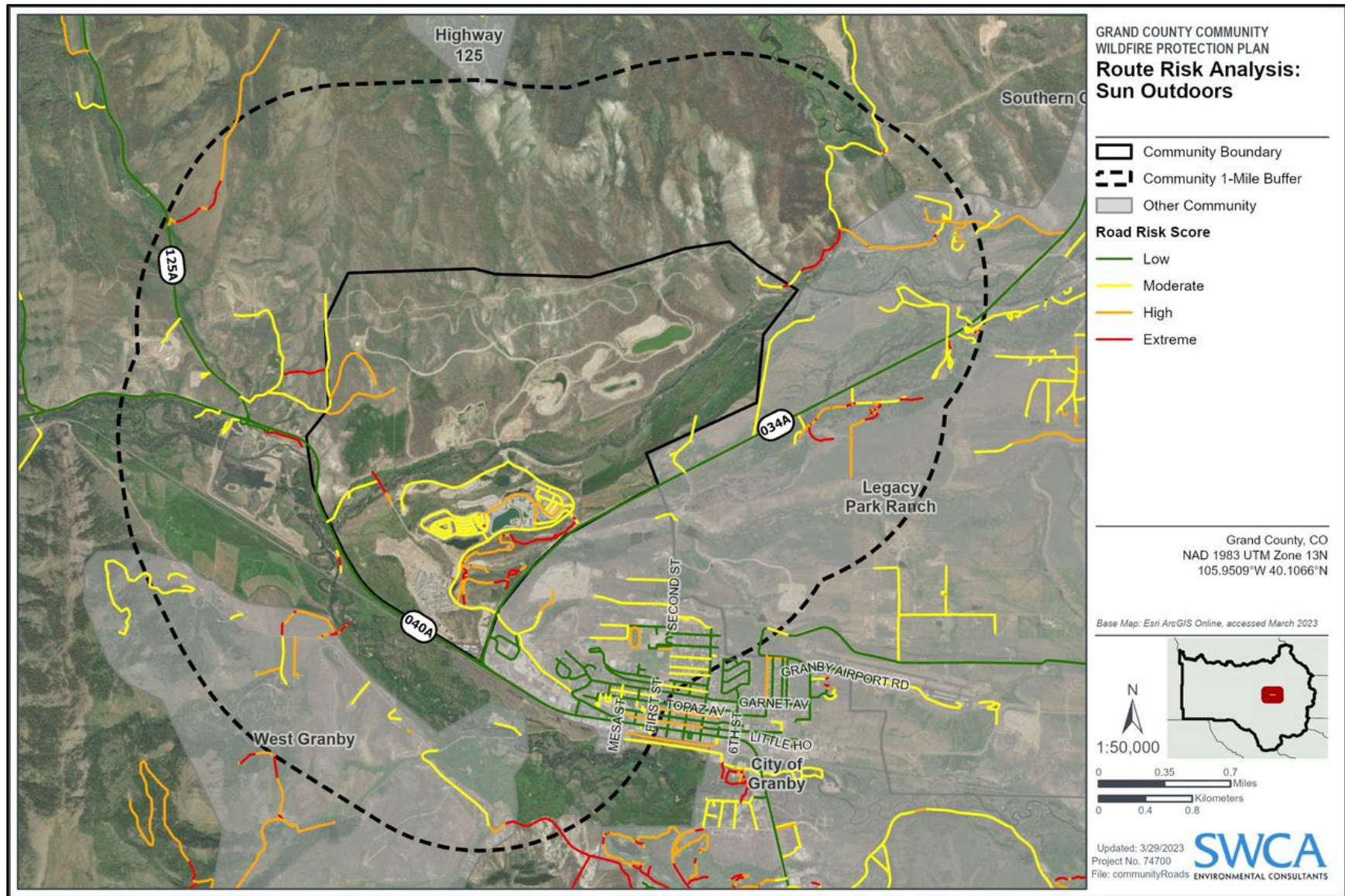


Figure C.41. Sun Outdoors Route Risk Analysis.

LEGACY PARK RANCH WILDLAND URBAN INTERFACE COMMUNITY

LEGACY PARK RANCH COMMUNITY POLYGON SUMMARY STATISTICS

| Community Polygon Background | | |
|---------------------------------------|--|--------------------------------|
| <u>Community Polygon Name:</u> | Legacy Park Ranch | <u>Total Score:</u> 107 |
| | | <u>Rating:</u> High |
| | Area (Square Miles): 12.5 | |
| | Building Count: 316 | |
| | Building Density (Building Units per square mile): 25.3 | |

| Percent of Community by Risk Assessment | | | |
|---|-------------------------|---------------------|------------------------|
| <u>Low:</u> | <u>Moderate:</u> | <u>High:</u> | <u>Extreme:</u> |
| 0.1% | 7.9% | 67.5% | 24.6% |

| Dominant Fuel Type | | | | |
|---------------------|---------------------------|---------------------|---------------------------------|-----------------------------|
| <u>Grass</u> | <u>Grass/Shrub</u> | <u>Shrub</u> | <u>Timber Understory</u> | <u>Timber Litter</u> |
| | GS2 | | TU5 | |

| Percent of Community by Modeled/Calculated Wildfire Risk Inputs | |
|---|--|
| <u>Flame Length</u> | <u>Drive Time from Fire Station</u> |
| 0-4 (ft): 25.7% | 0-0.5 (min.): 0.6% |
| 4-8 (ft): 19.3% | 0.5-1.0 (min.): 18.3% |
| 8-12 (ft): 33.2% | 1.0-1.5 (min.): 42.8% |
| >12 (ft): 21.9% | >1.5 (min.): 38.3% |

| 1144 Survey Summary Highlights | |
|---|--|
| <u>Positive Attributes (Low Scores)</u> | <u>Negative Attributes (High Scores)</u> |
| <ul style="list-style-type: none"> • 2+ roads in and out • Metal roof or asphalt shingle throughout • Some hydrants throughout | <ul style="list-style-type: none"> • Non surfaced, steep roads • Limited turnarounds for fire trucks • Limited defensible space • Combustible building materials |

| Recent Fires within the polygon |
|--|
| <ul style="list-style-type: none"> • East Troublesome (2020) • 627 Fire (2019) |

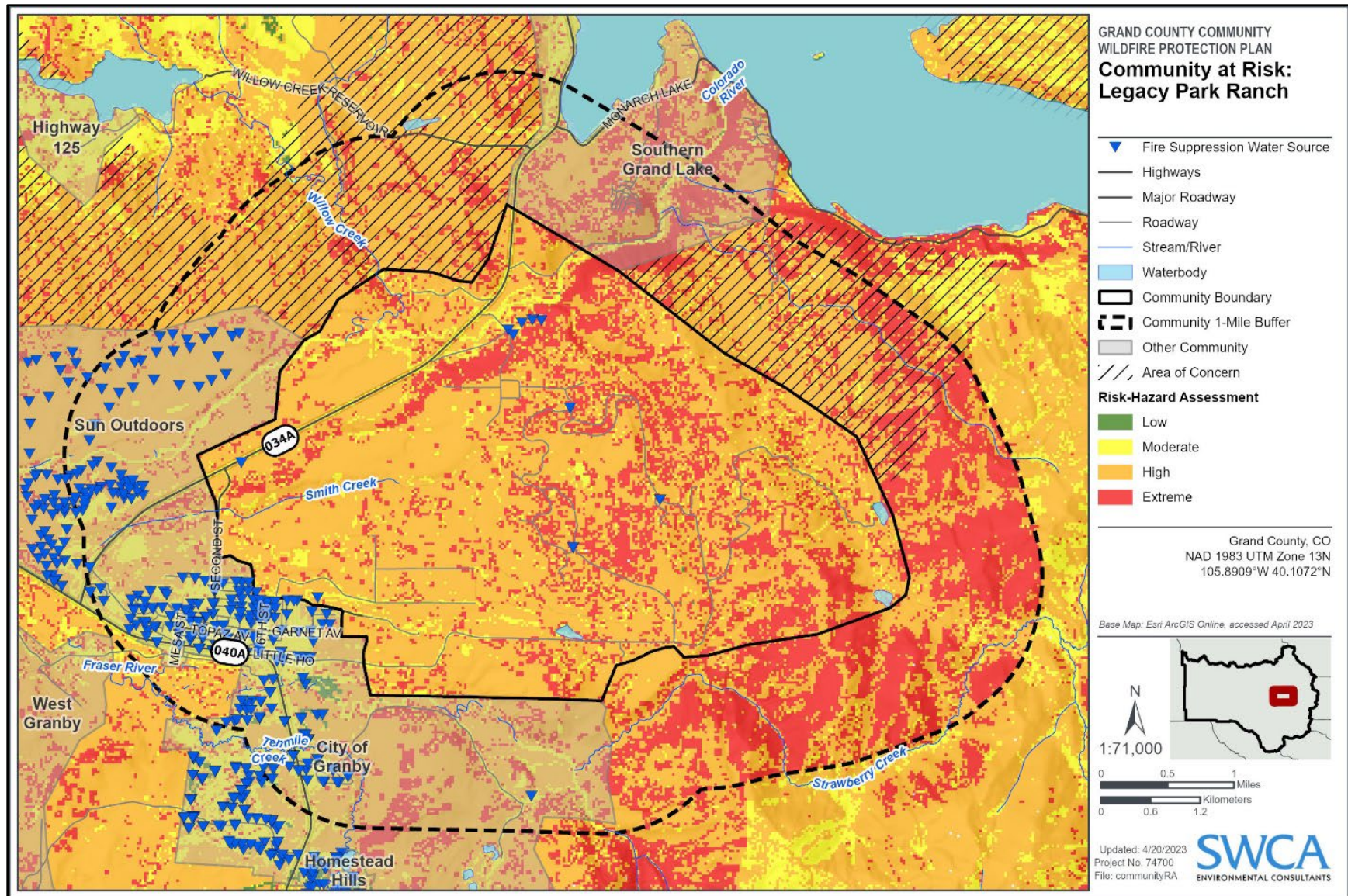


Figure C.42. Legacy Park Ranch Risk-Hazard Assessment.

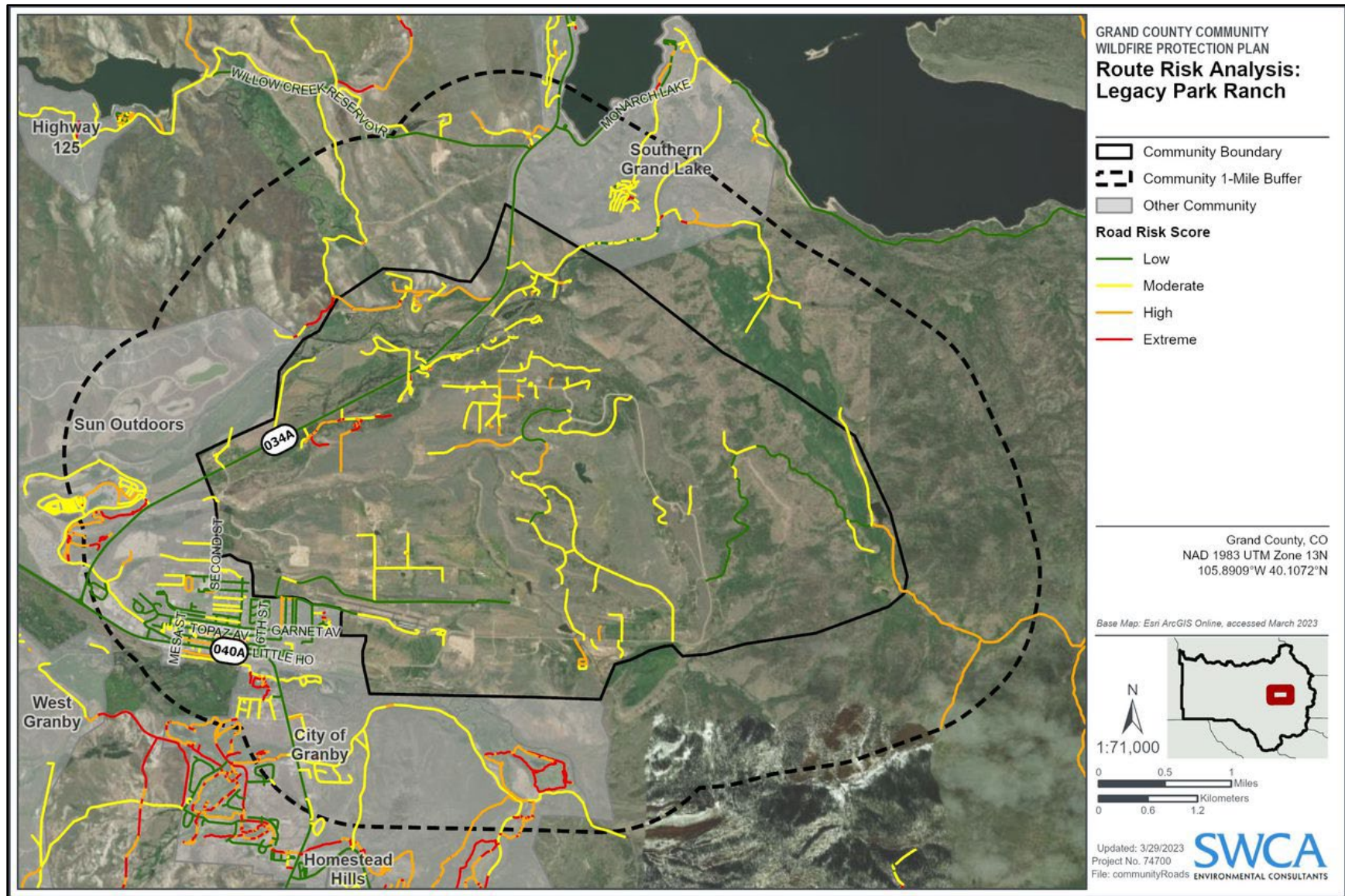


Figure C.43. Legacy Park Ranch Route Risk Analysis.

NORTHERN GRAND LAKE WILDLAND URBAN INTERFACE COMMUNITY

NORTHERN GRAND LAKE POLYGON SUMMARY STATISTICS

| Community Polygon Background | | |
|---------------------------------------|---|--------------------------------|
| <u>Community Polygon Name:</u> | Northern Grand Lake | <u>Total Score:</u> 101 |
| | | <u>Rating:</u> High |
| | Area (Square Miles): 10.6 | |
| | Building Count: 2284 | |
| | Building Density (Building Units per square mile): 215.2 | |

| Percent of Community by Risk Assessment | | | |
|---|-------------------------|---------------------|------------------------|
| <u>Low:</u> | <u>Moderate:</u> | <u>High:</u> | <u>Extreme:</u> |
| 10% | 51.2% | 31.6% | 7.1% |

| Dominant Fuel Type | | | | |
|---------------------|---------------------------|---------------------|---------------------------------|-----------------------------|
| <u>Grass</u> | <u>Grass/Shrub</u> | <u>Shrub</u> | <u>Timber Understory</u> | <u>Timber Litter</u> |
| | GS1 | | | |

| Percent of Community by Modeled/Calculated Wildfire Risk Inputs | |
|---|--|
| <u>Flame Length</u> | <u>Drive Time from Fire Station</u> |
| 0-4 (ft): 67.8% | 0-0.5 (min.): 37.3% |
| 4-8 (ft): 17.8% | 0.5-1.0 (min.): 22.2% |
| 8-12 (ft): 5.9% | 1.0-1.5 (min.): 0.18% |
| >12 (ft): 8.4% | >1.5 (min.): 40.3% |

| 1144 Survey Summary Highlights | |
|--|--|
| <u>Positive Attributes (Low Scores)</u> | <u>Negative Attributes (High Scores)</u> |
| <ul style="list-style-type: none"> • 2+ roads in and out • Reflective street signs • Metal roof or asphalt shingle throughout • Many structures >30 ft to slope • Hydrants and water tanks throughout • Station <5 mi from community | <ul style="list-style-type: none"> • Limited turnarounds for fire trucks • Limited defensible space • In areas that remain unburned, dense fuel loads • Combustible building materials |

| Recent Fires within the polygon |
|---|
| <ul style="list-style-type: none"> • East Troublesome (2020) • Middle Supply Creek (1980) • Grand Lake 06 (2006); Grand Lake (2004) • Golf Course Fire (2018) |

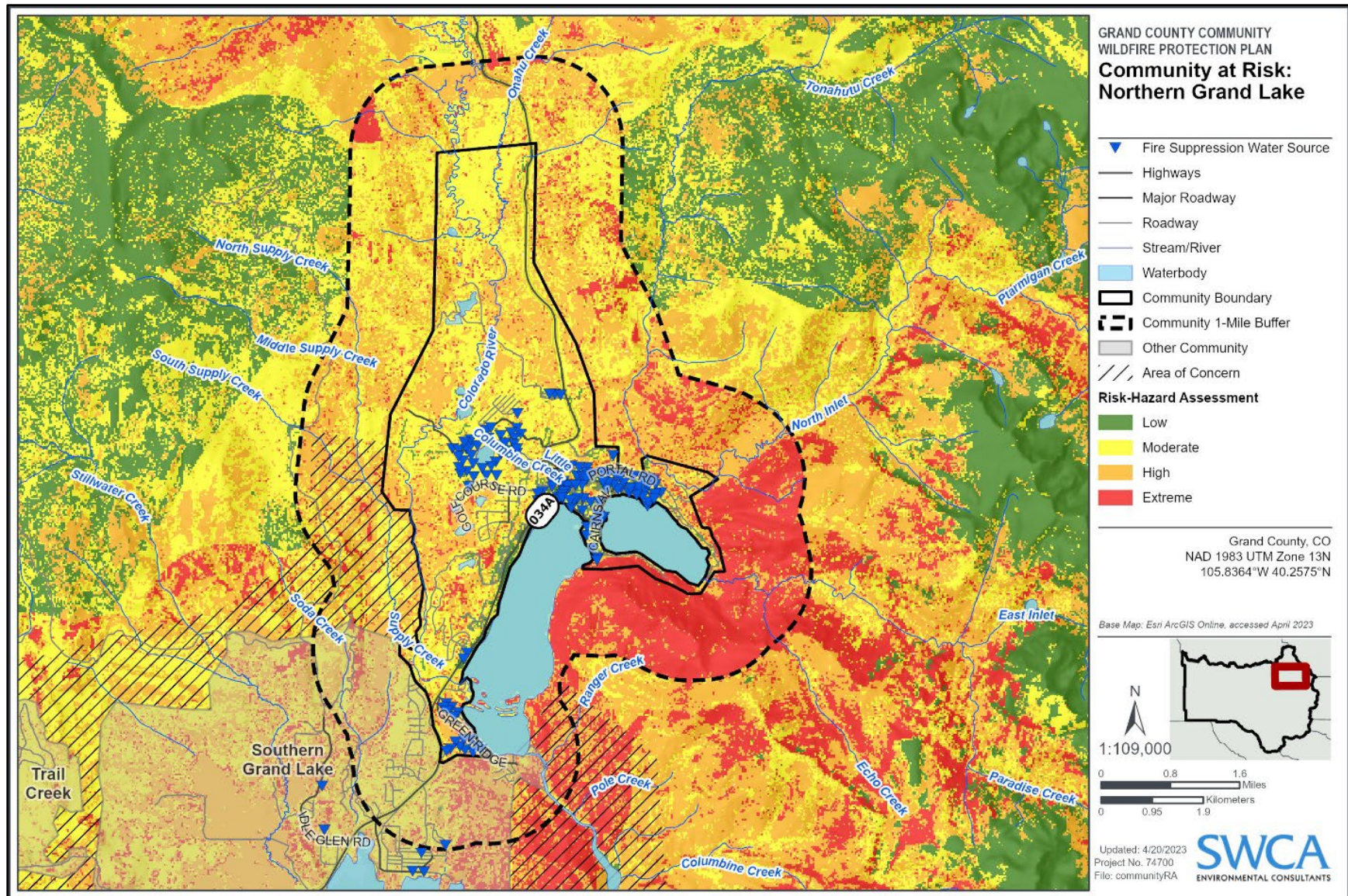


Figure C.44. Northern Grand Lake Risk-Hazard Assessment.

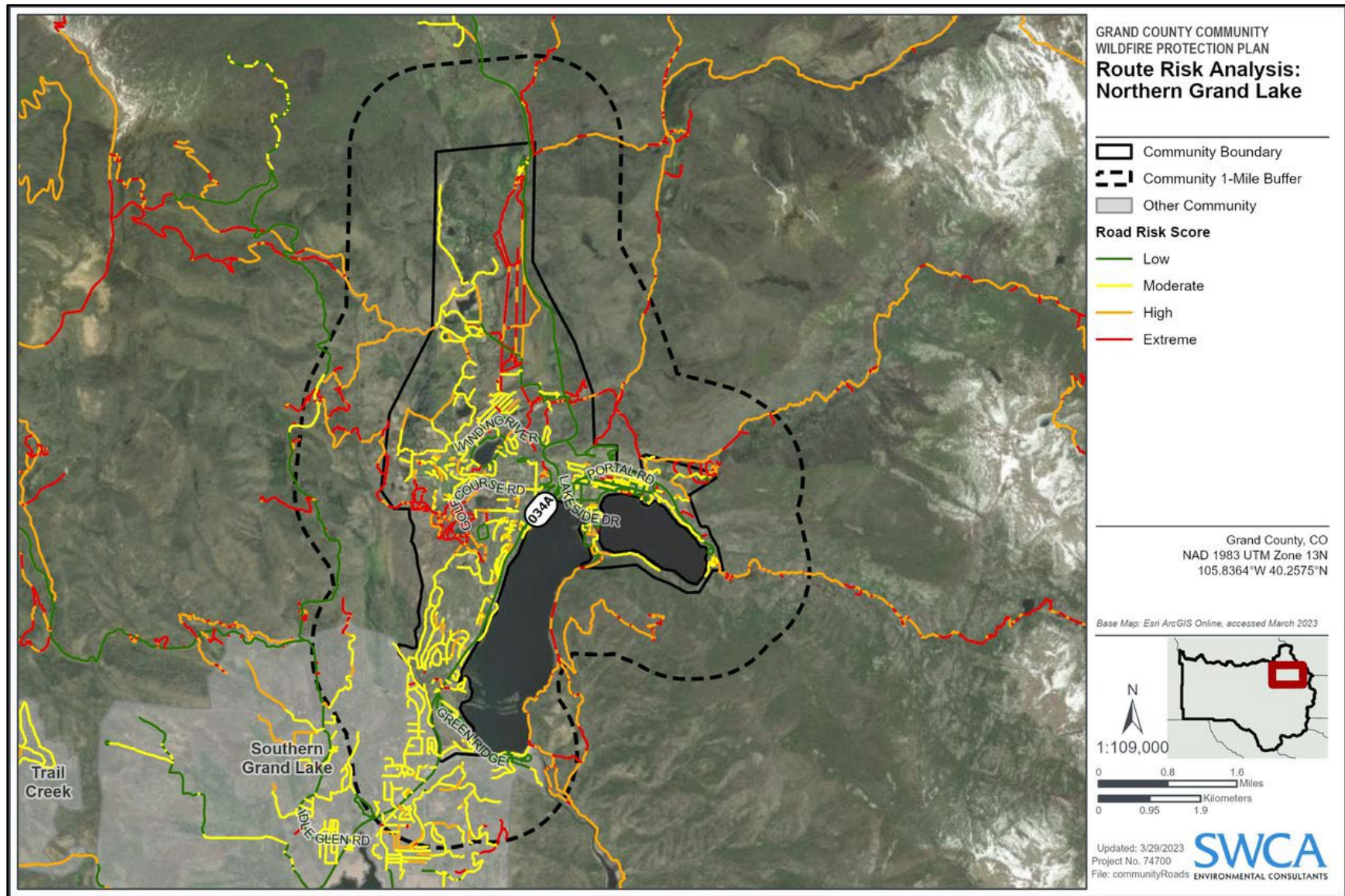


Figure C.45. Northern Grand Lake Route Risk Analysis.

SOUTHERN GRAND LAKE WILDLAND URBAN INTERFACE COMMUNITY

SOUTHERN GRAND LAKE POLYGON SUMMARY STATISTICS

| Community Polygon Background | | |
|---------------------------------------|---|--------------------------------|
| <u>Community Polygon Name:</u> | Southern Grand Lake | <u>Total Score:</u> 109 |
| | | <u>Rating:</u> High |
| | Area (Square Miles): 16.1 | |
| | Building Count: 1,641 | |
| | Building Density (Building Units per square mile): 102.2 | |

| Percent of Community by Risk Assessment | | | |
|---|-------------------------|---------------------|------------------------|
| <u>Low:</u> | <u>Moderate:</u> | <u>High:</u> | <u>Extreme:</u> |
| 2.5% | 35% | 46.1% | 16.3% |

| Dominant Fuel Type | | | | |
|---------------------|---------------------------|---------------------|---------------------------------|-----------------------------|
| <u>Grass</u> | <u>Grass/Shrub</u> | <u>Shrub</u> | <u>Timber Understory</u> | <u>Timber Litter</u> |
| | GS1 | | TU5 | |

| Percent of Community by Modeled/Calculated Wildfire Risk Inputs | |
|---|--|
| <u>Flame Length</u> | <u>Drive Time from Fire Station</u> |
| 0-4 (ft): 43.4% | 0-0.5 (min.): 36.8% |
| 4-8 (ft): 25.5% | 0.5-1.0 (min.): 24.2% |
| 8-12 (ft): 13.6% | 1.0-1.5 (min.): 25.5% |
| >12 (ft): 17.4% | >1.5 (min.): 13.6% |

| 1144 Survey Summary Highlights | |
|---|---|
| <u>Positive Attributes (Low Scores)</u> | <u>Negative Attributes (High Scores)</u> |
| <ul style="list-style-type: none"> • 2+ roads in and out • Reflective street signs • Metal roof or asphalt shingle throughout • Fire hydrants • Fire station <5 mi from community | <ul style="list-style-type: none"> • Non-surfaced roads, >5% grade • Limited turnarounds for fire trucks • Limited defensible space • Combustible building materials • Many structures <30 ft to slope |

| Recent Fires within the polygon |
|--|
| <ul style="list-style-type: none"> • East Troublesome (2020) • 424 Fire (2017) |

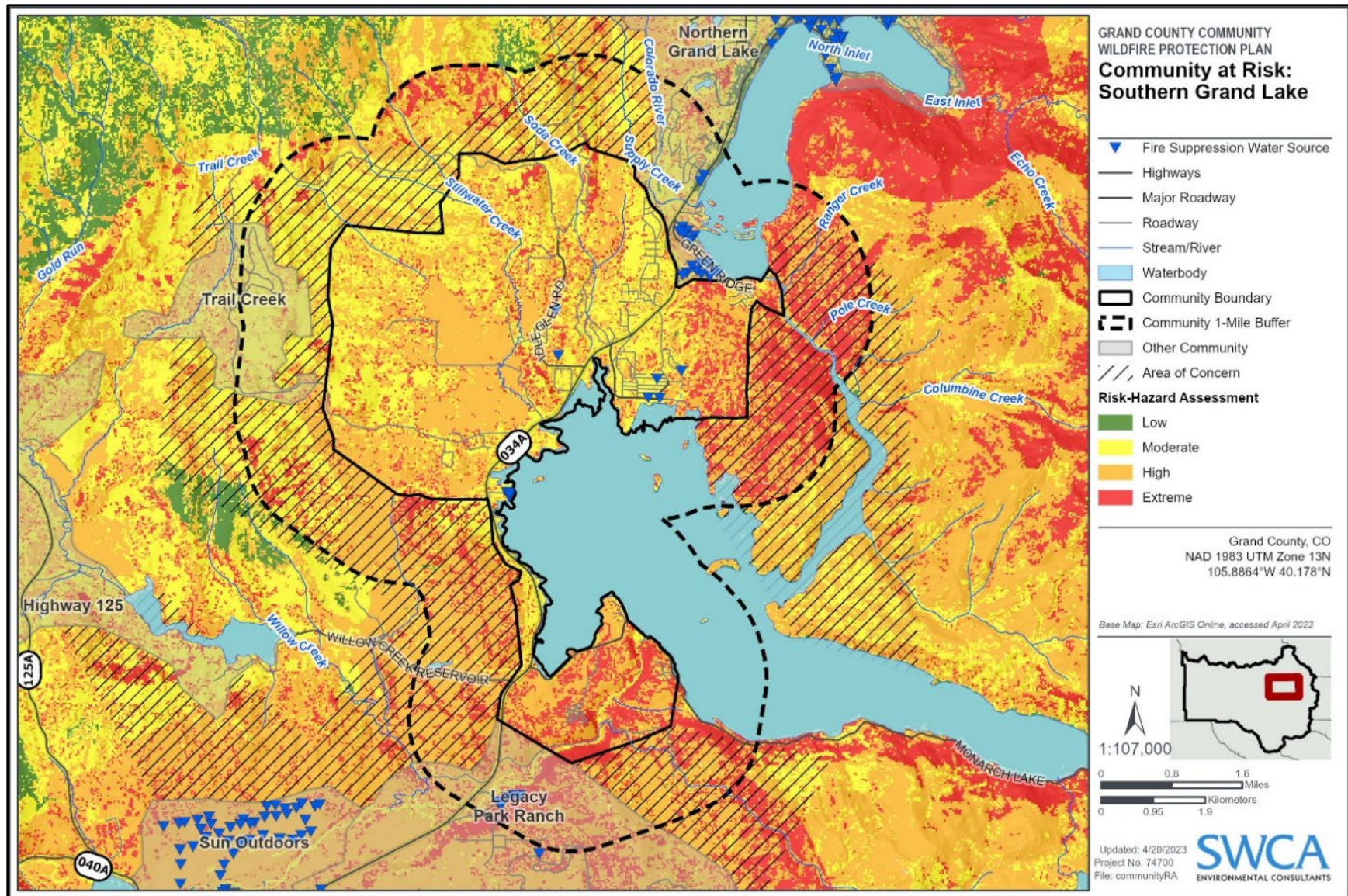


Figure C.46. Southern Grand Lake Risk-Hazard Assessment.

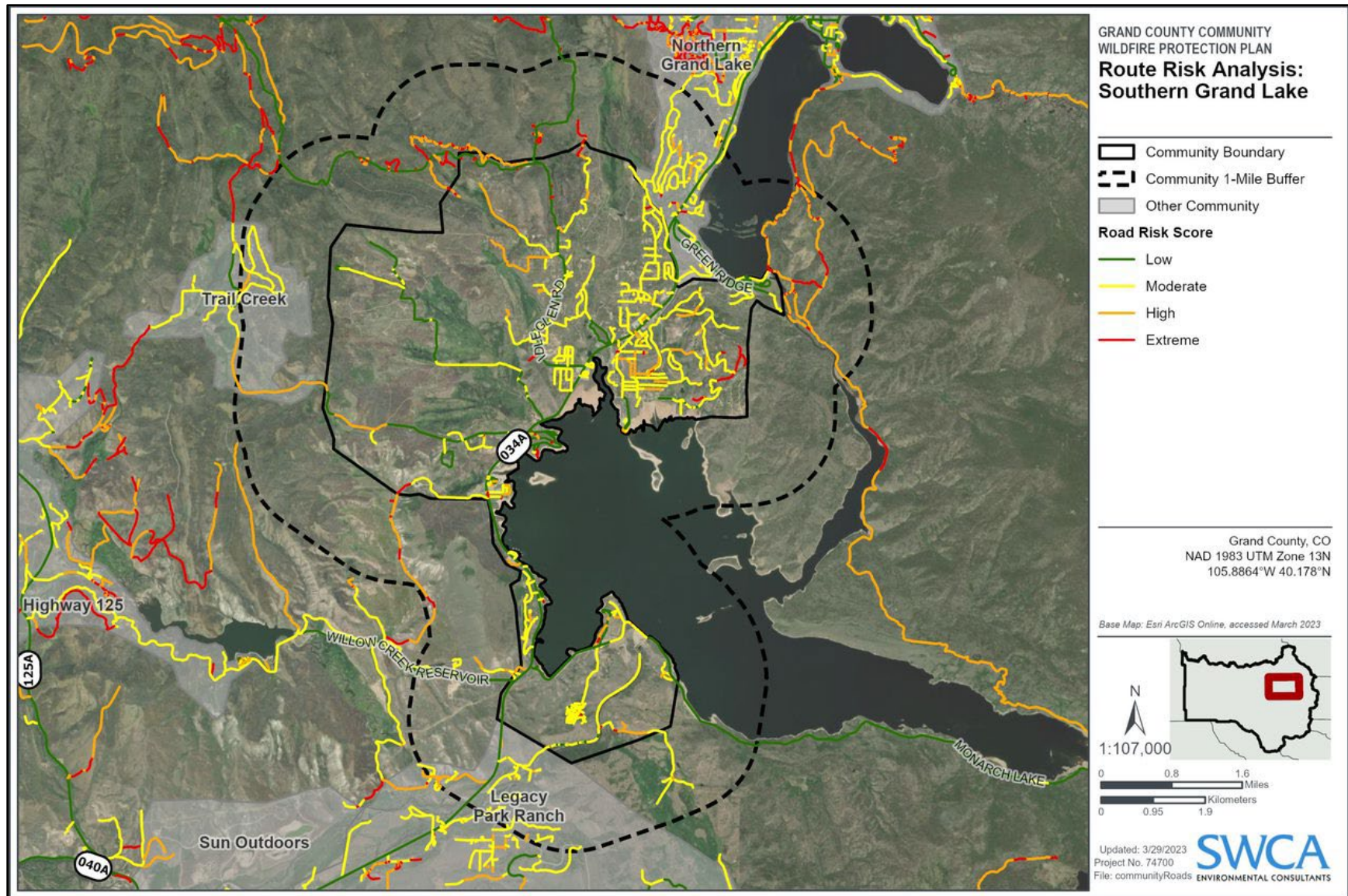


Figure C.47. Southern Grand Lake Route Risk Analysis.

TRAIL CREEK WILDLAND URBAN INTERFACE COMMUNITY

TRAIL CREEK POLYGON SUMMARY STATISTICS

| Community Polygon Background | | |
|--|--------------------------------|----------------------------|
| <u>Community Polygon Name:</u> Trail Creek | <u>Total Score:</u> 104 | <u>Rating:</u> High |
| Area (Square Miles): 2.2 | | |
| Building Count: 150 | | |
| Building Density (Building Units per square mile): 66.9 | | |

| Percent of Community by Risk Assessment | | | |
|---|-------------------------|---------------------|------------------------|
| <u>Low:</u> | <u>Moderate:</u> | <u>High:</u> | <u>Extreme:</u> |
| 0.28% | 63.1% | 30.6% | 5.9% |

| Dominant Fuel Type | | | | |
|---------------------|---------------------------|---------------------|---------------------------------|-----------------------------|
| <u>Grass</u> | <u>Grass/Shrub</u> | <u>Shrub</u> | <u>Timber Understory</u> | <u>Timber Litter</u> |
| | GS1 | | | |

| Percent of Community by Modeled/Calculated Wildfire Risk Inputs | |
|---|--|
| <u>Flame Length</u> | <u>Drive Time from Fire Station</u> |
| 0-4 (ft): 58% | 0-0.5 (min.): N/A |
| 4-8 (ft): 29.6% | 0.5-1.0 (min.): 23.3% |
| 8-12 (ft): 5.5% | 1.0-1.5 (min.): 48% |
| >12 (ft): 6.9% | >1.5 (min.): 28.7% |

| 1144 Survey Summary Highlights | |
|---|--|
| <u>Positive Attributes (Low Scores)</u> | <u>Negative Attributes (High Scores)</u> |
| <ul style="list-style-type: none"> • Present, reflective street signs • In areas, good defensible space • Metal roof or asphalt shingle throughout • Many structures >30 ft to slope | <ul style="list-style-type: none"> • Ingress/egress • Limited turnarounds for fire trucks • Combustible building materials • Limited water sources for suppression • Fire station >5 mi from community |

| Recent Fires within the polygon |
|---|
| <ul style="list-style-type: none"> • East Troublesome (2020) |

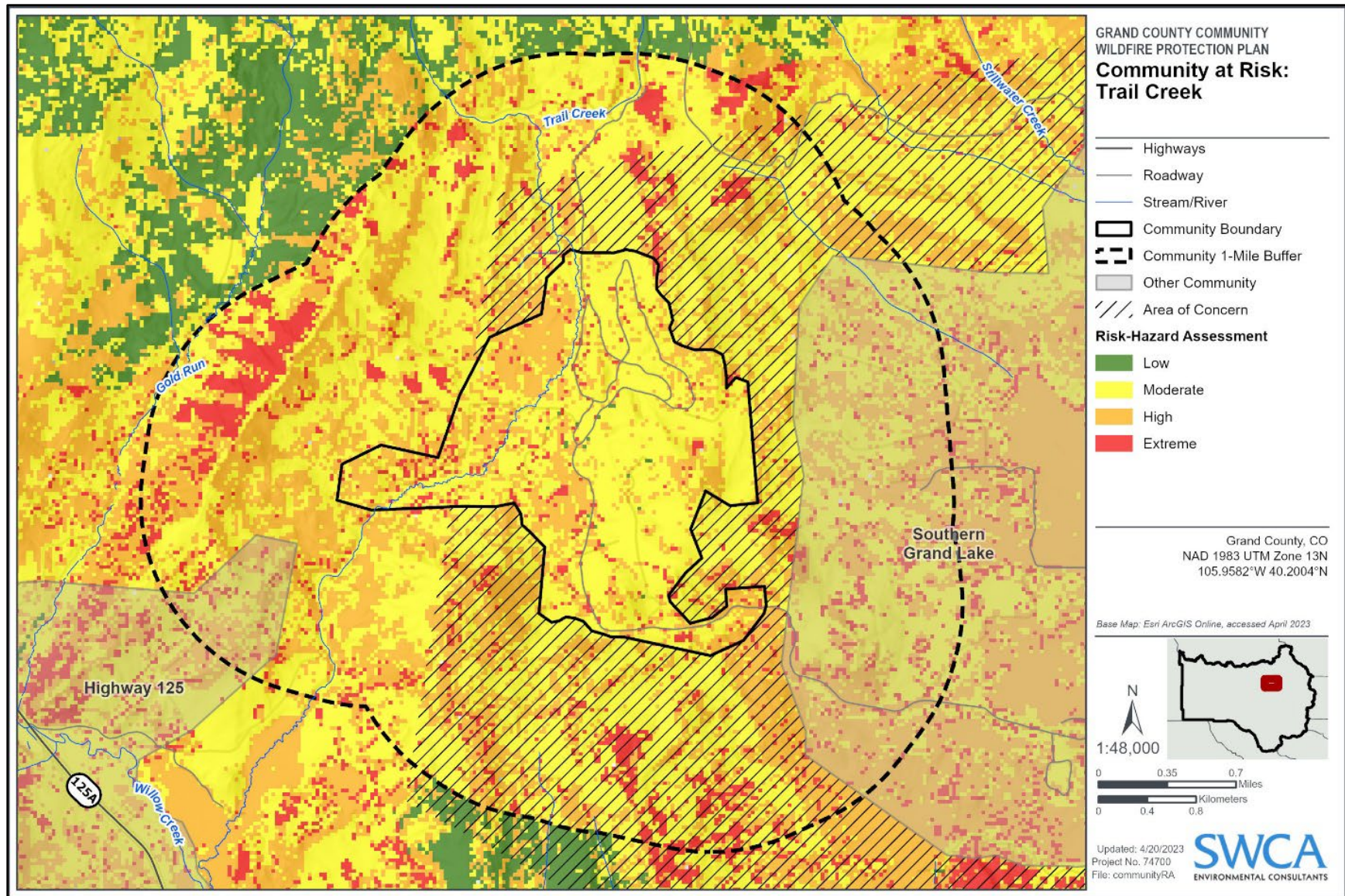


Figure C.48. Trail Creek Risk-Hazard Assessment.

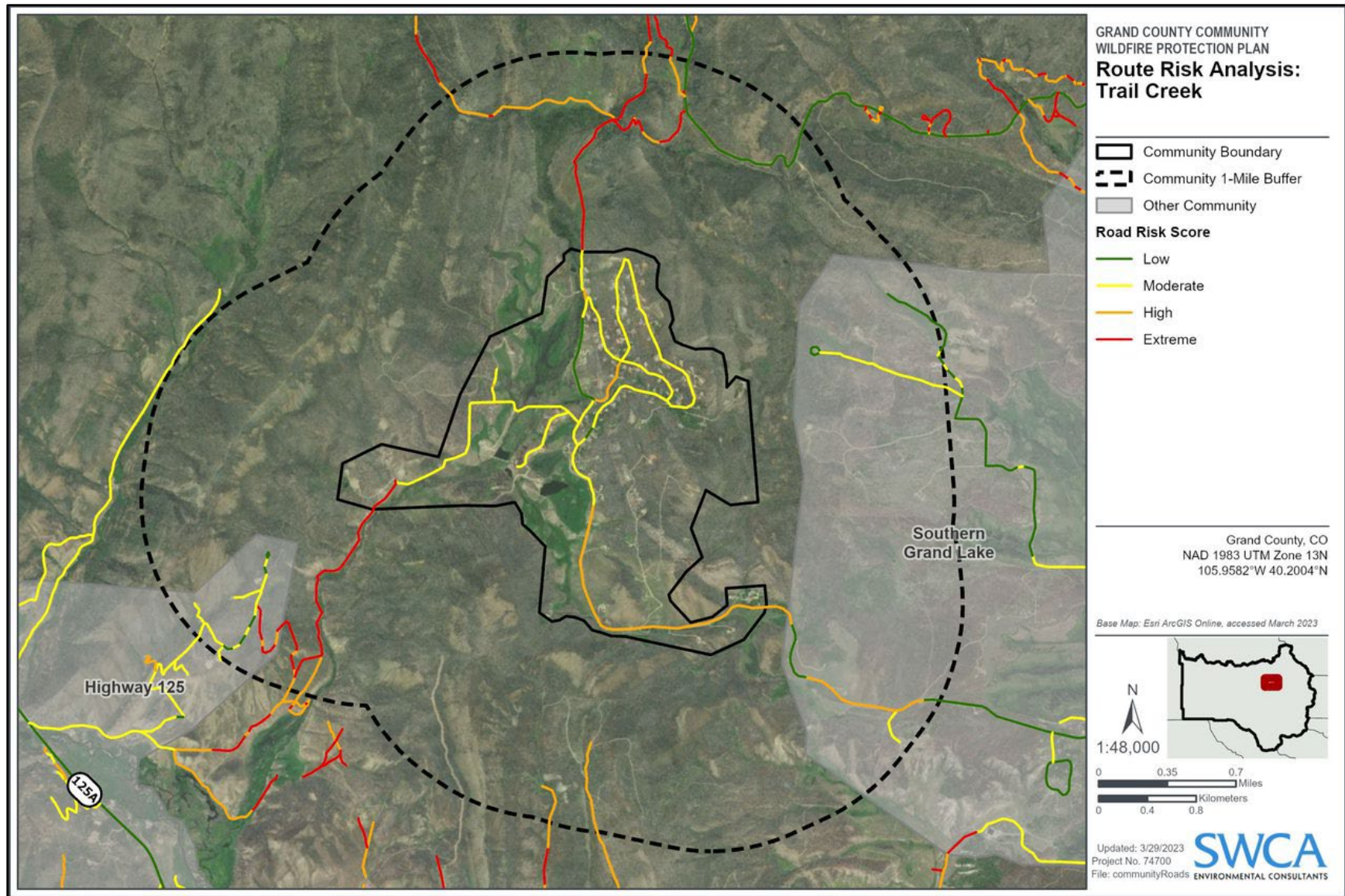


Figure C.49. Trail Creek Route Risk Analysis.

LAKE AGNES WILDLAND URBAN INTERFACE COMMUNITY

LAKE AGNES POLYGON SUMMARY STATISTICS

| Community Polygon Background | | |
|---|--------------------------------|-------------------------------|
| <u>Community Polygon Name:</u> Lake Agnes | <u>Total Score:</u> 115 | <u>Rating:</u> Extreme |
| Area (Square Miles): 6.3 | | |
| Building Count: 38 | | |
| Building Density (Building Units per square mile): 6 | | |

| Percent of Community by Risk Assessment | | | |
|---|-------------------------|---------------------|------------------------|
| <u>Low:</u> | <u>Moderate:</u> | <u>High:</u> | <u>Extreme:</u> |
| 2.6% | 44.1% | 41.3% | 12% |

| Dominant Fuel Type | | | | |
|---------------------|---------------------------|---------------------|---------------------------------|-----------------------------|
| <u>Grass</u> | <u>Grass/Shrub</u> | <u>Shrub</u> | <u>Timber Understory</u> | <u>Timber Litter</u> |
| | | | TU1 | |

| Percent of Community by Modeled/Calculated Wildfire Risk Inputs | |
|---|--|
| <u>Flame Length</u> | <u>Drive Time from Fire Station</u> |
| 0-4 (ft): 45.7% | 0-0.5 (min.): N/A |
| 4-8 (ft): 16.5% | 0.5-1.0 (min.): N/A |
| 8-12 (ft): 22.4% | 1.0-1.5 (min.): N/A |
| >12 (ft): 15.4% | >1.5 (min.): 100% |

| 1144 Survey Summary Highlights | |
|--|--|
| <u>Positive Attributes (Low Scores)</u> | <u>Negative Attributes (High Scores)</u> |
| <ul style="list-style-type: none"> • 2+ roads in and out • Class A roofing materials • Spacing between structures | <ul style="list-style-type: none"> • Ingress/egress • Limited turnarounds for fire trucks • Limited defensible space • Steep slopes • Combustible building materials • Structures <30 ft to slope • Fire station >5 mi from community |

| Recent Fires within the polygon |
|--|
| <ul style="list-style-type: none"> • None |

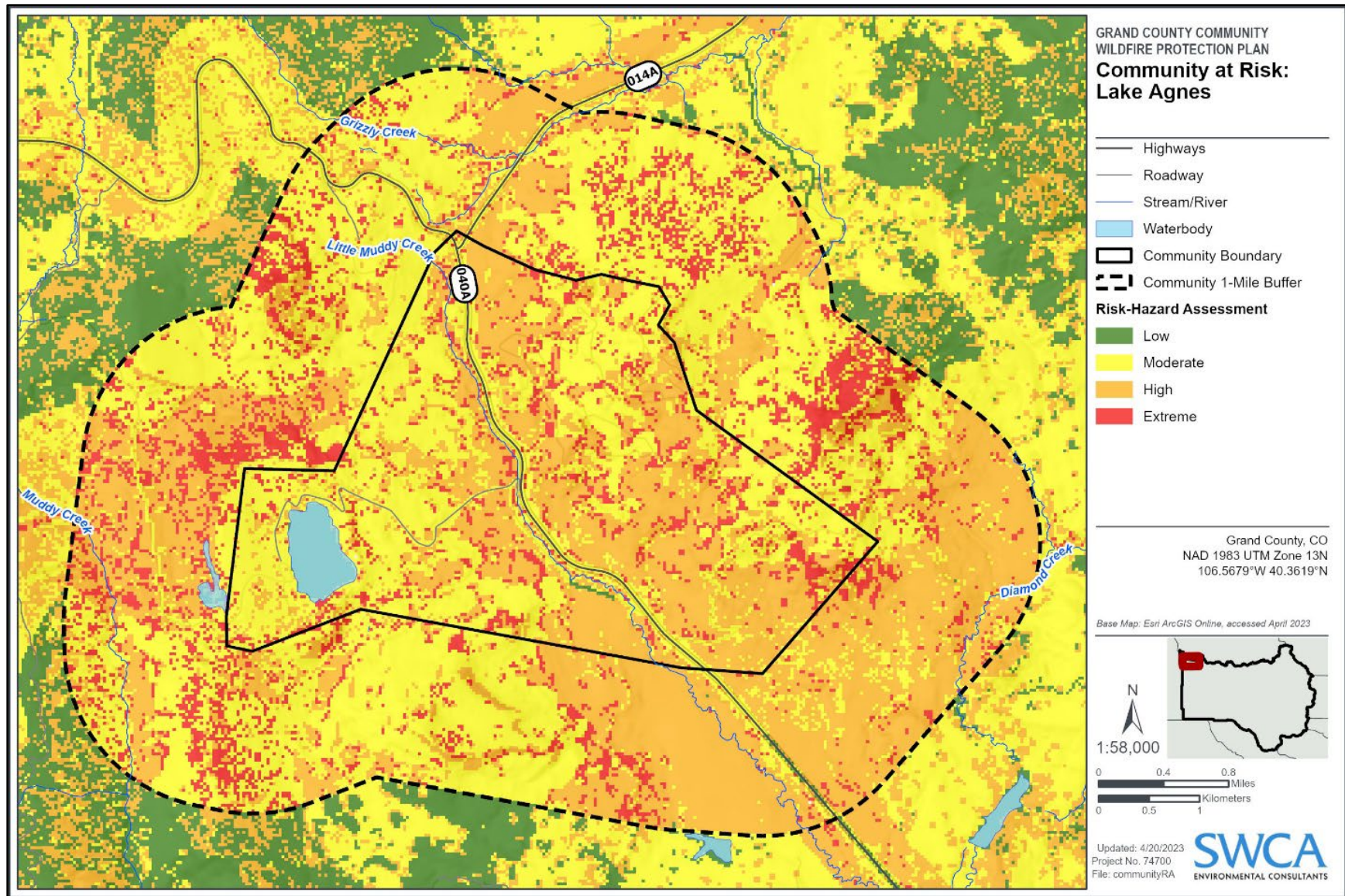


Figure C.50. Lake Agnes Risk-Hazard Assessment.

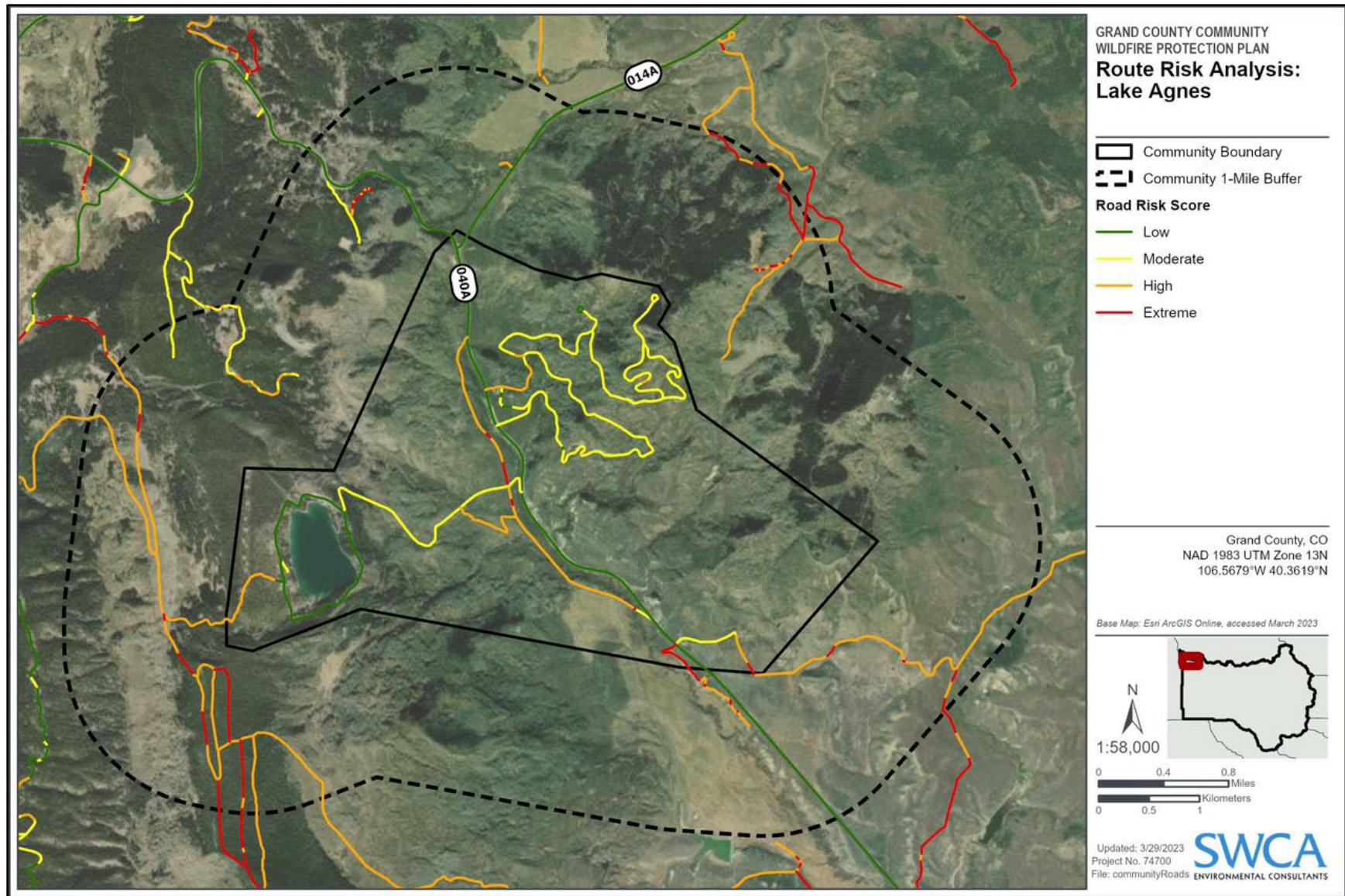


Figure C.51. Lake Agnes Route Risk Analysis.

TROUBLESOME CREEK WILDLAND URBAN INTERFACE COMMUNITY

TROUBLESOME CREEK POLYGON SUMMARY STATISTICS

| Community Polygon Background | | |
|---|-------------------------------|--------------------------------|
| <u>Community Polygon Name:</u> Troublesome Creek | <u>Total Score:</u> 69 | <u>Rating:</u> Moderate |
| Area (Square Miles): 11.6 | | |
| Building Count: 83 | | |
| Building Density (Building Units per square mile): 7.2 | | |

| Percent of Community by Risk Assessment | | | |
|---|----------------------------------|----------------------------|--------------------------------|
| <u>Low:</u> 1.8% | <u>Moderate:</u> 17.7% | <u>High:</u> 76% | <u>Extreme:</u> 4.4% |

| Dominant Fuel Type | | | | |
|----------------------------|---------------------------|---------------------|---------------------------------|-----------------------------|
| <u>Grass</u> GR2 | <u>Grass/Shrub</u> | <u>Shrub</u> | <u>Timber Understory</u> | <u>Timber Litter</u> |

| Percent of Community by Modeled/Calculated Wildfire Risk Inputs | |
|---|--|
| <u>Flame Length</u> | <u>Drive Time from Fire Station</u> |
| 0-4 (ft): 11.3% | 0-0.5 (min.): N/A |
| 4-8 (ft): 70.2% | 0.5-1.0 (min.): 2.7% |
| 8-12 (ft): 12.8% | 1.0-1.5 (min.): 31.6% |
| >12 (ft): 5.8% | >1.5 (min.): 65.7% |

| 1144 Survey Summary Highlights | |
|--|---|
| <u>Positive Attributes (Low Scores)</u> | <u>Negative Attributes (High Scores)</u> |
| <ul style="list-style-type: none"> • Ingress/egress • Some defensible space • Good spacing between structures • Metal roof or asphalt shingle throughout • Many structures >30 ft to slope | <ul style="list-style-type: none"> • Limited turnarounds for fire trucks • Combustible building materials • Fire station >5 mi from community |

| Recent Fires within the polygon |
|--|
| <ul style="list-style-type: none"> • Black Mountain Fire (2021) |

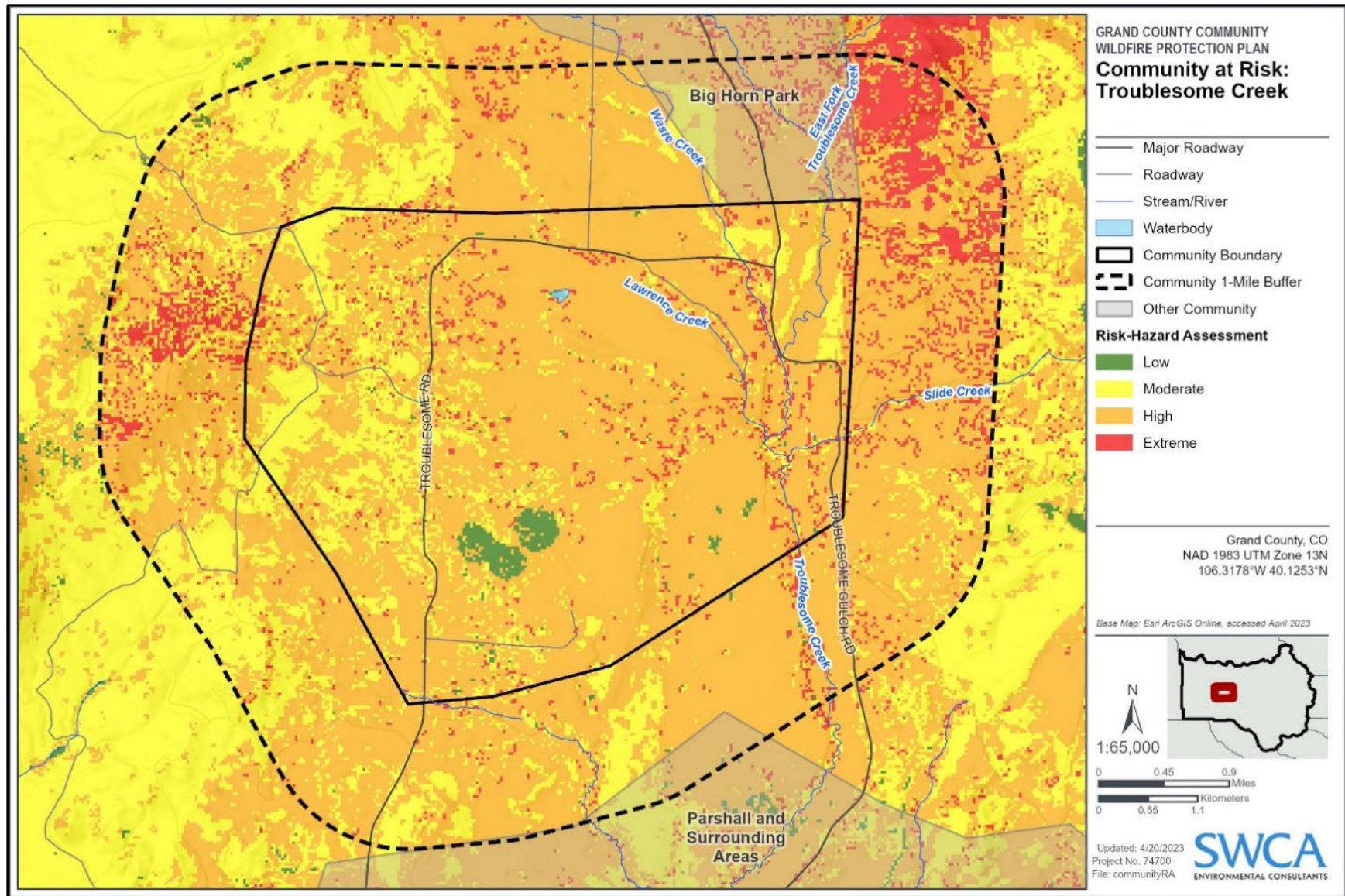


Figure C.52. Troublesome Creek Risk-Hazard Assessment.

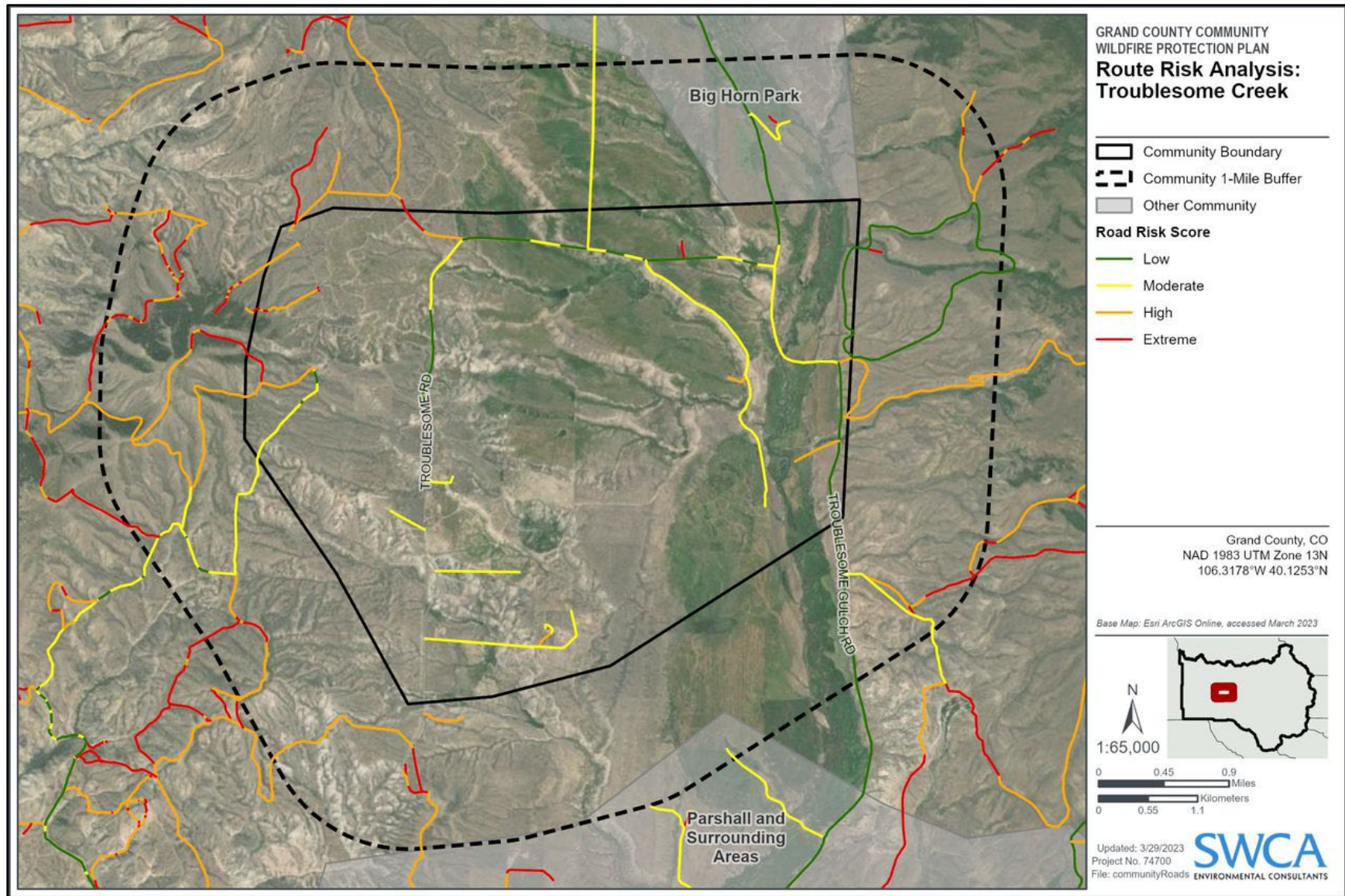


Figure C.53. Troublesome Creek Route Risk Analysis.

BLUE VALLEY ACRES WILDLAND URBAN INTERFACE COMMUNITY

BLUE VALLEY ACRES POLYGON SUMMARY STATISTICS

| Community Polygon Background | | |
|--|-------------------------------|----------------------------|
| <u>Community Polygon Name:</u> Blue Valley Acres | <u>Total Score:</u> 74 | <u>Rating:</u> High |
| Area (Square Miles): 2.8 | | |
| Building Count: 226 | | |
| Building Density (Building Units per square mile): 79.7 | | |

| Percent of Community by Risk Assessment | | | |
|---|--------------------------------|------------------------------|--------------------------------|
| <u>Low:</u> 7.8% | <u>Moderate:</u> 15% | <u>High:</u> 70.7% | <u>Extreme:</u> 6.4% |

| Dominant Fuel Type | | | | |
|---------------------|----------------------------------|---------------------|---------------------------------|-----------------------------|
| <u>Grass</u> | <u>Grass/Shrub</u> GS1 | <u>Shrub</u> | <u>Timber Understory</u> | <u>Timber Litter</u> |

| Percent of Community by Modeled/Calculated Wildfire Risk Inputs | |
|---|--|
| <u>Flame Length</u> | <u>Drive Time from Fire Station</u> |
| 0-4 (ft): 21.2% | 0-0.5 (min.): N/A |
| 4-8 (ft): 59.9% | 0.5-1.0 (min.): 35.6% |
| 8-12 (ft): 12.1% | 1.0-1.5 (min.): 25.1% |
| >12 (ft): 6.8% | >1.5 (min.): 39.3% |

| 1144 Survey Summary Highlights | |
|---|--|
| <u>Positive Attributes (Low Scores)</u> | <u>Negative Attributes (High Scores)</u> |
| <ul style="list-style-type: none"> Ingress/egress Some defensible space Metal roof or asphalt shingle throughout | <ul style="list-style-type: none"> Limited turnarounds for fire trucks Combustible building materials Structures <30 ft to slope Fire station >5 mi from community |

| Recent Fires within the polygon |
|--|
| <ul style="list-style-type: none"> Deep Creek Fire (2020) |

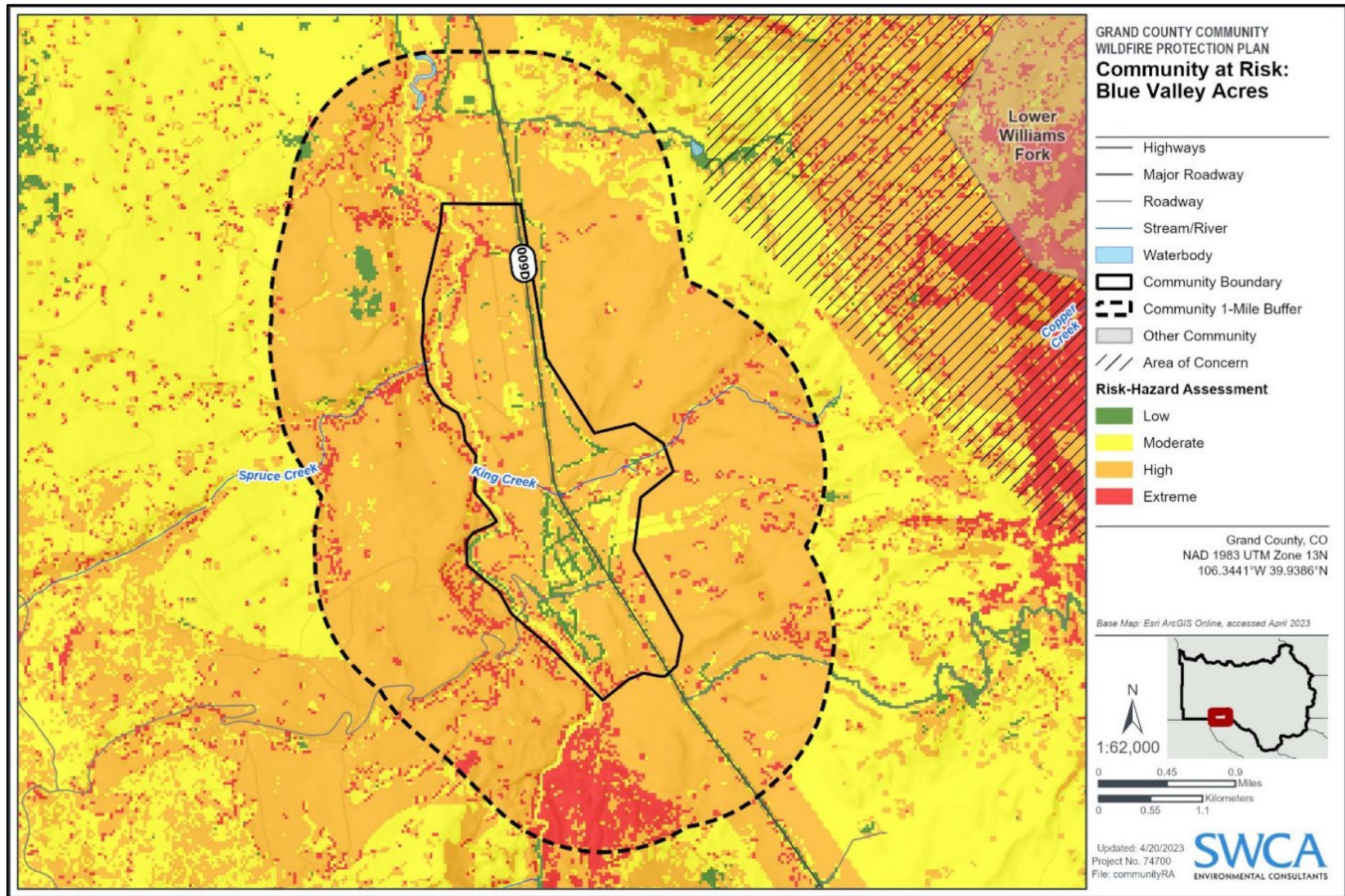


Figure C.54. Blue Valley Acres Risk-Hazard Assessment.

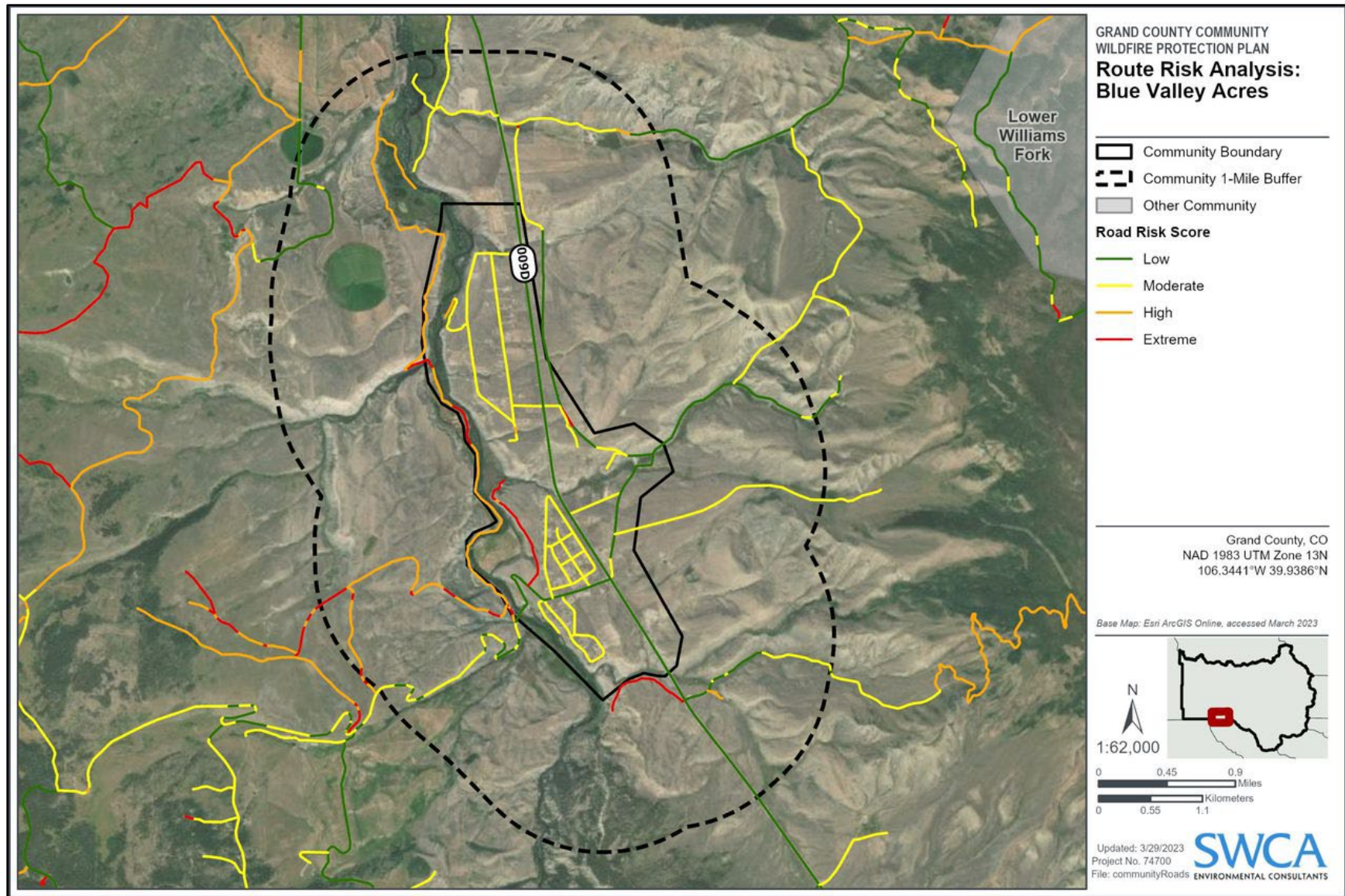


Figure C.55. Blue Valley Acres Route Risk Analysis.

GRAND RIVER RANCH WILDLAND URBAN INTERFACE COMMUNITY

GRAND RIVER RANCH POLYGON SUMMARY STATISTICS

| Community Polygon Background | | |
|---|-------------------------------|--------------------------------|
| <u>Community Polygon Name:</u> Grand River Ranch | <u>Total Score:</u> 67 | <u>Rating:</u> Moderate |
| Area (Square Miles): 4.2 | | |
| Building Count: 34 | | |
| Building Density (Building Units per square mile): 8.2 | | |

| Percent of Community by Risk Assessment | | | |
|---|-------------------------------|----------------------------|--------------------------------|
| <u>Low:</u> 3.1% | <u>Moderate:</u> 8% | <u>High:</u> 79% | <u>Extreme:</u> 9.9% |

| Dominant Fuel Type | | | | |
|---------------------|----------------------------------|---------------------|---------------------------------|-----------------------------|
| <u>Grass</u> | <u>Grass/Shrub</u> GS2 | <u>Shrub</u> | <u>Timber Understory</u> | <u>Timber Litter</u> |

| Percent of Community by Modeled/Calculated Wildfire Risk Inputs | |
|---|--|
| <u>Flame Length</u> | <u>Drive Time from Fire Station</u> |
| 0-4 (ft): 15.1% | 0-0.5 (min.): 12.1% |
| 4-8 (ft): 45% | 0.5-1.0 (min.): 23.6% |
| 8-12 (ft): 27.7% | 1.0-1.5 (min.): 49.2% |
| >12 (ft): 12.2% | >1.5 (min.): 15.1% |

| 1144 Survey Summary Highlights | |
|--|--|
| <u>Positive Attributes (Low Scores)</u> | <u>Negative Attributes (High Scores)</u> |
| <ul style="list-style-type: none"> Some defensible space around structures Metal roof or asphalt shingle throughout Structures <30 ft to slope | <ul style="list-style-type: none"> Limited turnarounds for fire trucks Non-reflective street signs Combustible building materials |

| Recent Fires within the polygon |
|--|
| <ul style="list-style-type: none"> Gorewood Fire (2016) |

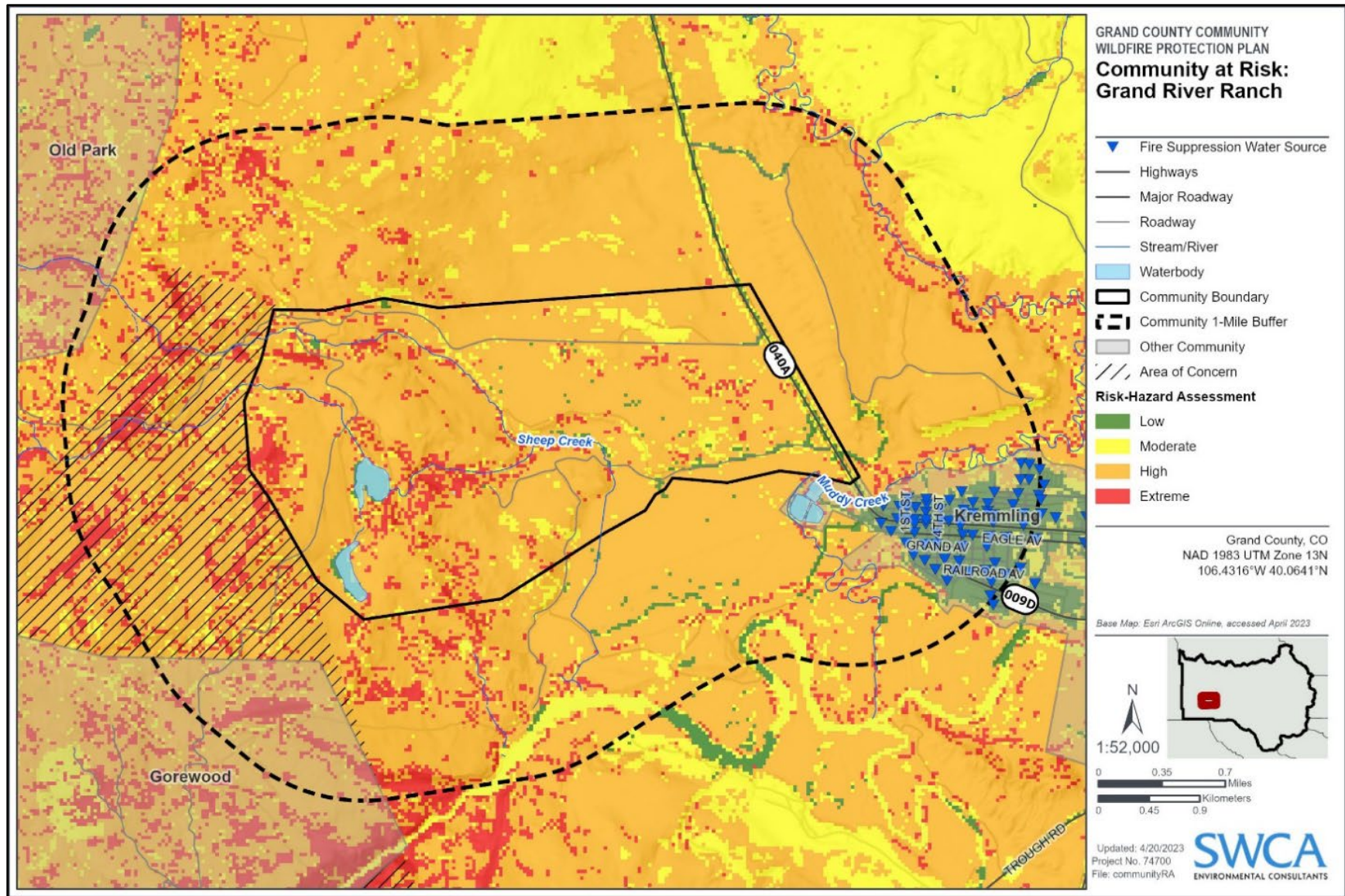


Figure C.56. Grand River Ranch Risk-Hazard Assessment.

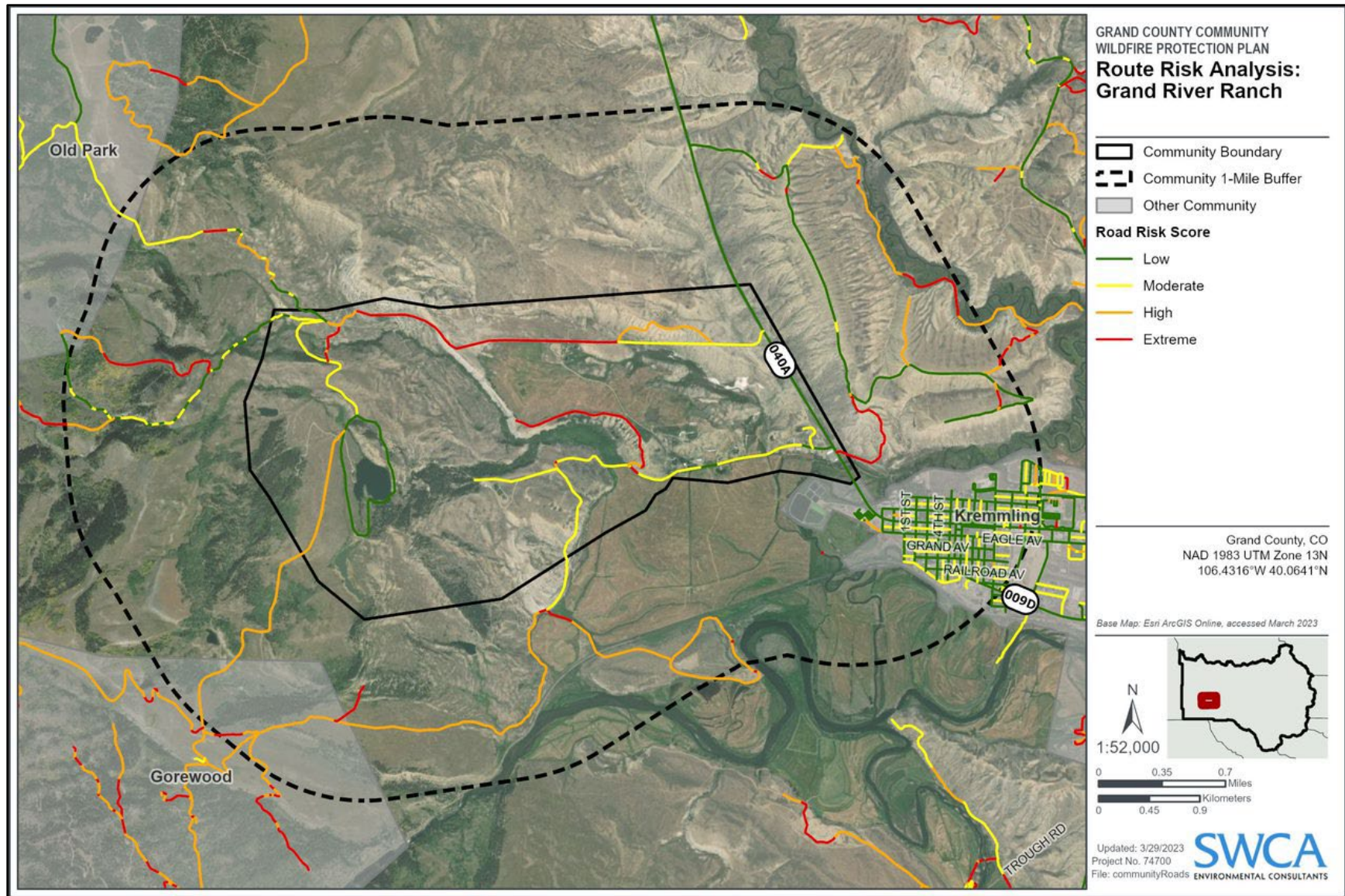


Figure C.57. Grand River Ranch Route Risk Analysis.

CITY OF GRANBY WILDLAND URBAN INTERFACE COMMUNITY

CITY OF GRANBY AREA POLYGON SUMMARY STATISTICS

| Community Polygon Background | | |
|---|--------------------------------|----------------------------|
| <u>Community Polygon Name:</u> City of Granby | <u>Total Score:</u> 104 | <u>Rating:</u> High |
| Area (Square Miles): 11.6 | | |
| Building Count: 1316 | | |
| Building Density (Building Units per square mile): 113.5 | | |

| Percent of Community by Risk Assessment | | | |
|---|----------------------------------|------------------------------|---------------------------------|
| <u>Low:</u> 1.6% | <u>Moderate:</u> 21.5% | <u>High:</u> 57.6% | <u>Extreme:</u> 19.3% |

| Dominant Fuel Type | | | | |
|---------------------|----------------------------------|---------------------|--|-----------------------------|
| <u>Grass</u> | <u>Grass/Shrub</u> GS2 | <u>Shrub</u> | <u>Timber Understory</u> TU5 | <u>Timber Litter</u> |

| Percent of Community by Modeled/Calculated Wildfire Risk Inputs | |
|---|--|
| <u>Flame Length</u> | <u>Drive Time from Fire Station</u> |
| 0-4 (ft): 39.1% | 0-0.5 (min.): 23.4% |
| 4-8 (ft): 15.9% | 0.5-1.0 (min.): 34% |
| 8-12 (ft): 27.1% | 1.0-1.5 (min.): 9.9% |
| >12 (ft): 18% | >1.5 (min.): 32.8% |

| 1144 Survey Summary Highlights | |
|---|---|
| <u>Positive Attributes (Low Scores)</u> | <u>Negative Attributes (High Scores)</u> |
| <ul style="list-style-type: none"> • Ingress/egress • Road width >24 ft • Metal roof or asphalt shingle throughout • Fire hydrants • Fire station <5 mi from community | <ul style="list-style-type: none"> • Limited turnarounds for fire trucks • Limited defensible space • Combustible building materials • Many structures <30 ft to slope |

| Recent Fires within the polygon |
|---|
| <ul style="list-style-type: none"> • West Mountain Fire (2017) |

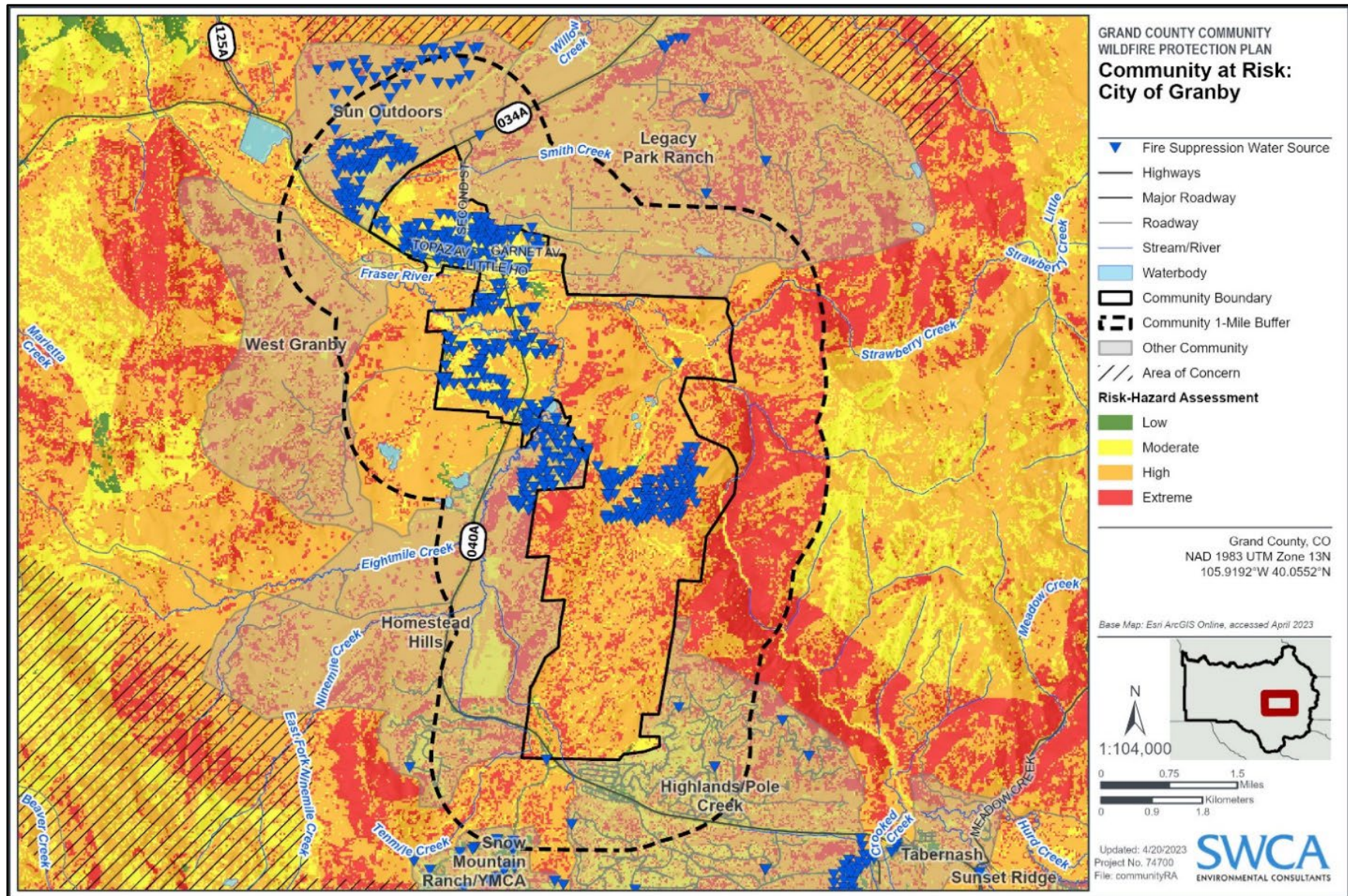


Figure C.58. City of Granby Risk-Hazard Assessment.

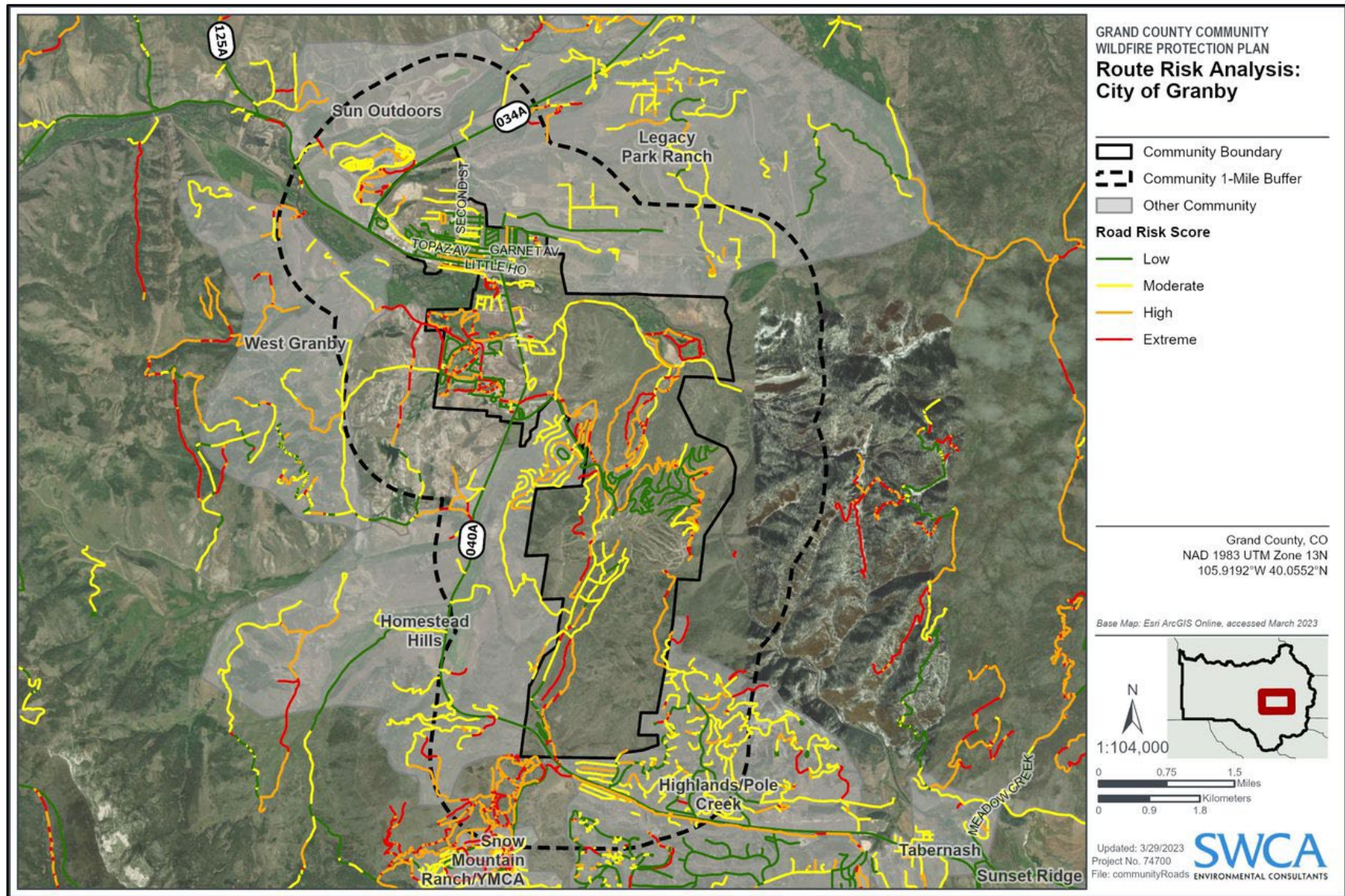


Figure C.59. City of Granby Route Risk Analysis.

HIGHWAY 125 WILDLAND URBAN INTERFACE COMMUNITY**HIGHWAY 125 POLYGON SUMMARY STATISTICS**

| Community Polygon Background | | |
|--|--------------------------------|----------------------------|
| <u>Community Polygon Name:</u> Highway 125 | <u>Total Score:</u> 102 | <u>Rating:</u> High |
| Area (Square Miles): 5.6 | | |
| Building Count: 100 | | |
| Building Density (Building Units per square mile): 17.8 | | |

| Percent of Community by Risk Assessment | | | |
|---|-------------------------|---------------------|------------------------|
| <u>Low:</u> | <u>Moderate:</u> | <u>High:</u> | <u>Extreme:</u> |
| 0.3% | 52.4% | 36.8% | 10.5% |

| Dominant Fuel Type | | | | |
|---------------------|---------------------------|---------------------|---------------------------------|-----------------------------|
| <u>Grass</u> | <u>Grass/Shrub</u> | <u>Shrub</u> | <u>Timber Understory</u> | <u>Timber Litter</u> |
| | GS1 | | TU5 | |

| Percent of Community by Modeled/Calculated Wildfire Risk Inputs | |
|---|--|
| <u>Flame Length</u> | <u>Drive Time from Fire Station</u> |
| 0-4 (ft): 51.27% | 0-0.5 (min.): N/A |
| 4-8 (ft): 31.5% | 0.5-1.0 (min.): N/A |
| 8-12 (ft): 6.4% | 1.0-1.5 (min.): 21.6% |
| >12 (ft): 10.9% | >1.5 (min.): 78.4% |

| 1144 Survey Summary Highlights | |
|--|--|
| <u>Positive Attributes (Low Scores)</u> | <u>Negative Attributes (High Scores)</u> |
| <ul style="list-style-type: none"> Some defensible space around structures Metal roof or asphalt shingle throughout Structures >30 ft to slope | <ul style="list-style-type: none"> Limited turnarounds for fire trucks Non-reflective street signs Combustible building materials Limited water sources for suppression Fire station >5 mi from community Hwy 125 has been prone to lightning strikes |

| Recent Fires within the polygon |
|---|
| <ul style="list-style-type: none"> East Troublesome (2020) C Lazy U Fire (2018) |

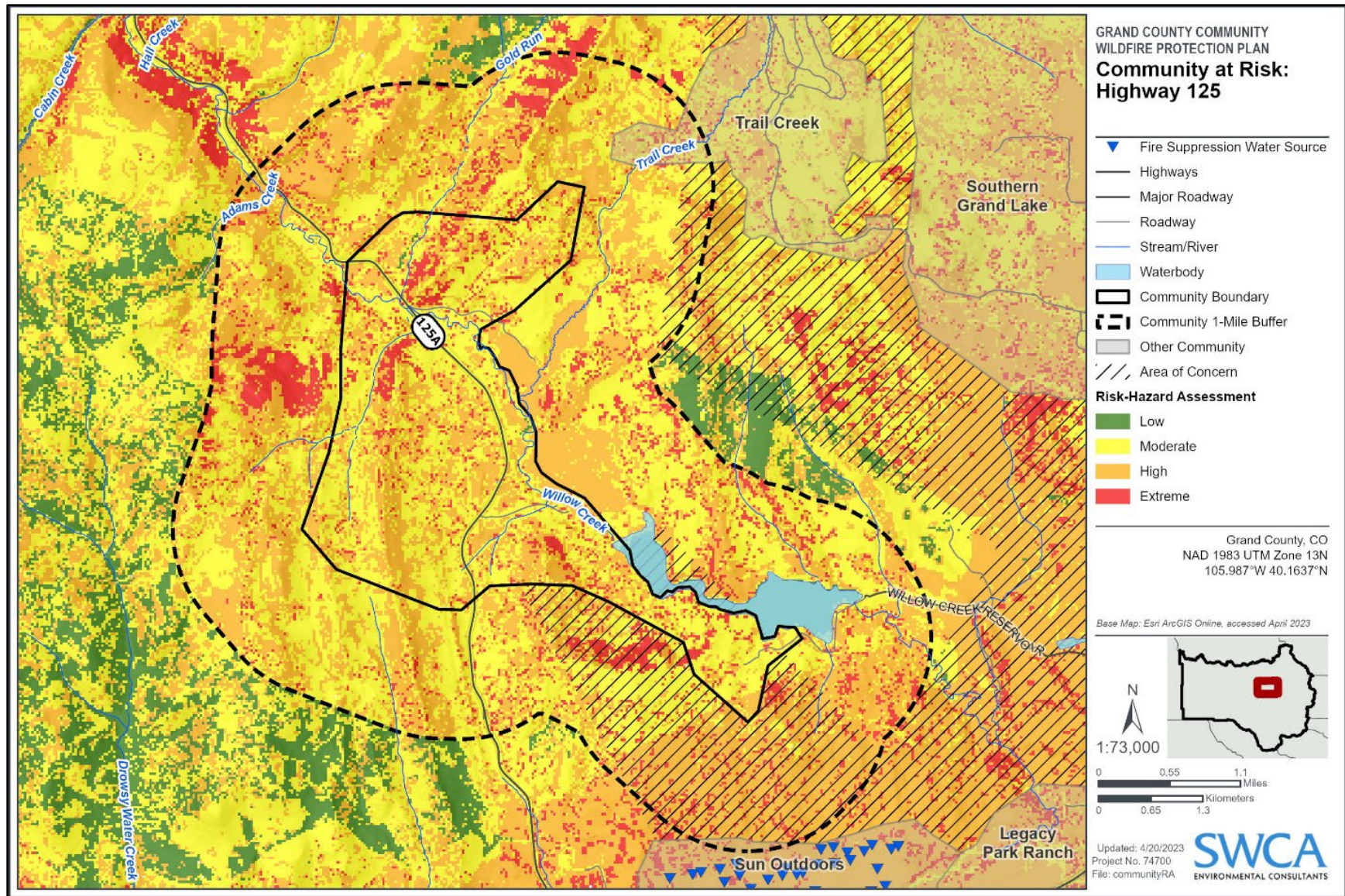


Figure C.60. Highway 125 Risk-Hazard Assessment.

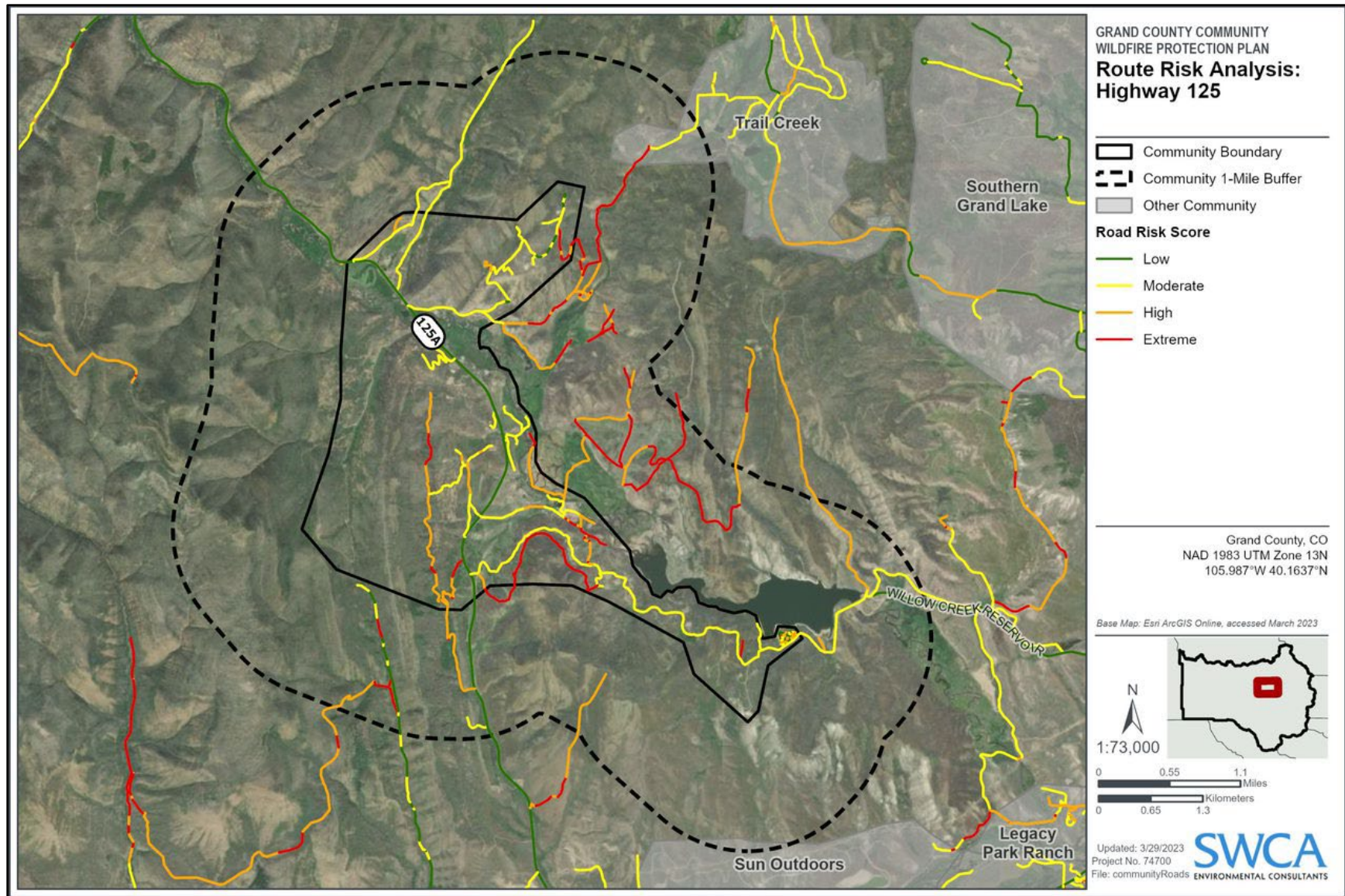


Figure C.61. Highway 125 Route Risk Analysis.

APPENDIX D

APPENDIX D:

Fire Behavior Modeling/GIS Background and Methodology

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FIRE BEHAVIOR MODELING

FIRE BEHAVIOR MODELS

Data utilized for the fire behavior models was primarily pulled from the Northern Colorado Fireshed Wildfire Risk Assessment (NCFWRA), which was developed by the Northern Colorado Fireshed Collaborative (NCFC) (NCFC 2022). The NCFWRA is a qualitative wildfire risk assessment which relies upon stakeholder engagement and informed up-to date science. The NCFWRA largely relies on models housed within LANDFIRE (2020) but has modified the modeling approach and parameters accordingly to accurately capture the wildland fire environment of Northern Colorado. FlamMap (housed within LANDFIRE) was also utilized to model fire behavior that the NCFWRA did not model (specifically, for rate of spread in our CWPP).

LANDFIRE

LANDFIRE is a national remote sensing project that provides land managers a data source for all inputs needed for Fire, FlamMap, and other fire behavior models. The database is managed by the USFS and the USDOl and is widely used throughout the United States for land management planning. More information can be obtained from <http://www.landfire.gov>. The NCFWRA utilized many of the fuel models housed within LANDFIRE but adjusted the models to create a better match for Northern Colorado's fire environment (NCFC 2022). Specifically, the NCFWRA used LANDFIRE to compile spatial data for fuels, slope steepness, slope aspect, and elevation (NCFC 2022).

FireFamilyPlus

FireFamilyPlus is a software package used to calculate fuel moisture values and indices from the US National Fire Danger Rating System (NRDRS) using local weather from Remote Automated Weather Stations (RAWS) (Bradshaw and McCormick 2000). The NCFWRA used FireFamilyPlus 5 to calculate percent fuel moisture for live and dead fuels for the length of the fire season, which was defined as April 1 to October 31. These fuel moisture outputs were needed to model fire behavior (NCFC 2022). NCFWRA also utilized FireFamilyPlus to generate a fire risk (FRISK) model that summarized RAWS, which was used to estimate burn probability (discussed below) (NCFC 2022).

FlamMap

FlamMap uses a spatial component for its inputs but only provides fire behavior predictions for a single set of weather inputs. In essence, FlamMap gives fire behavior predictions across a landscape for a snapshot of time; however, FlamMap does not predict fire spread across the landscape. FlamMap was used by the NCFWRA to predict potential fire behavior for flame length and crown fire activity in Grand County (NCFC 2022). The extreme (97% worst case) weather scenario, as utilized by the NCFWRA, was used for this CWPP to model flame length and crown fire activity (NCFC 2022).

FIRE BEHAVIOR MODEL INPUTS

Fuels

The NCFWRA classified fuels in the planning area using the recent version of LANDFIRE's Scott and Burgan's (2005) Standard Fire Behavior Fuel Model classification system. Fuel models were adjusted according to recent wildfires that have occurred in Northern Colorado (e.g., the Cameron Peak Fire and the East Troublesome Fire) (NCFC 2022). The adjusted fuel data was utilized in the 2023 Grand County CWPP. This classification system is based on the Rothermel surface fire spread equations, and each vegetation and litter type is broken down into 40 fuel models.

The general classification of fuels is by fire-carrying fuel type (Scott and Burgan 2005):

- (NB) Non-burnable
- (GR) Grass
- (GS) Grass-Shrub
- (SH) Shrub
- (TU) Timber-Understory
- (TL) Timber Litter
- (SB) Slash-Blowdown

Table D.1 provides a description of each fuel type.

Map 1 in Appendix J illustrates the fuels classification throughout the planning area.

Table D.1. Fuel Model Classification for the Grand County CWPP Planning Area

| | |
|---|---|
| 1. Nearly pure grass and/or forb type (Grass) | |
| i. | GR1: Grass is short, patchy, and possibly heavily grazed. Spread rate is moderate (5–20 chains/hour); flame length low (1–4 feet); fine fuel load (0.40 ton/acre). |
| ii. | GR2: Moderately coarse continuous grass, average depth about 1 foot. Spread rate high (20–50 chains/hour); flame length moderate (4–8 feet); fine fuel load (1.10 tons/acre). |
| iii. | GR3: Very coarse grass, average depth 2 feet. Spread rate high (20–50 chains/hour); flame length moderate (4–8 feet). |
| 2. Mixture of grass and shrub, up to about 50% shrub cover (Grass-Shrub) | |
| i. | GS1: Shrubs are about 1-foot high, low grass load. Spread rate moderate (5–20 chains/hour); flame length low (1–4 feet); fine fuel load (1.35 tons/acre). |
| ii. | GS2: Shrubs are 1–3 feet high, moderate grass load. Spread rate high (20–50 chains/hour); flame length moderate (4–8 feet); fine fuel load (2.1 tons/acre). |
| 3. Shrubs cover at least 50% of the site; grass sparse to non-existent (Shrub) | |
| i. | SH1: Low fuel load, depth about 1 foot, some grass fuels present. Spread rate very low (0–2 chains/hour); flame length very low (0–1 feet). |
| ii. | SH2: Moderate fuel load (higher than SH1), depth about 1 foot, no grass fuels present. Spread rate low (2–5 chains/hour); flame length low (1–4 feet); fine fuel load (5.2 tons/acre). |
| iii. | SH3: Moderate shrub load. Fuel bed depth 2–3 feet. Spread rate low (2–5 chains/hour), flame length low (1–4 feet). |
| iv. | SH5: Heavy shrub load. Fuel bed depth 4–6 feet. Spread rate very high (50–150 chains/hour), flame length very high (12–25 feet). |
| v. | SH7: Very heavy shrub load, possibly with pine overstory. Fuel bed depth 4–6 feet. Spread rate high (20–50 chains/hour); flame length very high (12–25 feet). |

| | |
|-----------|---|
| 4. | Grass or shrubs mixed with litter from forest canopy (Timber-Understory) |
| i. | TU1: Fuel bed is low load of grass and/or shrub with litter. Spread rate low (2–5 chains/hour); flame length low (1–4 feet); fine fuel load (1.3 tons/acre). |
| ii. | TU5: Fuel bed high load conifer with shrub understory. Spread rate moderate (5–20 chains/hour); flame length moderate (4–8 feet). |
| 5. | Dead and downed woody fuel (litter) beneath a forest canopy (Timber Litter) |
| i. | TL1: Low to moderate load, fuels 1–2 inches deep. Spread rate very low (0–2 chains/hour); flame length very low (0–1 foot). |
| ii. | TL2: Low load, compact. Spread rate very low (0–2 chains/hour); flame length very low (0–1 foot). |
| iii. | TL3: Moderate load. Spread rate very slow (0–2 chains/hour); flame length low (1–4 foot); fine fuel load (0.5 ton/acre). |
| iv. | TL4: Moderate load. Spread rate very low (0–2 chains/hour); flame length low (1–4 feet). |
| v. | TL5: High load conifer litter. Spread rate slow (2–5 chains/hour); flame length low (1–4 foot). |
| vi. | TL6: Moderate load. Spread rate moderate (5–20 chains/hour); flame length low (1–4 foot). |
| vii. | TL8: Long needle litter; long needle fuel. Spread rate moderate (5–20 chains/hour); flame length low (1–4 feet). |
| viii. | TL9: Very high load fluffy dead and downed fuel littler. Spread rate moderate (5–20 chains/hour); flame length moderate (4–8 feet). |
| 6. | Insufficient wildland fuel to carry wildland fire under any condition (Non-burnable) |
| i. | NB1: Urban or suburban development; insufficient wildland fuel to carry wildland fire. |
| ii. | NB2: Snow/ice |
| iii. | NB3: Agricultural field, maintained in non-burnable condition. |
| iv. | NB8: Open water. |
| v. | NB9: Bare ground. |
| 7. | Activity fuel (slash) or debris from wind damage (blowdown) (slash-blowdown) |
| i. | SB1: Fine fuel load is 10 to 20 tons/acre weighted toward fuels 1 to 3 inches diameter class, depth is less than 1 foot. Spread rate moderate (5–20 chains/hour); flame length low (1–4 feet). |

Notes: Based on Scott and Burgan's (2005) 40 Fuel Model System.

More detailed information on fuels within the planning area can be found in Chapter 2.

Topography

Topography is important in determining fire behavior and is a required input for FlamMap's models. Steepness of slope, aspect (direction the slope faces), elevation, and landscape features can all affect fuels, local weather (by channeling winds and affecting local temperatures), and rate of spread of wildfire. Grand County's mountainous terrain is comprised of many steep slopes that would strongly influence fire behavior and spread.

More detailed information regarding topography in Grand County can be found in Appendix B.

Weather

Of the three fire behavior components, weather is the most likely to fluctuate. Accurately predicting fire weather remains a challenge for forecasters. As rising temperatures dry fuels in the late spring, summer and early fall, dry conditions can be exacerbated, creating an environment that is susceptible to wildland fire (Figures 2.7–2.9 in Chapter 2). Fine fuels (grass and leaf litter) can cure rapidly, making them highly flammable in as little as 1 hour following light precipitation. Low live fuel moistures of grass, shrubs, and trees can significantly contribute to fire behavior in the form of fast rates of spread, crowning and torching.

One of the critical inputs for FlamMap are the fuel moisture files. The NCFWRA utilized a range of weather inputs to model fire behavior, but for this CWPP we utilized extreme weather scenarios (97th percentile modeling parameters) as developed by the NCFWRA to model and predict weather under extreme scenarios that will become more likely with future climate change. NCFWRA utilized remote automated weather stations (RAWS) to generate the weather parameters. Specifically, the Red Feather, Redstone, Estes Park, Sugarloaf, Harbison Meadow, Dumont, Pickle Creek, Corral Creek RAWS were utilized in the NCFWRA (NCFC 2022).

More detailed information regarding climate and weather can be found in Chapter 2.

FIRE BEHAVIOR MODEL OUTPUTS

Flame Length

Map 2 in Appendix J illustrates the flame length classifications for the planning area. Flame lengths are determined by fuels, weather, and topography. Flame length is a particularly important component of the Risk-Hazard Assessment because it relates to potential crown fire (particularly important in timber areas) and suppression tactics. Direct attack by hand lines is usually limited to flame lengths less than 4 feet. In excess of 4 feet, indirect suppression is the dominant tactic. Suppression using engines and heavy equipment will move from direct to indirect with flame lengths in excess of 8 feet. The Flame Length model was taken from the NCFWRA (NCFC 2022).

Flame lengths across the planning area range from 0 to more than 25 feet. The highest flame lengths are associated with the timber fuels found in the higher elevations of the county, especially in the spruce-fire forests.

Burn Probability

Map 3 in Appendix J illustrates the burn probability in the planning areas. Burn probability is a spatial estimate of fire likelihood each year and is derived by simulating fire spread under certain conditions. This CWPP utilizes the NCFWRA burn probability estimates. The NCFWRA estimates burn probability at the 270 meter resolution by using the large fire simulator, FSim, to simulate fire spread for 15,000 years (or 15,000 iterations). They adjusted simulation parameters until the simulation results matched the observed annual number of fires, mean fire size, and fire size distribution between 2000 and 2020 within a 50 km buffer of the analysis area. In Northern Colorado the burn probability model uses the Red Feather remote automatic weather station (RAWS) for weather inputs. Weather inputs were adjusted accordingly to allow simulations to match observed fire statistics (NCFC 2022). In Grand County, lodge-pole pine forests and shrublands (sage-brush steppe) are the most likely to burn in any given year.

Rate of Spread

Map 4 in Appendix J illustrates the rate of spread classifications for the planning area. The rates of spread in the area range from 0 chains/hour up to greater than 150 chains/hour (one chain is approximately 66 feet and is a common measure in wildland firefighting). Low rates of spread are associated with timber-dominated areas in forested regions, while moderate and high rates of spread are associated with grass and shrub fuels. Some areas of the WUI exhibit very steep slopes that can contribute to increased rates of spread and intense fire behavior. The rate of spread, or the speed with which fire is moving away from the point of origin, is influenced by the slope. Fire moves at a faster rate uphill than downhill, thus the steeper the slope the faster the rate of spread. Additionally, steep slopes bring the fuels above the fire closer to a growing fire, making them more susceptible to ignition. Another challenge with steep slopes is the possibility of burning debris rolling down the hill and igniting fuel below the main fire. This is illustrated in Figure D.1.

For this CWPP we utilized FlamMap to model rate of spread. Parameters (e.g., weather and fuels) were pulled from the NCFWRA (NCFC 2022) to ensure more accurate modeling.

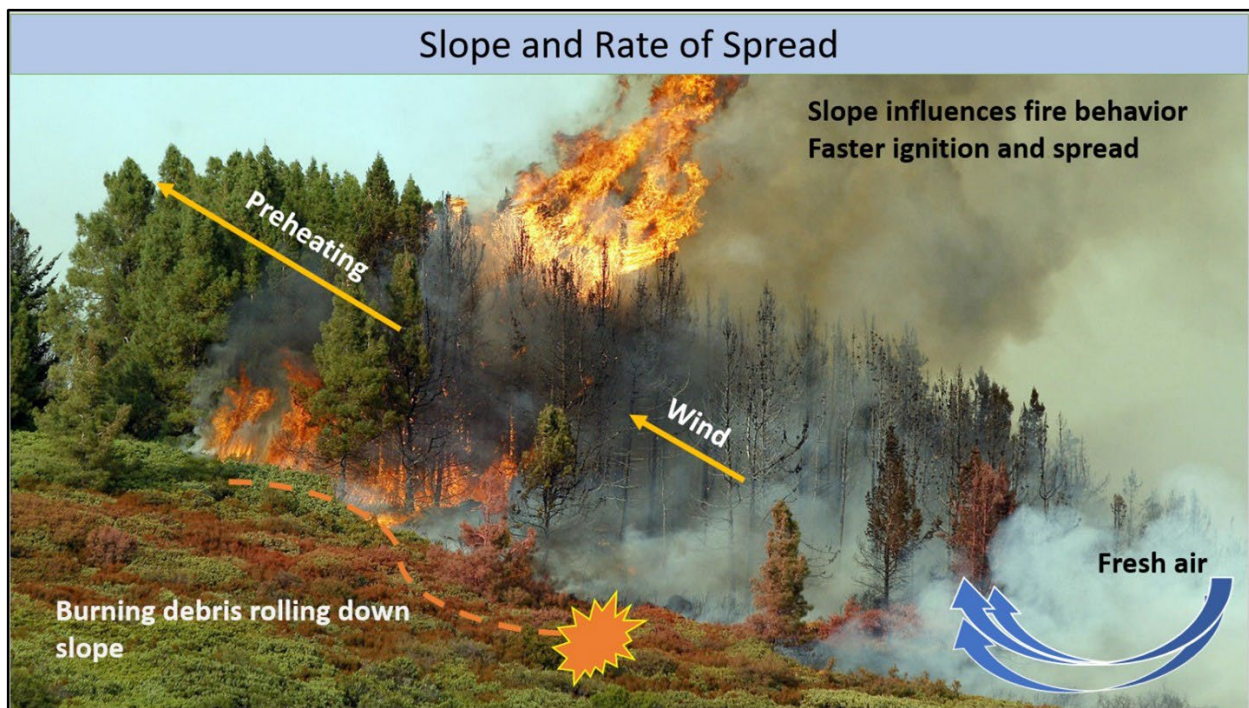


Figure D.1. Effect of topography on fire behavior.

Crown Fire Potential

Map 5 in Appendix J illustrates the range of crown fire activity from surface fire (in grass-dominated areas) to passive and active crown fire (in timber dominated fuels). The crown fire models were pulled from the NCFWRA (NCFC 2022).

Active crown fires are most commonly predicted in the high alpine forests and are characterized by fire propagation from tree to tree, while passive crown fires are more predicted in the lodgepole pine forests and consist of crown ignition of individual trees or groups of trees with no tree to tree spread. Surface fires are usually predicted in the county's shrublands and grasslands.

Fire Occurrence/Density of Starts

Figures 2.10 and 2.16 in Chapter 2 illustrate the fire history for the planning area. These perimeter occurrences have been provided by NIFC, Monitoring Trends in Burn Severity (MTBS), and local input from Chief White of the Grand Fire Protection District (via the National Fire Incident Reporting System (NFIRS)). These perimeters show the known and estimated location of fire perimeters within the planning area from 1931 to 2021.

Figure 2.17 (chapter 2) reveals a cluster pattern of fires in the WUI regions of the County. Fire occurrences are most common near the major towns/municipalities and highways. The fire history map is used to provide information on areas where human-ignited fires are prevalent and hence could be more prone to fire in the future and where there is a higher density of lightning ignitions due to topographic conditions and receptive forest fuels.

COMPOSITE RISK-HAZARD ASSESSMENT GIS MODEL

All data used in the Composite Risk-Hazard Assessment have been processed using ESRI ArcGIS Desktop and the ESRI Spatial Analyst Extension. Information on these programs can be found at <http://www.esri.com>. Data have been gathered from all relevant agencies, and the most current data have been used.

All fire parameter datasets have been converted to a raster format (a common GIS data format comprising a grid of cells or pixels, with each pixel containing a single value). The cell size for the data is 30 × 30 meters (98 × 98 feet). Each of the original cell values have been reclassified with a new value between 1 and 4, based on the significance of the data (1 = lowest, 4 = highest [extreme]). Prior to running the models on the reclassified datasets, each of the input parameters have been weighted; that is, they are assigned a percentage value reflecting that parameter's importance in the model. We used the weighted sum raster overlay geoprocessing tool to stack each geographically aligned dataset and evaluate an output value derived from each cell value of the overlaid dataset in combination with the weighted assessment. In a weighted sum model (Figure D.2), the weighted values of each cell from each parameter dataset are added together so that the resulting dataset contains cells with summed values of all the parameters. The assigned weights that we used in our risk assessment are described in Table D.2. This method ensures that the model resolution is maintained in the results and thus provides finer detail and range of values for denoting fire risk.

Table D.2. Final Weights Assigned to Each Component in the Composite Risk-Hazard Analysis

| Input | Weight |
|----------------------------|--------|
| Rate of Spread | 0.15 |
| Flame Length | 0.15 |
| Crown Fire Activity | 0.15 |
| Burn Probability | 0.15 |
| Fire History | 0.05 |
| HVRAs | 0.05 |
| WUI - Classes | 0.25 |
| Fire Station Response Time | 0.05 |

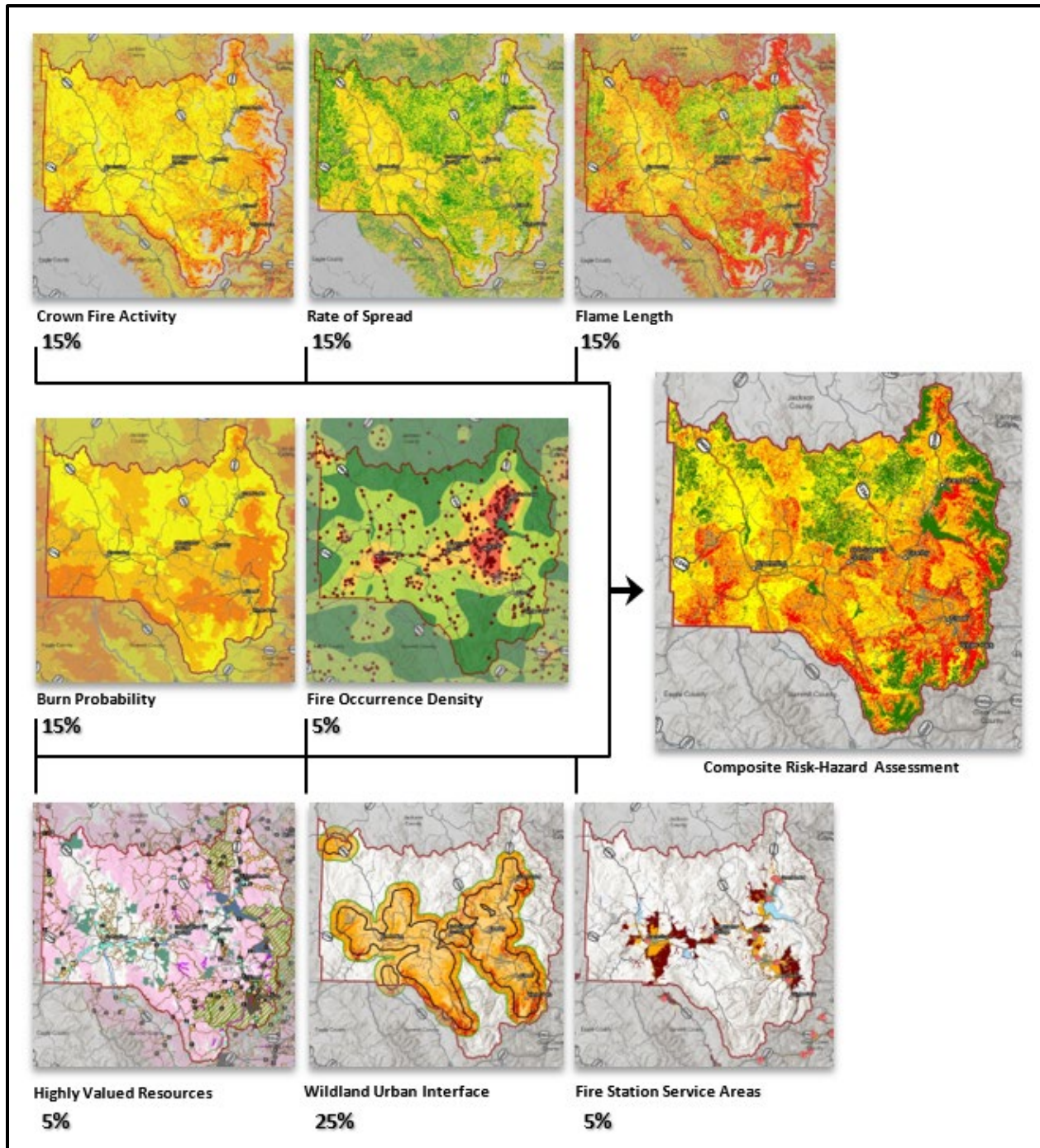


Figure D.2. Composite Risk-Hazard Assessment inputs.

Composite Risk-Hazard Assessment GIS Modeling Process

The Composite Risk-Hazard Assessments are comprised of multiple inputs which can be grouped into three categories: hazard, threat, and values. The result is a raster data layer that weights and sums those inputs to determine risk. Datasets in the hazard category include historical weather data, topography, and vegetation and fuel regimes. Datasets in the threat category include fire history points and perimeters.

The values category includes the WUI, distance from fire station, and natural, cultural, and socioeconomic assets datasets.

As shown in Figure D.3 with the elements in the shaded boxes were used to prepare a landscape file for the planning area. This landscape file compiles multiple LANDFIRE datasets, including fuels, slope, elevation, and aspect into one layer that can then be used to develop fire behavior outputs. We utilized the fuels model by the NCFWRA so we could accurately and precisely match local fuel conditions. The edited fuels and landscape files were then used to create custom fire behavior outputs.

Next, in Esri ArcGIS Pro, the fire history, fire station, WUI, and HVRA datasets were processed to merge and create buffers where appropriate and converted the layers to rasters with the same spatial extent and resolution as the IFTDSS fire behavior outputs (30 meter cell size).

Lastly, ArcGIS Pro was used to run the aforementioned weighted sum raster process to add all the inputs together. A list of weights, as agreed upon by and with input from the Core Team (provided in Table D.2), were used for all input layers. In addition, while weighted sum composite rasters can be better for describing more detailed variations in risk, they can be overwhelming and difficult to understand. Therefore, a reclassified raster was created from the weighted sum composite, using the natural breaks (Jenks) method, with four categories of low, medium, high, and extreme risk.

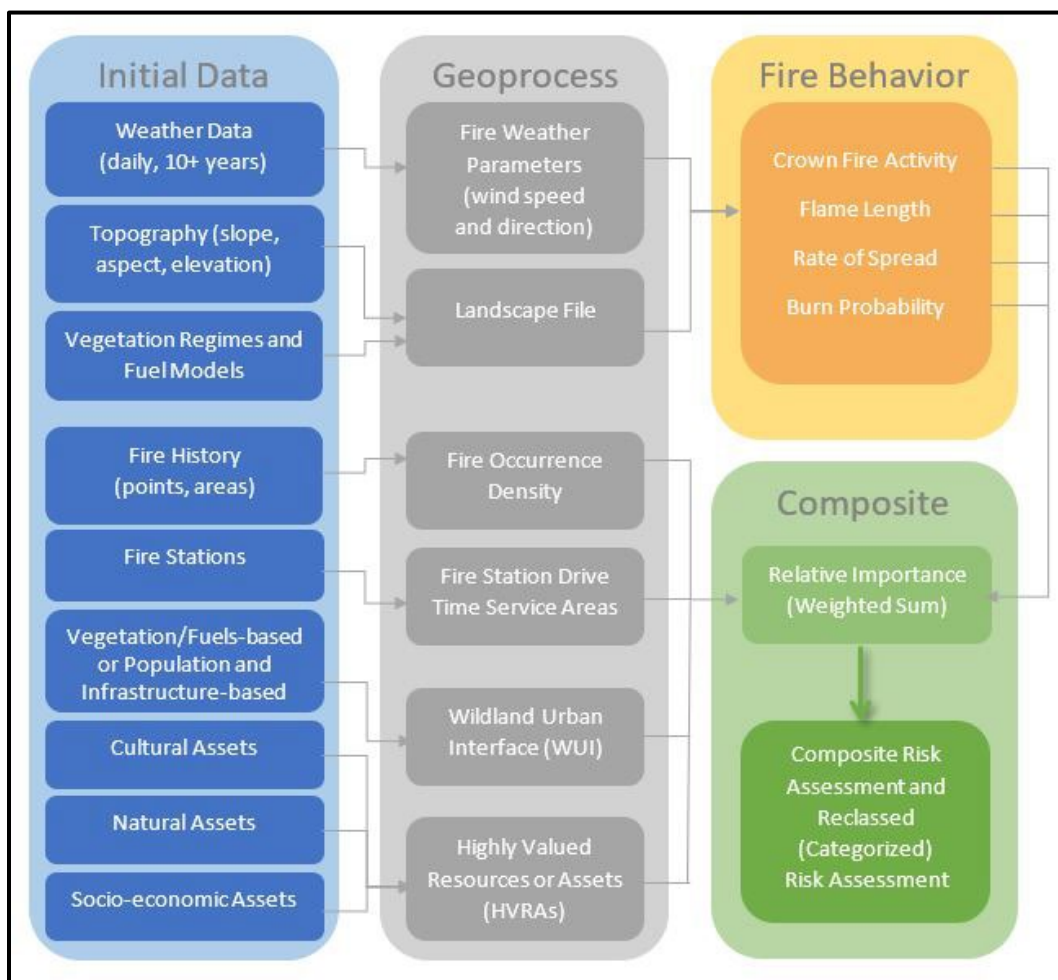


Figure D.3. Conceptual representation of the Risk-Hazard Assessment model data inputs and processes.

ROUTE RISK AND ROAD HAZARD ANALYSIS

SWCA performed a roads analysis looking at ingress and egress concerns for the planning area in relation to wildfire risk and hazard. Evacuation on roadways can be impacted by steepness, curvature, road surface, and road width, among others. The following analysis was run to identify potential areas with evacuation risk and provide potential recommendation that could improve ingress and egress in Grand County. Excess fuel loads along escape routes could create challenges for evacuation in the planning area in the event of a wildfire. In addition, road grade, curvature (sinuosity), length, surface material (e.g., paved vs. unpaved), connectivity (e.g., local access road vs. main transportation corridor), stability (e.g., bridged vs. unbridged), and adjacent structure density contribute to potential evacuation complications. Figure D.3 shows the level of risk along roads present in the planning area. Overall, the main transportation corridors, such as U.S Highway 40, U.S Highway 34, Colorado State Highway 134, Colorado State Highway 9, and Colorado State Highway 125, mostly received overall low risk ratings; however, parts of these roads received medium, high, or even extreme risk ratings. Generally, the higher risk areas on these major roads are typically in areas where the road is steep and surrounded by forests. The specific high-risk areas of these major roads are discussed in detail in table D.4.

Many of the smaller roads in the County received high and extreme risk ratings. These roads are generally unpaved Forest Service roads and are likely of minor concern (unless, however, they are popular with recreators). However, some of these high and extreme risk roads are residential and ex-urban roads. Of note are the roads surrounding Winter Park, Fraser, Granby, and Grand Lake. These roads are typically narrow, steep, frequently unpaved, and surrounded by overhanging trees. These roads could create high risk for effective evacuation in the event of wildfire.

The layers (geographic data, including primary roads and designated bypass routes) used to generate Figure D.3 and D.4 were sourced from the Core Team. The primary ingress-egress routes and designated bypass roads were identified by Grand County and the Grand Fire Protection District. Grand County has identified specific evacuation zones for all of Grand County. These evacuation zones are designed to aid in the evacuation of regions of Grand County in the event of an emergency (e.g., a wildfire). The original web map can be accessed here: <https://gcgeo.maps.arcgis.com/apps/webappviewer/index.html?id=ca4f74421b69416da9be1b9b92166534>.

Evacuation zones are discussed in Appendix B “Evacuation Resources”.

Several road features were used as inputs to determine road risk. The weights of these inputs are described in Table D.3. Data for these features were gathered from roads and buildings footprints from Open Street Map and satellite imagery from the USGS. The inputs were processed in ArcGIS Pro (geospatial software). All inputs were adjusted to a common scale to facilitate comparison and evaluation, i.e., a risk score on a scale from 0 to 1 was assigned to all input features, with lower values representing lower risk and higher values representing higher risk. For features that have a range of values (e.g., degree of slope), a decimal value was assigned. For example, a moderately steep road would receive a score of 0.6, whereas a road with a gentle slope would receive a score of 0.1. For features that were evaluated by presence or absence, either a 0 or a 1 was assigned. For example, an unsurfaced road would receive a score of 1, whereas a paved road would receive a score of 0. All inputs were combined to produce a final risk score; each feature was assigned a weight, i.e., a value based on how much influence that feature has on risk. The final weights are shown in Table D.3. Model outputs were also adjusted based on Core Team feedback.

Table D.3. Final Weights Assigned to Each Feature in the Ingress/Egress Analysis

| Input | Weight |
|------------------|--------|
| Sinuosity | 0.2 |
| Grade | 0.15 |
| Bridge | 0.05 |
| Surface Material | 0.1 |
| Connectivity | 0.15 |
| Length | 0.1 |
| Tree Cover | 0.1 |
| Building Density | 0.15 |

The final map (see Figure D.3) is the end result of the analysis; it accounts for all features in Table D.3 and their respective weights. Red segments represent portions of the roads that are rated as high risk, and green segments represent portions of the roads that are rated as low risk. This map can be explored further in the projects story map. Due to the broad scale of the county, a close-up of the road entrapment analysis for the Fraser area is also provided in Figure D.4. We also provide close-up of the evacuation risk analysis for each Annex.

You can view the story map here: <https://grand-county-cwpp-gcgeo.hub.arcgis.com/>

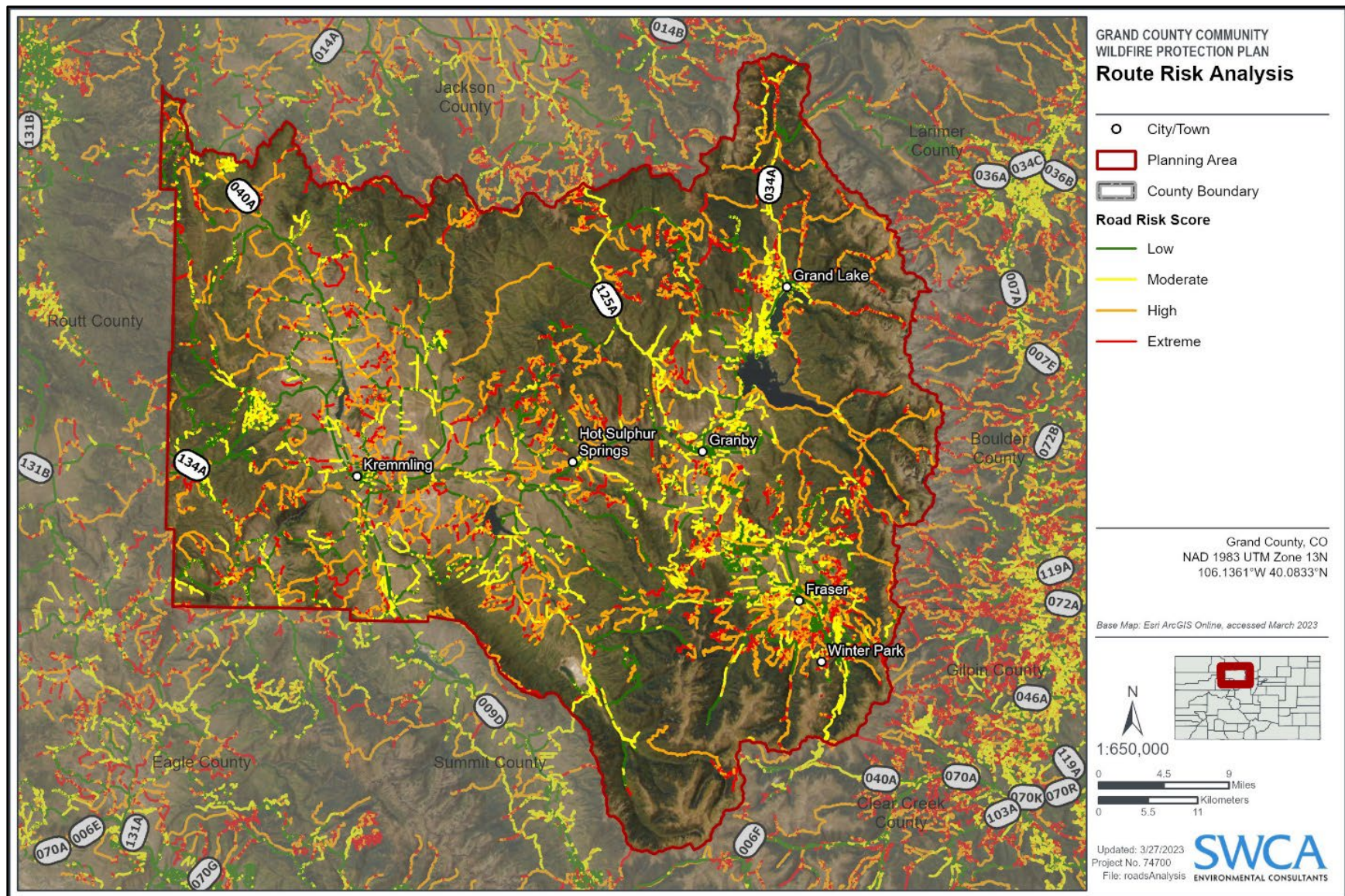


Figure D.3. Ingress/Egress route risk analysis.

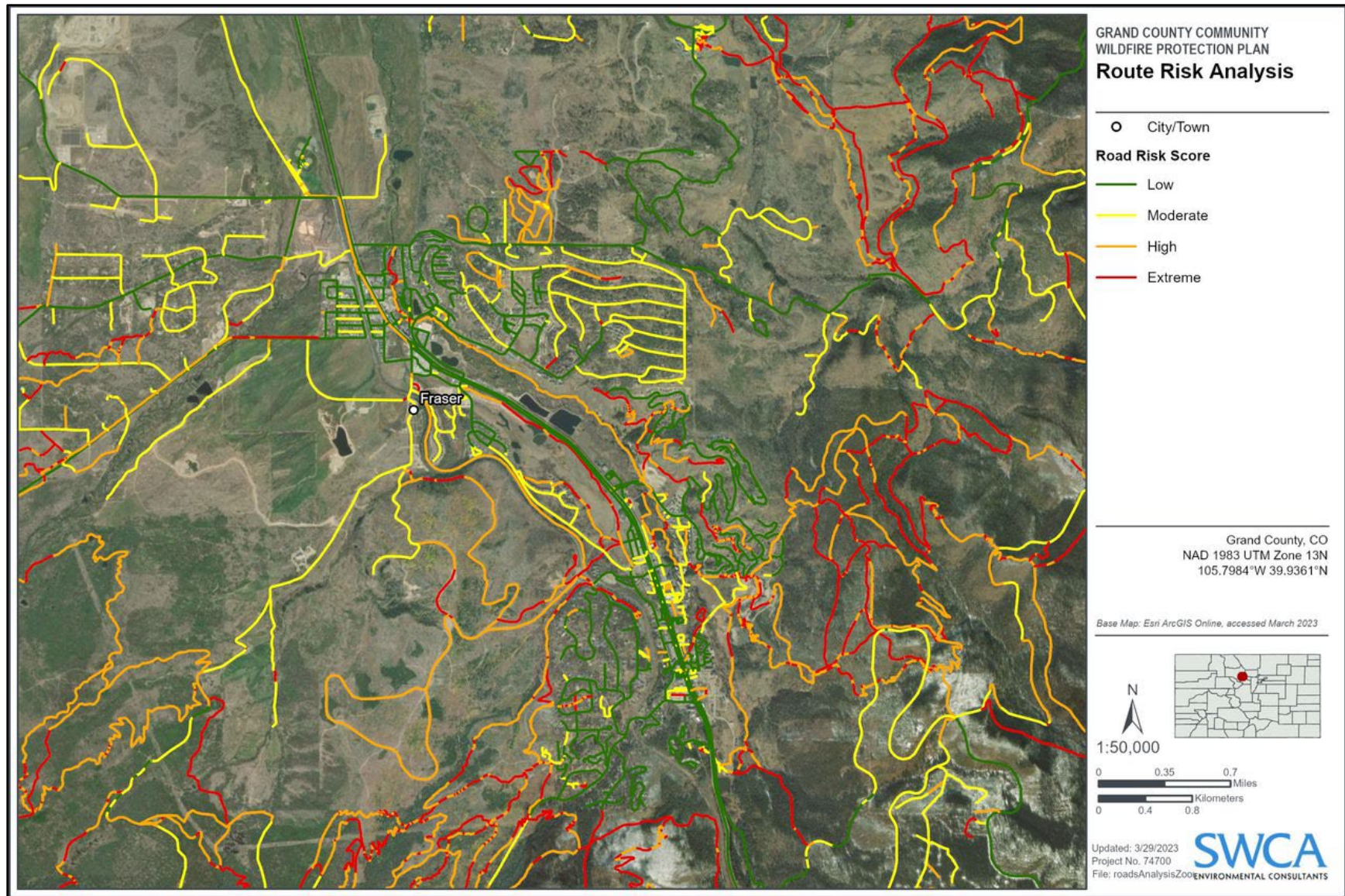


Figure D.4. Closeup of the ingress/egress route risk analysis for the Fraser area.

ROAD ENTRAPMENT ANALYSIS

While tree cover was included in the route risk analysis (see Figure D.3), specific fire behavior due to vegetation characteristics, weather, and topography was not accounted for. The road entrapment analysis (Figure D.5) considers the proximity of roads to landscapes that exhibit high flame lengths in the planning area. Specifically, roads that are within 25 feet of adjacent landscapes that exhibit flame lengths of 8 feet or greater are designated as likely to cause entrapment. Overall, 3,275 miles of roadway within Grand County were analyzed, of which 38.5% (1260.6 miles) were identified as likely to jeopardize evacuation activities and/or cause entrapment. The input map for this analysis (flame length) can be found in Appendix J.

Figure D.5. shows the roads or portions thereof that would likely compromise evacuation efforts due to exhibited fire behavior of the surrounding landscape. Yellow segments indicate roads that are within 25 feet of adjacent landscapes that exhibit flame lengths of 8 feet or more. Overall, the majority of the main transportation corridors, such as U.S Highway 40, U.S Highway 34, Colorado State Highway 134, Colorado State Highway 9, and Colorado State Highway 125, would not create entrapment issues. However, portions of these roads, especially in areas where the road is surrounded by steep forests, have the potential for entrapment. Due to the broad scale of the county, a close-up of the road entrapment analysis for the Fraser area is also provided in Figure D.6.

Mitigation work, such as fuel reduction, should focus on these high potential entrapment areas. While many of the minor roads in the County have the potential for entrapment, the roads of greatest concern are the smaller residential roads surrounding the County's major municipalities and the residential roads in the County's exurban areas. Many of these roads are steep, narrow, and/or surrounded by forest conditions. Residents in these areas should be proactive (e.g., practice fuel reduction treatments on their properties) in reducing the risk of entrapment during a wildfire for their roads. The County should also consider collaborating with public land management agencies to carry out fuel reduction projects on roadsides where appropriate and feasible.

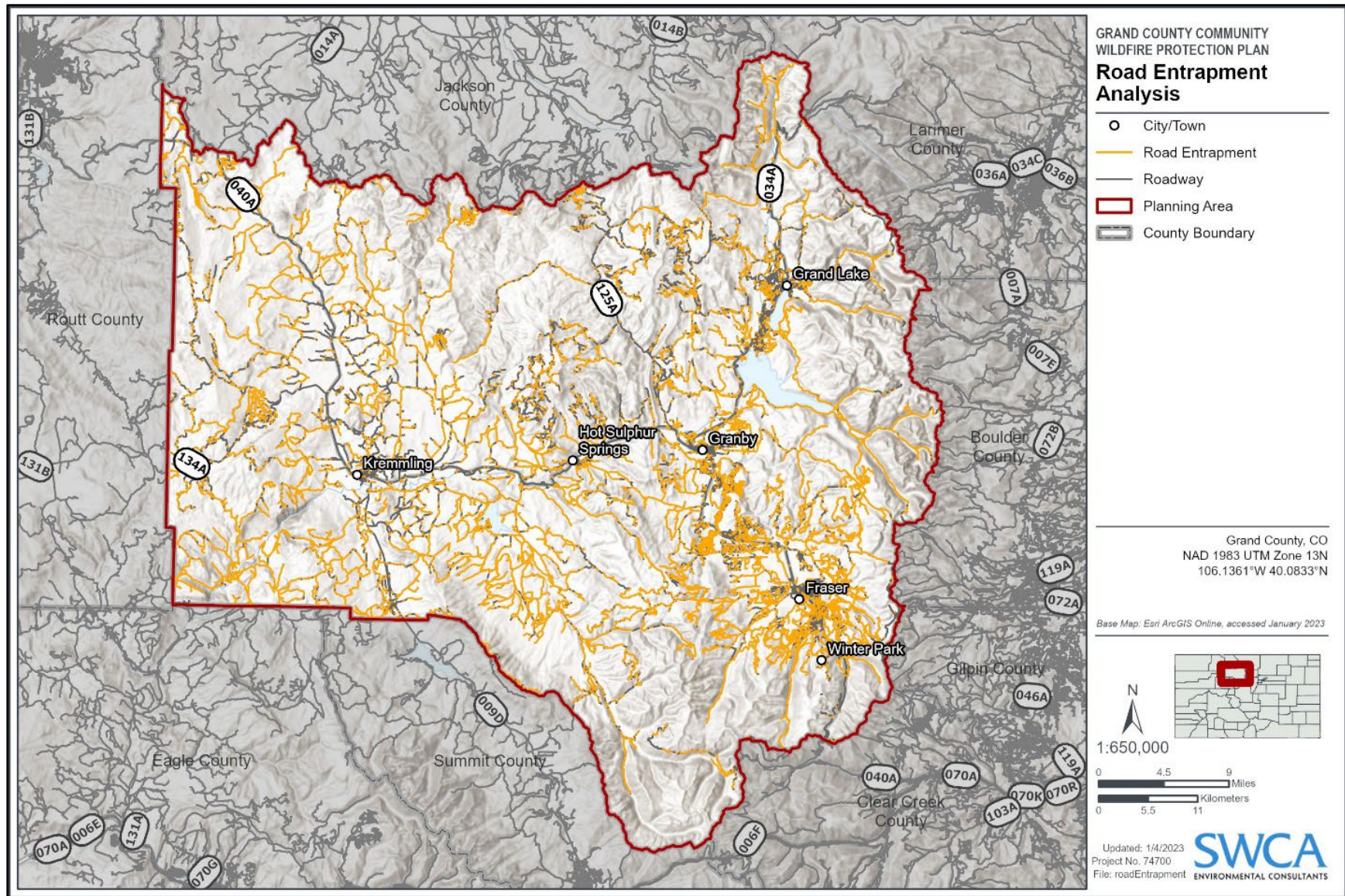


Figure D.5. Road entrapment analysis.

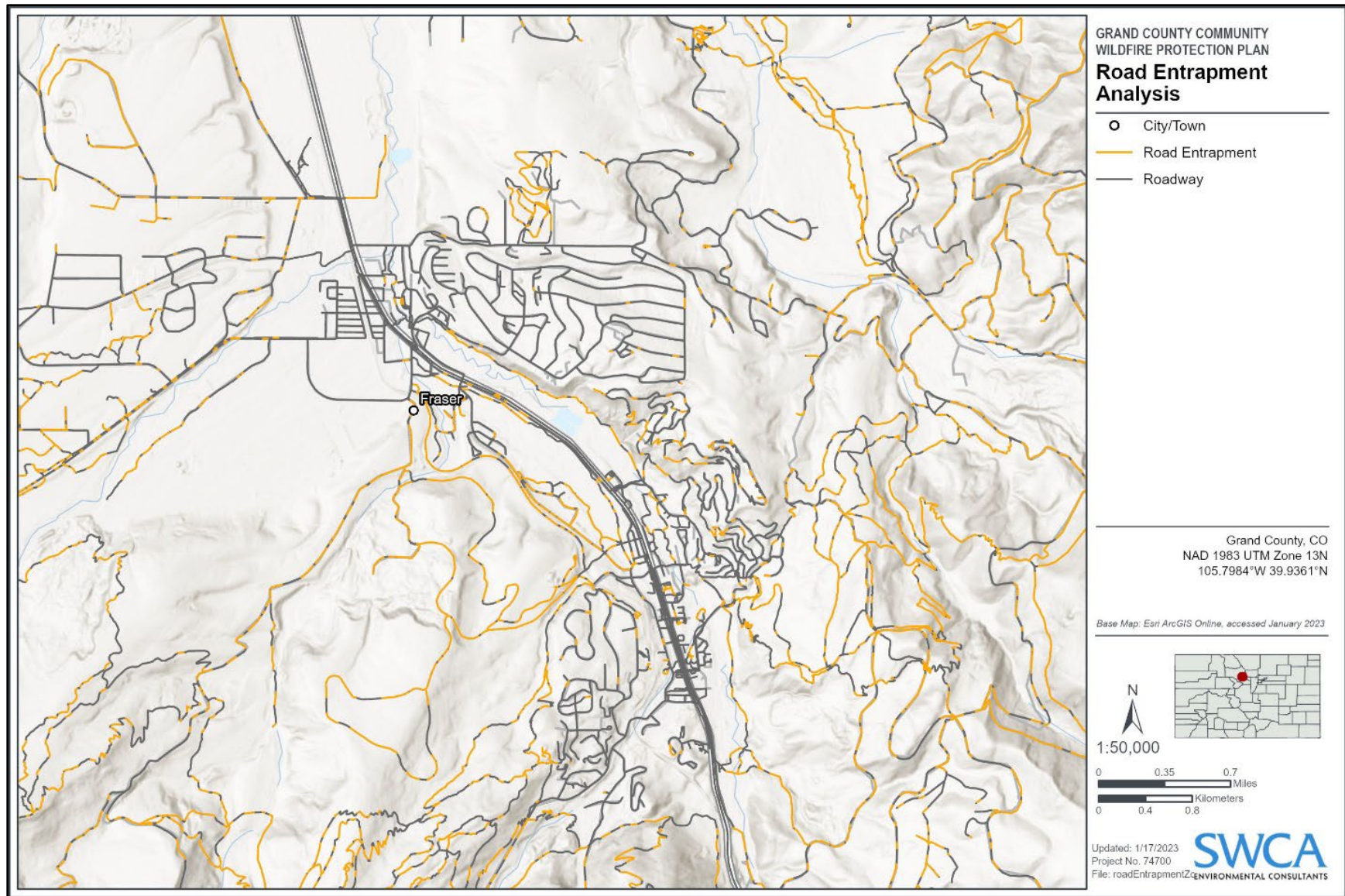


Figure D.6. Close-up of the road entrapment analysis for the Fraser area.

ROAD HAZARD ASSESSMENT

The GIS analyses described above (road entrapment and road hazard analysis) were used in conjunction with input from county officials to evaluate road hazards in the planning area for county's primary transportation corridors and their associated designated bypass routes (Figures D.7 and D.8). Table D.4 presents the key points, issues and/or likely hazards found in or around the primary transportation corridors, as well as potential mitigation recommendations.

Also presented in Table D.4 is the criticality ranking of the road. The Colorado Department of Transportation (CDOT) has determined criticality for Grand County's major transportation corridors. CDOT defines criticality as a "measure of the importance of an asset to the resilience of the system and, by extension, to the success of CDOT in carrying out its mission of delivering service to travelers." According to the CDOT assessing criticality "makes it possible to weigh mitigation alternatives, to know where emergency response plans are most urgently needed, and to identify alternate routes that should be examined for improvement should a critical link be highly susceptible to failure" (CDOT 2022). To simplify, high criticality roads are important roads – for economic and transportation reasons – that likely require substantial mitigation work to ensure they can continue to operate during a potential hazardous situation. Relevant to wildfire, high-severity wildfires could result in road damage and closures, while potential post-wildfire debris flows (fast moving, water laden landslides) can cause substantial damage to these roads and result in long-term closures if damage is bad enough. Mitigation work should seek to decrease wildfire severity along roadsides and improve the resilience of the roads where they may be susceptible to landslides.

Table D.5 presents the key points, issues and/or likely hazards found in or around the County's primary transportation corridor's designated bypass roads (Grand County 2022d), as well as potential mitigation recommendations. It should be noted that even though the primary transportation corridors have, generally, low evacuation risk and low likelihood of entrapment, other disasters (e.g., flooding) or potential road construction could impair the primary corridor's ability to function as an evacuation route. Thus, these bypass roads could be relied upon during the event of a wildfire evacuation. Additionally, many of these bypass roads already function as important egress routes for the County's residents. Bypass routes can be explored on the web map accessed here: <https://gcgeo.maps.arcgis.com/apps/webappviewer/index.html?id=42572e92742d422fbb941c6e437249a3>.

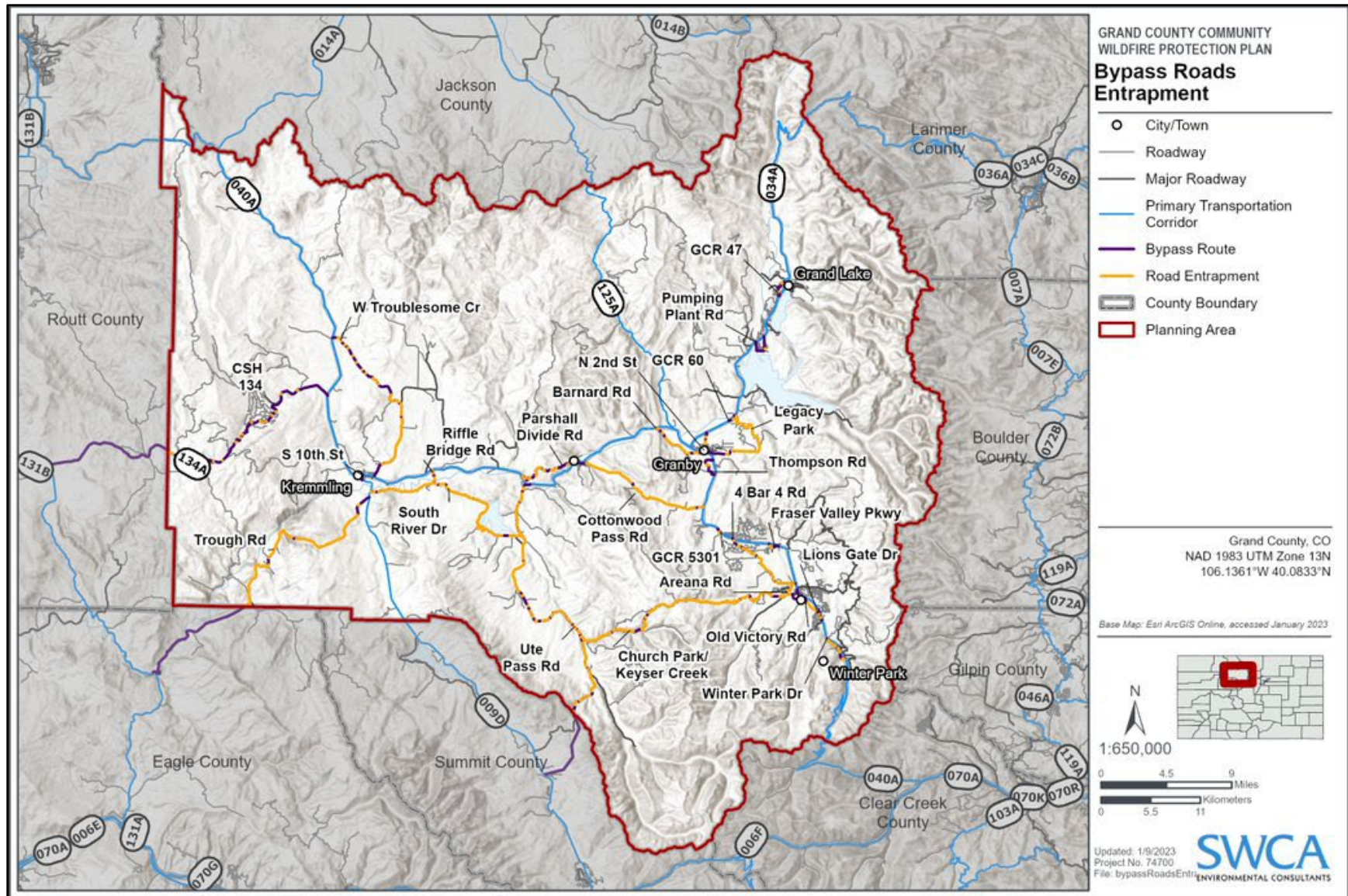


Figure D.7. Grand County bypass roads entrapment analysis.

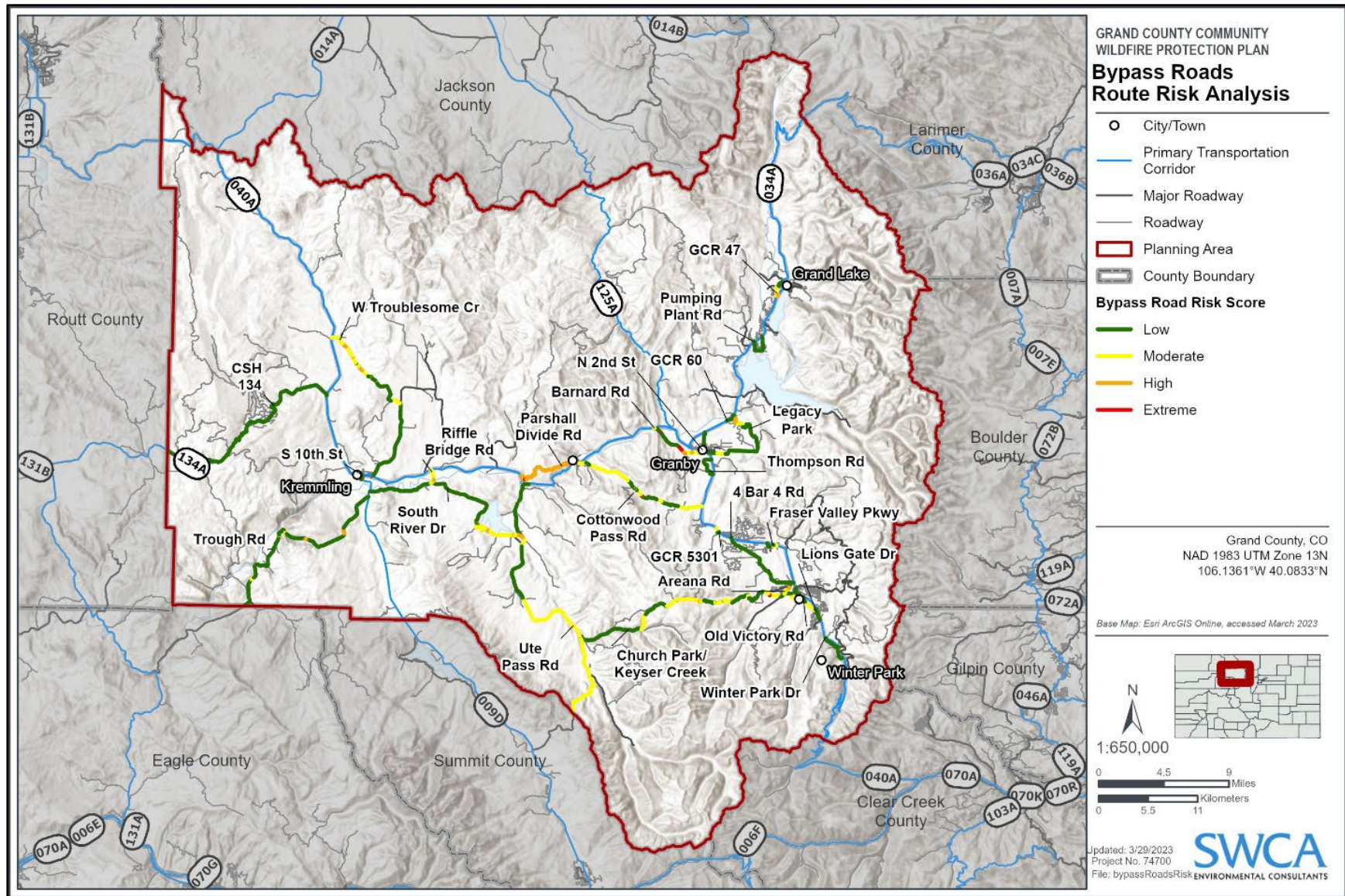


Figure D.8. Grand County bypass roads route risk analysis.

Table D.4. Primary Roads Hazards and Mitigation Recommendations

| Roads | Criticality Ranking within the County | Key Points | Issues | Recommendations |
|--------------------------|---|--|--|--|
| U.S 40 | <ul style="list-style-type: none"> High Criticality from Berthoud Pass to Granby High Criticality for minor portion in Kremmling (just west of intersection with 6th Street/CSH 9) Moderate criticality from Kremmling to northeast county border | <ul style="list-style-type: none"> Generally, low risk for evacuation Generally, low likelihood of entrapment Steep forested areas along highway could be at high evacuation risk during a fire | <ul style="list-style-type: none"> Some portions have high degree of sinuosity and have steep grades. Portions are adjacent next to landscapes that exhibit tall flame lengths (e.g., Berthoud Pass) Steep and curvy areas of road typically correspond with regions with that display tall flame lengths (e.g., Berthoud Pass). Many nearby, connecting, and adjacent roads display high and extreme levels of risk Many nearby and adjacent roads show potential for road entrapments | <ul style="list-style-type: none"> Implement/maintain roadside fuel reduction projects (at least 50 feet) where highway is steep, curvy, and forested. Reduce hazardous fuels on adjacent connecting roads so access is not impaired during a wildfire |
| Colorado State Highway 9 | <ul style="list-style-type: none"> Moderate Criticality | <ul style="list-style-type: none"> Low evacuation Low likelihood of fire entrapment Unlikely to be impaired in the event of a wildfire | <ul style="list-style-type: none"> Some steep and curvy areas of highway occur in shrub and grass-shrub fuels that could exhibit 8-11 ft tall flames Some adjacent and nearby connecting roads display high to extreme risk and potential for entrapment. | <ul style="list-style-type: none"> Monitor for flashy/hazardous along roadsides, especially in steep areas. Reduce roadside fuels where appropriate Reduce hazardous fuels on adjacent connecting roads so access is not impaired during a wildfire |

| Roads | Criticality Ranking within the County | Key Points | Issues | Recommendations |
|----------------------------|--|---|--|---|
| U.S Highway 34 | <ul style="list-style-type: none"> Moderate criticality from Junction of U.S. 40 to southwestern shore of Lake Granby. High criticality along western shore of Lake Granby High criticality along short portion of Little Columbine Creek Remainder of highway in County is moderate criticality | <ul style="list-style-type: none"> Generally, low evacuation risk Generally, low likelihood of entrapment Steep forested areas along highway could be at high evacuation risk during a fire | <ul style="list-style-type: none"> Some portions have high degree of sinuosity and have steep grades. Portions are adjacent next to landscapes that exhibit tall flame lengths (e.g., Trail Ridge Road) Steep and curvy areas of road typically correspond with regions with that display tall flame lengths (e.g., Trail Ridge Road). Many nearby, connecting, and adjacent roads display high and extreme levels of risk Many nearby and adjacent roads show potential for road entrapments | <ul style="list-style-type: none"> Implement/maintain roadside fuel reduction projects (at least 50 feet) where highway is steep, curvy, and forested, if appropriate and local and federal regulations permit. Reduce hazardous fuels on adjacent connecting roads so access is not impaired during a wildfire |
| Colorado State Highway 125 | <ul style="list-style-type: none"> Low criticality | <ul style="list-style-type: none"> Generally, low risk Generally, low likelihood of entrapment Generally, relatively low degree of sinuosity Steep forested areas along highway could be at high risk during a fire | <ul style="list-style-type: none"> Some portions have steep grades Portions are adjacent next to landscapes that exhibit tall flame lengths (especially in northern part of County) Steep portions of road correspond with forested fuels that yield tall flame lengths Many nearby, connecting, and adjacent roads display high and extreme levels of risk Many nearby and adjacent roads show potential for road entrapments | <ul style="list-style-type: none"> Implement/maintain roadside fuel reduction projects (at least 50 feet) where highway is steep, curvy, and forested Reduce hazardous fuels on adjacent connecting roads so access is not impaired during a wildfire |

*Distance value was not provided due to the proximity of many homes to the road.

Table D.5. Designated Bypass Roads for Primary Corridors

| Road Name/Number | Detour for: | Detour Length (miles) | Key Points | Issues | Recommendations |
|-------------------------------|--------------------------------------|-----------------------|---|---|--|
| Barnard Road (GCR 57) | U.S. 40 | 4.14 | <ul style="list-style-type: none"> Road displays high to extreme levels of risk for evacuation Most of road has potential for entrapment | <ul style="list-style-type: none"> Flammable fuels surround portions the road Gravel Road | <ul style="list-style-type: none"> Consider roadside fuel reduction projects |
| Ute Pass Road (GCR 3) | U.S. 40 and Colorado State Highway 9 | 27.36 | <ul style="list-style-type: none"> Generally, low risk for evacuation High likelihood of entrapment during a wildfire | <ul style="list-style-type: none"> Fuels that produce tall flame lengths surround most of the road Some of the road is gravel | <ul style="list-style-type: none"> Consider roadside fuel reduction projects Remove potential hazard trees flashy fuels, especially non-natives |
| Parshall Divide Road (GCR 20) | U.S. 40 | 5.71 | <ul style="list-style-type: none"> Entire road has high evacuation risk High likelihood of entrapment during a wildfire | <ul style="list-style-type: none"> Road is steep and curvy Fuels that produce tall flame lengths surround most of the road Seasonal Gravel Road | <ul style="list-style-type: none"> Consider roadside fuel reduction projects Remove potential hazard tree Remove fine, flashy fuels, especially non-natives |
| South River Drive (GCR 33) | U.S. 40 | 14.71 | <ul style="list-style-type: none"> Mostly low evacuation risk, but moderate and high evacuation risk near Williams Fork reservoir High likelihood of entrapment during a wildfire | <ul style="list-style-type: none"> High degree of sinuosity near reservoir Fuels that produce tall flame lengths surround most of the road | <ul style="list-style-type: none"> Consider roadside fuel reduction projects Remove fine, flashy fuels, especially non-natives |
| Riffle Bridge Road (GCR 39) | U.S. 40 and Colorado State Highway 9 | 1.08 | <ul style="list-style-type: none"> Crosses the Colorado River High likelihood of entrapment during a wildfire Moderate to high evacuation risk | <ul style="list-style-type: none"> Road is primarily a bridge Riparian fuels/trees could produce tall flame lengths (unlikely) Gravel road No semi-trucks | <ul style="list-style-type: none"> Consider roadside fuel reduction projects Remove fine, flashy fuels, especially non-natives |

| Road Name/Number | Detour for: | Detour Length (miles) | Key Points | Issues | Recommendations |
|-----------------------------------|-------------|-----------------------|---|---|---|
| Cottonwood Pass Road (GCR 55) | U.S. 40 | 9.75 | <ul style="list-style-type: none"> • Mostly moderate evacuation risk • High likelihood of entrapment during a wildfire | <ul style="list-style-type: none"> • Road is steep and curvy in parts • Fuels that produce tall flame lengths surround most of the road • Seasonal Gravel Road • No semi-trucks | <ul style="list-style-type: none"> • Consider roadside fuel reduction projects • Remove potential hazard trees • Remove fine, flashy fuels, especially non-natives |
| GCR 5301/GCR 53 | U.S. 40 | 0.47 | <ul style="list-style-type: none"> • Small connector road • Moderate evacuation risk • High likelihood of entrapment during a wildfire | <ul style="list-style-type: none"> • Fuels that produce tall flame lengths surround most of the road | <ul style="list-style-type: none"> • Consider roadside fuel reduction projects • Remove fine, flashy fuels, especially non-natives |
| 4 Bar 4 Road (GCR 5) | U.S. 40 | 5.97 | <ul style="list-style-type: none"> • Low evacuation risk • High likelihood of entrapment during a wildfire | <ul style="list-style-type: none"> • Fuels that produce tall flame lengths surround most of the road • Road is situated in WUI | <ul style="list-style-type: none"> • Consider roadside fuel reduction projects • Remove fine, flashy fuels, especially non-natives • Remove potential hazard trees |
| Winter Park Drive/ Old Town Drive | U.S. 40 | 2.10 | <ul style="list-style-type: none"> • Low evacuation risk • High likelihood of entrapment during a wildfire | <ul style="list-style-type: none"> • Fuels that produce tall flame lengths surround most of the road • Road is situated in WUI | <ul style="list-style-type: none"> • Consider roadside fuel reduction projects • Remove fine, flashy fuels, especially non-natives |
| Lions Gate Road | U.S. 40 | 0.75 | <ul style="list-style-type: none"> • Low evacuation risk • Moderate likelihood of entrapment during a wildfire | <ul style="list-style-type: none"> • Fuels that produce tall flame lengths surround portions of the road • Road is situated in WUI | <ul style="list-style-type: none"> • Consider roadside fuel reduction projects • Remove fine, flashy fuels, especially non-natives |
| Fraser Valley Parkway (GCR 522) | U.S. 40 | 0.33 | <ul style="list-style-type: none"> • Portions of road have moderate, high, and extreme evacuation risk • Moderate likelihood of road entrapment (near riparian zones) | <ul style="list-style-type: none"> • Sharp turns • Lots of intersections • Gravel surface • Situated in WUI | <ul style="list-style-type: none"> • Remove fine, flashy fuels, especially non-natives |

| Road Name/Number | Detour for: | Detour Length (miles) | Key Points | Issues | Recommendations |
|--|-----------------------|-----------------------|--|---|---|
| Thompson Road (10 Mile Drive) | U.S. 40 | 1.97 | <ul style="list-style-type: none"> Mostly low evacuation risk with exception of high risk zone in riparian corridor Moderate likelihood of entrapment during a wildfire (along riparian zone) | <ul style="list-style-type: none"> Some sharp turns Residential area Lots of intersections Situated in WUI | <ul style="list-style-type: none"> Remove fine, flashy fuels, especially non-natives from roadsides |
| North 2 nd Street (GCR 61) | U.S. 40/ U.S. 34 | 1.46 | <ul style="list-style-type: none"> Low evacuation risk Moderate likelihood of entrapment during a wildfire | <ul style="list-style-type: none"> Flammable grass-shrub fuels along roadways Situated in WUI | <ul style="list-style-type: none"> Remove fine, flashy fuels, especially non-natives from roadsides |
| Trough Road (GCR 1) | CSH 9/U.S. 40/CSH 131 | 24.41 | <ul style="list-style-type: none"> Most of road has low evacuation risk, but portions have moderate and high risk High likelihood of entrapment during a wildfire along majority of route | <ul style="list-style-type: none"> Road has lots of steep, curvy sections Flammable grass-shrub and forest fuels along most of roadway | <ul style="list-style-type: none"> fuel reduction projects Remove fine, flashy fuels, especially non-natives from roadsides |
| West Troublesome Creek (GCR 22/GCR25) | U.S. 40 | 13.48 | <ul style="list-style-type: none"> GCR 22 has low evacuation risk GCR 25 has large portions with moderate to high evacuation risk High likelihood of entrapment during a wildfire along majority of route | <ul style="list-style-type: none"> Steep, curvy section along most of GCR 25 Most of GCR 25 is a gravel or dirt surface Flammable grass-shrub fuels along roadways | <ul style="list-style-type: none"> Remove fine, flashy fuels, especially non-natives from roadsides |
| Legacy Park (GCR 620/GCR 60) | U.S. 40/ U.S. 34 | 7.68 | <ul style="list-style-type: none"> Mostly low evacuation risk except for portions with high degree of sinuosity Most of road has high likelihood of entrapment during a wildfire | <ul style="list-style-type: none"> Section of the road have steep curves Flammable grass-shrub and forest fuels along roadside Gravel surface | <ul style="list-style-type: none"> Consider roadside fuel reduction projects Remove fine, flashy fuels, especially non-natives from roadsides |

| Road Name/Number | Detour for: | Detour Length (miles) | Key Points | Issues | Recommendations |
|--|-------------------|-----------------------|--|--|---|
| Church Park/Keyser Creek (GCR 50/GCR 32) | U.S. 40/ CSH 9 | 19.63 | <ul style="list-style-type: none"> Most of road has moderate to high evacuation risk with small portion displaying extreme risk Most of road has high likelihood of entrapment during a wildfire | <ul style="list-style-type: none"> Many areas along the road are steep, curvy, and forested Flammable forest fuels surround most of the road Seasonal road Gravel surface | <ul style="list-style-type: none"> Consider roadside fuel reduction projects Remove fine, flashy fuels, especially non-natives from roadsides |
| Golf Course Road (GCR 47, 48, and 471) | U.S. 34 | 1.53 | <ul style="list-style-type: none"> Moderate and high evacuation risk along near southern junction with U.S. 34 Moderate likelihood of entrapment during a wildfire | <ul style="list-style-type: none"> High degree of sinuosity Lots of intersections Heavy concentration of residential structures Flammable forest fuels surrounding portions of road Portions with gravel surface Situated in WUI | <ul style="list-style-type: none"> Consider roadside fuel reduction projects Remove fine, flashy fuels, especially non-natives from roadsides |

*Note this table is not complete list of all bypass roads. Very small bypasses or roads with low evacuation risk and low likelihood of entrapment were not included. Roads that were not included are Railroad Avenue, Main Street (GCR 822), and South 10th Street.

WASH STATE

APPENDIX E:

Project Recommendations

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Table E.1 Recommendations to Create Resilient Landscapes (Fuel Treatments)*

*See Appendix A to consult relevant regulations and past planning efforts

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------|--------|------------------|---------------------|---|--|--|--|---|--|---|
| GC RL #1 | | H | 0–2 years | Mitigate wildfire hazards on private land | Highest risk communities identified in the assessment. This should be prioritized in areas of concern and along egress routes. | Private, county, local FPDs, CSFS, federal agencies, Grand County Wildfire Council | <div>Strategic placement of fuel breaks on private lands will help to limit the spread of wildland fire and increase access to difficult areas. Fuel break prescriptions should be site specific depending on the fuel type, topography, soils, adjacent land management practices and environmental regulations.</div> <ul style="list-style-type: none">Collaborate with local, state, and federal land management agencies, communities, and private landowners to link fuel treatments to increase effectiveness on a landscape scale (aligns with Colorado Forest Action Plan)Reduce fuel continuity where appropriate, focusing on high-risk areas and the WUIBreak down plans into high-risk communitiesUtilize mechanical and manual methods or consider biological controlsAim for 300-foot shaded fuel breaks around communitiesImplement and maintain shaded fuel breaks and reduce ladder fuelsUtilize the Good Neighbor Authority, as appropriate, to facilitate cross-boundary actions.Target vacant lots with accumulating vegetationProvide incentives for private landowners to engage in fuel reduction projects | <div>Protect life and property by mitigating fuels, providing defensible space for firefighters protecting structures.</div> <div>Create a fuel arrangement unlikely to support crown fire or fast rates of spread.</div> <div>Reduce the risk of home and structure ignitions.</div> | <div>Follow up with post-treatment stabilization practices.</div> <div>Frequent communication, collaboration, and cooperation with landowners.</div> <div>Regular maintenance to ensure the fuel break remains clear of vegetation.</div> <div>Monitor and treat for invasive species.</div> <div>Continued management of fire breaks maintained by grazing, brush breaking, controlled burns.</div> | <ul style="list-style-type: none">U.S. Endowment for Forestry and CommunitiesCommunity Wildfire Defense Grants (CWDG)Forest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS)National Fire Plan (NFP) GrantsBuilding Resilient infrastructure and Communities (BRIC)Congressionally Directed SpendingForm a "Forest Improvement Tax District" re. CO HB21-1008Modify Grand County "Open Lands, Rivers & Trails" sales tax to include wildfire mitigation and staffingCreate a Grand County real estate transfer fee to fund mitigation |



| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------|--------|------------------|---------------------|--|--|---|--|--|---|--|
| GC RL #2 | | H | 0–5+ years | Collaborate between private, state, and federal partners (especially the BLM, USFS and the NPS) to plan and conduct landscape-level fuel treatments. A focus should be to treat areas along egress routes. | County (private and local) and adjacent state and federally managed lands (i.e., public and private lands). This should be prioritized in areas of concern. <u>Priority areas:</u> West Fraser, Blue Ridge, East Fraser, East Lake Granby, Strawberry, South of Lake Granby, West 34, Copper Creek, Old Park, Kremmling Water | County, CSFS, federal agencies, non-profits (Grand County Wildfire Council) | <ul style="list-style-type: none">• Locate parcels on private and public lands where targeted fuel treatments can be performed that will connect pre-existing treatments.• Collaboratively identify vegetation and fuels management needs based on the risk/hazard assessment and input from local officials and land managers.• Develop equipment needs to accomplish work (including maintenance) and seek funding for purchase.• Create an educational tool/handout for land/property owners focused on various methods, techniques, and cost for various fuel treatments.• Cultivate and support partnerships with NGOs and volunteer groups to support implementation of projects, for example, the Grand County Wildfire Council.• Buffer roads, natural fuel breaks (rivers, creeks, and ridgelines), and designated ROWs to increase fuel break effectiveness.• Consider fuel breaks around the boundaries of federally owned land.• Create and maintain buffers around critical infrastructure.• Develop long-term maintenance plan with each project, including funding sources. | Create resilient landscapes and address potential for extreme wildfire behavior in and around the WUI. Create and maintain accountability with local landowners/managers. | Arrange a standing multi-agency meeting each year to review accomplishments and address future needs. Consider the use of timber sales. Survey for regeneration annually. Perform defensible space inspections. Monitor and treat for invasive species annually. | <ul style="list-style-type: none">• Forest Restoration & Wildfire Risk Mitigation (CSFS)• Wildfire Mitigation Incentives for Local Government (CSFS)• Wildfire Mitigation Resources & Best Practices (CSFS)• U.S. Endowment for Forestry and Communities• Western Bark Beetle Program• GSA Federal Excess Personal Property (FEPP)• Firewise Grants• BRIC• Regional Catastrophic Preparedness (RCP) grants• Fire Prevention and Safety (FP&S) Grants (FEMA)• Community Wildfire Defense Grants (CWDG)• National Urban and Community Forestry Challenge Cost Share Grant Program• Healthy Forests and Vibrant Communities (CSFS)• From Forests to Faucets (Denver Water)• Community Assistance Funds Adjacent to USFS lands (CAFA) – CSFS |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------|--------|------------------|---------------------|---|---|--|---|--|--|---|
| GC RL #3 | | H | 0–10 years | Conduct post-wildfire mitigation work in areas impacted by the East Troublesome and Williams’s Fork fires | Regions impacted by fire. This should be prioritized in areas of concern. | USFS, NPS, BLM, private (Northern Water), and CSFS | <div>Efforts should focus on post-wildfire landscape rehabilitation in the WUI and important watersheds.</div> <ul style="list-style-type: none">Determine current status of completed BAER and BAR work and assess needs for future efforts.Work with a forest hydrologist to address restoration efforts in valued watersheds and WUI areas to accelerate forest recovery. Work such as revegetation and tree planting can reduce debris flow risk, flooding risk, erosion, sedimentation, and protect water quality.Conduct regular post-fire monitoring efforts. Track forest/vegetation recovery and succession. Utilize management interventions in degraded areas to ensure successful recovery (e.g., monitor and control for invasive plants, plant native plants in areas experiencing erosion).Consider fuel reduction projects in WUI areas with considerable slash and blow down to reduce potential for future wildfire as recovery is ongoing.Conduct public outreach and education concerning post-wildfire hazards (e.g., falling trees, heightened flooding risk, and higher likelihood of road washout). | Aid in restoration and rehabilitation of landscape impacted by wildfire. | <div>Regular monitoring of post-fire environment.</div> <div>Assessment of WUI and watersheds at risk in the post-fire environment</div> <div>Committed long-term effort to tracking post-wildfire recovery and assessing post-wildfire risks.</div> | <ul style="list-style-type: none">Forest Restoration & Wildfire Risk Mitigation (CSFS)U.S. Endowment for Forestry and CommunitiesColorado Healthy Forests and Vibrant Communities ActEnvironmental Quality Incentives Program (EQIP)2022 Infrastructure Investments and Jobs Act |
| GC RL #4 | | H | 0–5 years | Have local FPDs design, implement, and prioritize local fuel reduction projects within the WUI in their respective FPD. | County-wide. This should be prioritized in areas of concern. | Local FPDs, with CSFS support and private and federal cooperation. | <ul style="list-style-type: none">Implement prescribed fire program.Utilize either fuel pile burning or broadcast prescribed burns – implementation and methods should consider fire regimes, fuels, hazards, and community concerns.Design “hybrid projects” that remove fuel from critical areas and prescribed burns to clean out interior fuels. Implement mechanical fuel reduction projects.Utilize woodchippers, saw crews, selective timber harvests, and timber stand improvement projects to obtain goalsUtilize mechanical and chemical means (e.g., mowing and/or herbicide) to control problematic invasive species, which contribute to hazardous fine fuel loading | <div>Reduce wildfire risk in WUI.</div> <div>Provide local input in fuel treatments.</div> | <div>Yearly maintenance and monitoring of post-treatment conditions</div> | <ul style="list-style-type: none">Colorado Healthy Forests and Vibrant Communities ActForest Restoration & Wildfire Risk Mitigation (CSFS)Environmental Quality Incentives Program (EQIP)National Urban and Community Forest ProgramU.S. Endowment for Forestry and CommunitiesForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS)HOA assessments |



| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------|--------|------------------|---------------------|--|--|---|---|---|--|--|
| GC RL #5 | | M | 0–5 years | Reduce potential for wildfire ignitions along roadways, railway tracks, and ATV/OHV/Jeep trails. | County-wide. Focus on primary transportation corridors, popular recreational areas, and community egress routes. This should be prioritized in areas of concern. | CDOT, private, county, federal agencies | <p>Road ROW vegetation improvements:</p> <ul style="list-style-type: none">• Frequent maintenance of ROW vegetation• Focus fuel treatments in areas identified as high risk in evacuation analysis and with high likelihood of entrapment as identified in the entrapment analysis (i.e., steep and windy areas, or regions with hazardous fuel loading).• Treat surface fuels within a minimum of a 10-foot buffer and up to 30 feet where possible. Focus in fine/flashy fuels on roadsides, especially invasive plants.• Treat fuels in non-paved parking areas and pull-offs (e.g., trailheads, campgrounds, scenic views) to reduce potential for unintentional grass/weed fires.• Trim fuels (ladder fuels/overhanging vegetation) to allow safe passage of emergency vehicles and to prevent potential for entrapment.• Control for roadside invasive species that may contribute to rapid fire spread or ignitions (i.e., weeds and grasses). Consider the use of herbicide.• Monitor railway tracks for overgrown conditions. Create and maintain fuel buffers along tracks.• Consider targeted restrictions (use of gates) on ATV/OHV/JEEP use during periods of heightened wildfire risk, especially on overgrown backcountry trails. | <p>Reduce roadside wildfire risk and hazards</p> <p>Reduce number of human- caused wildfire ignitions</p> <p>Provide improved ingress/egress capabilities during wildfire</p> | Yearly maintenance and monitoring of roads | <ul style="list-style-type: none">• BRIC• NFP• RCP• Firewise Grants• 2022 Infrastructure Investments and Jobs Act• Forest Restoration & Wildfire Risk Mitigation (CSFS)• Wildfire Mitigation Incentives for Local Government (CSFS)• Wildfire Mitigation Resources & Best Practices (CSFS)• CDOT• Railroads• GC OLR&T Fund |
| GC RL #6 | | M | 0–5 years | Assess health and status of aspens stands. Look for occurrences of sudden aspen decline. | West Grand County (primarily) and county wide | USFS, BLM, Private, and CSFS | <p>Aspen decline has largely been attributed to multiple effects, but the interaction between drought, climate change, disease, and land use is likely the primary cause.</p> <ul style="list-style-type: none">• Conduct monitoring efforts in locally important aspen stands in the WUI and assess and document occurrence of aspen decline.• Conserve healthy aspen stands and limit anthropogenic development into them.• Consider elk enclosures and grazing restrictions (where appropriate) to increase aspen recruitment.• Consider prescribed fire in older aspen forests to promote new growth/clear out older and/or dead trees and understory conifer competition (note: standing aspen has low fire tolerance, this will only help with recruitment).• Look to reduce prevalence of insects/disease in locally important stands (e.g., mechanical and chemical treatments). | <p>Improve forest health</p> <p>Reduce wildfire risk within the WUI</p> <p>Maintain and preserve native landscapes</p> | Yearly maintenance and monitoring of locally important and high-elevation aspen stands | <ul style="list-style-type: none">• Colorado Healthy Forests and Vibrant Communities Act• Forest Restoration & Wildfire Risk Mitigation (CSFS)• EQIP• National Urban and Community Forest Program• U.S. Endowment for Forestry and Communities |



| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------|--------|------------------|---------------------|--|--|--|---|--|---|---|
| GC RL #7 | | M | 0–10 years | Create more open canopies in forests and utilize prescriptions and treatments to clear out downed timber | Private and federal lands. This should be prioritized in areas of concern. | Federal agencies, local, and private FPDs | <ul style="list-style-type: none">Utilize mechanical treatments and prescribed firesTreatments should have dual purpose (e.g., they can be used widen ingress/egress for all non-county roads)Look at mapped Potential Operational Delineations (PODs) and map out areas with needed prescription burns. | Create resilient landscapes, maintain/restore forest and rangeland health, and address potential for extreme wildfire behavior. Decrease wildfire risk to communities | Set up a standing multi-agency meeting every fall to review accomplishments and address future needs. | <ul style="list-style-type: none">National Urban and Community Forestry Challenge Cost Share Grant ProgramFirewise grantsU.S. Endowment for Forestry and CommunitiesNFPForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |
| GC RL #8 | | L | Ongoing | Promote to role of fire in ecological processes | County-wide | Private, county, state, and federal agencies | <ul style="list-style-type: none">Educate the population about the natural role that wildfire plays in Grand County's ecosystems.Restore natural fire regimes in Wilderness areas (RMNP and USFS areas) and in roadless forests and rangelands areas. Let wildfires burn in regions that pose low risk to human health and safety.Foster relationships among researchers, managers, practitioners, and emergency responders to facilitate knowledge transfer and resource sharing. Use these relationships to develop creative means of restoring forest health and natural fire regimes in manner that balances ecological health with community concerns.Identify areas to manage fire to reduce fuels and restore ecosystems. Coordinate with appropriate entities and integrate information into response plans and management actions.Integrate potential prescribed fire projects in planning efforts where ecologically appropriate. | Restore/conserve native landscapes Promote environmental awareness | Stakeholder outreach, communication, and cooperation | <ul style="list-style-type: none">National Urban and Community Forestry Challenge Cost Share Grant ProgramFirewise grantsU.S. Endowment for Forestry and CommunitiesWestern Bark Beetle ProgramForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS)Environmental Quality Incentives Program (EQIP)Leonardo DiCaprio Foundation Grants2022 Infrastructure Investments and Jobs Act |

Table E.2. Recommendations for Creating Fire-Adapted Communities (Public Education and Reducing Structural Ignitability)*

*See Appendix A to consult relevant regulations and past planning efforts

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------|--------|------------------|---------------------|--|--|---|---|---|--|--|
| GC FAC #1 | | H | 0–10 years | Public education for exurban communities in fire prone environments | West Fraser, East Fraser, East Lake Granby, Strawberry Ranch, Cooper Creek/South William's Fork, Old Park, Kremmling Water/North of Highway 134, Communities surrounding West U.S. Highway 34, and any other community located in high to extreme risk areas | Private, Town and County Planning Commissions, local FPDs, HOAs, Grand County Wildfire Council, and community leaders | <div>Increase public awareness of the fire environment:<ul style="list-style-type: none">Communicate the inherent risk to homes/property situated on steep slopes in fire prone landscapes.Communicate the fast rates of spread that can occur in grass-shrub and shrub fuels.Communicate that tall flame lengths can occur in timber-understory and timber-litter and fuels (i.e., forested areas).Increase education and assistance for homeowners on home hardening, defensible space, and hazardous fuel treatments.Develop and encourage adoption of model HOA covenants and architectural guidelines that support WUI risk reduction.Enact and enforce a Wildland-Urban Interface Code for development in high-risk landscapes as noted in the risk-hazard assessment.Enact a county-wide requirement for a real estate transfer WUI disclosure, inspection checklist, and local FPD contacts.Create opportunities for landowners/mangers to address wildfire risk reduction.Increase awareness that many residents live within an environment that historically experienced regularly mixed to high severity wildfire (spruce-fir and lodgepole pine forests).Create mailers and flyers with simple fire safety practices and resources to distribute to visitors and short-term rental properties. Post to the wildfire council web page.Issue press releases in the spring and fall to local papers including fire-safe information for the public and Firewise resources.Develop a Grand County consumer recommendation for homeowner insurance.</div> | <div>Create and maintain accountability with local landowners and real estate developers</div> <div>Improve public knowledge about wildfire risk for the environment they live in</div> | Regular public outreach and communications with HOAs, landowners, real estate agents, developers and architects. | <ul style="list-style-type: none">Wildfire Mitigation Incentive for Local Government (CSFS)Fire Prevention and Safety GrantsFire Wise GrantsFEMA FP&S Grants |
| GC FAC #2 | | H | 0–5 years | Identify funding sources for underserved homeowners and vulnerable populations | County wide. Prioritize high risk areas. | FPDs, HOAs, community leaders GCOEM Mtn Family Center Grand County Wildfire Council | <ul style="list-style-type: none">Identify vulnerable populations (elderly, disabled, low income) and underserved homeowners who may need additional help to mitigate home hazards and to evacuate during a wildfire.Seek grant opportunities to support assistance for relevant populations. | Protect life and property of the most vulnerable members of the community | Annual review of number of actions taken to address vulnerable populations and underserved homeowners | <ul style="list-style-type: none">BRICCommunity Development Block GrantsFirewise grantsNational Urban and Community Forest ProgramChallenge Cost Share Grant ProgramCommunity Wildfire Defense Grants |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
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| GC FAC #3 | | H | | Reduce potential for human caused wildfire ignitions along recreational trails. | County-wide | BLM and USFS | <ul style="list-style-type: none">Consider targeted restrictions (e.g., use of gates) on recreational trails use during periods of heightened wildfire risk, especially on backcountry trails with high fuel loads.Communicate heightened wildfire ignition risk when motorized vehicles travel off trail, especially during dry periods of the year (e.g., utilize flyers at trailheads).Communicate safe parking practices to reduce wildfire ignition risk (e.g., don't park in tall, dry grass or use a ground tarp when parking).Communicate and enforce campfire restrictions.Utilize temporary and/or permanent trail closures in high-to extreme- fire risk areas.Implement geofenced messaging for areas with high tourist densities. | Reduce recreation caused wildfire ignitions. Encourage responsible recreation. | Regular monitoring of recreational trail conditions. Regular public outreach. | <ul style="list-style-type: none">USFS Community Wildfire Defense GrantsWildfire Mitigation Incentive for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices Grants (CSFS)Firewise Communities Grants |
| GC FAC #4 | | H | | Update current fire and building codes. Develop, enact, and enforce WUI codes. Focus on land use plans, existing building codes, and subdivision codes. | County and local municipalities | County planning commission and town governments FPDs, GCOEM | <ul style="list-style-type: none">Strengthen municipal and county codes for home and structures located within the WUIProvide list, examples, and costs of acceptable building materials.Continue to develop and adopt the latest building standards and codes.Clearly define the WUI in the county code.Consider county-wide adoption of International WUI code.Provide HOA model covenants and architectural guidelinesPublic (esp. builders, agency staff, architects, realtors) education. | Reduce wildfire risk and loss of structures through effective regulation | Annual updates to codes as necessary. Perform regular inspections to ensure codes are being adhered to. | <ul style="list-style-type: none">Firewise grants National Urban and Community Forest ProgramFP&S (FEMA)Environmental Protection Grants (EPA)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |
| GC FAC #5 | | H | | Communicate fire risk to real estate agents, developers, architects, insurance agents, and potential sellers/buyers | County and local municipalities | County and town planning commissions, local government, Grand County Board of Realtors | <ul style="list-style-type: none">Develop and distribute information regarding how topography, slope, and vegetation all impact a home's risk level and defensible space needs.Have wildfire risk and WUI delineation for listed properties included as an element of the Master Listing Service (MLS) – the master listings for sale utilized by the real estate industry.Have MLS include link to county-wide CWPP/story map (with preferred navigation to community/region specific NFPA 1144)Include Firewise assessments and recommendations to potential buyersProvide link to county CWPP on real-estate websitesProvide link to Grand County Wildfire Council assessment program page on real-estate websites.Encourage realtor associations to include wildfire risk areas and WUI in maps. | Increase pre-purchase knowledge of fire environment and post-purchase action by new homeowner. Educate property owners. Reduce threats to life and property. | Assess and improve communication between real estate sellers/buyers and county emergency planning | <ul style="list-style-type: none">BRICFirewise GrantsFP&SEPA Environmental Education GrantsWildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------|--------|------------------|---------------------|--|-------------|--|---|--|---|--|
| GC FAC #6 | | H | | Expand the capacity of the Grand County Wildfire Council | County-wide | Town and county planning ,FPDs, residents, Grand County Wildfire Council | <ul style="list-style-type: none">• Develop local, sustainable funding sources• Engage additional groups with vested interest in wildfire risk reduction, e.g., builders, suppliers, realtors, insurance agents.• Continue to develop and distribute information regarding how topography, slope, and vegetation all impact a home's risk level and defensible space needs.• Apply for and acquire funding to hire a full-time paid director.• Apply for and acquire funding to hire a full-time wildland fire mitigations specialist and associated team.• Continue efforts bolstering Firewise programs, education, and training; grant writing capabilities; improved public outreach; and community chipping days.• Continue to build collaboration with state and federal agencies – focus on joint fuel reduction projects.• Provide more opportunities form community chipping days (i.e., chipping hazardous fuels).• Continue and expand property wildfire assessment program.• Continue to fund and implement cost-share programs for homeowners, focusing on HIZ areas and vulnerable households.• Coordinate with national non-profit efforts ongoing in Grand County.• Add a "hit count" to bewildfireready.org | Improve local government and community ownership of reducing wildfire risk Strengthen ties between federal and private landowners Reduce wildfire risk throughout the County | Assess capacity needs and acquire funding to support. Review/tracking of goals and projects. Assessment of wildfire council advancements in wildfire risk reduction using the project tracker and pivot based off lessons-learned annually. | <ul style="list-style-type: none">• Firewise Grants• Community Wildfire Defense Grant (CDWG)• FP&S• EPA Environmental Education Grants• Wildfire Mitigation Incentives for Local Government (CSFS)• Wildfire Mitigation Resources & Best Practices (CSFS)• Form a "Forest Improvement Tax District' re. CO HB21-1008• Modify Grand County "Open Lands, Rivers & Trails" sales tax to include wildfire mitigation and staffing• Create a Grand County real estate transfer fee to fund mitigation |



| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------|--------|------------------|---------------------|---|---|--|---|---|--|--|
| GC FAC #7 | | H | | Monitor and enforce defensible space standards. Encourage home hardening. Improve homeowner mitigation efforts and opportunities. | WUI, county-wide, high-risk areas as identified in the risk assessment. | Private, County Planning Commission, local FPDs, Grand County Wildfire Council, HOAs and community leaders | Strongly promote defensible space: <ul style="list-style-type: none">Consider adhering to CSFS recommended defensible space standards (e.g., enforce 100 feet of defensible space).Clean and maintain fuel buffers in ingress/egress routes.Ensure there are two ways out of a community.Consider landscaping methods across multiple properties that reduces fire potential (e.g., connect fuel treatments across different properties).Develop staffing plan to support enforcement and seek funding to implement the plan.Provide tax incentives for defensible space actions.Work with insurance commission and companies to determine the potential to provide incentives for defensible space associated with reduced insurance premiums.Consider fuels pickup/disposal options.Require notice in real transfer of home location in WUI, assessment checklist, and FPD contacts.Promote education of the reduction of structural ignitability and enact WUI codes.Educate homeowners on methods and resources to reduce their home's risk through defensible space improvements and structure hardening.Train home repair contractors to assess and harden homes to build local capacity and capability. | Reduce loss of life and structures through defensible space and home hardening. | Annual program evaluation and updates as necessary. Update the building code. | <ul style="list-style-type: none">FirewiseFP&S (FEMA)EPA Environmental Education GrantsCWDGBRICWildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |
| GC FAC #8 | | M | 0–5 years | Improve evacuation zone and route education and outreach to the public. | County wide | Federal, state, and local agencies. GC Sherriff and GCOEM FPDs Grand County Wildfire Council | <ul style="list-style-type: none">Publish primary and secondary evacuation route maps.Include evacuation zone and route info in required STR info packages.Complete traffic/scenario evacuation route models. | Ensure public and first responder safety in the event of a wildfire or other emergency. | Develop and distribute a survey to understand and adapt best practices for communication and teaching. Assess and adapt methodologies and current information annually to ensure information is up to date. | <ul style="list-style-type: none">FEMA Building Resilient Infrastructure and Communities GrantsUSFS Community Wildfire Defense GrantFEMA FP&S GrantsWildfire Mitigation Incentive for Local Government (CSFS)Firewise Communities Grants |



| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
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| GC FAC #9 | | M | 0–5 years | Public education and law enforcement of local ordinances and regulations that reduce the occurrence of human-caused wildfire | County wide | County, state, and federal agencies Grand County Wildfire Council | <p>Inform and educate public about ordinances concerning wildfire and structure fire.</p> <ul style="list-style-type: none">Enact and education recreators on ordinance changes regarding campfire structure design.Communicate campfire regulations to common recreationist (e.g., distribute flyers at shops/agencies that sell hunting and fishing licenses or areas that give out backcountry/camping permits).Continue effective communication of fire bans and restrictions.Communicate regulations concerning county burn permits. Include pile burning, agricultural burning, ditch burning, and garbage burning.Enforce dispersed campfire regulations, especially on BLM and USFS lands. If federal law enforcement is understaffed/unavailable, consider an agreement with Sheriff's department and local law enforcement.Implement geofenced messaging. | <p>Recue risk of human-caused wildfire ignitions.</p> <p>Educate citizens about wildfire hazards.</p> <p>Empower local communities and visitors.</p> | <p>Conduct regular review of County ordinances and update outreach materials and efforts as needed.</p> <p>Maintain working relationship with local businesses and land management/wildlife agencies so materials can be disseminated to the public.</p> | <ul style="list-style-type: none">Community Planning Assistance for Wildfire (CPAW)BRICFP&SFirewise grantsNational Urban and Community Forest ProgramChallenge Cost Share Grant ProgramCommunity Wildfire Defense GrantsWildfire Mitigation Incentive for Local Government (CSFS) |
| GC FAC #10 | | M | | Public outreach and education aimed at reducing human-caused wildfire | County wide | Local, state, and federal agencies Grand County Wildfire Council Short-term rental and HOA managers | <p>Inform and educate the public about methods to reduce human-caused wildfire ignitions.</p> <ul style="list-style-type: none">Educate around sources of human-caused wildfire ignitions (e.g., target practice, driving through or parking in tall, dry vegetation; discarded cigarette butts; fireworks; campfires, etc.).Communicate hazardous conditions surrounding homes/structures (e.g., exposed propane tanks, electrical hazards, hazard trees, limited defensible place, etc.)Provide materials with resources for the public to understand how and with what funding they can take action to reduce risks.Integrate with tourism and STR advertising.Utilize Appendix G of the CWPP: Homeowner Resources | <p>Recue risk of human-caused wildfire ignitions.</p> <p>Educate citizens about wildfire hazards.</p> <p>Empower local communities and visitors.</p> | <p>Track successes and learnings from outreach campaigns and enact changes with each wildfire season.</p> <p>Assess and utilize current popular information sources such as Nextdoor, social media, news outlets, and more.</p> | <ul style="list-style-type: none">Wildfire Mitigation Incentive for Local Government (CSFS)Firewise Communities GrantsWildfire Mitigation Resources & Best Practices Grants (CSFS)EPA Environmental Education GrantsFEMA BRIC Grants |
| GC FAC #11 | | M | | Dedicate staff, funding, and other resources to Project Tracker tool updates and maintenance. | County wide | Grand County agencies Grand County Wildfire Council | <p>Inform and education partners, agencies, and the public on the progress being made to reduce wildfire risk and hazard in the County.</p> <p>Ensure mitigation efforts and the associated metrics and data are tracked collaboratively and often.</p> <ul style="list-style-type: none">Advertise to the public when data is updated in the project tracker through the GCWC page and other social media outlets.Dedicate staff GIS time at all agencies to periodically review and update data on progress made towards accomplishing these CWPP recommendations. | <p>Educate citizens about wildfire hazards and mitigation.</p> <p>Empower local communities and visitors.</p> <p>Ensure collaboration towards goals by all agencies and civic groups in the County.</p> | <p>Review and update data on project progress biannually.</p> | <ul style="list-style-type: none">USFS Community Wildfire Defense GrantsFEMA FP&S GrantsEPA Environmental Education GrantsState Farm GNC Grants |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------|--------|------------------|---------------------|--|--|--|---|---|--|---|
| GC FAC #12 | | M | | Increase Firewise (USA) support to communities throughout the County | County-wide | County, subdivisions. (HOAs, etc. organized homeowners), developers, realtors, Grand County Wildfire Council, FPDs | <div>Improve education and knowledge of Firewise practices<ul style="list-style-type: none">Continue current Firewise practices.Include Firewise information in short-term rental contracts.Conduct Firewise/Ready, Set, GO! Workshops. Offer hands-on workshops to highlight individual home vulnerabilities and how-to techniques to reduce ignitability of common structural elements.Conduct more public meetings to educate citizens about Firewise.Provide free neighborhood and property assessments and mitigation planning; website sign-ups.Provide wildfire assessor training.Provide home hardening resource lists/ examples/cost estimates.Provide links to Firewise websites, downloadable forms, and other resources (e.g., Grand County's Wildfire Council- bewildfireready.org) on any relevant materials distributed (flyers, emails, and/or texts) at meetings or workshops.Consider direct mailers.Distribute Firewise information to school children during Fire Prevention Week.Re-Establish a Firewise coordinator in the county, possible within GCWC</div> | Reduce wildfire risk through greater adoption of Firewise and structure hardening measures. | <div>Annual review of number of events implemented. Conduct regular surveys to assess effectiveness. Firewise: number of recognized communities, percentage of subdivisions in Grand County number of Firewise homes, percentage of homes in Grand County Total cost and hours spent by Firewise communities</div> | <div><ul style="list-style-type: none">Firewise grants National Urban and Community Forest ProgramFP&S (FEMA)Environmental Protection Grants (EPA)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS)</div> |
| GC FAC #13 | | M | | Mitigate risk to Community Lifelines through contingency planning and consideration of the risk-hazard assessment. | County-wide, local municipalities, state, and federal agencies | Municipal, county, state, and federal partners | <div><ul style="list-style-type: none">Consider adopting recommend strategies to protect community lifelines (further detailed in Chapter 3):Grand County emergency planners should consider contingency response solutions should lifelines become threatened during a wildfire event.Primary lifelines are communication, food, water, shelter, health, medical, energy, community, transportation, and safety and security.</div> | Protect essential infrastructure, resources, and emergency services during a large and extreme wildfire | Assess and improve contingency planning and the current wildfire risk to community lifelines. | <div><ul style="list-style-type: none">BRICFP&SCWDGWildfire Mitigation Incentives for Local Government (CSFS)</div> |
| GC FAC #14 | | L | | Utilize and improve existing wildfire risk signage | County-wide | County, state, and federal agencies FPDs | <div><ul style="list-style-type: none">Continue to spread seasonally adjusted fire prevention messages along highways and in public open space areas to reduce human ignitions and promote defensible space.Continue the use of existing electronic signs at firehouses and other locales to display fire prevention information, safety messages, and fire danger ratings linked to safety actions.</div> | <div>Reduce wildfire risk through public education and outreach. Reduce threats to life and property.</div> | <div>Assess current situation and determine where signage can be improved (e.g., increasingly popular recreation areas). Provide information on pertinent county webpages and webpages of local businesses. Assess and utilize current popular information sources (Nextdoor, social media, Twitter, etc.)</div> | <div><ul style="list-style-type: none">Community Planning Assistance for Wildfire (CPAW)BRICFP&SFirewise grantsNational Urban and Community Forest ProgramChallenge Cost Share Grant ProgramCDWDGWildfire Mitigation Incentive for Local Government (CSFS)</div> |

Table E.3. Recommendations for Safe and Effective Wildfire Response*

*See Appendix A to consult relevant regulations and past planning efforts

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------|--------|------------------|---------------------|--|---|--|---|---|---|---|
| GC FR #1 | | H | | Improve local wildfire response capabilities | Local, state, and federal lands | County and local governments, local FPDs, federal agencies | <ul style="list-style-type: none">• Increase number of persons on seasonal severity crew, increase number of local firefighters• Ensure local FPDs have a paid wildland division (jointly)• Obtain more equipment for wildfire mitigation (e.g., water tenders and woodchippers)• Leverage grants/funding opportunities to increase seasonal firefighting capacity (e.g., hire more seasonal employees and provide red card opportunities for volunteers)• Provide more NWCG based training/qualification/certification opportunities for county firefighters and county staff (e.g., provide year-round training, hire/retain training officers and instructors, obtain more NWCG task books)• Collaborate with the Northern Colorado Fireshed Collaborative to identify opportunities for funding and hiring• Prioritize funding, hiring, and mitigation work in local FPDs.• Apply for and obtain funding to increase number of water resources for suppression in more rural areas of the County.• Increase airport and helipad capacity for air assets during a wildfire.• Utilize mapped dead and downed fuel to focus fuel treatments to improve response time. | <div>Enhance public and firefighter safety and mitigate wildfire risk within the county</div> <div>Improve local ability and self-reliance of County to address its own wildfire concerns</div> | <div>Convene annually to assess and document status of county-specific firefighting capabilities.</div> <div>Maintain list of trained personnel and volunteers that can be utilized across all field and incident command positions.</div> <div>Regularly update the Incident Qualification Plan (IQP).</div> <div>Track career advancement of wildland firefighting personnel.</div> | <ul style="list-style-type: none">• Emergency Management Performance Grant (EMPG) (FEMA)• RCP• BRIC• Firewise grants• Forest Restoration & Wildfire Risk Mitigation (CSFS)• Wildfire Mitigation Incentives for Local Government (CSFS)• Wildfire Mitigation Resources & Best Practices (CSFS)• Volunteer Fire Assistance (VFA) Grant (Colorado DFPC)• Colorado House Bill 22-1194• Congressionally Directed Spending |
| GC FR #2 | | H | | Increase direct and ancillary wildfire personnel. Provide inhouse and online personnel training. | Local FPDs, state fire responders, and federal agencies | County and local governments, local FPDs, federal agencies | <ul style="list-style-type: none">• Increase number of firefighting jobs available and associated funding for these salaries.• Increase volunteer firefighting opportunities and associated necessary funding.• Improve collaboration/cooperation capabilities between firefighting agencies.• Train physically capable workers from other departments to fight fire on fire lines (e.g., roads, train workers from vegetation, wildlife, and weed crews)• Achieve funding through fundraising/grant applications (e.g., federal, state, local, and independent grants and private donations). | <div>Enhance public safety, improve wildfire response, and limit size of wildfires</div> <div>Increase capacity to address growth of new residential areas in the WUI</div> | <div>Provide annual red card training/refresher/pack test events before start of fire season.</div> <div>Provide annual online wildfire training classes/refresher courses.</div> <div>Annual assessment of personnel and equipment capacity.</div> | <div>FEMA, State funds, and private grants</div> <ul style="list-style-type: none">• Emergency Management Performance Grant (EMPG) (FEMA)• RCP• BRIC• Firewise grants• Volunteer Fire Assistance (VFA) Grant (Colorado DFPC)• Forest Restoration & Wildfire Risk Mitigation (CSFS)• Wildfire Mitigation Incentives for Local Government (CSFS)• Wildfire Mitigation Resources & Best Practices (CSFS) |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------|--------|------------------|---------------------|---|-------------|--|---|---|---|---|
| GC FR #3 | | H | | Pre-evacuation planning and evacuation planning | County-wide | Emergency planners, county planning commission, FPDs, state and federal agencies | <ul style="list-style-type: none">Identify evacuation routes. Fuel treatments adjacent to roads can reduce fire behavior along important travel routes used for ingress by emergency vehicles and egress by residents.Identify parcel-owners along primary evacuation routes.Seek grant opportunities to support priority project implementation.Evacuation PlanningHave emergency responders/planners practice IPAWS, the Emergency Alert System (EAS), and CodeRED (e.g., drills and test notifications)Provide handouts to visitors, STRs, and residents on preparing "Go Bags" – an emergency supply bag that can be accessed in cases of evacuationConstruct a livestock and pet evacuation and sheltering planUtilize Appendix B for guidance on pet evacuation planningUtilize USDA's disaster planning for animal facilities; CSU Extension's livestock resources webpage; and PetAid Colorado Disaster ServicesConsider a comprehensive evacuation plan for the county that includes a road risk analysis, traffic control, re-routing, and risk mitigation.Consider adopting evacuation modeling and planning into the County Emergency Operations Plan or other hazard mitigation planning documents.Consider the use of dynamic AI evacuation modeling to assess traffic movements, especially under a scenario where areas are inundated with tourists during peak fire season.Define emergency evacuation center and medical treatment support options.Identify vulnerable individuals and processes for their evacuation support. | Protect life by reducing high-risk fire behavior along important roads. Protect public and first responder life and safety | Annual maintenance Yearly updates to materials | <ul style="list-style-type: none">EMPGRCPBRICFirewise grants National Urban and Community Forest ProgramFP&S (FEMA) |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------|--------|------------------|---------------------|--|---|---|--|---|--|--|
| GC FR #4 | | M | | Identify and improve roadway access to WUI areas. Reduce risk in areas identified as high risk or high likelihood of road entrapment in roads and evacuation analysis. | County-wide. Primary transportation corridors, bypass routes, and community specific egress routes. This should be prioritized in areas of concern. | County, private (private roads), federal agencies and CDOT | Roadway improvements: <ul style="list-style-type: none">While increasing roadway width may not be feasible in many locations, creation of passing areas where possible should be prioritizedConsider roadway improvements that increase ingress/egress in popular recreation areas in case of emergencyGrade and maintain roads to reduce hazards to emergency apparatus (potholes and poor surfacing)Install proper signage and turn around points where appropriate.Perform roadside fuels treatments to reduce wildfire behavior along major ingress and egress routes. | Provides for safe and effective wildfire response capabilities Provides safe and effective means of evacuation in case of emergencies | Regular monitoring and maintenance to ensure roads are drivable for emergency response vehicles | <ul style="list-style-type: none">BRICNFPRCPFirewise Grants2022 Infrastructure Investments and Jobs ActForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |
| GC FR #5 | | M | | Increase National Wildfire Coordinating Group Training | County-wide | Grand County Wildfire Council | <ul style="list-style-type: none">Fund and implement year-round trainings and classes to improve public education and outreach, funding acquisition, and collaboration between all stakeholders. Trainings should focus on wildfire assessments, response, incident command, logistics coordination, and resource management. | Reduce risk of loss of life and property from wildfire. | Assess annual effectiveness and adjust approaches based off of current needs and lessons-learned. | <ul style="list-style-type: none">FEMA BRIC GrantsWildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS)FEMA RCP GrantsEPA Environmental Education Grants |
| GC FR #6 | | M | | Improve wildfire coordination efforts | Local FPDs, federal and state fire crews, Grand County Communications Center, and interagency dispatch centers | County and federal agencies | <ul style="list-style-type: none">Grade and maintain select roads to reduce hazards to emergency apparatus (potholes and poor surfacing).Engage in regular joint training and drill exercises (e.g., desktop exercises).Ensure up-to-date communications, equipment, and procedures between federal, state, and local wildland fire responders (e.g., regularly update employee phone and email lists)Regularly update mutual aid/cooperative agreements between local, state, and federal fire respondersClarify roles and responsibilities of fire responders and Incident Command pre-, during, and post-wildfire or emergency. | Improve efficiency and speed of wildfire response Reduce wildfire threats to life and property Clarify party responsibilities for wildfire response | Annually review and update cooperative and mutual aid agreements Training for new staff on roles and responsibilities Host pre-season coordination meetings between response agencies and other stakeholders | <ul style="list-style-type: none">Emergency Management Performance Grant (EMPG) (FEMA)BRICNFPRCP2022 Infrastructure Investments and Jobs ActForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |
| GC FR #7 | | M | | Continue and bolster pre-planning amongst all collaborating response jurisdictions | County-wide | Local FPDs, State and federal fire responders/land managers | <ul style="list-style-type: none">Guarantee access to lands for fire response. Map out gates or other potential access issues and gain agreements for access during emergencies.Map out and delineate regions for water intake for fire suppression. Guarantee access to water supply during wildfire (e.g., know how unlock access gates)Consider equipment caches strategic locations to improve wildfire response times | Provide reliable fire suppression resources Improve wildfire response times | Annual review of exiting access issues and concerns, lessons learned Annual review of agreements with landowners Annual assessment/review of water resources | <ul style="list-style-type: none">EMPGBRICNFPForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------|--------|------------------|---------------------|--|-------------|---|--|---|---|---|
| GC FR #8 | | M | | Clarify roles of fire responders and Incident Command (IC) | County-wide | Local FPDs, federal and state fire responders. Grand County Communications Center, and interagency dispatch centers | <ul style="list-style-type: none">Clear communication on incident command and fire response for Type 3 and Type 4 wildfire incidentsClarify regulations/operations for “pushing” a Type 4 wildfire incident to a Type 3 wildfire incident - consider making this “push” easier to accomplish. | Increase efficiency of wildfire response and incident command Reduce the potential small fires to develop into large wildfires | Review and update regulations agreements Communication on roles and responsibilities between all fire responders | <ul style="list-style-type: none">EMPGWildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |

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APPENDIX F:

Fuel Treatment Types and Methods

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FUELS TREATMENT TYPES

DEFENSIBLE SPACE

Defensible space is perhaps the fastest, most cost-effective, and most efficacious means of reducing the risk of loss of life and property. Although fire agencies can be valuable in providing guidance and assistance, creating defensible space is the responsibility of the individual homeowner (Figure F.1).

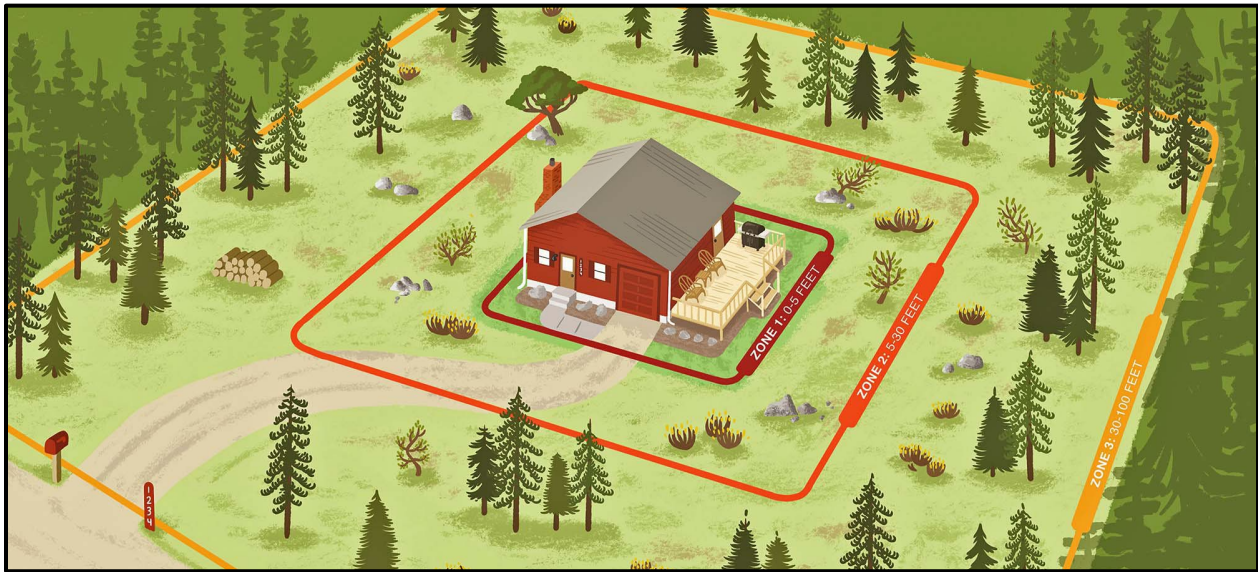


Figure F.1. Defensible space zones providing clearance between a structure and adjacent woodland or forest fuels.

Source: NFPA 2022

Effective defensible space consists of creating an essentially fire-free zone adjacent to the home, a treated secondary zone that is thinned and cleaned of surface fuels, and (if the parcel is large enough) a transitional third zone that is basically a managed forest area (Figure F.1). These components work together in a proven and predictable manner. Zone 1 keeps fire from burning directly to the home; Zone 2 reduces the adjacent fire intensity and the likelihood of torching, crown fire, and ember production; and Zone 3 does the same at a broader scale, keeping the fire intensity lower by maintaining a more natural, historic condition (Figure F.1).

Three zones for defensible space actions are described. These include:

Zone 1 This zone, which consists of an area of 0-5 feet around the structure, is designed to prevent flames from coming in direct contact with the structure. Use nonflammable, hard surface materials in this zone, such as rock, gravel, sand, cement, bare earth or stone/concrete pavers.

Recommendations for treating Zone 1 include (NFPA 2022):

- Remove all flammable vegetation, including shrubs, slash, mulch and other woody debris.
- Do not store firewood or other combustible materials inside this zone.
- Prune tree branches hanging over the roof or decks and remove all fuels within 10 feet of the chimney.

- Regularly remove all pine needles and other debris from the roof, deck, and gutters.
- Rake and dispose of pine needles, dead leaves, mulch, and other organic debris within 5 feet of all decks and structures. Farther than 5 feet from structures, raking material will not significantly reduce the likelihood of ignition and can negatively affect other trees.
- Do not use space under decks for storage.

Zone 2 This zone, which consists of an area of 5-30 feet around the structure, is designed to give an approaching fire less fuel, which will help reduce its intensity as it gets nearer to your home or any structures.

Recommendations for treating Zone 2 include (NFPA 2022):

- Mow grasses to 4 inches tall or less.
- Avoid large accumulations of surface fuels such as logs, branches, slash, and mulch.
- Remove enough trees to create at least 10 feet* of space between crowns. Measure from the outermost branch of one tree to the nearest branch on the next tree.
- Small groups of two or three trees may be left in some areas of Zone 2. Spacing of 30 feet* should be maintained between remaining tree groups to ensure fire doesn't jump from one group to another.
- Remove ladder fuels under remaining trees. This is any vegetation that can bring fire from the ground up into taller fuels.
- Prune tree branches to a height of 6-10 feet from the ground or a third of the total height of the tree, whichever is less.
- Remove stressed, diseased, dead, or dying trees and shrubs. This reduces the amount of vegetation available to burn and improves forest health.
- Common ground junipers should be removed whenever possible because they are highly flammable and tend to hold a layer of flammable material beneath them.
- You can keep isolated shrubs in Zone 2, as long as they are not growing under trees. Keep shrubs at least 10 feet* away from the edge of tree branches.
- Periodically prune and maintain shrubs to prevent excessive growth. Remove dead stems annually.
- Spacing between clumps of shrubs should be at least 2 1/2 times* their mature height. Each clump should have a diameter no more than twice the mature height of the vegetation. Example: For shrubs that grow 6 feet tall, space clumps 15 feet apart or more (measured from the edge of the crowns of vegetation clumps). Each clump of these shrubs should not exceed 12 feet in diameter.

* Horizontal spacing recommendations are minimums and can be increased to reduce potential fire behavior, particularly on slopes. Consult a forestry, fire, or natural resource professional for guidance with spacing on slopes.

Zone 3 This zone, which consists of an area of 30-100 feet around the structure, focuses on mitigation that keeps fire on the ground, but it is also a space to make choices that can improve forest health. Healthy forests include trees of multiple ages, sizes, and species, where adequate growing room is maintained over time. If the distance of 100 feet to the edge of Zone 3 stretches beyond your

property lines, it is encouraged to work with adjoining property owners to complete an appropriate defensible space. If your house is on steep slopes or has certain topographic considerations, this zone may be larger.

Recommendations for treating Zone 3 include (NFPA 2022):

- Mowing grasses is not necessary in Zone 3.
- Watch for hazards associated with ladder fuels. The chance of a surface fire climbing into the trees is reduced in a forest where surface fuels are widely separated and low tree branches are removed.
- Tree crown spacing of 6-10 feet is suggested. Consider creating openings or meadows between small clumps of trees so fire must transition to the ground to keep moving.
- Where practical, prune tree branches to a height of 6-10 feet from the ground or a third of the total height of the tree, whichever is less.
- Any approved method of slash treatment is acceptable in this zone, including removal, piling and burning, lop and scatter, or mulching. Lop-and-scatter or mulching treatments should be minimized in favor of treatments that reduce the amount of woody material in the zone. The farther this material is from the home, the better.

Please see the figures below for a visual representation of minimum vertical (Figure F.3) and horizontal spacing (Figure F.2), as well as spacing on slopes (Figure F.4).

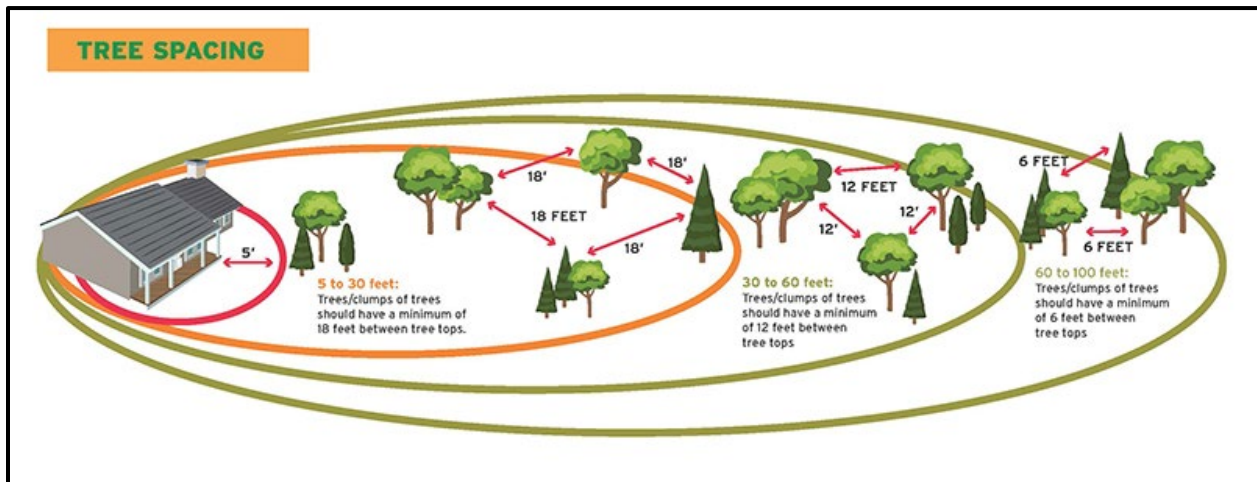


Figure F.2. Recommended tree spacing.

Source: NFPA 2022



Figure F.3. Recommended minimal vertical clearance.

Source: CAL FIRE 2022

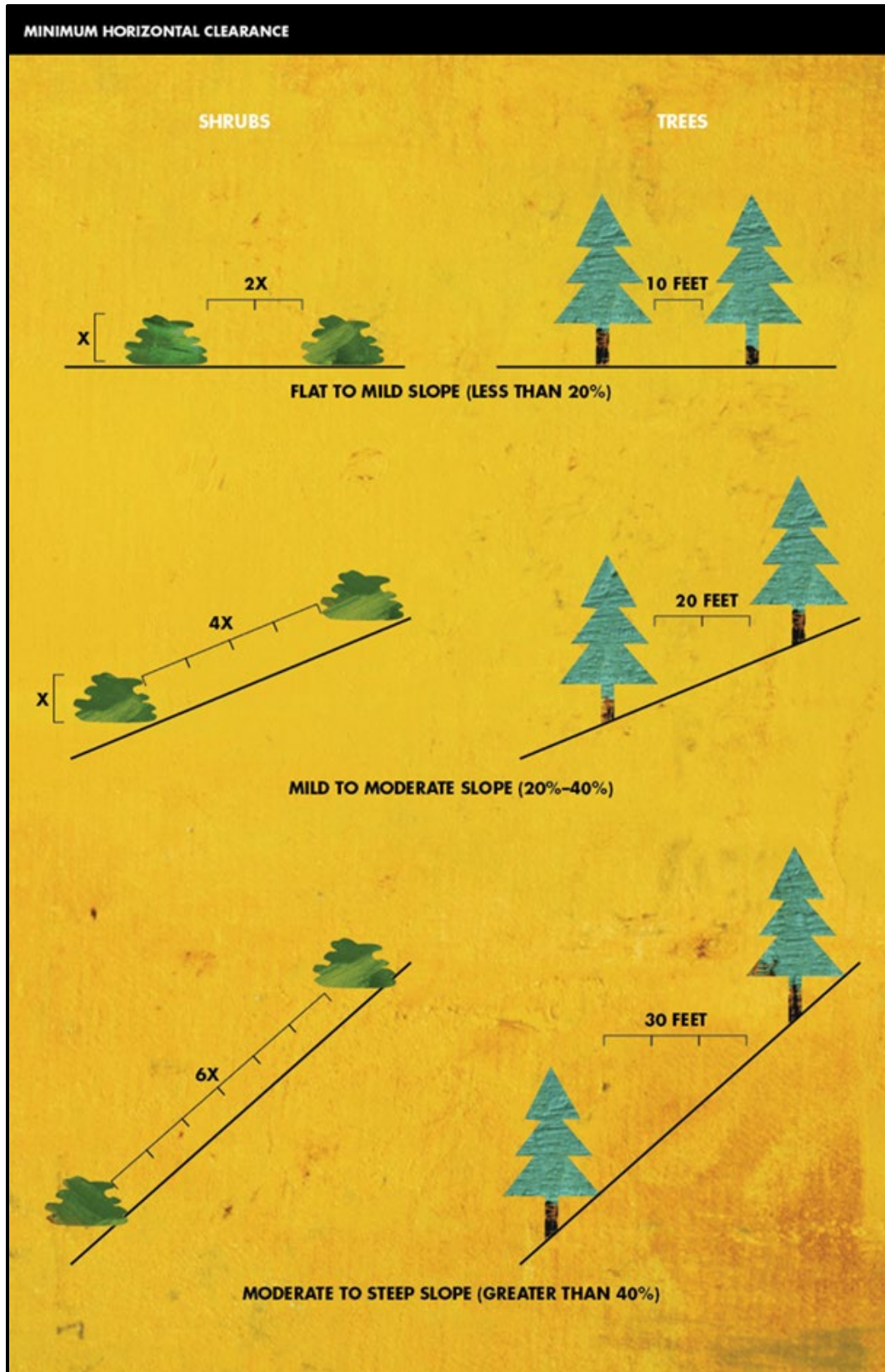


Figure F.4. Recommended minimal horizontal clearance.

Source: CAL FIRE 2022

Specific recommendations should be based on the hazards adjacent to a structure such as slope steepness and fuel type. Firewise guidelines and the Homeowner's Guide (see Appendix G) are excellent resources but creating defensible space does not have to be an overwhelming process. The NFPA offers a free [Community Wildfire Risk Assessment Tutorial](#) and an online learning module: [Understanding the Wildfire Threat to Homes](#). Both tools are great resources for learning about, and implementing, defensible space.

Assisting neighbors may be essential in many cases. Homeowners should consider assisting the elderly, sharing ladders for gutter cleaning, and assisting neighbors with large fuels thinning needs. Homeowner actions have been found to also motivate neighbors to act, increasing the scope of the wildfire mitigation across a community (Evans et al. 2015). Adopting a phased approach can make the process more manageable and encourage maintenance (Table F.1).

Table F.1. Example of a Phased Approach to Mitigating Home Ignitability

| Year | Project | Actions |
|------|---|--|
| 1 | Basic yard cleanup (annual) | Dispose of clutter and dead branches in the yard and under porches. Move firewood to >30 ft from home Mow and rake grass. Clean off roofs and gutters. Remove combustible vegetation near structures, especially junipers. Coordinate fuels disposal as a neighborhood or community. Post 6-inch reflective address numbers visible from road. |
| 1-2 | Understory thinning near structures | Repeat basic yard cleanup. Limb trees up to 6–10 feet. Trim branches back 15 feet from chimneys. Trim or cut down brush. Remove young trees that can carry fire into forest canopy. Coordinate disposal as a neighborhood or community. |
| 1-3 | Understory thinning on private property along roads and drainages | Limb trees up to 6–10 feet. Trim or cut down brush. Evaluate the need to thin diseased trees. Remove young trees that can carry fire into forest canopy. Coordinate disposal as a neighborhood or community. |
| 2-4 | Overstory treatments on private property | Evaluate the need to thin mature or diseased trees. Prioritize and coordinate tree removal within neighborhoods to increase cost effectiveness. |
| 5 | Restart defensible space treatment cycle | Continue the annual basic yard cleanup. Evaluate need to revisit past efforts or catch those that were bypassed. |

FUEL BREAKS AND OPEN SPACE CLEANUP

The next location priority for fuels treatments should be where the community meets wildland. This may be the outer margins of a town or an area adjacent to occluded open spaces such as a park. Fuel breaks (also known as shaded fuel breaks) are strips of land where fuel (for example, living trees and brush, dead branches, leaves or downed logs) has been modified or reduced to limit the fire's ability to spread rapidly. Fuel breaks should not be confused with firebreaks, which are areas where vegetation and

organic matter are removed down to mineral soil. Shaded fuel breaks may be created to provide options for suppression resources or to provide opportunities to introduce prescribed fire. In many cases, shaded fuel breaks may be created by thinning along roads. This provides access for mitigation resources and firefighters, as well as enhancing the safety of evacuation routes.

LARGER SCALE TREATMENTS

Farther away from WUI communities, the emphasis of treatments often becomes broader. While reducing the buildup of hazardous fuels remains important, other objectives are often included, such as forest health and resiliency to catastrophic wildfire and climate change considerations. Wildfires frequently burn across jurisdictional boundaries, sometimes on landscape scales. As such, these larger treatments need to be coordinated on a strategic level. This requires coordination between projects and jurisdictions, as is currently occurring.

Specifically, land managers have carried out numerous pre- and post-fire forest restoration projects across the county and have ongoing projects planned that are designed to reduce hazardous fuels to protect communities and resources, while restoring fire-adapted communities.



Figure F.5. Fuel treatment project in Grand County.



Figure F.6. Burn pile – active fuels mitigation treatment. Photo provided by Philip Brinkman, December 2022.

ACTION ITEMS FOR HOMEOWNERS TO REDUCE STRUCTURAL IGNITABILITY

Limited Investment (<\$250)

- Regularly check fire extinguishers and have a 100-foot hose available to wet perimeter of home.
- Maintain defensible space within 30ft around home. Collaborate with neighbors to provide adequate fuels mitigation in the event of overlapping property boundaries.
- Ensure that reflective 4-inch house numbers are easily readable from the street.
- Keep wooden fence perimeters free of combustible materials. If possible, 5 feet of non-combustible material should link the house and fence.
- Store combustible materials (liquid fuels, propane, grills, firewood) away from the house.
- Remove flammable material from around propane tanks.
- Clear out materials from under decks and near structures.
- Stack firewood at least 30ft away from the house.

Limited Investment (<\$250)

- Reduce your workload by considering local weather conditions. First, mitigate hazards on the side of your property that faces the prevailing wind direction. Then work around to cover the whole property.
- Keep gutters free of combustible material. Gutters can act as collection points for embers.
- Maintain roofs by flashing, fixing holes, replacing shingles, and closing gaps.
- Purchase or use a National Oceanic and Atmospheric Administration weather alert radio to hear fire weather announcements.

Moderate Investment (<\$1,500)

- When landscaping in the home ignition zone (HIZ) (approximately 30 feet around the property), select non-combustible plants, decks, lawn furniture, and landscaping material. Combustible plant material like ornamental conifers should be pruned and kept away from siding. If possible, trees should be planted in groups and no closer than 10 feet to the house. Tree crowns should have a spacing of at least 18 feet when within the HIZ. Vegetation at the greatest distance from the structure and closest to wildland fuels should be carefully trimmed and pruned to reduce ladder fuels, and density should be reduced with approximately 6-foot spacing between trees and crowns.
- Work on mitigating hazards on adjoining structures. Sheds, garages, barns, etc. These can act as ignition points to your home.
- Clear and thin vegetation along driveways and access roads so they can act as a safe evacuation route and allow emergency responders access to the home to at least 14 ft clear width and 14 ft height clearance
- Construct a gravel turnaround in your driveway to improve access and mobilization of fire responders. (e.g., 100-foot-diameter cul-de-sac or T-shape with 28-foot radius)
- Install a roof irrigation system.

High Investment (\$1,500+)

- Install an environmentally friendly and fire-resistant xeriscape yard. \$5 - \$20 sq ft.
- Install screen vents with non-combustible meshing. Mesh openings should not exceed nominal 1/8 - 1/16-inch size. \$2.50 sq ft. Average cost per home approximately \$5,000.
- Enclose open space underneath decks or permanently located manufactured homes using noncombustible skirting and ember resistant skirting vents.
-
- Install fire resistant Soffits and under eave vents to protect your home from heat and embers that can be trapped beneath roof overhangs.
- Replace exterior windows and skylights with tempered glass or multilayered glazed panels.
- Update your roof to a non-combustible construction. Look for materials that have been treated and given a fire-resistant roof classification of Class A.
- Upgrade exterior walls with fire resistant siding materials.
- Relocate propane tanks underground.

Additional resources regarding home hardening can be found in Appendix G.

FUEL TREATMENT METHODS

Since specifics of the treatments are not provided in detail in Table F.2, different fuels reduction methods are outlined in the following narrative.

Several treatment methods are commonly used for hazardous fuels reduction, including manual treatments, mechanized treatments, prescribed fire, and grazing (Table F.2). This brief synopsis of treatment options is provided for general knowledge; specific projects will require further planning. The appropriate treatment method and cost will vary depending on factors such as the following:

- Diameter of materials
- Proximity to structures
- Acreage of project
- Fuel costs
- Steepness of slope
- Area accessibility
- Density of fuels
- Project objectives

It is imperative that long-term monitoring and maintenance of all treatments is implemented. Post-treatment rehabilitation such as seeding with native plants and erosion control may be necessary. In addition, post-treatment fuel clean-up is a must as neglected piles of vegetation may result in increased fire risk.

Table F.2. Summary of Fuels Treatment Methods

| Treatment | Comments |
|--|---|
| Machine mowing | Appropriate for large, flat, grassy areas on relatively flat terrain. |
| Manual treatment with chipping or pile burning | Requires chipping, hauling, and pile burning of slash in cases where lop and scatter is inappropriate. Slash tree limbs to 6 feet from ground or max of 1/3 of tree height Remove ladder fuels below / near trees. Pile burning must comply with smoke management policy. Permits administered on behalf of the state by the Grand County Division of Natural Resources. |
| Brush mastication | Brush species tend to re-sprout vigorously after mechanical treatment. Frequent maintenance of treatments is typically necessary. Mastication tends to be less expensive than manual (chainsaw) treatment and eliminates disposal issues. |
| Timber mastication | Materials up to 10 inches in diameter and slopes up to 30% can be treated. Eliminates disposal issues. Environmental impact of residue being left on-site is still being studied. |

| Treatment | Comments |
|-----------------|--|
| Prescribed fire | <p>Can be very cost effective for public land but not close to the city.</p> <p>Ecologically beneficial.</p> <p>Can be used as training opportunities for firefighters.</p> <p>May require manual or mechanical pretreatment.</p> <p>Carries risk of escape.</p> <p>Unreliable scheduling due to weather and smoke management constraints.</p> |
| Feller buncher | <p>Mechanical treatment on slopes more than 30% or of materials more than 10 inches in diameter may require a feller buncher rather than a masticator.</p> <p>Costs tend to be considerably higher than masticator.</p> |
| Grazing (goats) | <p>Can be cost effective.</p> <p>Ecologically beneficial.</p> <p>Can be applied on steep slopes and shrubby and flashy fuels.</p> <p>Requires close management.</p> |

MANUAL TREATMENT

Manual treatment refers to crew-implemented cutting with chainsaws. Although it can be more expensive than mechanized treatment, crews can access many areas that are too steep or otherwise inaccessible with machines. Treatments can often be implemented with more precision than prescribed fire or mechanized methods allow. Merchantable materials and firewood can be removed while non-merchantable materials are often lopped and scattered, chipped, or piled and burned on-site. Care should be exercised to not increase the fire hazard by failing to remove or treat discarded material in a site-appropriate manner.

Strategic timing and placement of fuels treatments is critical for effective fuels management practices and should be prescribed based on the conditions of each treatment area. Some examples of this would be to place fuel breaks in areas where the fuels are heavier and in the path of prevailing winds and to mow grasses just before they cure and become flammable. Also, fuel reductions on slopes/ridgelines extending from the WUI to enhance community protection. In areas where the vegetation is sparse and not continuous, fuels treatments may not be necessary to create a defensible area where firefighters can work. In this situation, where the amount of fuel to carry a fire is minimal, it is best to leave the site in its current condition to avoid the introduction of exotic species.

MECHANIZED TREATMENTS

Mechanized treatments include mowing, mastication (ground-up timber), and whole tree felling. These treatments allow for more precision than prescribed fire and are often more cost-effective than manual treatment.

Mowing, including skid steer, ATV, and tractor-pulled mower decks, can effectively reduce grass and brush fuels adjacent to structures and along highway rights-of-way and fence lines. For heavier fuels, several different masticating machines can be used, including drum- or blade-type masticating heads mounted on machines and ranging in size from a small skid-steer to large front-end loaders. Some masticators can grind standing timber up to 10 inches in diameter. Other masticators are more effective for use in brush or surface fuels. Mowing and mastication do not actually reduce the amount of on-site biomass but alter the fuel arrangement to a less combustible profile.

In existing fuel break areas maintenance is crucial especially in areas of encroaching shrubs or trees. In extreme risk areas more intensive fuels treatments may be necessary to keep the fire on the ground surface and reduce flame lengths. Within the fuel break, shrubs should be removed, and the branches of trees should be pruned from the ground surface to a height of 4 to 8 feet, depending on the height of the fuel below the canopy, and thinned with a spacing of at least two to three times the height of the trees to avoid movement of an active fire into the canopy.

Mechanical shears mounted on feller bunchers are used for whole tree removal. The stems are typically hauled off-site for utilization while the limbs are discarded. The discarded material may be masticated, chipped, or burned in order to reduce the wildfire hazard and to speed the recycling of nutrients.

GRAZING

Fuel modifications targeted toward decreasing both vertical and horizontal continuity in fuels is critical as a prevention method against fire proliferation. The primary objectives for these modifications are treating surface fuels and producing low-density and vertically disconnected stands. Goat grazing is an effective, nontoxic, nonpolluting, and practically carbon-neutral vegetation treatment method. A goat grazing system typically consists of a high density of goats enclosed by a metallic or electrified fence guided by herders. Goats feed on a variety of foliage and twigs from herbaceous vegetation and woody plants (Lovreglio et al. 2014).

PRESCRIBED BURNING

Prescribed burning is also a useful tool to reduce the threat of extreme fire behavior by removing excessive standing plant material, litter, and woody debris while limiting the encroachment of shrubby vegetation (see Figure 4.8). Where possible, prescribed fire could occur on public land since fire is ecologically beneficial to this fire-adapted vegetation community and wildlife habitat. Fire managers from the Northwest Colorado Fire Management Unit, the BLM, the USFS, and CPW have been implementing prescribed burning in Grand County (BLM 2017, 2019).

All prescribed fire operations will be conducted in accordance with federal and state laws and regulations. Public safety would be the primary consideration in the design of any prescribed burn plan so as to not negatively impact the WUI. Agency use of prescribed fire on public land would be carried out within the confines of the agency's fire management planning documents and would require individual prescribed burn plans that are developed for specific burn units and consider smoke management concerns and sensitive receptors within the WUI. Smoke monitors could be placed in areas where smoke concerns have been raised in the past.

Following any type of fuels reduction treatment, post-treatment monitoring should continue to ensure that management actions continue to be effective throughout the fire season. The vegetation within this ecosystem can change rapidly in response to drought or moisture from year to year and during the course of the season, so fuels treatments should be adjusted accordingly. To learn more about firing techniques, visit the EFIRE Fire Techniques webpage: <https://efire.cnr.ncsu.edu/efire/fire-techniques/>.

Several burns may be needed to meet full resource management objectives, so a solid maintenance plan is needed to ensure success.

AGRICULTURAL BURNING

Agricultural burning of field and ditches is a common practice among agricultural areas of Grand County. The process typically functions to clear land, fertilize soil, or prepare for planting of new crops. Awareness of smoke dispersal, obtainment of proper permits, and alerting proper personnel prior to burn operations are critical components of agricultural burning. Historically, wildfire risks associated with agricultural burning have been low in Grand County but escape occasionally occurs.

Cultural Burning

Across the American west, fire has historically been a means forest management and restoration by Indigenous communities for thousands of years across the western U.S (Carter et al 2021; Roos et al. 2021). Research has demonstrated that use of wildfire by indigenous communities prior to European settlement frequently served to reduce fuel loads, maintain wildlife habitat, and reduce wildfire severity (Carter et al 2021) Research suggests that utilizing these traditional indigenous wildfire management practices can help create and maintain fire resilient WUI communities.

Although cultural burning is included under the umbrella of prescribed burns, it holds a different meaning and has more purposes than a typical prescribed burn (FACNM 2021). Cultural burns are “pertinent and substantial to the cultural livelihood” with over 70 identified purposes (FACNM 2021).

Rather than focusing solely on fuel reduction, or as a means of wildfire mitigation, cultural burning is done with a more holistic view, under the philosophy of “reciprocal restoration,” meaning, as stewardship responsibilities to the land are fulfilled, those actions will in turn benefit the peoples who depend on those ecosystems (Long et al. 2021). Cultural burning is typically performed with a variety of objectives, such as landscape management, ecosystem and species biodiversity and health, transmission of environmental and cultural knowledge, ceremonies and spiritual wellbeing, a sense of place, and material services (i.e., food, medicine, plant materials, etc.). Extensive site preparation is typically done before a burn, and post-burn monitoring and additional cultural practices are a common factor of the land stewardship tradition (Long et al. 2021).

“Cultural burning by Native Americans interconnected them not only to the land but to their animal, reptile, bird and plant spiritual relatives. Therefore, conducting a cultural burn relates to what they burned, how they burned it, and why they burned it.”

- Ron W. Goode, Tribal Chair, North Fork Mono Tribe

Impacts of Prescribed Fire to Communities

Prescribed fires can have impacts on air quality that may impact local communities. Impacts on a regional scale are typically only acute when many acres are burned on the same day, which is uncommon in this region. Local problems are occasionally acute due to the large quantities of smoke that can be produced in a given area during a short period of time. Residents with respiratory problems may be impacted during these burning periods since smoke consists of small particles of ash, partly consumed fuel, and liquid droplets that are considered air pollutants. Other combustion products include invisible gases such as carbon monoxide, carbon dioxide, hydrocarbons, and small quantities of nitrogen oxides. Oxides of nitrogen are usually produced at temperatures only reached in piled or windrowed slash or in very intense wildfires that are uncommon in the region. In general, prescribed fires produce inconsequential amounts of these gases. Inappropriate management of prescribed fires can be bothersome to residents, and it can negatively affect community health.

Smoke from burning vegetation produces air pollutants that are regulated by both the U.S. Environmental Protection Agency (EPA) and the state of Colorado (Colorado General Assembly 2020). Additionally, smoke can increase ambient air pollution levels to a point where it exceeds air quality standards (Colorado General Assembly 2020). Therefore, effective smoke management is a vital component of planning and conducting prescribed fires. The Colorado Department of Public Health & Environment has smoke management guidelines that protect the health and welfare of Californians from the impacts of smoke. In Grand County, a permit from Grand County Natural Resources (GCNR) must be obtained to start a prescribed burn and can only do so during “permissive burn days” which are determined by the GCNR (DPHE 2022).

In addition, the NWCG released the NWCG Smoke Management Guide for Prescribed Fire in 2020 (NWCG 2020). This plan is designed to act as a guide to all those who use prescribed fire. Smoke management techniques, air quality regulations, public perception of prescribed fire, foundational science behind prescribed fire, modeling, smoke tools, air quality impacts, and more are all discussed in this plan. The document is meant to pair with NWCG’s Interagency Prescribed Fire Planning and Implementation Procedures Guide for planning and addressing smoke when prescribed fire is used (NWCG 2020). To view the plan, please visit: <https://www.nwcg.gov/sites/default/files/publications/pms420-3.pdf>.

Effects of smoke can be managed by burning on days when smoke will blow away from smoke-sensitive areas. Precautions are taken when burning near populated areas, highways, airports, and other smoke sensitive areas. Any smoke impact downwind is considered before lighting a fire. Smoke management is a significant component of all prescribed burn plans. Other mitigating actions include alerting the public of upcoming burning activities, including the purpose, best conditions for ensuring good smoke dispersal, duration, size, and location of projects. Local radio, newspapers, social media, and TV can provide broad coverage for alerts. Land management agencies in the planning area consistently work with concerned citizens regarding smoke management and attempt to provide solutions such as the placement of smoke monitors at sensitive sites.



**Figure F.7. Photograph showing a prescribed burn in Grand County.
Photo by Brad White.**

Thinning and Prescribed Fire Combined

Combining thinning and prescribed fire can be the most effective treatment (Graham et al. 2004). In forests where fire exclusion or disease has created a buildup of hazardous fuels, prescribed fire cannot be safely applied, and pre-burn thinning is required. The subsequent use of fire can further reduce residual fuels and reintroduce this ecologically imperative process.

MANAGEMENT OF NON-NATIVE PLANTS

The USDA maintains a list of introduced, invasive, and noxious plants by state (USDA 2022). Fuel treatment approaches should always consider the potential for introduction or proliferation of invasive non-native species as a result of management actions.

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WASH STATE

APPENDIX G:

Homeowner Resources

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ADDITIONAL LINKS AND RESOURCES

LOCAL RESOURCES

Grand County Office of Emergency Management

- Main page: <https://www.co.grand.co.us/156/Office-of-Emergency-Management>
- Fire Restrictions List: <https://www.co.grand.co.us/1338/Fire-Restrictions>
- Sign Up for Emergency Alerts: <https://www.co.grand.co.us/193/Sign-Up-for-Emergency-Alerts>
- County-wide evacuation map: <https://gcgeo.maps.arcgis.com/apps/webappviewer/index.html?id=ca4f74421b69416da9be1b9b92166534>
- Mitigation and Preparedness: <https://www.co.grand.co.us/166/11943/Mitigation-Preparedness>
- Fire and Watershed Recovery: <https://www.co.grand.co.us/1355/Fire-and-Watershed-Recovery>
- Fire Recovery Resources: <https://www.co.grand.co.us/1354/Fire-Recovery-Resources>

Grand County Wildfire Council

- Wildland Fire Action Guide: <http://bewildfireready.org/wp-content/uploads/2015/09/RSG-2015-Guide-FINAL-72dpi.pdf>
- Grand County Wildfire Council Wildfire Prevention, Preparedness, and Survival Guide: https://bewildfireready.org/wp-content/uploads/2022/06/Wildfires_white_FINAL_web.pdf
- Strategic Fire Plan: https://grandfire.specialdistrict.org/files/8187d6303/GFPD-2021-Strategic-Plan_Final1.pdf
- Resources for Residents <https://bewildfireready.org/resources-for-residents/>
- Daily Fire Danger and Fire Restrictions: <https://bewildfireready.org/fire-restrictions/>
- County-wide evacuation map: <https://gcgeo.maps.arcgis.com/apps/webappviewer/index.html?id=ca4f74421b69416da9be1b9b92166534>

STATE RESOURCES

Colorado Division of Fire Prevention and Control (DFPC)

- Community Preparedness – Living in the WUI and Vehicle Safety Tips: <https://dfpc.colorado.gov/communityfireprep>
- Colorado Wildfire Preparedness Plan: <https://dfpc.colorado.gov/colorado-wildfire-preparedness-plan>
- Wildfire Information Resource Center: <https://dfpc.colorado.gov/sections/wildfire-information-resource-center>

Colorado State Forest Service

For Homeowners

- Educational Resources and Publications: <https://csfs.colostate.edu/csfspublications/>
 - Includes wildfire mitigation and education for homeowners
- Resources for Homeowners and Landowners: <https://csfs.colostate.edu/homeowners-landowners/>
 - Includes resources to help you manage your property
- Resources for Communities: <https://csfs.colostate.edu/communities/>
- Programs for Homeowners and Landowners: <https://csfs.colostate.edu/forest-management/programs-for-homeowners-landowners/>
 - Grant programs and homesite assessments
- Post-Fire Forest Restoration and Rehabilitation: <https://csfs.colostate.edu/forest-management/restoration-rehabilitation/>
 - Includes rehabilitation practices, restoration publications, and burned tree management for various species
- Home Ignition Zone and Defensible Space Guide
 - https://csfs.colostate.edu/wp-content/uploads/2021/04/2021_CSFS_HIZGuide_Web.pdf#:~:text=DEFENSIBLE%20SPACE%20is%20the%20area%20around%20a%20home,in%20a%20residential%20area%20to%20reduce%20wildfire%20risk.

Misc.

- Colorado Forest Atlas: <https://coloradoforestatlas.org/>
 - Includes spatial maps for the 2020 Forest Action Plan, Wildfire Risk Reduction Planner, and Wildfire Risk Viewer

West Region Wildfire Council

- Online Rapid Wildfire Risk Assessment rating for your home: <https://cowildfire.org/myhome>
- Home hardening information: <https://cowildfire.org/home-hardening/>
- Defensible Space Information: <https://cowildfire.org/defensible-space/>
- Emergency Access Information: <https://cowildfire.org/emergency-access/>

Colorado Misc.

- Colorado Emergency Alert Notification Sign-up: <https://www.tchd.org/DocumentCenter/View/3703/Sign-Up-for-Emergency-Alert-Notifications-by-County-PDF>
- Community Preparedness – Living in the WUI and Vehicle Safety Tips: <https://dfpc.colorado.gov/communityfireprep>

- Colorado Wildfire Preparedness Plan: <https://dfpc.colorado.gov/colorado-wildfire-preparedness-plan>
- Colorado Association of Realtors Colorado Project Wildfire: <https://coloradorealtors.com/projectwildfire/>
- Common Colorado Insects and Diseases: <https://csfs.colostate.edu/forest-management/common-forest-insects-diseases/>
- Ignition Resistant Construction Design Manual: https://coloradosprings.gov/sites/default/files/2020_ignition_resistant_design_manual_march_2020.pdf
- Colorado Property and Insurance Wildfire Preparedness Guide: https://93j20c.p3cdn2.secure-server.net/wp-content/uploads/2021/08/Wildfire_22x8.5_2021.pdf

NATIONAL RESOURCES

National Fire Protection Association (NFPA):

Protecting Your Home

- Understanding the Wildfire Threat to Homes: <https://www.nfpa.org/News-and-Research/Publications-and-media/Blogs-Landing-Page/Fire-Break/Blog-Posts/2020/12/08/Interactive-online-resource-helps-build-understanding-of-wildfire-risks>
- Preparing Homes for Wildfire: <https://www.nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire/Preparing-homes-for-wildfire>
- If your Home Doesn't Ignite, It Can't Burn: <https://www.youtube.com/watch?v=RqKFDDBGd5o>
- How do Homes Burn in a Wildfire? <https://www.youtube.com/watch?v=3QthynXympl>
- Wildfire Community Preparedness Day Toolkit: <https://go.nfpa.org/l/14662/2022-01-11/8j6nqh>
- 5 Key Areas Around the Home You Must Examine When Assessing Wildfire Risk: <https://www.youtube.com/watch?v=MIUQVL3BvVg>
- Your Home and Wildfire, Choices That Make a Difference: <https://www.youtube.com/watch?v=pfbEcMeYFFA>
- Home Hardening Fact Sheets: <https://www.nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire/Firewise-USA/Firewise-USA-Resources/Research-Fact-Sheet-Series>

Preparation and Evacuation

- Wildfire Preparedness Tips: <https://www.nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire/Wildfire-safety-tips>
- Wildfire Preparedness for Household Pets: <https://www.nfpa.org/-/media/Files/Public-Education/Campaigns/TakeAction/TakeActionPetsChecklist.pdf>
- Wildfire Preparedness for Horses and Livestock: <https://www.nfpa.org/-/media/Files/Public-Education/Campaigns/TakeAction/TakeActionHorseChecklist.ashx>

- Backpack Emergency GO! Kit: <https://www.nfpa.org/-/media/Files/Public-Education/Campaigns/TakeAction/TakeActionBackPackGoKit.ashx>
- Outthink a Wildfire; Wildfire Action Policies: <https://www.nfpa.org/wildfirepolicy>

FEMA

- Protective Actions for Wildfires FEMA: <https://community.fema.gov/ProtectiveActions/s/article/Wildfire>
- Flood Insurance Information: <https://www.fema.gov/flood-insurance>
- Explore FEMA's National Risk Index by County for risk, expected annual loss, social vulnerability, and community resilience: <https://hazards.fema.gov/nri/map>

RED CROSS

- Red Cross – How to Prepare For Emergencies: <https://www.redcross.org/get-help/how-to-prepare-for-emergencies.html>
- Red Cross – Colorado Wildfire Handbook: <https://sheriff.mesacounty.us/globalassets/divisions/emergency-services/arc-brochure.pdf>
- Red Cross – Wildfire Checklist (English): <https://sheriff.mesacounty.us/globalassets/divisions/emergency-services/arc-wildfire.pdf>
- Red Cross – Wildfire Checklist (Spanish): https://sheriff.mesacounty.us/globalassets/divisions/emergency-services/arc-wildfire_spn.pdf
- Red Cross – Preparing for Disaster for People with Disabilities and Other Special Needs: <https://sheriff.mesacounty.us/globalassets/divisions/emergency-services/arc-special-needs.pdf>

EPA

- Smoke Ready Toolbox for Wildfires EPA: <https://www.epa.gov/smoke-ready-toolbox-wildfires>
- Airnow: <https://www.airnow.gov/>
- Airnow Fire and Smoke Map: <https://fire.airnow.gov/>
- Smoke Advisories: <https://www.airnow.gov/air-quality-and-health/fires/smoke-advisories/>
- Fires and Your Health: <https://www.epa.gov/pm-pollution/fires-and-your-health>
- Wildfires and Indoor Air Quality: <https://www.epa.gov/indoor-air-quality-iaq/wildfires-and-indoor-air-quality-iaq>
- Frequent Questions About Wildfire Smoke: https://usepa.servicenowservices.com/airnow?id=kb_search&kb_knowledge_base=798f5d172fa050102be2d2172799b6d8&spa=1&kb_category=23bbbd9f1b681c104614ddb6bc4bcb70
- Smoke Sense App: <https://www.epa.gov/air-research/smoke-sense-study-citizen-science-project-using-mobile-app>
- Prepare For Natural Disasters and Recovery: <https://www.epa.gov/natural-disasters>

READY.GOV

- Wildfires Ready.gov: <https://www.ready.gov/wildfires>
- Family Disaster Readiness: <https://www.ready.gov/kids>
- Kids: <https://www.ready.gov/kids/be-ready-kids>
- Teens: <https://www.ready.gov/kids/teens>
- Families: <https://www.ready.gov/kids/prepare-your-family>
- Educators and Organizations: <https://www.ready.gov/kids/educators-organizations>
- Wildfire Information Sheet: https://www.ready.gov/sites/default/files/2021-12/ready_wildfire_info-sheet.pdf

MISC.

- Climate Mapping for Resilience and Adaptation (CMRA) portal which provides a live dashboard to help communities see extreme weather and other hazards from climate change: <https://resilience.climate.gov/#real-time-data>
- Community Planning for Wildfire Assistance Program (CPAW) – Assists the GCWC with wildfire risk-reduction communications, increasing land use planning capacity, and collaborating with agencies to identify overlaps in scopes of work: <https://cpaw.headwaterseconomics.org/>
- Instructor Guide; The ability to identifying, analyzing, and using relevant situational information about topographic features can help predict wildland fire behavior is the responsibility of everyone on the fireline: <https://www.nwcg.gov/sites/default/files/training/docs/s-190-ig04.pdf>
- WiRē – Wildfire Research, an interdisciplinary collaboration on community adaptability to wildland fire: <https://wildfireresearchcenter.org/>
- Wildfire Ready App:
 - App Store: <https://apps.apple.com/us/app/wildfire-ready-virtual/id1540773278?msclkid=4eac0069a71411ecb26fa03c0b08eba2>
 - Google Play: <https://play.google.com/store/apps/details?id=com.BaltiVirtual.Wildfire&gl=US&msclkid=4eabc8f6a71411ecbfe27aa64cd6d835>

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WASH STATE

APPENDIX H:

Post-fire Recovery and Restoration

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POST-FIRE RESPONSE AND REHABILITATION

The recent increase in severe fires has highlighted the numerous complexities of post-fire response. Research indicates that high-severity burn areas may produce erosion and runoff rates 5 to 10 times higher than the rates produced by moderate-severity burn areas (Sierra Nevada Conservancy 2021). Following a fire, heavy rains may result in widespread floods carrying trees, boulders, and soil through canyons, ultimately damaging communities and critical infrastructure. In addition, aquatic resources, such as Grand Lake, the Lake Granby Reservoir, and the tributaries and headwaters of the Colorado River, as well as water processing facilities, may be negatively impacted or contaminated by post-fire debris and ash. The County is generally rated as medium hazard for landslides. However, denuding related to wildfires exacerbates this hazard and some areas of the county are highly susceptible including Fraser Canyon, Byers Canyon, and Sheep Mountain (HMP 2020). Slope-adjacent roadways are particularly vulnerable to debris flow.

A map of landslide hazard areas is available in the county's 2020 Multi-Hazard Mitigation Plan, which you can view here: <https://co.grand.co.us/1340/Program-Plans#:~:text=Hazard%20Mitigation%20Plan%20The%20purpose%20of%20natural%20hazard,County%20and%20its%20communities%20resulting%20from%20natural%20hazards.>

Learn more about debris and mud flow here: <https://coloradogeologicalsurvey.org/hazards/debris-flows/>

The most recent fire in the county was the East Troublesome which resulted in 193,812 acres burned. The fire burned portions of the east and west slopes of the continental divide, impacting forested and alpine environments. The fire spread quickly due to high winds and dry conditions resulting in stand replacement in most of the impacted area (NWCG 2020b). Soil cover is dramatically reduced in areas with moderate soil burn severity (SBS), leading to increased water repellency and runoff. By contrast, soil cover is nearly non-existent in areas experiencing high SBS and the surface mineral soil has been burned to fine powder. Exposed, granular mineral soil is readily transported during rain events resulting in elevated soil erosion and sediment loading in streams, creeks, and rivers (BAER 2021).

The USFS's post-fire emergency stabilization program is called the Burned Area Emergency Response (BAER) program. The goal of the BAER program is to discover post-wildfire threats to human life and safety, property, and critical natural or cultural resources on USFS lands and take appropriate actions to mitigate unacceptable risks (BAER 2021). BAER teams are composed of trained professionals in different fields: soil scientists, engineers, hydrologists, biologists, botanists, archaeologists, and others who quickly assess the burned area and advise emergency stabilization treatments (BAER 2021).

There are many facets to post-fire recovery, including but not limited to:

- Ensuring public health and safety—prompt removal of downed and hazard trees, addressing watershed damage, and mitigating potential flooding.
- Rebuilding communities and assessing economic needs—securing the financial resources necessary for communities to rebuild homes, business, and infrastructure.
- Restoring the damaged landscape—restoration of watersheds, soil stabilization, and tree planting.
- Reducing fire risk in the future—identifying hazard areas and implementing mitigation.
- Prioritizing the needs of vulnerable and disadvantaged communities during response and disaster recovery efforts.

- Reducing post-fire recovery time by replanting native species.
- Ensuring fire protection measures enhance sustainability of restoration projects e.g., introducing prescribed fire to a fire-dependent ecosystem where fire had previously been excluded.
- Retaining downed logs for erosion control and habitat maintenance.
- Evaluating and updating disaster recovery plans every 5 years to respond to changing needs and characteristics of the community.
- Coordinating with planning, housing, health and human services, and other local, regional or state agencies to develop contingency plans for meeting short-term, temporary housing needs of those displaced during a catastrophic wildfire event.
- Incorporating forecasted impacts from climate change into trends and projections of future risk and consideration of policies to address identified risk.
- Updating codes and ordinances to specify procedures and standards for planning and permitting the reconstruction of buildings destroyed by wildfire.

The USFS and CSFS provide science-based frameworks to guide post-fire restoration efforts in State Forest lands of Colorado. This guidance outlines methods of ecological management and a step-by-step framework for agencies to follow in post-fire planning (CSFS 2022). A list of resources to guide post-wildfire rehabilitation is available at: <https://csfs.colostate.edu/forest-management/restoration-rehabilitation/>

COMMUNITY RESPONSE AND RECOVERY

Recovery of the vegetated landscape is often more straightforward than recovery of the human environment. Assessments of the burned landscape are often well-coordinated through the use of interagency crews who are mobilized immediately after a fire to assess the post-fire environment and make recommendations for rehabilitation efforts.

For the community impacted by fire, however, there is often very little planning at the local level to guide their return after the fire. Residents impacted by the fire need assistance making insurance claims; finding temporary accommodation for themselves, pets, and livestock; rebuilding or repairing damaged property; removing debris and burned trees; stabilizing the land for construction; mitigating potential flood damage; repairing infrastructure; reconnecting to utilities; and mitigating impacts to health. Oftentimes, physical impacts can be mitigated over time, but emotional impacts of the loss and change to surroundings are long-lasting and require support and compassion from the community.

After the Fire

Rebuilding and recovery from wildfire can vary greatly across income levels and demographics. Rural areas, low-income neighborhoods, and immigrant communities generally do not have the necessary resources to cover insurance and rebuilding expenses that occur after a fire. Due to this, many of these areas take more time to recover than those with greater access to resources. In addition, the occurrence of wildfire can worsen existing mental health conditions and lead to post-traumatic stress (PTS), low self-esteem, and depression for at-risk populations (CA GOPR 2020).

Returning Home

First and foremost, follow the advice and recommendations of emergency management agencies, fire departments, utility companies, and local aid organizations regarding activities following the wildfire. Do not attempt to return to your home until fire personnel have deemed it safe to do so.

When driving, watch for trees, brush, and rocks which may have been weakened or loosened by the fire. Be aware of any damage or debris on roads and driveways. Traffic may be delayed, or lanes closed due to firefighter operations. Use extreme caution around trees, power poles, and any other tall objects that may have been weakened by the fire (Colorado Silver Jackets 2021).

Even if the fire did not damage your house, do not expect to return to normal routines immediately. Expect that utility infrastructure may have been damaged and repairs may be necessary. When you return to your home, check for hazards, such as gas or water leaks and electrical shorts. Turn off damaged utilities if you did not do so previously. Request that the fire department or utility companies turn the utilities back on once the area is secured. Similarly, water supply systems may have been damaged; do not drink from the tap until you have been advised that it is safe to do so. Finally, keep a “fire watch”; look for smoke or sparks in houses and other buildings (CDHSEM 2022). Once at home, check for the following (CDHSEM 2022):

- Wait to return home until fire officials declare it is safe to do so.
- Use caution when walking through burned areas. Hazards, such as hot spots and flare ups, may still exist.
- Keep a “Fire watch” for several hours after returning to watch for smoke and sparks.
- Leave immediately if there is heat or smoke coming from a damaged structure.
- Avoid damaged or fallen power lines, poles, and downed wires.
- Mark ash pits properly and warn others of them. Stay clear of pits when possible.
- Keep animals close by- do not allow them to wander as hot spots and embers can burn their paws.
- Listen to instructions given by those in charge. Remain calm and deal with the most urgent issues first.
- If there is damage to your property, contact your insurance company.

Insurance Claims

Your insurance agent is the best source of information for submitting a claim. It is recommended you take photos of your home, of both the inside and outside, in preparation for an emergency. Keep the photos in a safe place as this will make the insurance claim process easier. Most expenses incurred during the time you are forced to live elsewhere may be reimbursed, so be sure to keep all receipts. Additional items that may be covered are extra transportation costs to and from work or school, telephone installation, furniture rental, extra food costs, and water damage. Do not start any repairs without the approval of your claims adjuster (Colorado Division of Insurance 2020).

Natural disasters aren’t always predictable, but there are steps homeowners can take to better prepare for an emergency.

- Review your insurance policy annually to see if your home is adequately insured

- Know your “loss of use” section – this covers living expenses should your home become unlivable due to fire, smoke, or otherwise

You can view a guide on creating a home inventory here: <https://www.iii.org/article/how-create-home-inventory>

Learn more about insurance decisions in the Colorado Property and Insurance Wildfire Preparedness Guide: https://93j20c.p3cdn2.secureserver.net/wp-content/uploads/2021/08/Wildfire_22x8.5_2021.pdf

Community Safety: Post-Fire Floods and Debris Flows

There are numerous natural hazards after a wildfire. Perhaps most dangerous are potential flash floods and landslides following rainfall in a burned area upstream of a community. Wildfires increase risk of flooding because burned soil is unable to absorb rainfall and it becomes hydrophobic. Factors that contribute to flooding and debris flows are steep slopes, heavy rainfall, weak or loose rock and soil, and improper construction and grading. Even small rainfall can cause a flash flood, transporting debris and damaging homes and other structures. Following a wildfire, burned areas are susceptible to debris flows for 5-10 years, leaving downhill residents in danger. It is crucial to be aware of your surroundings and take note of steep unstable slopes that could require hasty evacuation when rainfalls (Colorado Geological Survey 2021). Develop an evacuation plan with your family and stay away from waterways, storm channels, and arroyos. Be aware of your risk, pay attention to weather forecasts, listen to local authorities, and have a household inventory with copies of critical documents (Colorado Geological Survey 2021).

Mobilizing Your Community

Wildfires that produce extensive damage require a community-scale response for recovery efforts. The local Emergency Manager will collaborate with state and federal partners to manage disaster response and urgent needs. Still, mobilizing a response and recovery team or a group of teams in a community can function as a vital part of the recovery procedure. Coordinated and informed direction throughout community-level volunteers and all levels of government are necessary for successful recovery (Colorado Silver Jackets 2021).

As opposed to wildfire response, post-fire response is not typically managed by a unified state or federal team. Rather, each organization and each tier of government acts on its own authority. This produces a greater demand for coordination at the local level and the sharing of information between organizations to coordinate recovery efforts. The local Emergency Manager as well as the state Office of Emergency Management will generally coordinate response efforts and facilitate recovery resources (Colorado Silver Jackets 2021).

In addition, each community is encouraged to create its own type of a Post-Fire Coordination Group (PFCG) to direct the response to any ensuing post-wildfire natural hazards and aid in determining post-fire mitigation actions. The PFCG should work directly with local, state, or federal agencies, emergency response officials, and others to aid in a coordinated response. Primary duties of the PFCG include coordinating the exchange of information among agencies and the Risk-Hazard Assessment, assembling and exchanging geospatial data, assisting public communications, and coordinating with elected officials (Colorado Silver Jackets 2021).

Communities are also encouraged to establish a post-fire coordinator. The post-fire coordinator is appointed by the community to facilitate a coordinated response to a wildfire and to aid the community's post-fire recovery efforts. The post-fire coordinator is likely to collaborate with local, state, and federal

organizations that participate in emergency response and post-fire recovery efforts. It is important that the post-fire coordinator have demonstrated management, internet, and social media skills, community knowledge, and experience with government agencies and programs (California Silver Jackets 2019).

The recovery coordinator should become familiar with representatives from local, state, and government agencies that will be helping with coordination or funding of post-fire recovery. Any large wildfire will also involve an Incident Command System (ICS), an appropriately sized team assigned to aid in post-fire recovery. Learn more are <https://www.nps.gov/articles/wildland-fire-incident-command-system-levels.htm>.

Communication

After a team is assembled and immediate tasks are identified, find the best way to spread information in your community. You may distribute flyers, set up a voicemail box, work to find pets or livestock that have been displaced, develop a mailing list for property owners, hold regular public meetings, etc. It is important that a long-term communications plan is developed (Natural Hazards Center, 2020). Applying the following steps can aid in successful communication (Colorado Silver Jackets 2021):

- Communicate through familiar and trusted messengers
- Provide clear, actionable information
- Tailor messages and information pathways for target audience
- Communicate hazards that still exist
- Use diverse communication networks
- Ensure cross-organizational communication
- Work with educational institutions
- Encourage alert system participation

POST-FIRE REHABILITATION AND RESOURCES

Wildfires that cause extensive damage necessitate dedicated efforts to avert issues afterwards. As aforementioned, loss of vegetation increases soil susceptibility to erosion; water runoff may increase and lead to flooding; sediments and debris may be transported downstream and damage properties or saturate reservoirs putting endangered species and water reserves at risk (USFS 2021c). Following a fire, the primary priority is emergency stabilization to prevent additional damage to life, property, or natural resources. The soil stabilization work starts immediately and may proceed for up to a year. The rehabilitation effort to restore damage caused by the fire starts after the fire is out and may persist for various years. For the most part, rehabilitation efforts focus on the lands not likely to recover naturally from wildfire damage (USFS 2021c).

The NRCS Emergency Watershed Protection (EWP) program provides technical and financial services for watershed repair on **public (state and local) and private land**. The goal is reduced flood risk via funding and expert advice for land treatments. The EWP program can provide up to 75% of funds; remaining funds can be paid with in-kind volunteer labor (Coalition for the Upper South Platte [CUSP] 2016). This funding is used by the State Emergency Rehabilitation Team (a multi-agency group assembled by the NRCS) to develop specific recovery and treatment plans.

Examples of potential treatments include (USFS 2021b):

- Hillside stabilization (for example, placing bundles of straw parallel to the slope to slow erosion)
- Hazard tree cutting
- Felling trees perpendicular to the slope contour to reduce runoff
- Mulching areas seeded with native vegetation
- Stream enhancements and construction of catchments to control erosion, runoff, and debris flows
- Planting or seeding native species to limit spread of invasive species

The Colorado State Forest Service maintains a webpage with Colorado-specific forest restoration resources. This page includes guides on soil and erosion treatment techniques, rehabilitation and replanting for success guides, and a link to the Colorado Post-Fire Playbook. These resources are available here: <https://csfs.colostate.edu/forest-management/restoration-rehabilitation/>

A comparison of potential hillside, channel, and road treatments is available at: <https://www.afterwildfirenm.org/post-fire-treatments/which-treatment-do-i-use>

The effectiveness of various treatments is described at: https://www.fs.usda.gov/rm/pubs/rmrs_gtr240.pdf

Specific Treatment Details

Hillslope Treatments

Cover Applications:

Dry mulch: provides immediate ground cover with mulch to reduce erosion and downstream flow.

Wet mulch (hydromulch): provides immediate cover to hold moisture and seeds on slopes using a combination of organic fibers, glue, suspension agents, and seeds (most effective on inaccessible slopes).

Slash spreading: provides ground cover to reduce erosion by felling trees in burned areas.

Seeding: reduces soil erosion over time with an application of native seed mixtures (most successful in combination with mulching). Breaking up and loosening topsoil to break down the hydrophobic layer on top of the soil is also effective.

Erosion Barrier Applications:

Erosion control mat: organic mats staked on the soil surface to provide stability for vegetation establishment.

Log erosion barrier: trees felled perpendicular to the hillslope to slow runoff.

Fiber rolls (wattles): rolls placed perpendicular to the hillslope to reduce surface flows and reduce erosion.

Silt fencing: permeable fabric fencing installed parallel to the slope contour to trap sediment as water flows down the hillslope.

Channel Treatments

Check dam: small dams built to trap and store sediment in stream channels.

In-channel tree felling: felling trees in a staggered pattern in a channel to trap debris and sediment.

Grade stabilizer: structures made of natural materials placed in ephemeral channels for stabilization.

Stream bank armoring: reinforcing streambanks with natural materials to reduce bank cutting during stream flow.

Channel deflector: an engineered structure to direct flow away from unstable banks or nearby roads.

Debris basin: constructed to store large amounts of sediment moving in a stream channel.

Road and Trail Treatments

Outsloping and rolling dips (water bars): alter the road shape or template to disperse water and reduce erosion.

Overflow structures: protect the road by controlling runoff and diverting stream flow to constructed channels.

Low water stream crossing: culverts replaced by natural fords to prevent stream diversion and keep water in the natural channel.

Culvert modification: upgrading culvert size to prevent road damage.

Debris rack and deflectors: structure placed in a stream channel to collect debris before reaching a culvert.

Riser pipes: filter out debris and allow the passage of water in stream channels.

Catchment-basin cleanout: using machinery to clean debris and sediment out of stream channels and catchment basins.

Trail stabilization: constructing water bars and spillways to provide drainage away from the trail surface.

These treatments and descriptions are further detailed at: <https://afterwildfirenm.org/post-fire-treatments/treatment-descriptions>

For more information about how to install and build treatments, see the Wildfire Restoration Handbook at: https://www.rmfi.org/sites/default/files/hero-content-files/Fire-Restoration-HandbookDraft_2015_2.compressed_0.pdf

Timber Salvage

Many private landowners may decide to harvest trees killed in the fire, a decision that can be controversial. Trees remaining post-fire can be instrumental for soil and wildlife habitat recovery, but dead standing trees may also pose safety concerns and fuel loadings may still be conducive to future high intensity wildfires. Burned soils are especially susceptible to soil compaction and erosion so it is recommended to have professionals perform the timber salvage. Several programs assist landowners with timber salvage, including the NRCS Environmental Quality Incentives Program (EQIP) (CUSP 2016).

Invasive Species Management and Native Revegetation

Wildfire provides opportunity for many invasive species to dominate the landscape because many of these species thrive on recently burned landscapes. It is imperative that landowners prevent invasive establishment by eradicating weeds early, planting native species, and limiting invasive seed dispersal (CUSP 2016).

Planting native seeds is an economical way to restore a disturbed landscape. Vegetation provides protection against erosion and stabilizes exposed soils. In order to be successful, seeds must be planted during the proper time of year and using correct techniques. Use a native seed mixture with a diversity of species and consider the species' ability to compete with invasive species. Before planting, the seedbed must be prepared with topsoil and by raking to break up the hydrophobic soil layer. If you choose to transplant or plant native species, consider whether the landscape has made a sufficient recovery to ensure the safety of the individuals (CUSP 2016).

LONG-TERM COMMUNITY RECOVERY

On non-federal land, recovery efforts are the responsibility of local governments and private landowners. Challenges associated with long-term recovery include homes that were severely damaged or were saved but are located in high-severity burn areas. Furthermore, homes saved but located on unstable slopes or in areas in danger of flooding or landslides present a more complicated challenge.

Economically, essential businesses that were burned or were otherwise forced to close pose a challenge to communities of all sizes. Given these complications, rebuilding and recovery efforts can last for years, with invasive species control and ecosystem restoration lasting even longer (CUSP 2016). It is critical that a long-term plan is in place and there is sufficient funding and support for all necessary ecosystem and community recovery. To learn about more post-fire recovery resources, visit the After the Flames website here: <https://aftertheflames.com/resources/>.

Additional resources regarding post-fire return and recovery can be found in Appendix H.

WASH STATE

APPENDIX I:

Project Outreach

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COMMUNITY OUTREACH

Table I.1 presents examples of the public outreach completed as part of the CWPP development. To maximize audience reached, online resources were used to provide information to the public and solicit feedback. Figures I.1 through I.4 show examples of online posts.

Table I.1. Public Outreach Resources

| Resource Description | Location | URL | Date |
|---|--|---|---------------------|
| Fire Chiefs Meeting Presentation | Grand Fire Station, Granby CO | NA | 10/14/22 |
| Public Open House Event | Grand Fire Station, Granby CO | NA | 12/3/22 |
| Grand County Commissioner Meeting Presentation | Zoom | https://www.co.grand.co.us/725/Media-Archive | 12/20/22 and 5/9/23 |
| Grand County Mayors and Managers Meeting Presentation | Zoom | NA | 1/9/23 |
| Public Q&A Webinars | Zoom, saved on the Story Map under Public Engagement | https://grand-county-cwpp-gcgeo.hub.arcgis.com/ | 1/10/23 |
| Grand County Wildfire Council Meeting Presentations | Zoom | NA | 1/26/23 and 4/27/23 |
| Radio advertisements | KKCH-FM | NA | 11/23-12/2/22 |
| Channel 9 News Interview and article | Online | https://www.9news.com/video/news/local/9news-mornings/grand-county-fire-asking-for-community-input-on-new-wildfire-plans/73-6a92fa33-6293-47b8-9cce-50f7a47190c7 | 12/02/22 |
| Sky Hi News Article | Online | https://www.skyhinews.com/news/grand-county-invites-community-to-participate-in-community-wildfire-protection-plan-update/ | 11/30/22 |
| Northern Colorado Fireshed Collaborative Article | Online | https://nocofirshed.org/grand-county-updating-community-wildfire-protection-plan/ | 12/9/22 |
| Grand County Wildfire Council Article | Online | https://bewildfireready.org/grand-county-community-wildfire-protection-plan-cwpp-community-survey/#:~:text=Grand%20County%20and%20other%20stakeholders%20are%20currently%20working,the%20County%20that%20are%20at%20risk%20from%20wildfire. | 11/24/22 |
| Press Release | Online | https://www.facebook.com/GrandCountyOEM/ | |

| Resource Description | Location | URL | Date |
|--|---|--|--------------------------------|
| Q&A Webinar Flyer | Grand County Public Libraries, Grand County Wildfire Council website, Grand County OEM Social Media pages and Local Emergency Planning Committee contact list | https://bewildfireready.org/wp-content/uploads/2022/11/CWPP_Flyer_Grand.pdf https://www.facebook.com/GrandCountyOEM/ | December 2022 and January 2023 |
| Community Survey (English and Spanish) | Online | English: https://forms.office.com/pages/responsepage.aspx?id=9rCYT_sm0EGp-Jso45xj3rAL2ghBgn5FhMs2o0KB7wpURFdGRklzT09OVVNYTzdTQ1ILRjhCVFBRTiQIQCN0PWcu Spanish: https://forms.office.com/pages/responsepage.aspx?id=9rCYT_sm0EGp-Jso45xj3pdzgBW_gK9DnEHU3NZFTMpUOVhXTkQxUDNCNIZINVNUUDVSNUIUNkhYRC4u | October 2022 |
| Social Media Posts – Project Introduction (English and Spanish) | Online | https://bewildfireready.org/wp-content/uploads/2022/11/CWPP_Flyer_Grand.pdf | Throughout Project |
| Hub Site and Story Map | Online | https://grand-county-cwpp-gcgeo.hub.arcgis.com/ | October 2022 |
| Shared the Grand County Community Wildfire Protection Plan story maps link on Facebook | Online | NA | February 22 |
| Shared the live Q&A Webinar flyer on Facebook | Online | NA | January 6 |
| Shared the live Q&A Webinar flyer on Facebook | Online | NA | January 4 |
| Shared the live Q&A Webinar flyer on Facebook | Online | NA | December 8 |
| Shared the Community Meeting being held at Grand Fire on Facebook | Online | NA | December 2 |
| Shared the Survey Link/Community Meeting Flyer on Facebook | Online | NA | December 1 |
| Shared the Survey Link/Community Meeting Flyer on Facebook | Online | NA | November 28 |

| Resource Description | Location | URL | Date |
|---|----------|-----|-------------|
| Shared the Survey Link/Community Meeting Flyer on Instagram | Online | NA | December 2 |
| Shared the Survey Link/Community Meeting Flyer on Instagram | Online | NA | December 1 |
| Shared the Survey Link/Community Meeting Flyer on Instagram | Online | NA | November 28 |

Grand County invites community to participate in Community Wildfire Protection Plan update

News [FOLLOW NEWS](#) | Nov 30, 2022



Kyle McCabe [FOLLOW](#)
kmccabe@skyhi.news.com



A screenshot from the Grand County Community Wildfire Protection Plan's website shows the four goals of the National Cohesive Wildland Fire Management Strategy, which the county's plan is aligned with.

Grand County/Courtesy image

Grand County will host an event Saturday, Dec. 3, from 2-4 p.m. at the Grand Fire Protection District headquarters in Granby (60500 U.S. Highway 40) for community members to learn from wildfire experts how they can mitigate fire risk in their community and share their thoughts about the county's Community Wildfire Protection Plan.

Figure I.1. Sky Hi News article.

Grand County Fire asking for community input on new wildfire plans



Firefighters in Grand County are putting together a comprehensive plan on how to respond to wildfires and they're looking for ideas from the public.

Author: 9news.com


Published: 7:29 AM MST December 2, 2022

Updated: 7:29 AM MST December 2, 2022

Figure I.2. Chanel 9 News article.

GRAND COUNTY

COMMUNITY WILDFIRE PROTECTION PLAN



Grand County
Colorado



SWCA
ENVIRONMENTAL CONSULTANTS

THE PLAN

The Grand County Office of Emergency Management has contracted SWCA Environmental Consultants to work in collaboration with municipal, state, and federal land management agencies to develop the 2023 Grand County Community Wildfire Protection Plan.

A CWPP is designed to assist the County and landowners in ensuring that a future catastrophic wildfire is avoided or mitigated by assessing areas at risk and recommending measures to decrease those risks. That means we need to hear from YOU! Please scan the QR code above to take a brief survey letting your local land managers know about your concerns and ideas related to wildfire in your community.



WHAT DOES A COMMUNITY WILDFIRE PROTECTION PLAN DO?

- Identify areas at risk for wildland fire
- Make recommendations for hazardous fuels treatments (vegetation thinning)
- Prioritize areas for wildfire mitigation funding
- Make recommendations for homeowners to reduce fire risk
- Ask the public to share ideas about wildfire prevention and identify community values at risk

UPCOMING EVENTS

In conjunction with the County, SWCA will be hosting live (and recorded) online CWPP Q&A events with local first responders, emergency managers, and project managers. These webinars will take place on Tuesday December 13th from 5-6pm MT as well as Tuesday January 10th from 4-5pm MT. These public meetings are the primary vehicle for you to give your feedback on your wildfire concerns in the County and ensure that the plan addresses them. Please see the webinar links below:

- Tuesday December 13th: https://swca.zoom.us/join/register/WN_ackvx0fkQcm8MI_EUhgJmA
- Tuesday January 10th: https://swca.zoom.us/join/register/WN_XfOiplEISZ69suifw5Vnlw

PROJECT CONTACT ARIANNA.PORTER@SWCA.COM

Figure I.3. CWPP flyer.

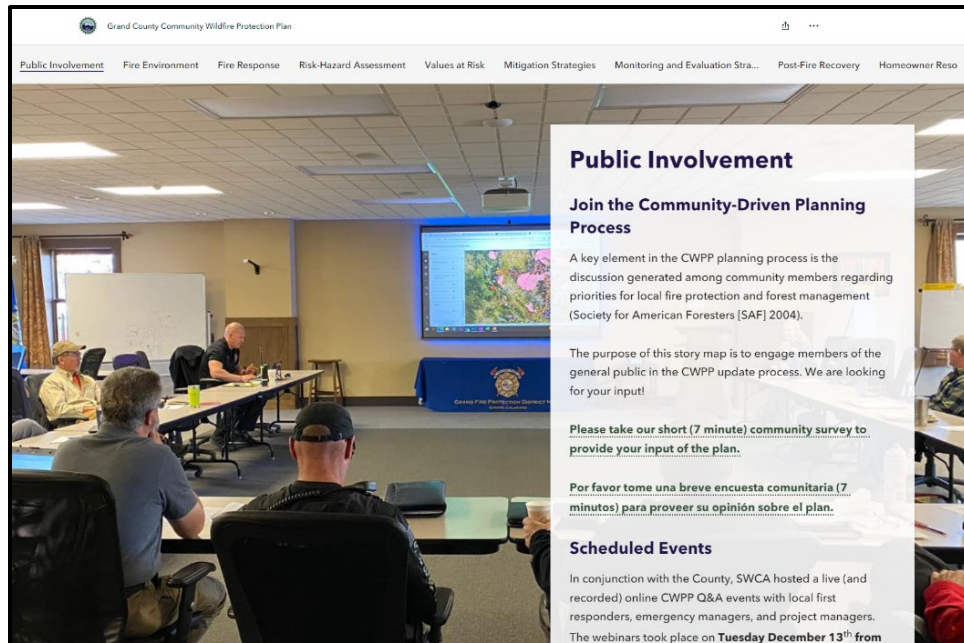


Figure I.4. Community survey and events listing page.

STORY MAP

Grand County developed the CWPP story map (online content, link in Table I.1) to accommodate engagement with the public. The story map provides opportunities for both information sharing and gathering between the public and the County. The story map has several tabs, each demonstrating information from various chapters in the CWPP document. The introductory tab presents the purpose of the story map, project history, instructions for navigating the content, and the National Cohesive Wildland Fire Management Strategy framework (Figure I.6). Next, the public involvement tab invites viewers to see a list of scheduled events, participate in the CWPP community survey, and view the CWPP hub site. The fire environment, values at risk, WUI hazard and Risk-Hazard Assessment, mitigation strategies, and monitoring and evaluation strategies tabs present the bulk of the CWPP content (Figures I.6–I.8). These tabs introduce the WUI concept, fire regimes and fire history in the county, information regarding county fire planning and response, county values at risk from wildfire, areas with high versus low risk, wildfire mitigation actions, and monitoring strategies for applied treatments.

The story map also links the viewer to the CWPP document and contact information for the Grand County contractor planning team. The figures below (I.6–I.8) demonstrate the spatial information that is conveyed through the story map. Each map is interactive, with several clickable layers providing information on numerous aspects of wildfire, including but not limited to communities in high-risk areas, vegetation and fuels, current mitigation projects, and fire behavior.

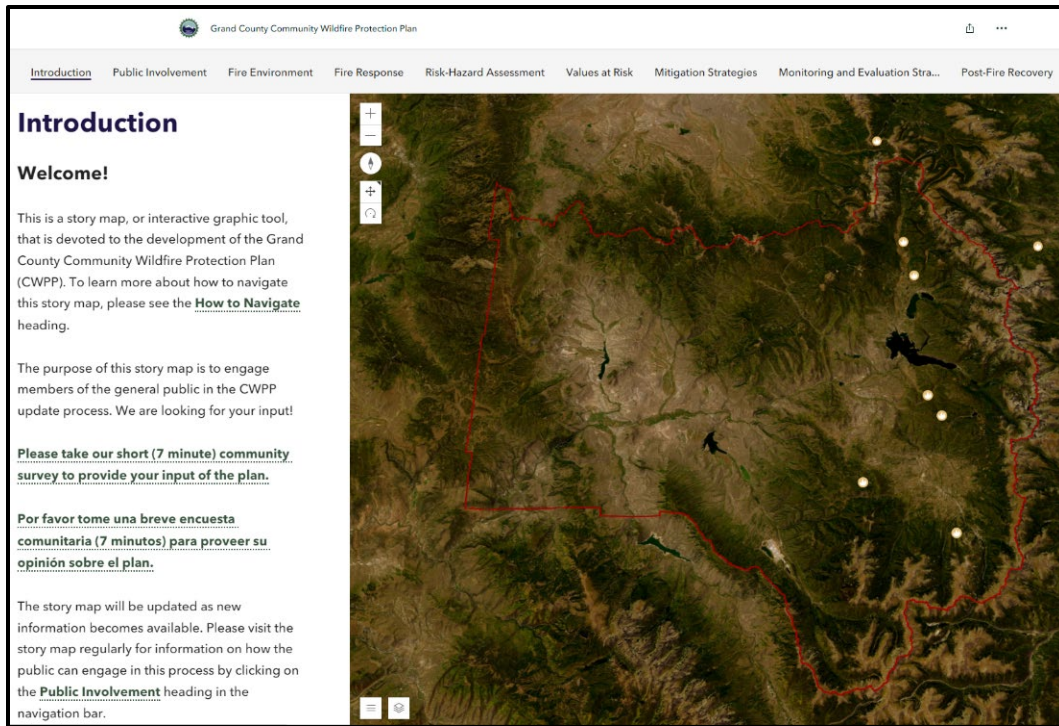


Figure I.6. CWPP story map introduction tab sample.

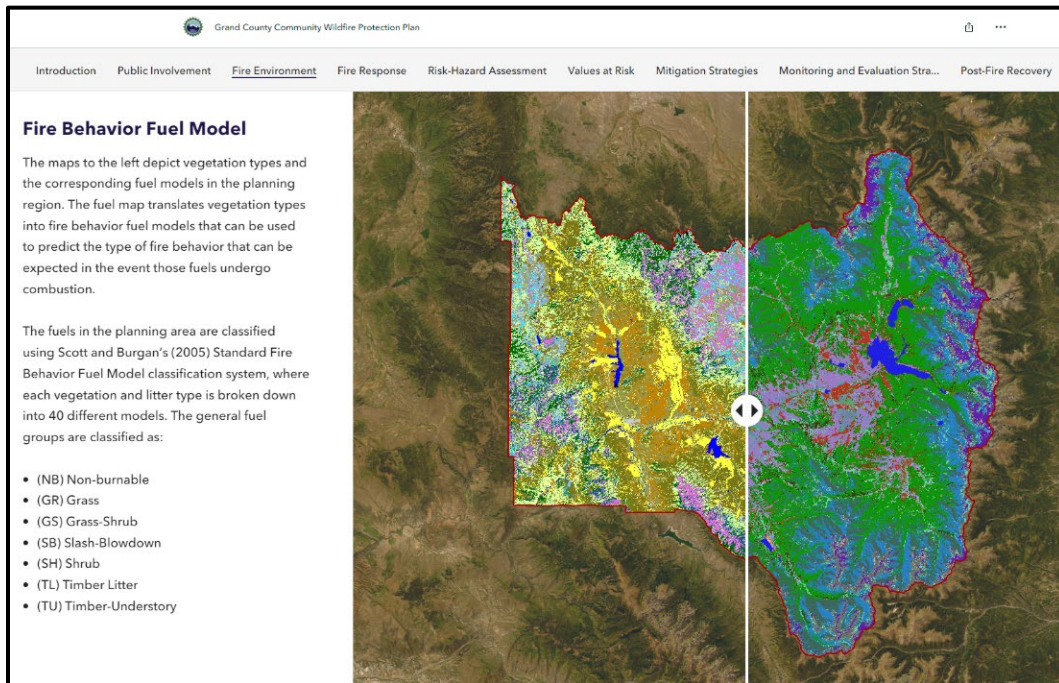


Figure I.7. Story map fire behavior fuel models tab sample.

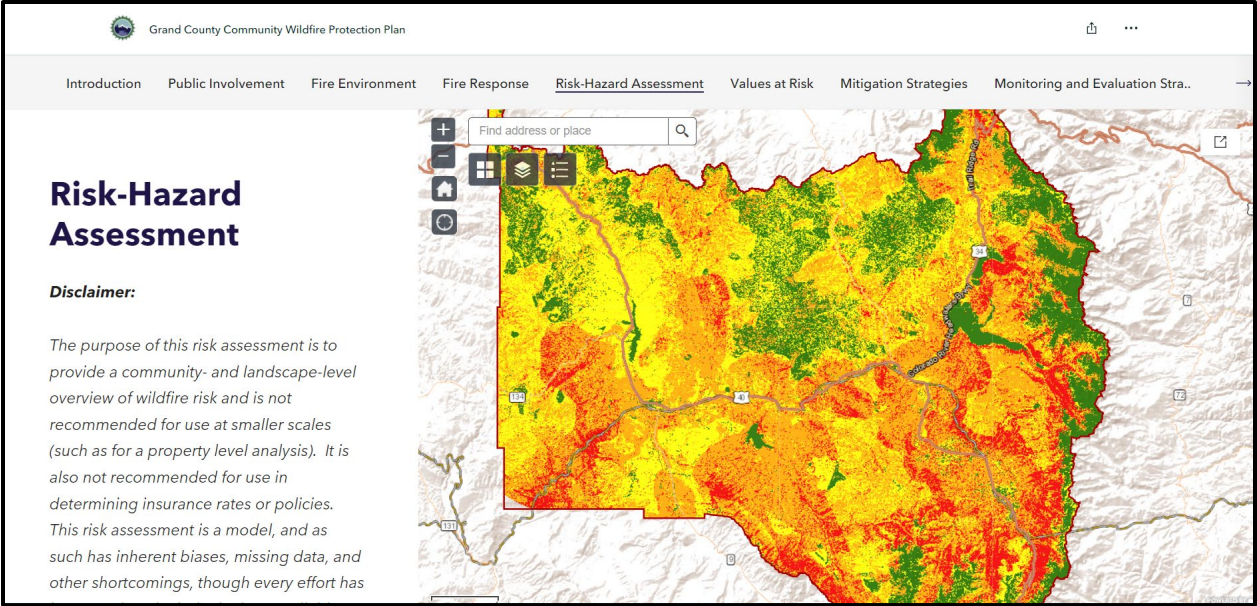


Figure I.8. Story map Risk-Hazard Assessment tab sample.

The story map tool allowed the project team to assess the number of views per day. Figure I.9 shows the average number of views per day and related graphical information. The number of views from September 26, 2022 (when the story map was originally published) through May 2, 2023 (the public comment period closed on 4/16/23) was 1,120, and the average number of views per day was just over 5 (see Figure I.9). Hub site views for the same time range totaled 2,509, averaging over 11 views per day (Figure I.10).

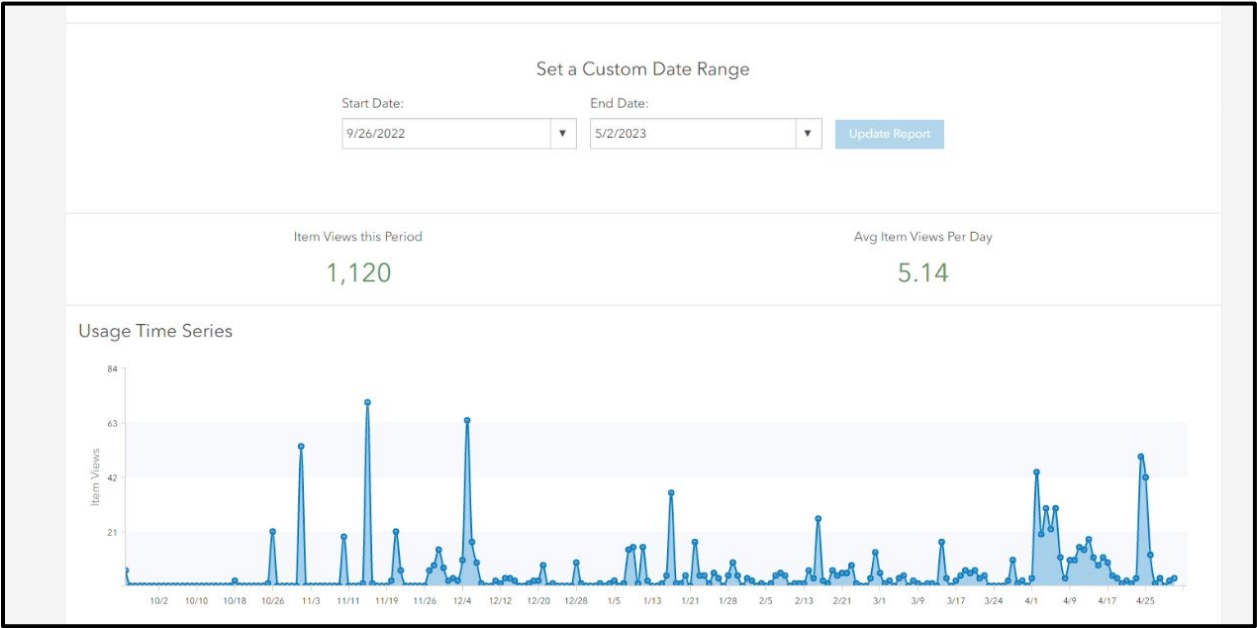


Figure I.9. Story map views from September 26, 2022, through May 2, 2023

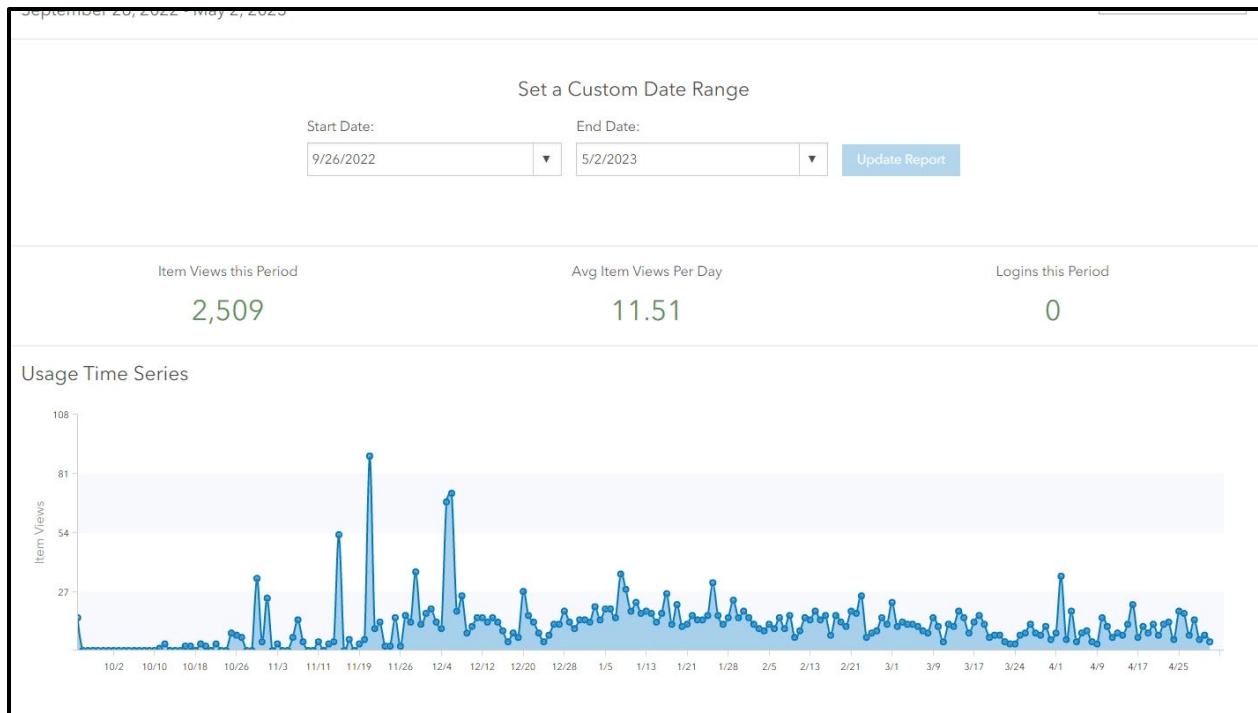


Figure I.10. Hub site views from September 26, 2022 through May 2, 2023.

COMMUNITY SURVEY

A total of 59 community survey responses were collected throughout the project lifespan. The results are summarized below.

4. How prepared is your community for large wildfire? (Select one)

[More Details](#)

[Insights](#)


| | |
|---------------------|----|
| Poorly prepared | 10 |
| Moderately prepared | 43 |
| Well prepared | 6 |



Figure I.11. Community survey response summary for question 4.

5. How would you rate your house in terms of risk from wildfire? (Consider the proximity of your house to tracts of undeveloped land, vegetated land, emergency response, and access.)

[More Details](#)

 Insights

| | |
|--------|----|
| Low | 15 |
| Medium | 32 |
| High | 12 |

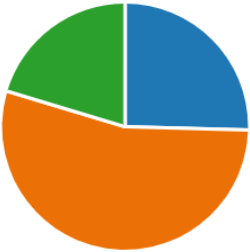


Figure I.12. Community survey response summary for question 5.

6. My home is vulnerable to wildfire because of..... (Select top 2 choices)

[More Details](#)

| | |
|--|----|
| Surrounding fuels on your prop... | 19 |
| Surrounding fuels on neighbori... | 33 |
| Building materials - (i.e., wood s... | 22 |
| Lack of water supply - (i.e., depe... | 22 |
| Inaccessible area - (i.e., long nar... | 9 |
| Ignition sources from neighbori... | 15 |

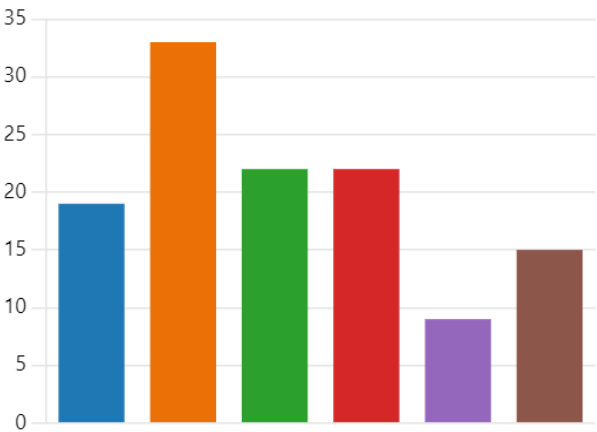


Figure I.13. Community survey response summary for question 6.

7. Rate the following actions in their importance to making the community better prepared for wildfire (Please RANK 1-7; 1 is most important).

[More Details](#)

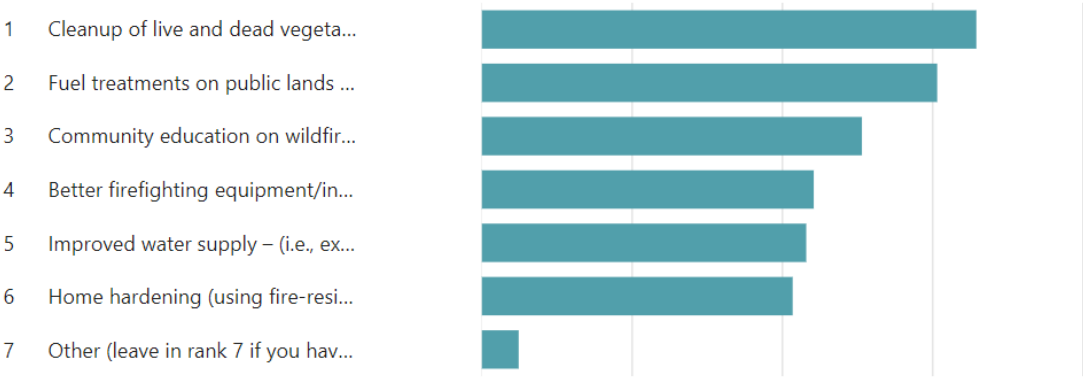


Figure I.14. Community survey response summary for question 7.

9. My biggest challenge to making my home fire safe is.... (Please RANK 1-6; 1 is most important).

[More Details](#)

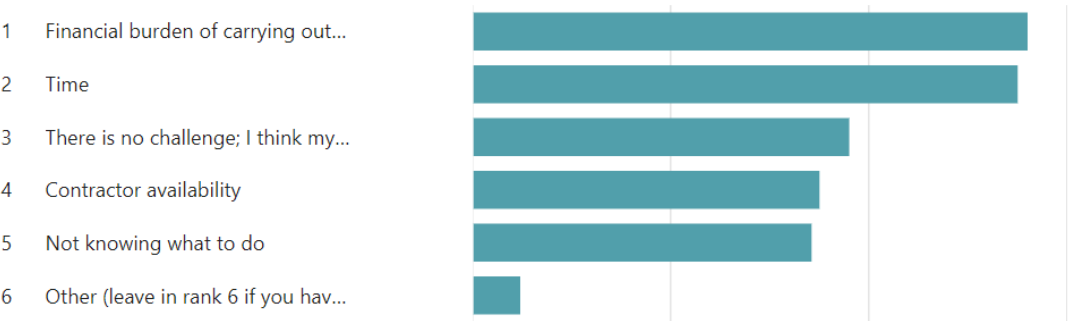


Figure I.15. Community survey response summary for question 9.

11. I would be most interested in funding to help me and my community with.... (Please RANK 1-9; 1 is most important)

[More Details](#)

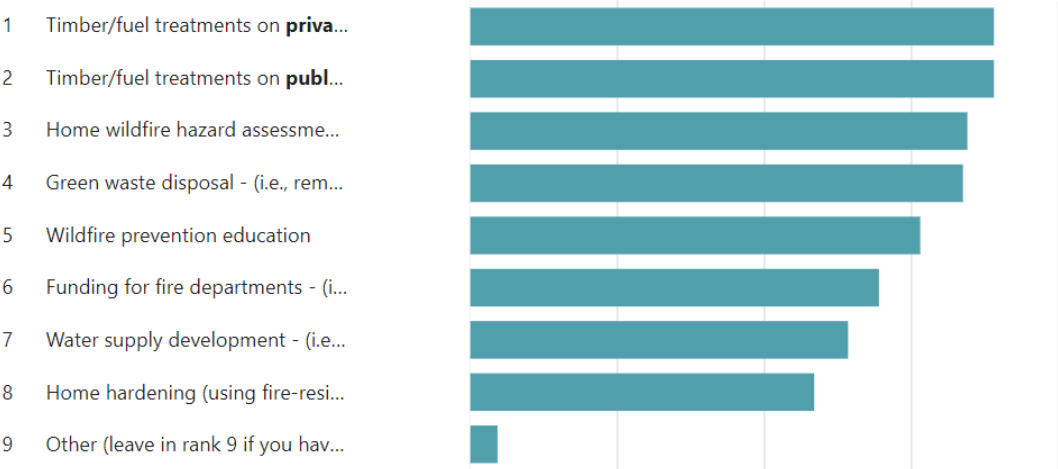


Figure I.16. Community survey response summary for question 11.

13. Are you currently using prescribed fire, burning, chipping, or other methods to reduce fuels on your property?

[More Details](#)

Insights



Figure I.17. Community survey response summary for question 13.

14. Name any community resources or assets you would most like to see prioritized for protection from wildfire (e.g., natural areas, cultural sites, municipal infrastructure, and recreation sites). Please be specific.

[More Details](#) [Insights](#)

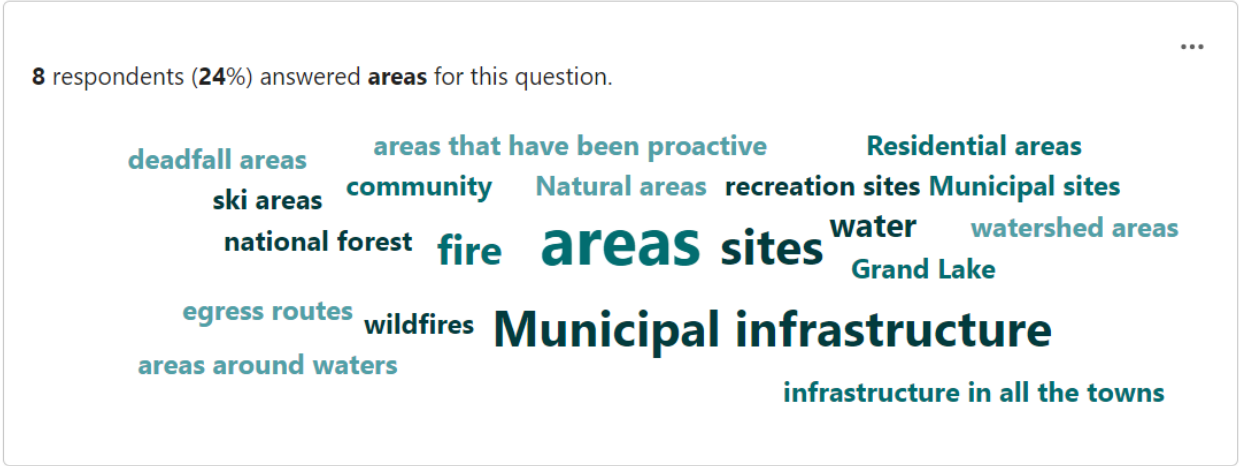


Figure I.18. Community survey response summary for question 14.

15. Do you have an updated evacuation plan for you/your family?

[More Details](#) [Insights](#)

| | |
|-----|----|
| Yes | 40 |
| No | 19 |



Figure I.19. Community survey response summary for question 15.

16. Do you have an emergency evacuation kit ready?

[More Details](#)

 Insights





| | |
|--|----|
|  Yes | 27 |
|  No | 31 |
|  I am not sure what an evacuatio... | 1 |



Figure I.20. Community survey response summary for question 16.

17. Are you familiar with local evacuation routes?

[More Details](#)

 Insights

| | |
|---|----|
|  Yes | 52 |
|  No | 7 |



Figure I.21. Community survey response summary for question 17.

18. How likely are you to leave your home under an optional evacuation order?

[More Details](#)

 Insights




| | |
|---|----|
|  Will not evacuate | 8 |
|  Will evacuate | 27 |
|  Not sure | 24 |



Figure I.22. Community survey response summary for question 18.

19. How likely are you to leave your home under a mandatory evacuation order?

[More Details](#)


| | |
|-------------------|----|
| Will not evacuate | 4 |
| Will evacuate | 53 |
| Not sure | 2 |



Figure I.23. Community survey response summary for question 19.

20. Do you know how to sign up for local emergency notifications?

[More Details](#)

 Insights


| | |
|-----|----|
| Yes | 56 |
| No | 3 |



Figure I.24. Community survey response summary for question 20.

21. Are you registered for local emergency notifications?

[More Details](#)

 Insights

| | |
|-----|----|
| Yes | 55 |
| No | 3 |



Figure I.25. Community survey response summary for question 21.

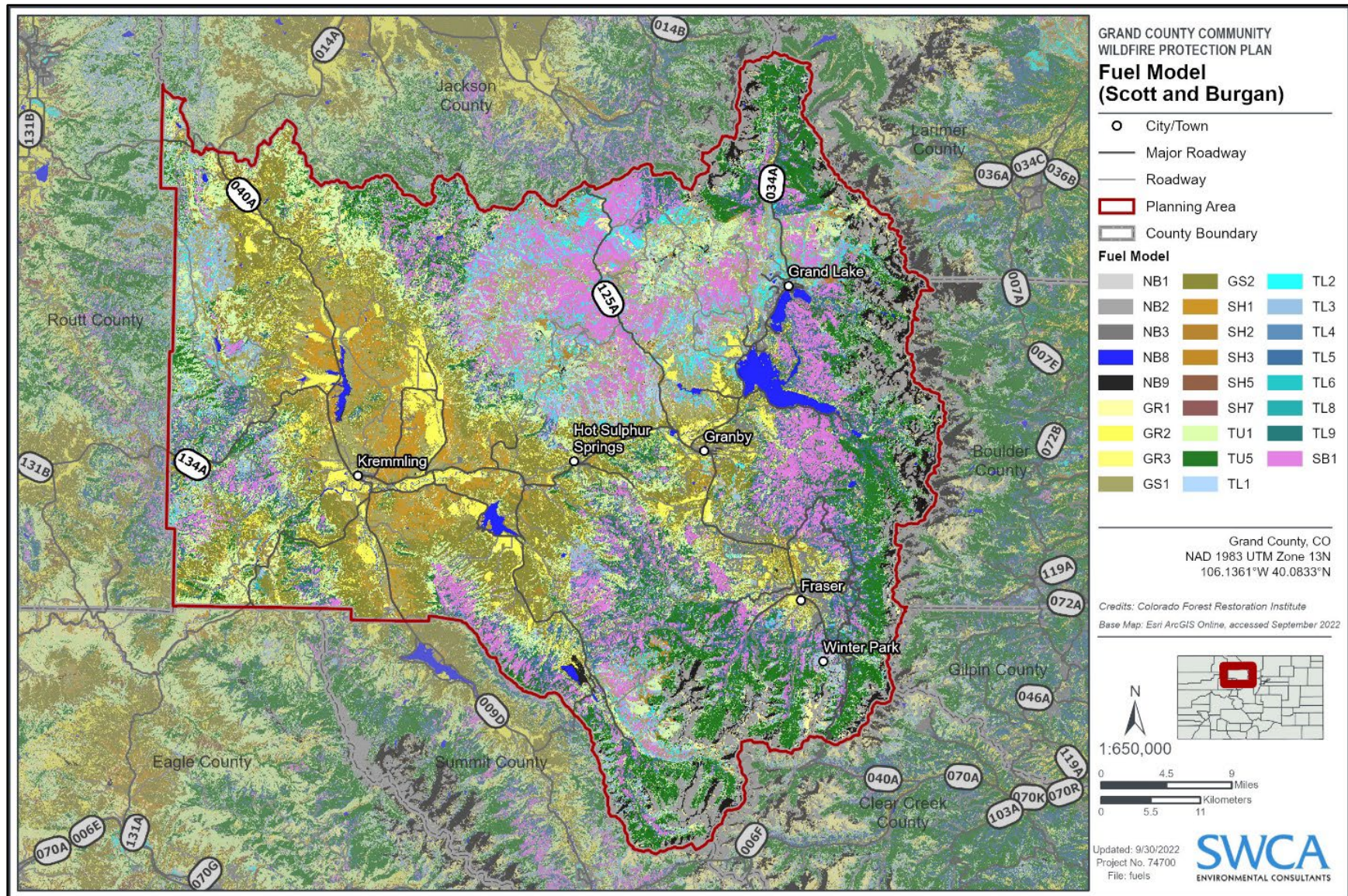
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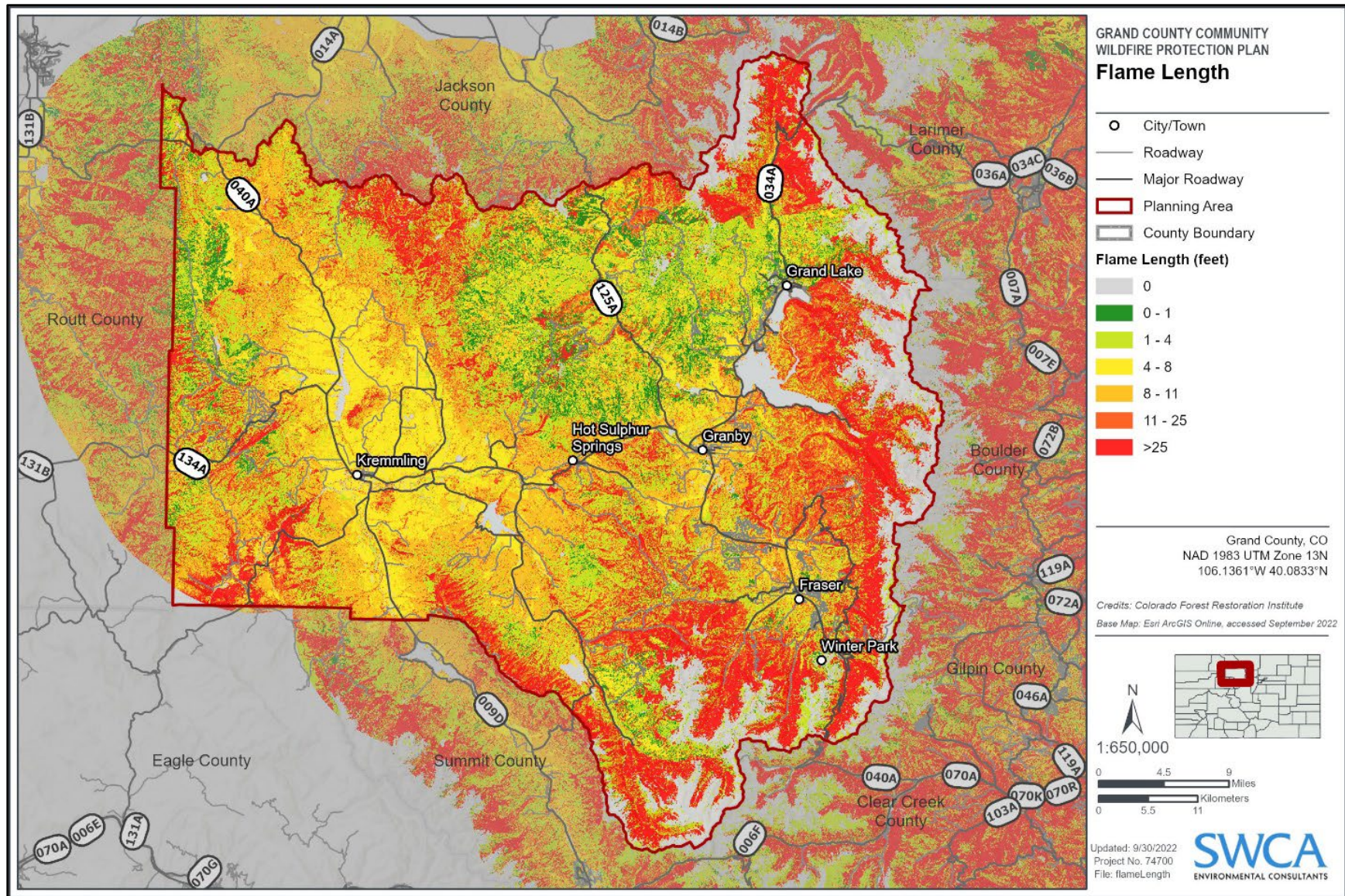
APPENDIX J:

Additional Mapping

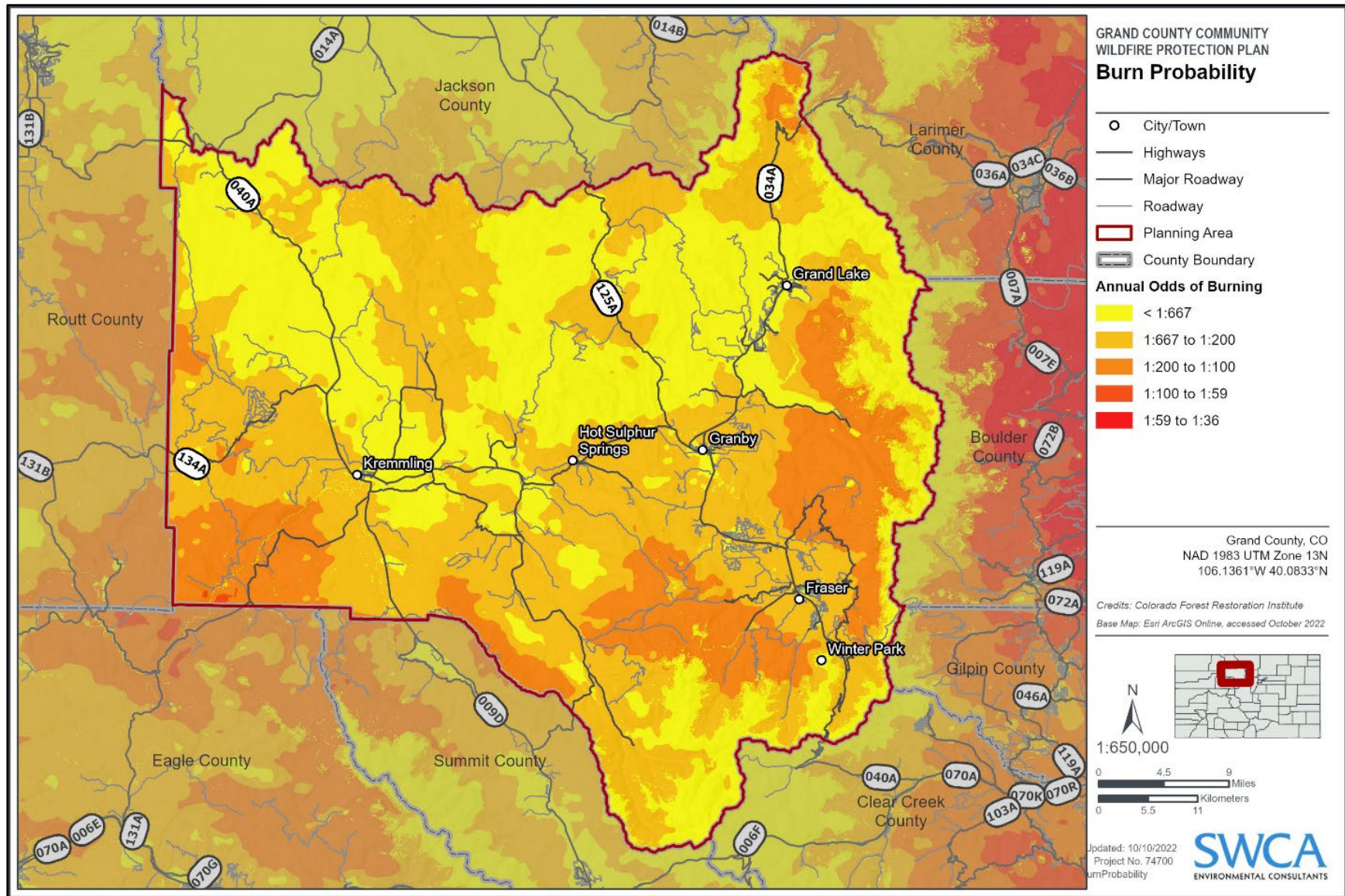
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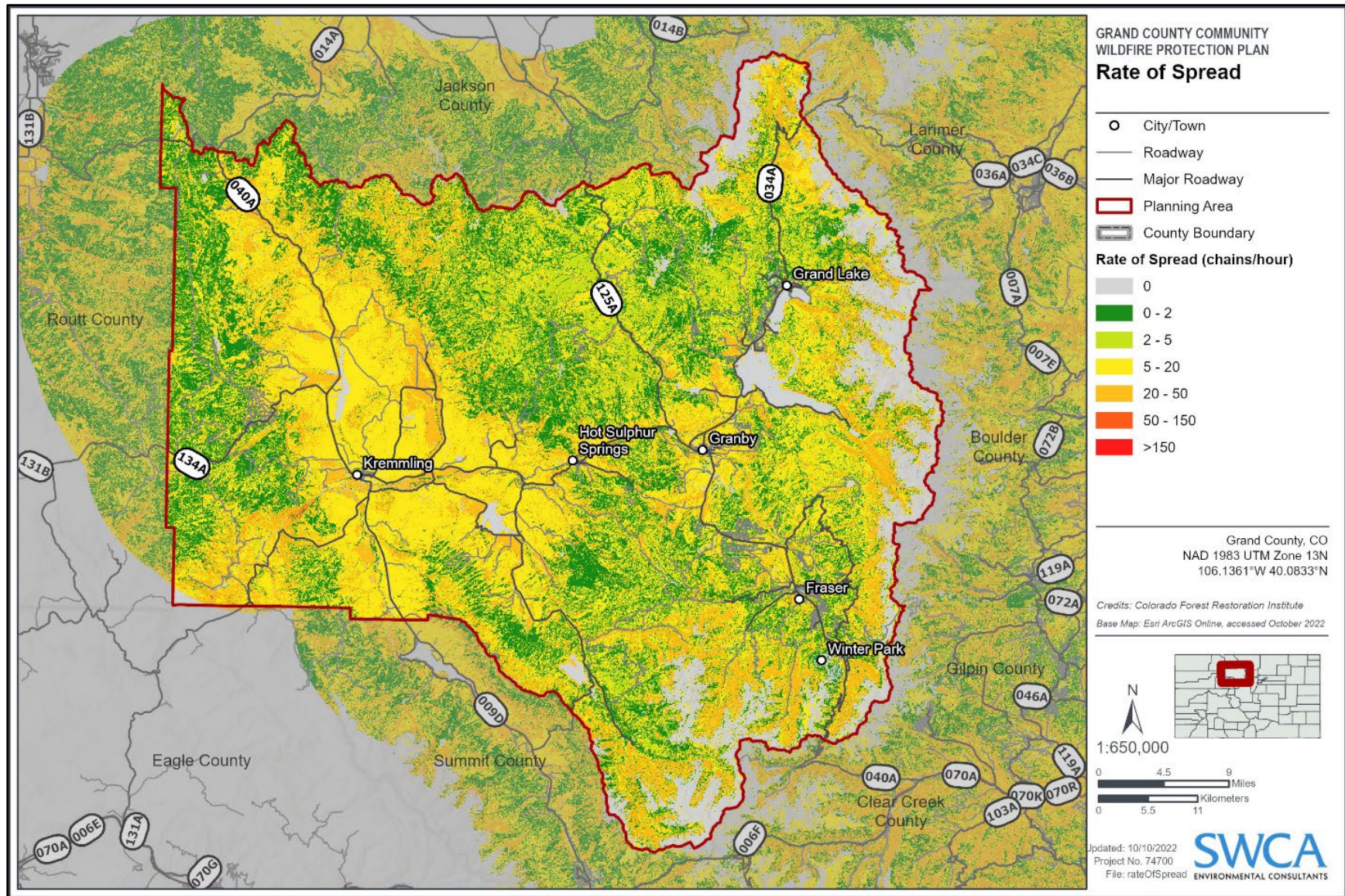
Map J.1. Scott and Burgan 40 fire behavior fuel models.



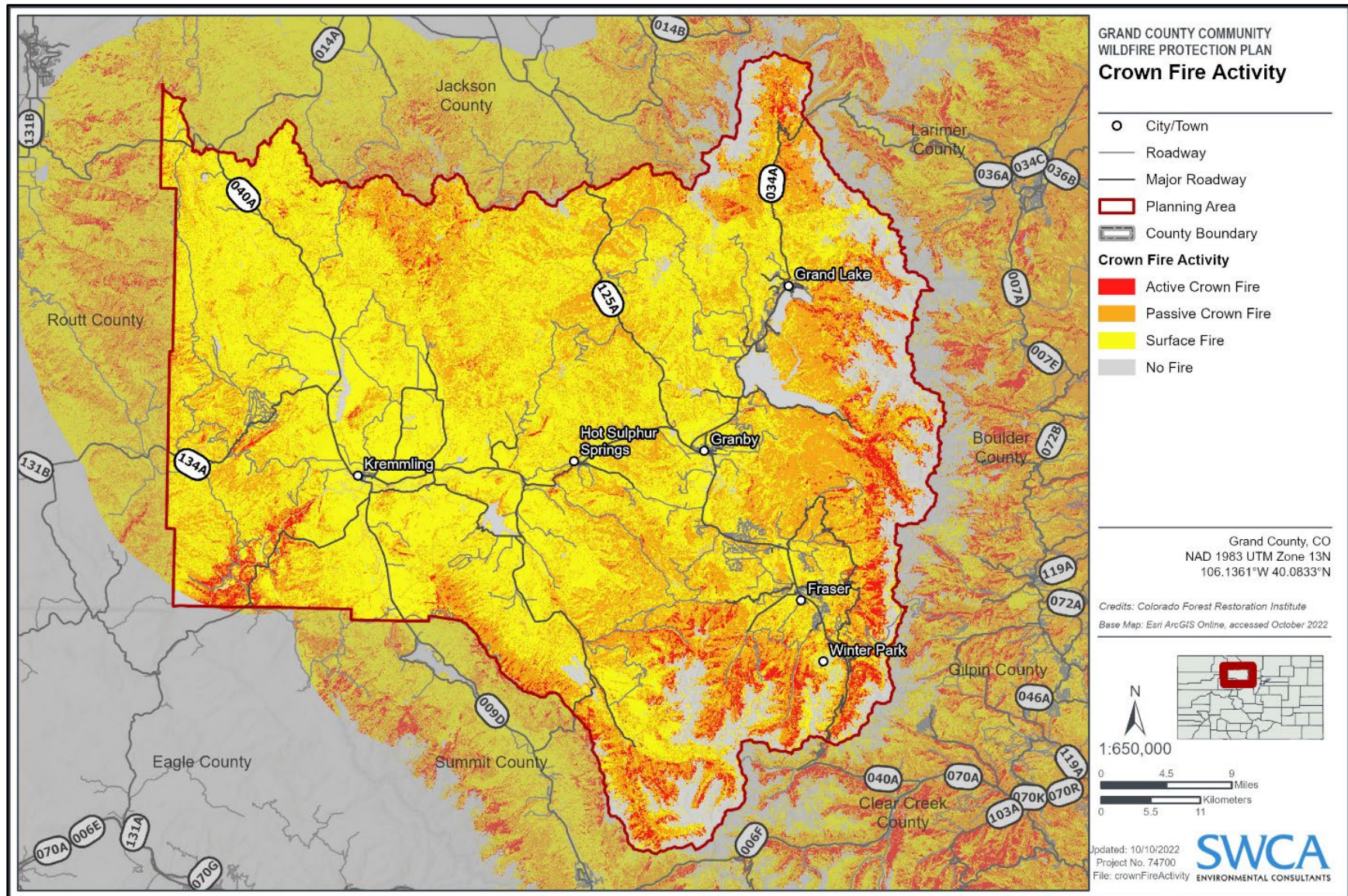
Map J.2. Risk-Hazard Assessment inputs: flame length.



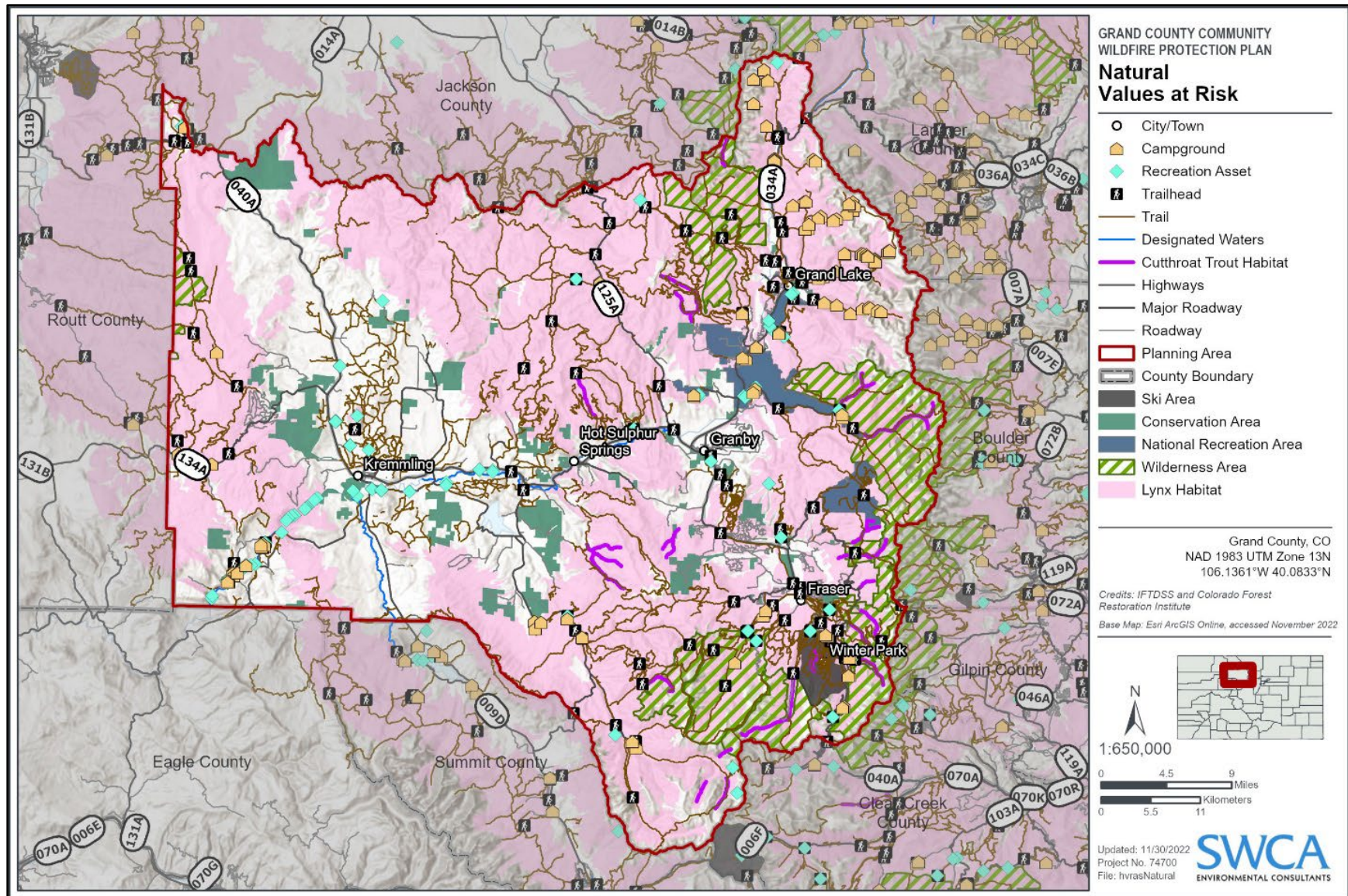
Map J.3. Risk-Hazard Assessment inputs: burn probability.



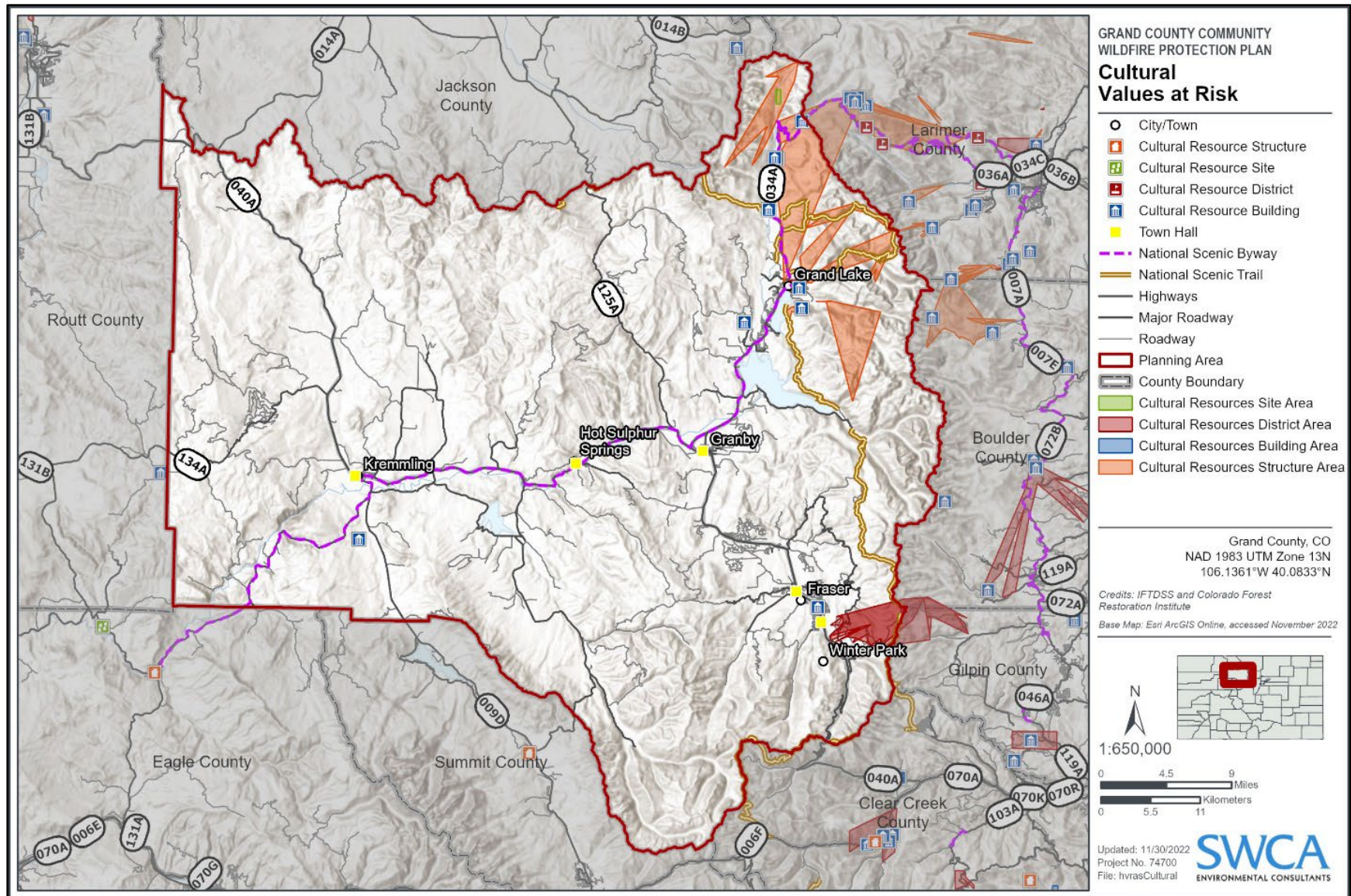
Map J.4. Risk-Hazard Assessment inputs: rate of spread.



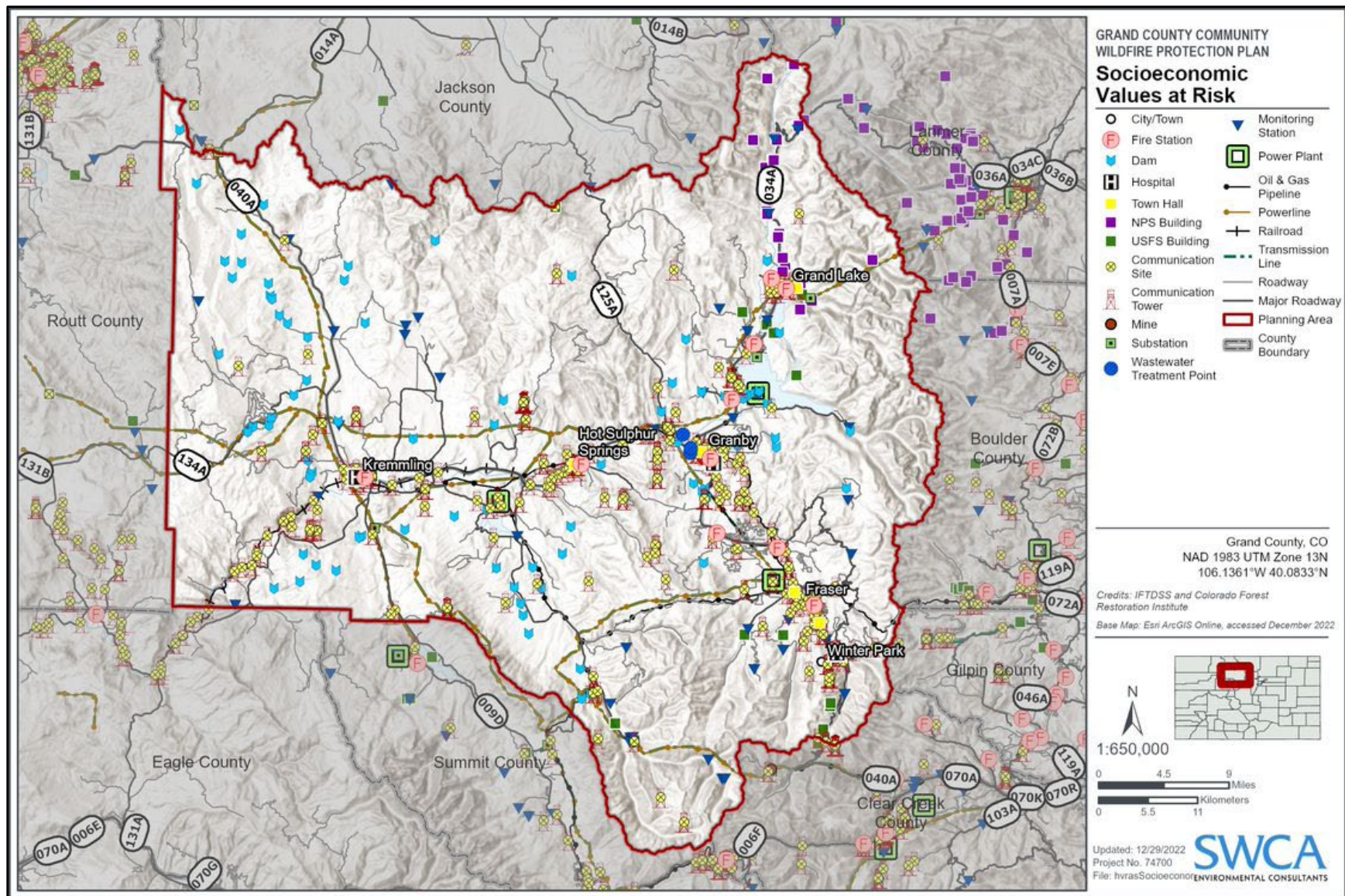
Map J.5. Risk-Hazard Assessment inputs: crown fire activity.



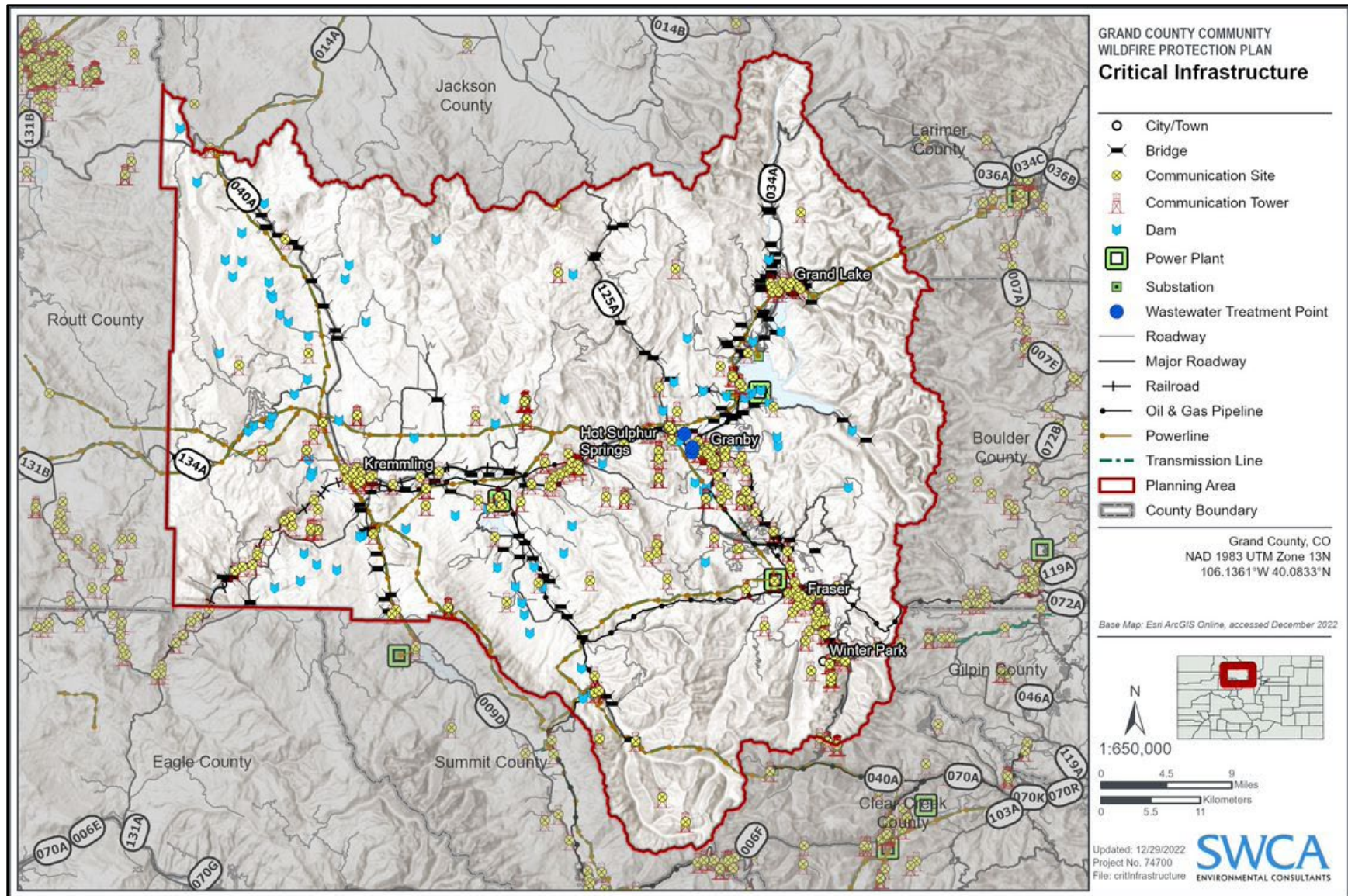
Map J.6. Highly valued natural resources at risk.



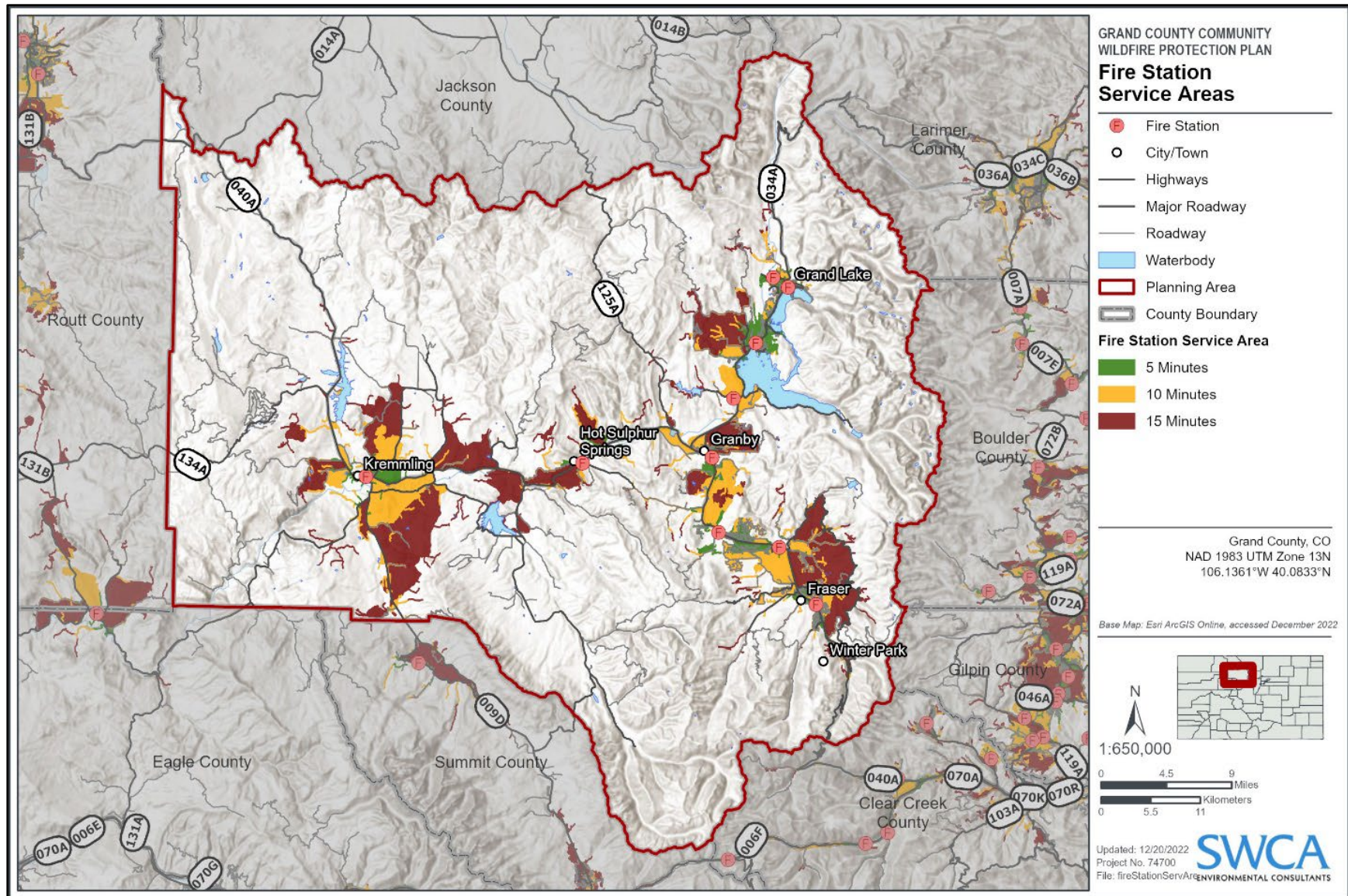
Map J.7. Highly valued cultural resources at risk.



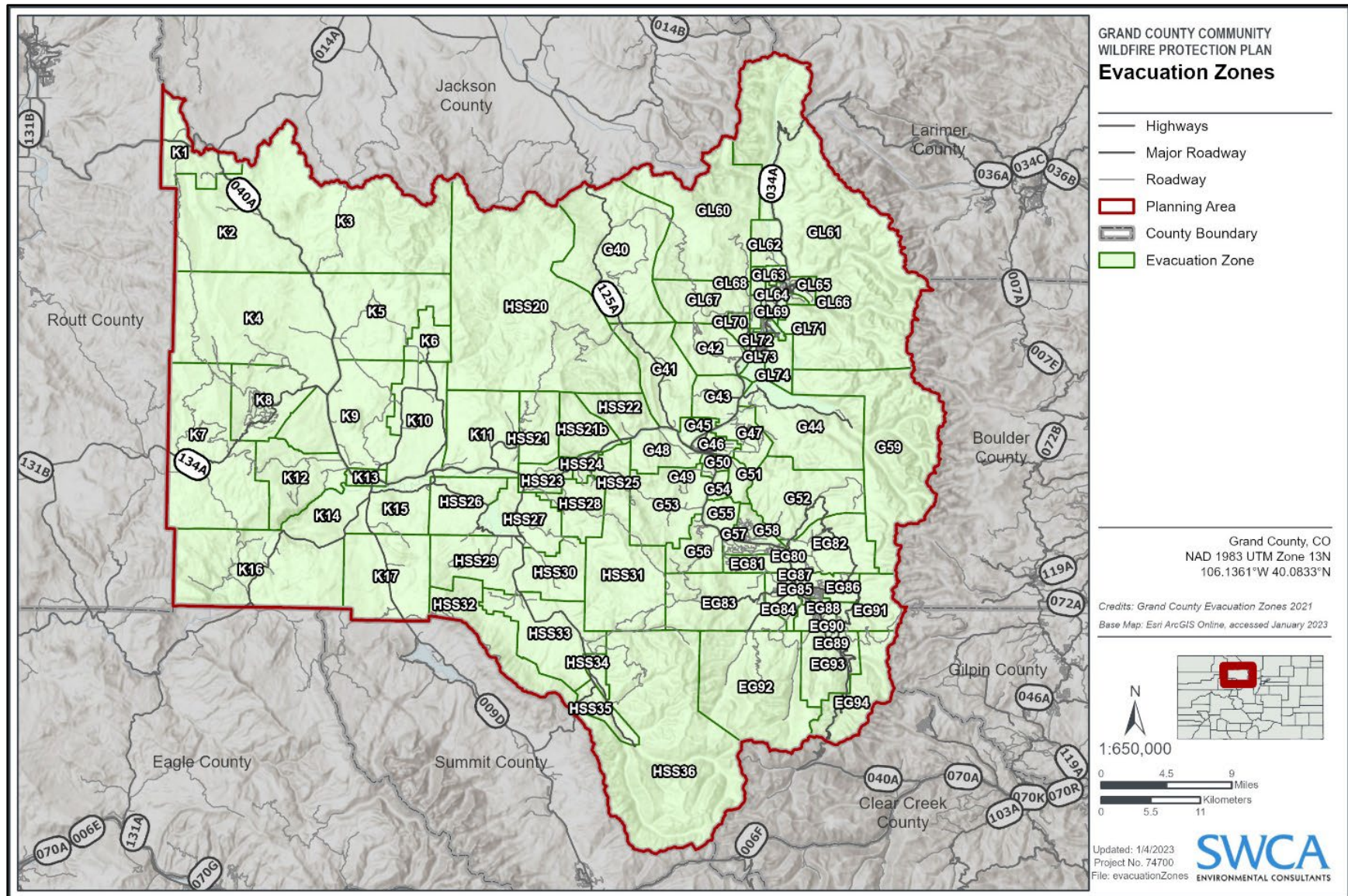
Map J.8. Highly valued socioeconomic resources at risk.



Map J.9. Critical infrastructure.



Map J.10. Fire station service areas.



Map J.11. Grand County's evacuation zones.

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TABLE OF CONTENTS

APPENDIX K:

Forms

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1144 NATIONAL FIRE PROTECTION ASSOCIATION ASSESSMENT FORM

| SWCA – 1144 Assessment | | |
|--------------------------------------|--|---------------|
| Community | | Notes: |
| Surveyor | | |
| Survey Date/Time | | |
| Means of Access | | |
| Ingress and Egress | | |
| 2 or more roads in and out score 0 | | |
| 1 road in and out 7 | | |
| Road Width | | |
| > 24 ft 0 | | |
| > 20 ft < 24 ft 2 | | |
| < 20 ft 4 | | |
| Road Conditions | | |
| Surfaced road, grade < 5% 0 | | |
| Surfaced road, grade > 5% 2 | | |
| Non-surfaced road, grade < 5% 2 | | |
| Non-surfaced road, grade > 5% 5 | | |
| Other than all season 7 | | |
| Fire Access | | |
| < 300 ft with turnaround 0 | | |
| > 300 ft with turnaround 2 | | |
| < 300 ft with no turnaround 4 | | |
| > 300 ft with no turnaround 5 | | |
| Street Signs | | |
| Present – reflective 0 | | |
| Present – non-reflective 2 | | |
| Not present 5 | | |
| Notes: | | |
| | | |
| Vegetation (Fuel Models) | | |
| Predominant Vegetation | | |
| Primary Predominant Vegetation | | |
| Non-Burnable (NB) Score 2 | | |
| Grass (GR) Score 5 | | |

| | |
|--|--|
| Grass-Shrub (GS) Score 10 | |
| Shrub (SH) Score 15 | |
| Timber-Understory (TU) Score 20 | |
| Timber-Litter (TL) Score 25 | |
| Slash-Blow (TU) Score 30 | |
| Notes: | |
| Defensible Space | |
| > 100 ft around structure 1 | |
| > 70 ft < 100 ft around structure 3 | |
| > 30 ft < 70 ft around structure 10 | |
| < 30 ft around structure 25 | |
| Topography Within 300 ft of Structures | |
| Slope | |
| < 9% 1 | |
| 10% to 20% 4 | |
| 21% to 30% 7 | |
| 31% to 40% 8 | |
| >41% 10 | |
| Additional Rating Factors (rate all that apply) | |
| Topographic features 1-5 | |
| History of high fire occurrence 1-5 | |
| Severe fire weather potential 1-5 | |
| Separation of adjacent structures 1-5 | |
| Notes: | |
| Roofing Assembly | |
| Roofing | |
| Class A - metal roof, clay/concrete tiles, slate, asphalt shingles 0 | |
| Class B - pressure treated composite shakes and shingles 3 | |
| Class C - untreated wood shingle, plywood, particle board 15 | |
| Unrated - Extremely poor roofing conditions 25 | |
| Notes: | |

| | |
|---|--|
| Building Construction | |
| <i>Siding Materials (predominant)</i> | |
| Non-combustible (brick/concrete) 5 | |
| Fire Resistive (stucco/adobe) 10 | |
| Combustible (wood or vinyl) 12 | |
| <i>Deck and fencing (predominant)</i> | |
| No deck or fence/non-combustible 0 | |
| Combustible deck and fence 5 | |
| <i>Building Set-Back</i> | |
| > 30 ft to slope 1 | |
| < 30 ft to slope 5 | |
| Notes: | |
| | |
| Available Fire Protection | |
| <i>Water Sources</i> | |
| Water Source? yes/no | |
| Water Source Type hydrant, water tank, other | |
| Other Water Source | |
| Water Source Score Hydrant = 1 Water Tank = 3 | |
| <i>Organized Response</i> | |
| Station < 5 mi from community 1 | |
| Station > 5 mi from community 3 | |
| Notes: | |
| | |
| Placement of Gas and Electric Utilities | |
| Both underground 0 | |
| One above, one below 3 | |
| Both above ground 5 | |
| <i>Values at Risk Observations</i> | |
| | |
| <i>Forest Health Observations</i> | |
| | |
| <i>Land Use Observations</i> | |
| | |



| | | | | |
|--------------------------|---------|--------------|----------|--------------|
| <i>Misc Observations</i> | | | | |
| | | | | |
| Total | | | | |
| Hazard Rating Scale | <40 Low | >40 Moderate | >70 High | >112 Extreme |

TABLE

APPENDIX L: Funding Sources

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FUNDING SOURCES

The following section provides information on federal, state, and private funding opportunities for conducting wildfire mitigation projects. It should be noted that matched funding can be an excellent funding strategy, when possible.

FEDERAL FUNDING INFORMATION

Source: 2022 Infrastructure Investments and Jobs Act

Agency: Multiple

Website: <https://www.congress.gov/bill/117th-congress/house-bill/3684>

Description: The Infrastructure Investments and Jobs act allocated funding through various departments for infrastructure projects including, but not limited to roads, bridges, and major projects; passenger and freight rail; highway and pedestrian safety; public transit; broadband; ports and waterways; airports; water infrastructure; power and grid reliability and resiliency; resiliency, including funding for coastal resiliency, ecosystem restoration, and weatherization; clean school buses and ferries; electric vehicle charging; addressing legacy pollution by cleaning up Brownfield and Superfund sites and reclaiming abandoned mines; and Western Water Infrastructure.

Specifically, the Community Wildfire Defense Grant Program is a \$1 billion program where the Department of Agriculture will provide grants to communities at risk from wildfire to develop or revise their community wildfire protection plans and carry out projects described within those plans. It will include a mix of formula and competitive funds. Applications are expected to open early in 2023.

Section 40803 addresses wildfire risk reduction, section 40804 deals with ecosystem restoration, section 40806 handles the establishment of fuel breaks in forests and other wildland vegetation, and section 70302 addresses reforestation. To learn more about the Act, please see guidebook located here <https://www.whitehouse.gov/wp-content/uploads/2022/05/BUILDING-A-BETTER-AMERICA-V2.pdf>

Source: Tribal Lands Landscape Scale Restoration Grants

Agency: First Nations Development Institute

Website: <https://www.firstnations.org/projects/landscape-scale-restoration/>

Description: For more than 41 years, First Nations Development Institute (First Nations), a Native-led 501(c)(3) nonprofit organization, has worked to strengthen American Indian economies to support healthy Native communities by investing in and creating innovative institutions and models that strengthen asset control and support economic development for American Indian people and their communities. First Nations began its national grantmaking program in 1993. Through mid-year 2021, First Nations has successfully managed 2,276 grants totaling more than \$46 million to tribal and community institutions across Indian Country. First Nations supports a series of grants focused on controlling and protecting food systems, water, languages, traditional ecological knowledge, and land. They support landscape restoration grants funded through the USDA Forest Service to support

priority forest landscapes at a high wildfire risk. You can find more information about this grant here: <https://www.grants.gov/web/grants/view-opportunity.html?oppld=342979>.

Source: Building Resilient Infrastructure and Communities (BRIC) Grant Program

Agency: Department of Homeland Security (DHS) Federal Emergency Management Agency (FEMA)

Website: <https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities>

Description: BRIC will supports states, local communities, tribes, and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards. The BRIC program guiding principles are supporting communities through capability- and capacity-building; encouraging and enabling innovation; promoting partnerships; enabling large projects; maintaining flexibility; and providing consistency. You can find more information on the BRIC program here: <https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities>

Source: Hazard Mitigation Grant Program (HMGP)

Agency: FEMA

Website: <https://www.fema.gov/grants/mitigation/hazard-mitigation>

Description: The HMGP provides funding to state, local, tribal, or territorial governments (and individuals or businesses if the community applies on their behalf) to rebuild with the intentions to mitigate future losses due to potential disasters. This grant program is available after a presidentially declared disaster.

Source: Hazard Mitigation Grant Program (HMGP) – Post Fire

Agency: FEMA

Website: <https://www.fema.gov/grants/mitigation/post-fire>

Description: The HMGP Post Fire grant program provides assistance to communities for the purpose of implementing hazard mitigation measures following a wildfire. Mitigation measures may include:

- Soil stabilization
- Flood diversion
- Reforestation

Source: Flood Mitigation Assistance (FMA) Grant

Agency: FEMA

Website: <https://www.fema.gov/grants/mitigation/floods>

Description: The Flood Mitigation Assistance Program is a competitive grant program that provides funding to states, local communities, federally recognized tribes, and territories. Funds can be used for projects that reduce or eliminate the risk of repetitive flood damage to buildings insured by the National Flood Insurance Program. FEMA chooses recipients based on the applicant's ranking of the project and the eligibility and cost-effectiveness of the project.

Source: Emergency Management Performance Grant (EMPG)

Agency: FEMA

Website: <https://www.fema.gov/grants/preparedness/emergency-management-performance>

Description: The EMPG program provides funding to state, local, tribal, and territorial emergency management agencies with the overall goal of creating a safe and resilient nation. The two main objectives of the program are 1) closing capability gaps that are identified in the state or territory's most recent Stakeholder Preparedness Review (SPR); and 2) building or sustaining those capabilities that are identified as high priority through the Threat and Hazard Identification and Risk Assessment (THIRA)/SPR process and other relevant information sources. The grant recipient and Regional Administrator must come to an agreement on program priorities, which are crafted based on National, State, and regional priorities.

Source: Fire Management Assistance Grant (FMAG)

Agency: FEMA

Website: <https://www.fema.gov/assistance/public/fire-management-assistance>

Description: Fire Management Assistance is available to state, local, and tribal governments for the mitigation, management, and control of fires on publicly or privately owned forests or grasslands, which threaten such destruction as would constitute a major disaster. The Fire Management Assistance declaration process is initiated when a state submits a request for assistance to the FEMA Regional Director at the time a "threat of major disaster" exists. The entire process is accomplished on an expedited basis and a FEMA decision is rendered in a matter of hours. Before a grant can be awarded, a state must demonstrate that total eligible costs for the declared fire meet or exceed either the individual fire cost threshold, which applies to single fires, or the cumulative fire cost threshold, which recognizes numerous smaller fires burning throughout a state.

Source: Regional Catastrophic Preparedness (RCP) Grants

Agency: FEMA

Website: <https://www.fema.gov/grants/preparedness/regional-catastrophic>

Description: The Regional Catastrophic Preparedness Grant program provides funding to increase collaboration and capacity in regard to catastrophic incident response and preparation.

Source: America the Beautiful Challenge

Agency: National Fish and Wildlife Foundation

Website: <https://www.nfwf.org/programs/america-beautiful-challenge>

Description: The America the Beautiful Challenge is an annual initiative to streamline funding for conservation and restoration work to build watershed and forest resilience. The program emphasizes restoration of rivers, coasts, wetlands, grasslands, and forests to protect from drought, flooding, and wildfire. ATBC encourages public-private partnerships to benefit landscape scale conservation and resilience efforts.

Source: Emergency Forest Restoration Program (EFRP)**Agency:** USDA Farm Service Agency (FSA)**Website:** <https://www.fsa.usda.gov/programs-and-services/disaster-assistance-program/emergency-forest-restoration/index>

Description: The Emergency Forest Restoration Program (EFRP) helps the owners of non-industrial private forests restore forest health damaged by natural disasters. The EFRP does this by authorizing payments to owners of private forests to restore disaster damaged forests. The local FSA County Committee implements EFRP for all disasters with the exceptions of drought and insect infestations. Eligible practices may include debris removal, such as down or damaged trees; site preparation, planting materials, and labor to replant forest stand; restoration of forestland roads, fire lanes, fuel breaks, or erosion-control structures; fencing, tree shelters; wildlife enhancement.

To be eligible for EFRP, the land must have existing tree cover; and be owned by any nonindustrial private individual, group, association, corporation, or other private legal entity.

Source: Emergency Conservation Program (ECP)**Agency:** USDA Farm Service Agency (FSA)**Website:** <https://www.fsa.usda.gov/programs-and-services/conservation-programs/emergency-conservation/index>

Description: The Emergency Conservation Program (ECP) helps farmers and ranchers to repair damage to farmlands caused by natural disasters and to help put in place methods for water conservation during severe drought. The ECP does this by giving ranchers and farmers funding and assistance to repair the damaged farmland or to install methods for water conservation. The grant could be used for restoring conservation structures (waterways, diversion ditches, buried irrigation mainlines, and permanently installed ditching system).

Source: Environmental Quality Incentives Program (EQIP)**Agency:** National Resource Conservation Service (NRCS)**Website:** <https://www.nrcs.usda.gov/programs-initiatives/eqip-environmental-quality-incentives>

Description: The Environmental Quality Incentives Program (EQIP) is a voluntary program authorized under the Agricultural Act of 2014 (2014 Farm Bill) that helps producers install measures to protect soil, water, plant, wildlife, and other natural resources while ensuring sustainable production on their farms, ranches, and working forest lands.

Source: Emergency Watershed Protection (EWP) Program**Agency:** National Resource Conservation Service (NRCS)**Website:** <https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/ewpp/>

Description: The program offers technical and financial assistance to help local communities relieve imminent threats to life and property caused by floods, fires, windstorms, and other natural disasters that impair a watershed.

Eligible sponsors include cities, counties, towns, conservation districts, or any federally recognized Native American tribe or tribal organization. Interested public and private landowners can apply for EWP Program recovery assistance through one of those sponsors.

EWP Program covers the following activities.

- Debris removal from stream channels, road culverts, and bridges
- Reshape and protect eroded streambanks
- Correct damaged drainage facilities
- Establish vegetative cover on critically eroded lands
- Repair levees and structures
- Repair conservation practices

Source: Funding for Fire Departments and First Responders

Agency: DHS, U.S. Fire Administration

Website: <https://www.fema.gov/grants/preparedness/firefighters/assistance-grants>

Description: Includes grants and general information on financial assistance for fire departments and first responders. Programs include the Assistance to Firefighters Grant Program, Reimbursement for Firefighting on Federal Property, State Fire Training Systems Grants, and National Fire Academy Training Assistance.

Source: Tribal Environmental General Assistance Program (GAP)

Agency: Environmental Protection Agency (EPA)

Website: <https://www.epa.gov/tribal-pacific-sw/epa-region-9-tribal-environmental-gap-funding>

Description: Funding under this program is used to aid Native American tribes in establishing and implementing their own reservation-specific environmental protection programs. To find out more about this funding opportunity please contact Tribal Branch Manager, Jeremy Bauer, at bauer.jeremy@epa.gov.

Source: Specific EPA Grant Programs

Agency: Environmental Protection Agency (EPA)

Website: <https://www.epa.gov/grants/grants-your-region-information-specific-epa-region-8>

Description: Various grant programs are listed under this site. Listed below are examples of grants offered:

- Multipurpose Grants to States and Tribes: <https://www.epa.gov/grants/multipurpose-grants-states-and-tribes>
- Environmental Education Grants: <https://www.epa.gov/education/grants>
- Environmental Justice Grants: <https://www.epa.gov/environmentaljustice/environmental-justice-grants-funding-and-technical-assistance>

Source: Conservation Innovation Grants (CIG)

Agency: National Resource Conservation Service

Website: <https://www.nrcs.usda.gov/programs-initiatives/cig-conservation-innovation-grants>

Description: CIG State Component. CIG is a voluntary program intended to stimulate the development and adoption of innovative conservation approaches and technologies while leveraging federal investment in environmental enhancement and protection, in conjunction with agricultural production. Under CIG, Environmental Quality Incentives Program (EQIP) funds are used to award competitive grants to non-federal governmental or nongovernmental organizations, tribes, or individuals. CIG enables the Natural Resources Conservation Service (NRCS) to work with other public and private entities to accelerate technology transfer and adoption of promising technologies and approaches to address some of the nation's most pressing natural resource concerns. CIG will benefit agricultural producers by providing more options for environmental enhancement and compliance with federal, state, and local regulations. The NRCS administers the CIG program. The CIG requires a 50/50 match between the agency and the applicant. The CIG has two funding components: national and state. Funding sources are available for water resources, soil resources, atmospheric resources, and grazing land and forest health.

Source: Urban and Community Forestry Program, National Urban and Community Forestry Challenge Cost Share Grant Program

Agency: U.S. Forest Service

Website: <https://www.fs.usda.gov/managing-land/urban-forests/ucf>

Description: U.S. Forest Service funding will provide for Urban and Community Forestry Programs that work with local communities to establish climate-resilient tree species to promote long-term forest health. The other initiative behind this program is to promote and carry out disaster risk mitigation activities, with priority given to environmental justice communities. For more information, contact a Forest Service Regional Program Manager.

Source: Community Wildfire Defense Grant

Agency: U.S. Forest Service

Website: <https://www.fs.usda.gov/managing-land/fire/grants>

Description: The Community Wildfire Defense Grant is intended to help communities with a high wildfire risk plan and implement the goals of the National Cohesive Wildland Fire Management Strategy. These goals include restoring and maintaining landscapes, creating fire adapted communities, and improving wildfire response. Funds are available to develop or update community wildfire protection plans and to implement projects listed in CWPPs that are less than 10 years old. At-risk communities are those positioned in fire prone areas, low-income communities, and those that have been impacted by a severe disaster.

Source: Catalog of Federal Funding Sources; Land Resources

Agency: Multiple

Website: <https://ordspub.epa.gov/ords/wfc/f?p=165:512:16627993499812:::512::>

Description: The Land Finance Clearing House is a catalogue of federal funding sources for all things land related.

Examples of the types of grants found at this site are:

- Forest and Woodlands Resource Management Grant: https://sam.gov/fal/a798ad78cac749639b48270db3e86fdc/view?index=cfd&page=2&organization_id=100011100

- Environmental Education Grant: <https://www.epa.gov/education/grants>
- Public Assistance Grant Program: <https://www.fema.gov/assistance/public>
- Hazard Mitigation Grant: <https://www.fema.gov/grants/mitigation/hazard-mitigation>

Source: Catalog of Federal Funding Sources; Water Resources

Agency: Multiple

Website: <https://ordspub.epa.gov/ords/wfc/f?p=165:12:16627993499812:::12::>

Description: The Water Finance Clearing House is a catalogue of federal funding sources for all things water related.

Examples of the types of grants found at this site are:

- Water Conservation Field Services Program: <https://www.usbr.gov/waterconservation/>
- Colorado Community Development Block Grant: <https://oedit.colorado.gov/community-development-block-grant-planning-feasibility-studies-grant#:~:text=The%20Community%20Development%20Block%20Grant%20%28CDBG%29%20Planning%20and,least%20one%20full-time%20equivalent%20job%20per%20%2420%2C000%20funded.>
- Colorado State Water Quality Grants: <https://cdphe.colorado.gov/water-quality/funding-grants-and-loans/water-quality-grants>

Source: Firewise Communities

Agency: Multiple

Website: <https://www.nfpa.org/about-nfpa/awards>

Description: Many different Firewise Communities activities are available to help homes and whole neighborhoods become safer from wildfire without significant expense. Community cleanup days, awareness events, and other cooperative activities can often be successfully accomplished through partnerships among neighbors, local businesses, and local fire departments at little or no cost.

The kind of help you need will depend on who you are, where you are, and what you want to do. Among the different activities that individuals and neighborhoods can undertake, the following often benefit from seed funding or additional assistance from an outside source:

- Thinning/pruning/tree removal/clearing on private property—particularly on very large, densely wooded properties
- Retrofit of home roofing or siding to non-combustible materials
- Managing private forest
- Community slash pickup or chipping
- Creation or improvement of access/egress roads
- Improvement of water supply for firefighting
- Public education activities throughout the community or region

Source: The National Fire Plan (NFP)

Agency: DOI & USDA

Website: <http://www.forestsandrangelands.gov/>

Description: Many states are using funds from the NFP to provide funds through a cost-share with residents to help them reduce the wildfire risk to their private property. These actions are usually in the form of thinning or pruning trees, shrubs, and other vegetation and/or clearing the slash and debris from this kind of work. Opportunities are available for rural, state, and volunteer fire assistance.

Source: Staffing for Adequate Fire and Emergency Response (SAFER)

Agency: FEMA

Website: <https://www.fema.gov/grants/preparedness/firefighters/safer>

Description: The purpose of SAFER grants is to help fire departments increase the number of frontline firefighters. The goal is for fire departments to increase their staffing and deployment capabilities and ultimately attain 24-hour staffing, thus ensuring that their communities have adequate protection from fire and fire-related hazards. The SAFER grants support two specific activities: (1) hiring of firefighters and (2) recruitment and retention of volunteer firefighters. The hiring of firefighters activity provides grants to pay for part of the salaries of newly hired firefighters over the five-year program.

Source: The Fire Prevention and Safety Grants (FP&S)

Agency: FEMA

Website: <https://www.fema.gov/grants/preparedness/firefighters/safety-awards#:~:text=Awards%20%20%20%20Organization%20%20%20,%20%20%241%2C499%2C957%20%2016%20more%20rows%20>

Description: FP&S offers support to projects that enhance the safety of the public and firefighters who may be exposed to fire and related hazards. The primary goal is to target high risk populations and mitigate high incidences of death and injury. Examples of the types of projects supported by FP&S include fire-prevention and public-safety education campaigns, juvenile fire-setter interventions, media campaigns, and arson prevention and awareness programs. In fiscal year 2005, Congress reauthorized funding for FP&S and expanded the eligible uses of funds to include firefighter safety research and development.

Source: GSA-Federal Excess Personal Property

Agency: USFS

Website: <https://gsaccess.gov/>

Description: The Federal Excess Personal Property (FEPP) program refers to Forest Service-owned property that is on loan to State Foresters for the purpose of wildland and rural firefighting. Most of the property originally belonged to the Department of Defense (DoD). Once acquired by the Forest Service, it is loaned to State Cooperators for firefighting purposes. The property is then loaned to the State Forester, who may then place it with local departments to improve local fire programs. State Foresters and the USDA Forest Service have mutually participated in the FEPP program since 1956.

Source: Assistance to Firefighters Grants (AFG)

Agency: FEMA

Website: <https://www.fema.gov/grants/preparedness/firefighters>.

Description: The AFG program provides resources to assist fire departments in attaining critical resources such as training and equipment.

STATE FUNDING INFORMATION

Source: Colorado State Forest Service Grants & funding Assistance

Agency: Colorado State Forest Service

Website: <https://csfs.colostate.edu/grants/>

Description: The Colorado State Forest Service manages multiple funding programs to assist private and public landowners in managing forested lands to mitigate the risk of wildfire and steward forests for ecological, economic, and social value. A list of current programs is provided here with links to respective program sites:

Public Programs

- Forest Restoration & Wildfire Risk Mitigation: <https://csfs.colostate.edu/grants/forest-restoration-wildfire-risk-mitigation/>
- Wildfire Mitigation Incentives for Local Government: <https://csfs.colostate.edu/grants/wildfire-mitigation-incentives-for-local-government/>
- Wildfire Mitigation Resources & Best Practices Grant Program: <https://csfs.colostate.edu/grants/wildfire-mitigation-resources-best-practices-grant-program/>

Private Landowner Programs

- Forest Ag Program: <https://csfs.colostate.edu/forest-ag-program/>
- Forest Legacy Program: <https://csfs.colostate.edu/forest-legacy-program/>
- Forest Stewardship Program: <https://csfs.colostate.edu/forest-stewardship-program/>
- Tree Farm Program: <https://csfs.colostate.edu/tree-farm/>

Source: Various Funding Sources

Agency: Colorado Division of Fire Prevention and Control (DFPC)

Website: <https://dfpc.colorado.gov/sections/grants>

Description: The DFPC manages three funding programs: HB 22-1194 funding, Firefighter Safety Disease Prevention Grant, and the Volunteer Fire Assistance Grant. HB 22-1194 provides funds to structural and wildland crews to purchase personal protective equipment such as breathing apparatuses and line packs. The FFSDP grant similarly provides funding for any firefighter equipment that improves safety and prevents occupation-related diseases. The VFA Program supports rural fire stations with volunteer crews that serve communities with 10,000 people or fewer.

Source: Colorado Strategic Wildfire Action Program

Agency: Colorado Department of Natural Resources

Website: <https://dnr.colorado.gov/divisions/forestry/co-strategic-wildfire-action-program>

Description: In 2021, Senate Bill 21-258 was signed into law and established the Colorado Strategic Wildfire Action Program. This program is intended to bolster wildland firefighter capabilities by expanding workforce development, providing additional funds to hire more crew members, and helping state wildland inmate fire teams (SWIFT), find long term employment post-incarceration. This funding opportunity is intended to strategically address focal landscapes and concern areas through expanded mitigation and response capacity.

PRIVATE FUNDING INFORMATION

Source: Grand Foundation Wildfire Fund

Agency: Grand Foundation

Website: <https://www.grandfoundation.com/Give/Wildfire-Fund>

The Grand Foundation served as the Long-Term Recovery Committee following the East Troublesome Fire and is still working in this capacity today. The Foundation stepped in when Grand County was not awarded FEMA Individual Assistance, which supports private individuals. The Foundation also took on case management when other groups could not hire anyone for this work. The Foundation committed the final \$20K of this CWPP project.

Source: State Farm Good Neighbor Citizenship (GNC) Grants

Agency: State Farm

Website: <https://www.statefarm.com/about-us/corporate-responsibility/community-grants/good-neighbor-citizenship-grants>

Description: State Farm funding is directed at:

- Auto and roadway safety
- Teen Driver Education
- Home safety and fire prevention
- Disaster preparedness
- Disaster recovery

Source: The Urban Land Institute (ULI)

Website: <http://www.uli.org>

Description: ULI is a 501(c)(3) nonprofit research and education organization supported by its members. The institute has more than 22,000 members worldwide, representing the entire spectrum of land use and real estate development disciplines, working in private enterprise and public service. The mission of the ULI is to provide responsible leadership in the use of land to enhance the total environment. ULI and the ULI Foundation have instituted Community Action Grants that could be used for Firewise Communities activities. Applicants must be ULI members or part of a ULI District

Council. Contact actiongrants@uli.org or review the web page to find your District Council and the application information.

Source: Environmental Systems Research Institute (ESRI)

Website: <https://www.esri.com/en-us/home>

Description: ESRI is a privately held firm and the world's largest research and development organization dedicated to geographic information systems. ESRI provides free software, hardware, and training bundles under ESRI-sponsored Grants that include such activities as conservation, education, and sustainable development, and posts related non-ESRI grant opportunities under such categories as agriculture, education, environment, fire, public safety, and more. You can register on the website to receive updates on grant opportunities.

Source: National Forest Foundation; Innovative Finance for National Forests Grant Program

Website: <https://www.nationalforests.org/grant-programs/innovative-finance-for-national-forests-grant-program>

Description: The Innovative Finance for National Forests Grant Program aims to bring in non-USFS funds to increase forest resilience. There are three main topics for funding: wildfire resilience and recovery, sustainable recreation access and infrastructure, and watershed health. In addition, three types of projects are funded: pilot programs with on-the-ground implementation, scaling projects to deliver backlogs of unfunded work, and research and development to provide to new forest information.

Source: StEPP Foundation

Website: <https://steppfoundation.org/>

Description: StEPP is a 501(c)(3) organization dedicated to helping organizations realize their vision of a clean and safe environment by matching projects with funders nationwide. The StEPP Foundation provides project oversight to enhance the success of projects, increasing the number of energy efficiency, clean energy, and pollution prevention projects implemented at the local, state, and national levels for the benefit of the public. The website includes an online project submittal system and a Request for Proposals page.

Source: Matching Awards Program

Agency: National Forest Foundation (NFF)

Website: <https://www.nationalforests.org/grant-programs/map>

Description: The NFF is soliciting proposals for its Matching Awards Program (MAP) to provide funds for direct on-the-ground projects benefitting America's National Forests and Grasslands. By pairing federal funds provided through a cooperative agreement with the U.S. Forest Service with non-federal dollars raised by award recipients, MAP measurably multiplies the resources available to implement stewardship projects that benefit the National Forest System.

Source: Patagonia Environmental Grants and Support

Agency: Patagonia

Website: <https://www.patagonia.com/how-we-fund/>

Description: Patagonia supports innovative work that addresses the root causes of the environmental crisis and seeks to protect both the environment and affected communities. Patagonia focuses on places where they have built connections through outdoor recreation and through their network of retail stores, nationally and internationally.

Source: Leonardo DiCaprio Foundation Grants

Agency: Leonardo DiCaprio Foundation

Website: <https://www.rewild.org/>

Description: The foundation supports projects around the world that build climate resiliency, protect vulnerable wildlife, and restore balance to threatened ecosystems and communities.

Source: U.S. Endowment for Forestry and Communities

Agency: U.S. Environmental Protection Agency, Natural Resources Conservation Service (NRCS), U.S. Forest Service, U.S. Department of Defense, U.S. Economic Development Agency

Website: <https://www.usendowment.org/>

Description: As the nation's largest public charity dedicated to keeping our working forests working and ensuring their bounty for current and future generations, the Endowment deploys the creativity and power of markets to advance their mission: The Endowment works collaboratively with partners in the public and private sectors to advance systemic, transformative and sustainable change for the health and vitality of the nation's working forests and forest-reliant communities.

OTHER FUNDING INFORMATION

The following resources may also provide helpful information for funding opportunities:

- Western Forestry Leadership Coalition: <https://www.thewflc.org/>
- USDA Information Center: <https://www.nal.usda.gov/main/information-centers>
- Forest Service Fire Management website: <https://www.fs.usda.gov/science-technology/fire>
- Insurance Services Office Mitigation Online (town fire ratings): <http://www.isomitigation.com/>
- National Fire Protection Association: <http://www.nfpa.org>
- National Interagency Fire Center, Wildland Fire Prevention/Education: <https://www.nifc.gov/fire-information/fire-prevention-education-mitigation>
- Department of Homeland Security U.S. Fire Administration: <https://www.usfa.fema.gov/index.html>

FUNDING SOURCES FOR HOMEOWNERS

Source: Forest Ag Program

Agency: Colorado State Forest Service

Website: <https://csfs.colostate.edu/forest-ag-program/>

The Forest Ag Program is a voluntary program available to landowners with 40 or more acres of forested land who manage their land for harvestable wood products. The program is intended to incentivize forest management and fire resilient forests through property tax reductions for land managers. Landowners are required to complete a Forest Management Plan with a professional forester to ensure management activities are in line with landscape objectives and best management practices.

Source: Forest Legacy Program

Agency: Colorado State Forest Service

Website: <https://csfs.colostate.edu/forest-legacy-program/>

The Forest Legacy Program is a federally funded initiative to assist in the acquisition or designation of conservation easements on privately owned forest land. The program was established to permanently protect portions of Colorado's forests that contribute to the state's ecological and scenic value while maintaining sustainable uses of forest resources such as recreation. Funds are primarily provided by the federal government with matching funds required by state funders or conservation organizations to purchase or secure forested lands. Conserved lands can be kept under private ownership or opened to public access through this easement program.

Source: Forest Stewardship Program

Agency: Colorado State Forest Service

Website: <https://csfs.colostate.edu/forest-stewardship-program/>

The Forest Stewardship Program is a voluntary initiative intended to broaden resource availability and technical assistance for privately owned forest land. The program connects landowners with professional foresters to identify property goals and develop a Stewardship Management Plan to improve overall forest health and landowner knowledge. The program goal is to expand forest stewardship principles to ensure proper management and connectivity of private forestland. Financial assistance may be available for landowners with a Forest Stewardship Plan.

Source: Wildfire Mitigation Resources & Best Practices Grant Program

Agency: Colorado State Forest Service

Website: <https://csfs.colostate.edu/grants/wildfire-mitigation-resources-best-practices-grant-program/>

The Colorado Legislature established the Wildfire Mitigation Resources & Best Practices Grant Program in 2022. This program provides state support to conduct outreach among landowners in high wildfire hazard areas. To be eligible, a recipient must be an agency of local government, a county, municipality, special district, a tribal agency or program, or a nonprofit organization. The Colorado State Forest Service has \$300,000 available for grant awards through this program.

Source: Homesite Assessments

Agency: Colorado State Forest Service

Website: <https://csfs.colostate.edu/homeowners-landowners/homesite-assessments/>

CSFS foresters are available to assist homeowners and landowners through homesite assessments. A forester will visit your land and examine your trees for disease, wildland fire defensible space, and

overall health. They can make recommendations for disposing of diseased trees, safeguarding your trees, keeping your trees healthy and reducing their risk of disease, and mitigating the risk of catastrophic wildfire. For more information or to schedule a homesite assessment, contact a local CSFS Field Office.

Source: Colorado Tree Farm Program

Agency: Colorado State Forest Service

Website: <https://csfs.colostate.edu/tree-farm/>

The Colorado Tree Farm Program is part of the American Tree Farm System (ATFS) and is a program of the American Forest Foundation. The ATFS is a privately funded, national tree-growing effort that encourages forest management on private lands. Other forest certification organizations exist, but the ATFS is the oldest and largest forest certification program in the United States.

ACMS

APPENDIX M:

List of Preparers

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| Name | Organization | Title |
|---------------------|---|---|
| Joel Cochran | GCOEM | Project Support Specialist and POC |
| Alexis Kimbrough | GCOEM | Director |
| Brett Schroetlin | Sheriff's Office | County Sheriff |
| Paul Mintier | Sheriff's Office | Fire Management Officer |
| Eric Freels | National Forest (ARNF, Medicine Bow-Routt NF) | District Ranger |
| Brad White | Grand FPD No. 1 | Fire Chief |
| Seth St. Germain | Grand Lake FPD No. 2 | Fire Chief |
| Tom Baumgarten | Hot Sulphur Springs/Parshall FPD No. 3 | Fire Chief |
| Todd Holzwarth | East Grand FPD No. 4 | Fire Chief |
| Tony Tucker | Kremmling FPD No. 5 | Fire Chief |
| Zachary Wehr | CSFS | Supervisory Forester – Northwest Area |
| Ryan McNertney | CSFS | Forester – Northwest Area & GCWC Board |
| Madelene McDonald | Denver Water | Watershed Scientist |
| Kimberly Mihelich | Northern Water | Source Water Protection Specialist |
| Katlin Miller | Middle Park Conservation District | Executive Director |
| Amy Sidener | Grand County DNR | Natural Resource Management Specialist |
| Tyler Campbell | DFPC | Battalion Chief |
| Ryan Kay | BLM | Acting Kremmling Field Manager |
| Jimmy Michaels | BLM | District FMO |
| Philip Brinkman | Grand County Wildfire Council | Chair, Board of Directors |
| Clancy Philipsborn | Grand County Wildfire Council | Mitigation Committee Chair |
| Brandon J Voegtle | BLM, NWD fire unit | Wildfire Prevention and Mitigation Specialist |
| Steven Reeves | CWCB | Watershed and Flood Protection Specialist |
| Daniel Godwin | USFW | Forest Fire Planner |
| Victoria Amato | SWCA | Principal Fire Planner |
| Arianna Porter | SWCA | Project Manager |
| Breanna Plucinski | SWCA | Assistant Project Manager |
| Liz Hitzfelder | SWCA | Lead Geospatial Analyst |
| Tim Clute | SWCA | Fire Planner |
| Isaac Fournier | SWCA | Fire Planner |
| Alexis Roberts | SWCA | Fire Planner |
| Rachel Carlson | SWCA | Fire Planner |
| Christian Testerman | SWCA | Fire Planner |

ANNEX 1

EAST GRAND FIRE PROTECTION DISTRICT NO. 4

Organization and Jurisdiction

The East Grand Fire Protection District (FPD) No. 4's jurisdictional boundaries extend from the Meadow Creek Reservoir and Highway 40, and the neighborhoods surrounding the Snow Mountain Ranch - Tabernash south to the Winter Park Ski Resort. Its boundaries also extend east through much of the James Peak Wilderness, and west to include Byers Peak (Figure 1.1). The FPD is responsible for responding to incidents across 200 square miles ranging in elevation from 7,586-foot river bottoms to 12,799-foot montane regions. The FPD's land is managed and owned predominately by the Forest Service, followed by BLM and private landowners (Figure 1.2). East Grand FPD No. 4's response district encompasses the towns of Fraser, Winter Park, Tabernash; in addition to Meadow Creek Reservoir and portions of the Arapaho National Forest and National Recreation Area. The FPD has two response facilities.

Outside of the town of Fraser, higher population density areas within the FPD include Tabernash, Fraser, Winter Park, and the west and east sides of Highway 40 in the Snow Mountain Ranch, Tabernash, Fraser, and Winter Park area. East Grand FPD No. 4 contains one main transportation corridor: U.S. Highway 40. Across its entire jurisdiction, the FPD includes 4,453 buildings and has a building density of 22.18 units per square mile.

WUI Area Description

The wildland urban interface (WUI) is composed of both interface and intermix communities and is defined as areas where human habitation and development meet or intermix with wildland fuels (U.S. Department of the Interior and U.S. Department of Agriculture [USDA] 2001:752–753). Interface areas include housing developments that meet or are in the vicinity of continuous vegetation. Intermix areas are those areas where structures are scattered throughout a wildland area where the cover of continuous vegetation and fuels is often greater than cover by human habitation. WUI is further delineated through buffers and with a Low, Medium, High, or Extreme classification based on fuels and slope steepness. Buffers are derived from the general boundaries of where development meets wildland fuels, and more extreme classifications correspond to greater presences of wildland fuels and steeper slope angles.

The WUI in the East Grand FPD No. 4 is extensive and contains significant quantities of both interface and intermix development. The majority of the FPD falls within a 2.5-mile WUI buffer, and the most populated areas lie within a 1-mile WUI buffer (Figure 1.3). Similar to areas classified as extreme in our Risk-Hazard Assessment (Figure 1.5), WUI classified as extreme lies primarily in the upper elevation reaches of ecotone zones where sagebrush steppe completes its transition into stands of lodgepole pine. These areas have a high concentration of conifer stands that have yet to experience recent wildfire. This includes communities surrounding the more forested regions of Winter Park (Winter Park Resort, Fraser and Winter Park) those living within the higher elevation regions of the Arapahoe National Forest (Junction Ranch, Sunset Ridge, Ranch Creek) and the inter mountain basins surrounding Sheep Mountain, Morse Mountain, and Ninemile Mountain (Homestead Hills, Snow Mountain Ranch/YMCA, Ice Box). Communities in the FPD directly adjacent to those in extreme WUI zones generally have high WUI classifications and include Tabernash and Highlands/Pole Creek (Figure 1.4)

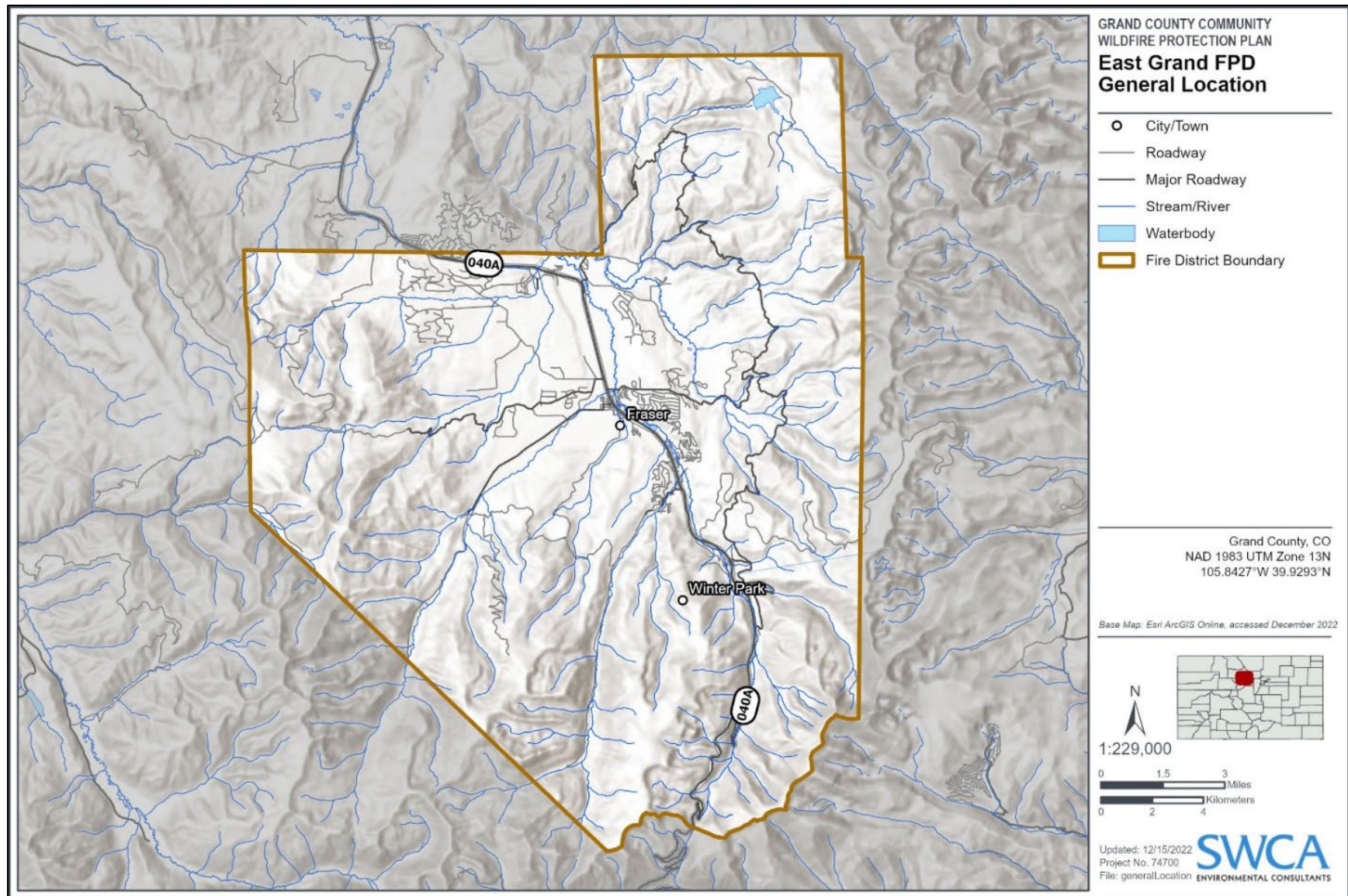


Figure 1.1. East Grand FPD No. 4.

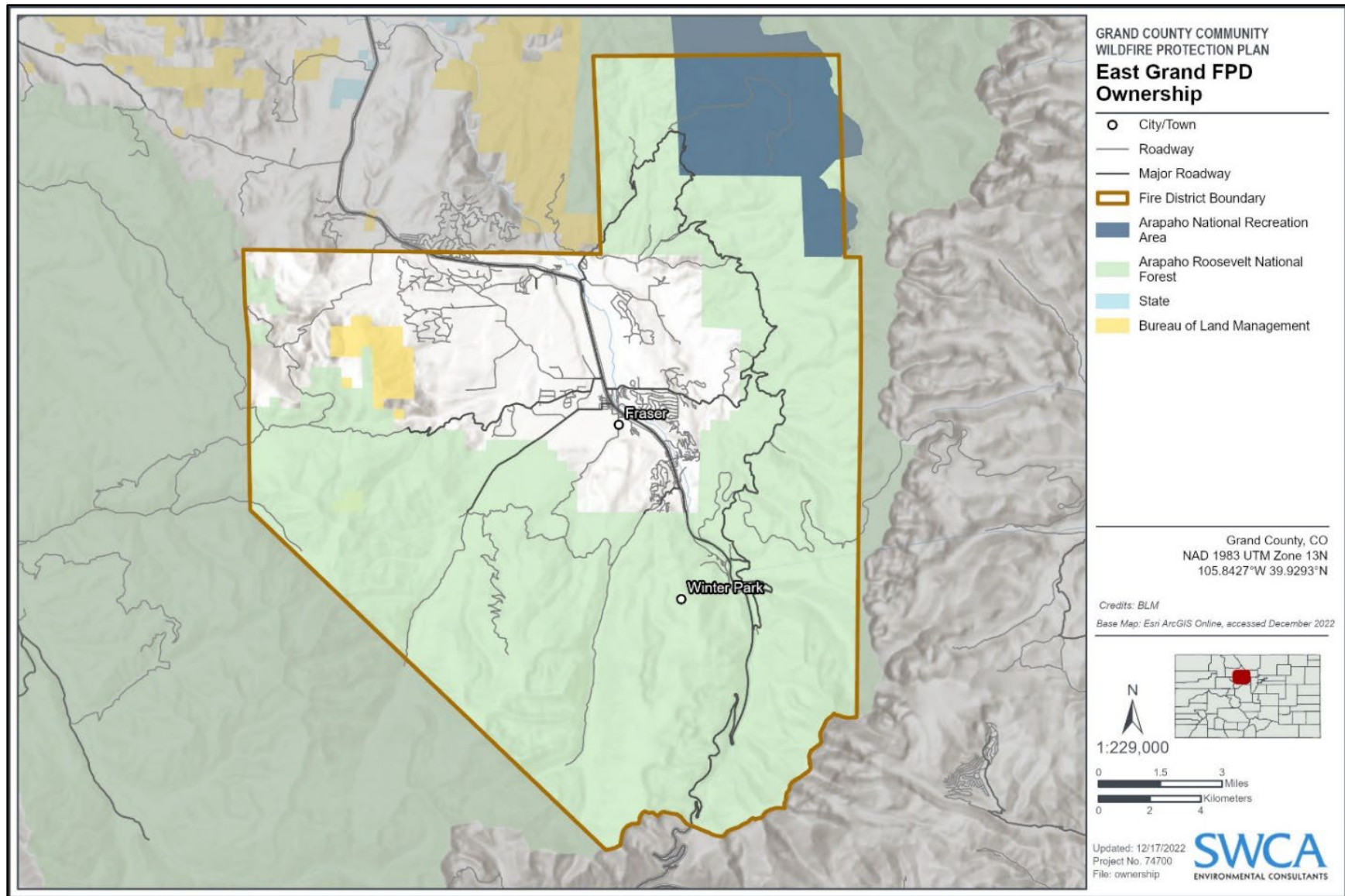


Figure 1.2 East Grand FPD No. 4 land ownership.

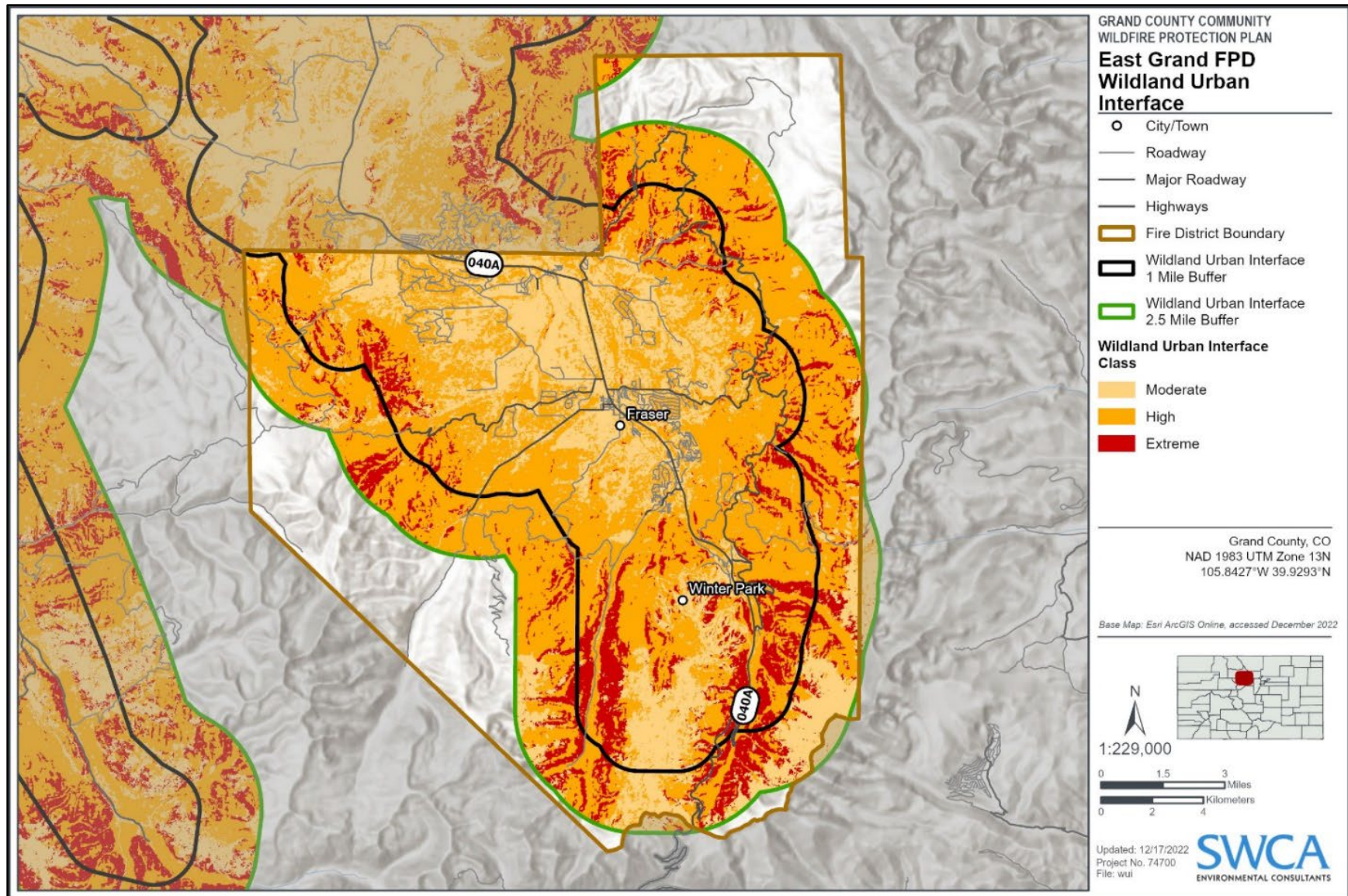


Figure 1.3. East Grand FPD No. 4 WUI boundaries and associated risk.

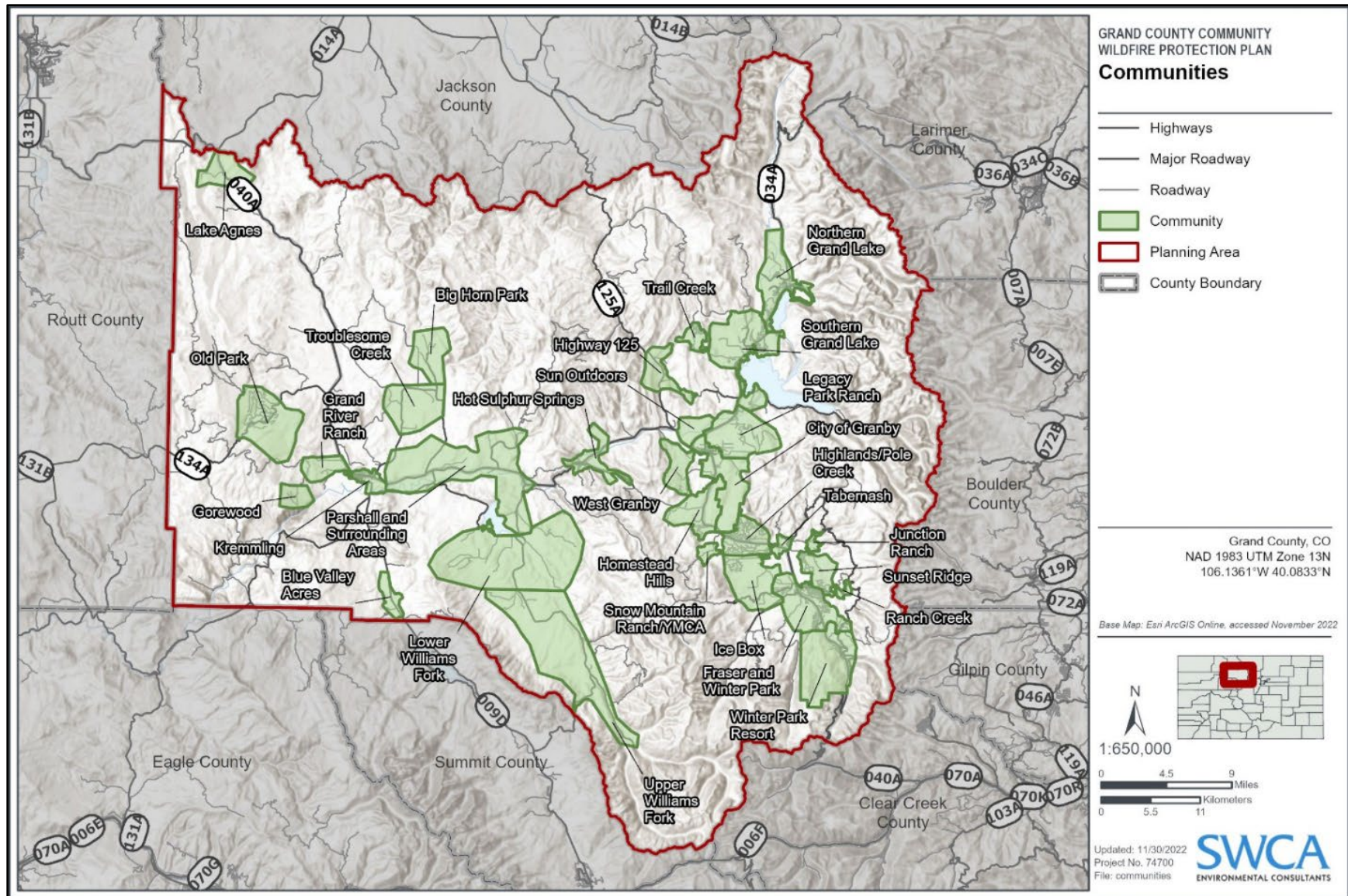


Figure 1.4. Grand County WUI communities.

Risk-Hazard Summary

The purpose of the Risk-Hazard Assessment is to evaluate and provide information pertaining to the risk of wildland fires within East Grand FPD No. 4 jurisdictional land. For more information on the Risk-Hazard Assessment purpose and process, see Chapter 3. The Composite Risk-Hazard Assessment is twofold and combines a geographic information system (GIS) model of hazard based on fire behavior and fuels modeling technology and a Core Team-generated assessment of on-the-ground community hazards and values at risk (VARs).

The Risk-Hazard Assessment considers:

- Fire behavior modeling outputs
- Fire history
- HVRAs
- Fire response

Figure 1.5 contains a visual summary of the East Grand FPD No. 4 Risk-Hazard Assessment. Most of the high-risk areas identified are in unburned montane conifer forests along the fringes of inter-mountain basins. These include those surrounding Sheep Mountain, Morse Mountain, and Ninemile Mountain, located west of Fraser and Winter Park, and Arapaho National Forest which is situated east of Fraser and Winter Park. Winter Park Resort is included in the East Grand FPD No. 4 and has a moderate Risk-Hazard Assessment that escalates to extreme risk in the more forested, outer reaches of the resort.

Fire History

Large fires in East Grand FPD No. 4's boundaries have been uncommon, although the FPD regularly responds to smaller structural and wildland ignitions (Figure 1.6). In 2007, the FPD fought the largest fire they had ever responded to in their district, the approximately 50-acre Y Fire just south of Snow Mountain Ranch (Table 1.1, Figure 1.7).

Table 1.1. Large Wildland Fire History in East Grand FPD No. 4

| Fire Name | Location | Year | Acres Burned | Cause of Ignition |
|-----------|--------------------------|------|--------------|-------------------|
| Y Fire | Near Snow Mountain Ranch | 2007 | ~50 | Likely human |

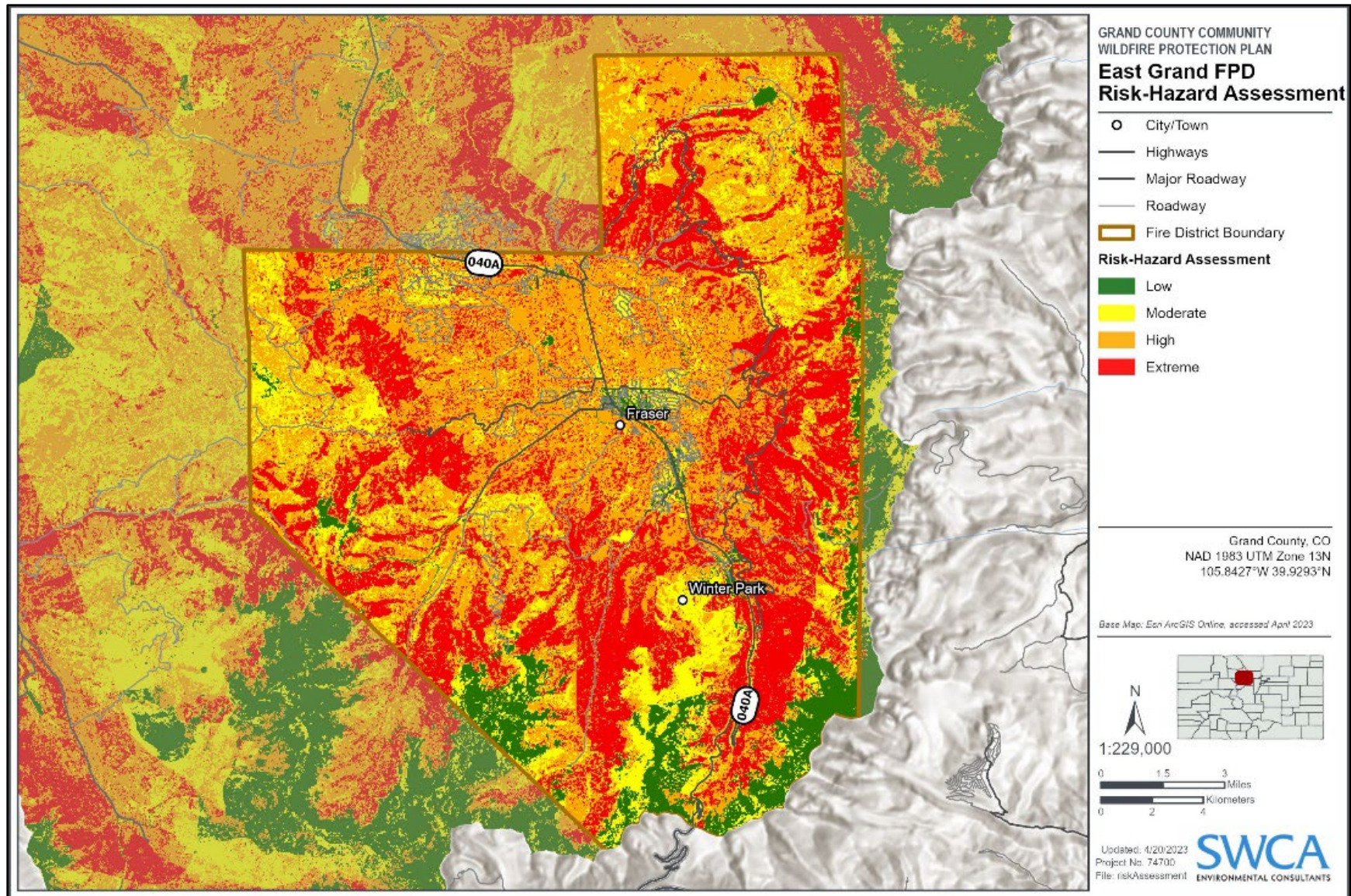


Figure 1.5. East Grand FPD No. 4 Risk-Hazard Assessment.

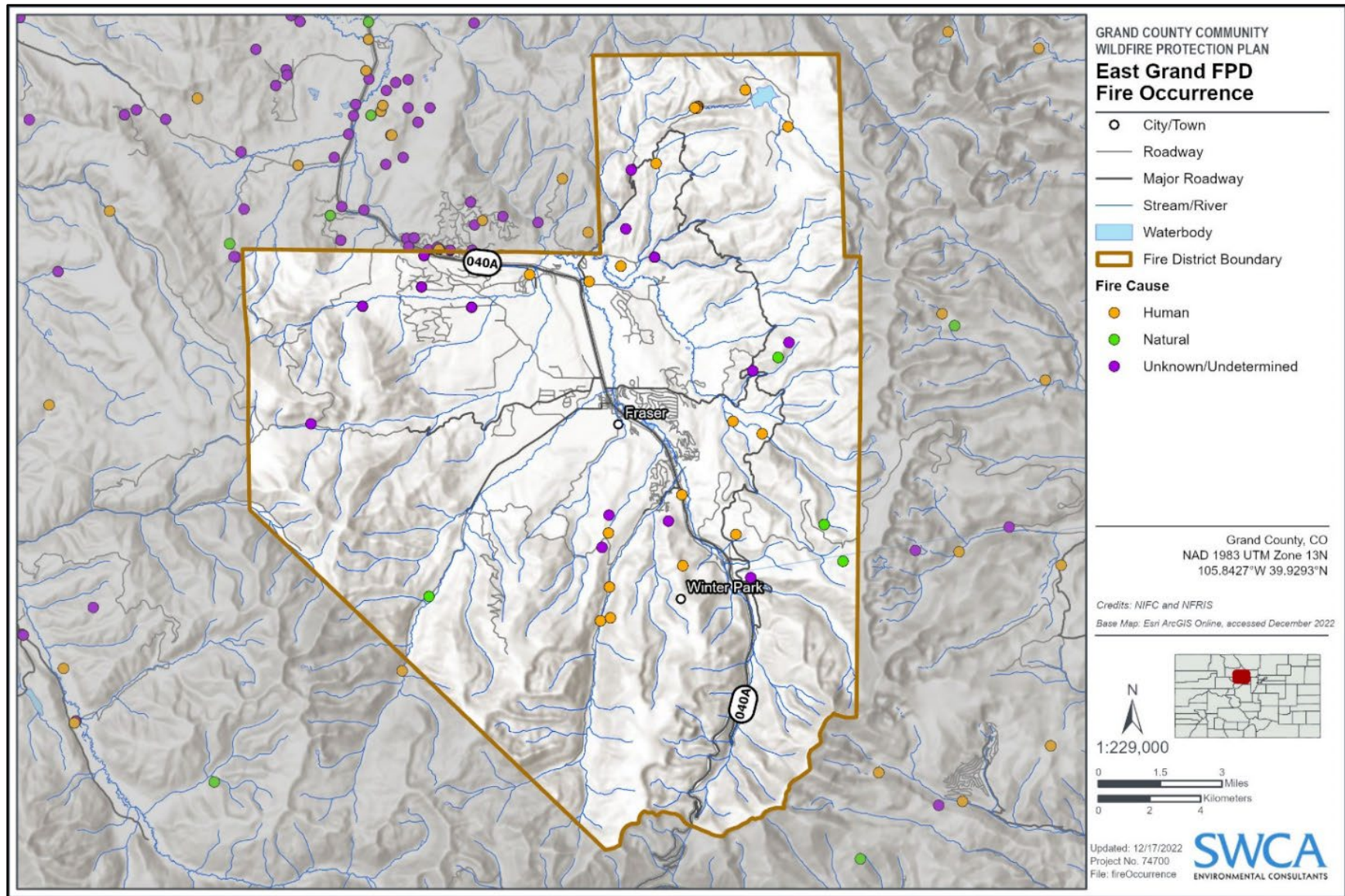


Figure 1.6. East Grand FPD No. 4 fire occurrence.

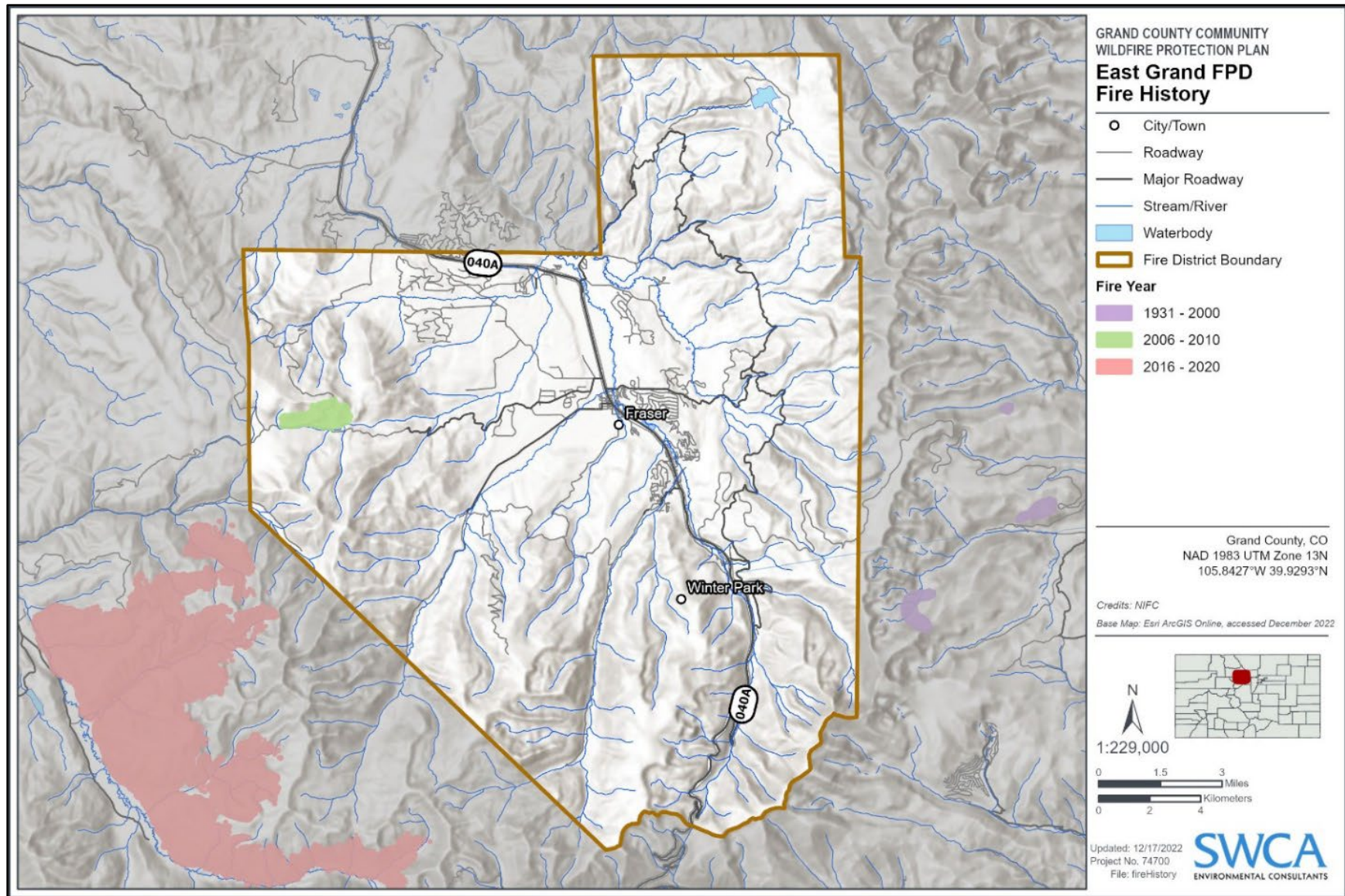


Figure 1.7. East Grand FPD No. 4 fire history.

Hazardous Fuel Characteristics

Fuels found within the East Grand FPD No. 4 jurisdiction are listed below in Table 1.2 and illustrated in Figure 1.8. Please see Chapter 2, Fire Environment, for more information regarding fuels within the county.

Table 1.2. Fuel Types (Scott and Burgan 2005) in East Grand FPD No. 4's Boundaries

| Existing Fuel Type | Acres | Percent |
|---|---------|---------|
| TU5 – Timber-understory, fuelbed is high load conifer litter with shrub understory. Spread rate moderate; flame length moderate. | 37, 391 | 29.10% |
| TL5 – Timber-litter, High load conifer litter; light slash or mortality fuel. Spread rate low; flame length low. | 18 445 | 14.36% |
| SB1 – Slash-blowdown, fine fuel load is 10 to 20 tons/acre, weighted toward fuels 1 to 3 inches diameter class, depth is less than 1 foot. Spread rate moderate; flame length low. | 16,656 | 12.96% |
| TU1 – Timber-understory, fuelbed is low load of grass and/or shrub with litter. Spread rate low; flame length low. | 15, 656 | 12.18% |
| GS2 – Grass-shrub, Shrubs are 1 to 3 feet high, moderate grass load. Spread rate high; flame length moderate. | 9,445 | 7.35% |
| TL3 – Timber-litter, Moderate load conifer litter. Spread rate very low; flame length low. | 7,173 | 5.58% |
| NB2 – Snow/ice. | 4,392 | 3.42% |
| NB9 – Bare ground. | 3,979 | 3.10% |
| NB1 – Non burnable urban or suburban development; insufficient wildland fuel to carry wildland fire | 3,884 | 3.02% |
| GR2 – Grass, moderately coarse continuous grass, average depth about 1 foot. Spread rate high; flame length moderate. | 3,697 | 2.88% |
| GR1 – Grass, grass is short, patchy, and possibly heavily grazed. Spread rate moderate; flame length low. | 3,587 | 2.79% |
| Other* – Various fuel types | 2,778 | 2.16% |
| SH2 – Moderate shrub fuel load, depth about 1 foot, no grass fuel present. Spread rate low; flame length low. | 1,406 | 1.09% |

*Other includes fuel types with <1% cover of the FPD. These include GR3, GS1, NB3, NB8, SH1, SH7, TL1, TL2, TL6, TL8, TL9.

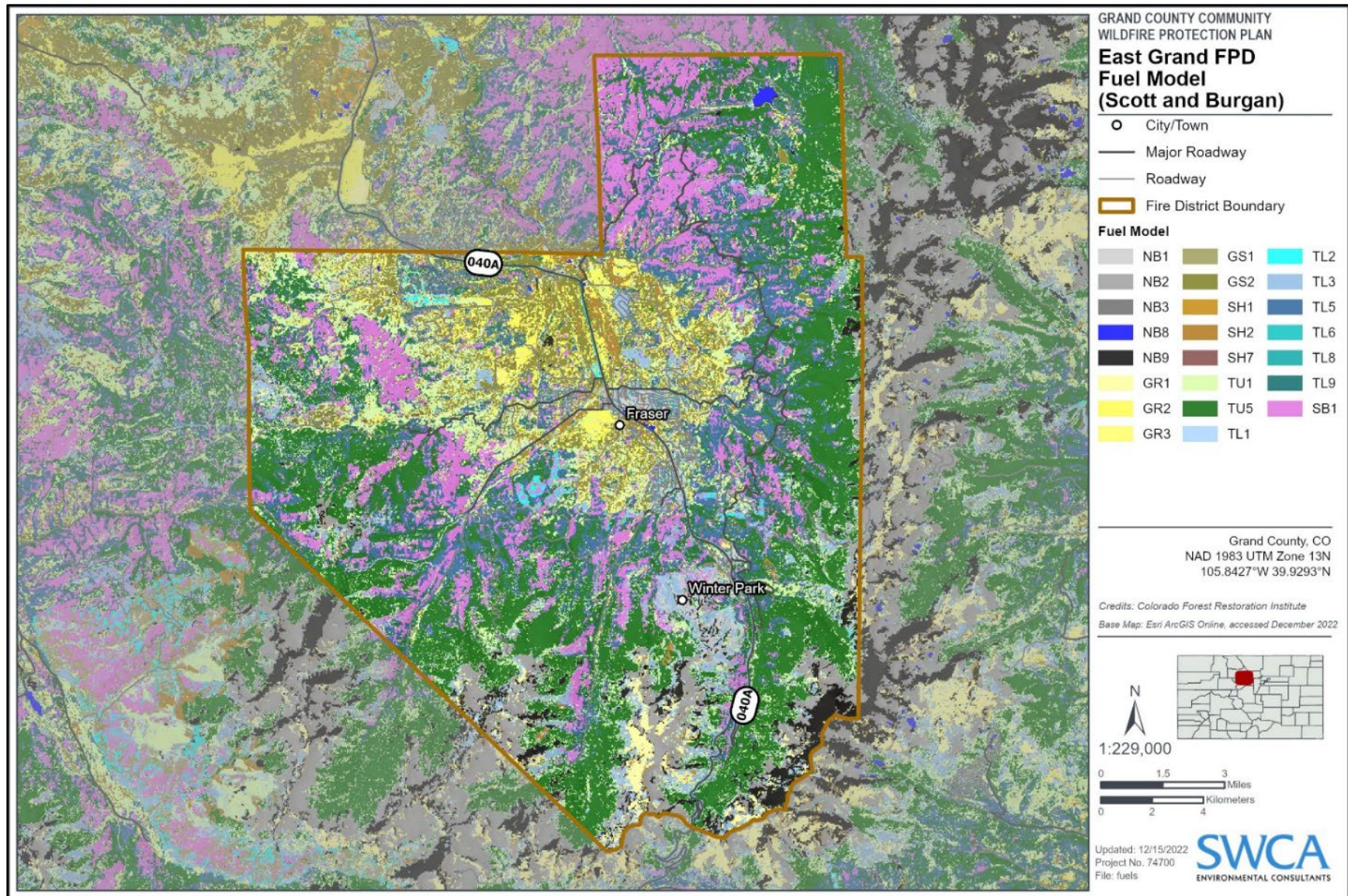


Figure 1.8. East Grand FPD No. 4 Scott and Burgan fuels model.

Neighborhood and Structural Characteristics

The East Grand FPD No. 4 NFPA 1144 assessment results found that the majority of the FPD has water sources throughout for suppression. 4 communities within the district are >5 miles from the nearest fire station. Five of the communities have challenging ingress/egress, with narrow roads and limited turnarounds for fire trucks. Many structures in the FPD are made of combustible building materials, and while there is visible fuels mitigation work throughout the FPD, some of the communities contain high fuel loads. See Table 1.3 and Figures 1.9, 1.10, 1.11, and 1.12 for more information on community specifics within the district. Scores correspond to the risk rating given during the Community Hazard Assessments as described in Chapter 3 of this Grand County CWPP.

Table 1.3. East Grand FPD No. 4 NFPA 1144 Assessment Results

| Community | Score | Rating | Fire Station | Positives | Negatives |
|---|-------|--------|---|--|--|
| Fraser and Winter Park (Map C-4, Appendix C) | 97 | High | East Grand Fire Protection District No. 4 Main Station | <ul style="list-style-type: none"> • Fire hydrants throughout • Many structures >30 ft from slopes • Ingress/egress • Class A Roofing Materials | <ul style="list-style-type: none"> • Some narrow access to homes with no turnarounds • Combustible building materials • Limited defensible space • High fuel loads |
| Highlands/Pole Creek *Also within Grand FPD No. 1 Boundary. (Map C-16, Appendix C) | 111 | High | <ul style="list-style-type: none"> • Grand Fire Protection District No. 1 Red Dirt Station • East Grand County Fire Protection District No. 4 Tabernash Station | <ul style="list-style-type: none"> • Hydrants throughout • Reflective street signs • Visible fuels mitigation • Metal roof or asphalt shingle throughout • Fire station <5 mi from community | <ul style="list-style-type: none"> • Difficult to navigate • Lack of turnarounds for fire trucks • Narrow, steep roads in places • Combustible building materials • Limited defensible space • Homes built near slopes |
| Homestead Hills *Also within Grand FPD No. 1 Boundary. (Map C-12, Appendix C) | 110 | High | <ul style="list-style-type: none"> • Grand Fire Protection District No. 1 Headquarters Station • Grand Fire Protection District No. 1 Red Dirt Station | <ul style="list-style-type: none"> • Reflective street signs • Metal roof or asphalt shingle throughout • Fire hydrants • <5 mi from fire station | <ul style="list-style-type: none"> • Challenging ingress/egress • Limited fire truck turnarounds • Homes built near slopes • Combustible siding • Limited defensible space |

| Community | Score | Rating | Fire Station | Positives | Negatives |
|---|-------|---------|---|---|--|
| Ice Box (Map C-22, Appendix C) | 106 | High | <ul style="list-style-type: none"> Grand Fire Protection District No.1 Red Dirt Station East Grand Fire Protection District No. 4 Tabernash Station East Grand County Fire District 4 Main Station | <ul style="list-style-type: none"> Ingress/egress Reflective street signs Metal roof or asphalt shingle throughout | <ul style="list-style-type: none"> Limited turnarounds for fire trucks Limited defensible space Combustible Building Materials Limited water sources for suppression Fire station >5 mi from the community |
| Junction Ranch (Map C-20, Appendix C) | 121 | Extreme | East Grand Fire Protection District No. 4 Tabernash Station | <ul style="list-style-type: none"> 2+ roads in and out Reflective street signs Metal roof or asphalt shingle throughout Visible fuels mitigation work | <ul style="list-style-type: none"> Limited turnarounds for fire trucks Limited defensible space Limited water sources for suppression Fire station >5 mi from community Narrow, steep roads in places |
| Ranch Creek (Map C-6, Appendix C) | 120 | Extreme | East Grand Fire Protection District No. 4 Main Station <ul style="list-style-type: none"> East Grand Fire Protection District No. 4 Tabernash Station | <ul style="list-style-type: none"> Ingress/egress Structures spaced further apart | <ul style="list-style-type: none"> House numbering inconsistent and non-reflective Steep, narrow roads in places High fuel loads Houses built near slopes Lack of water source for suppression Limited defensible space Limited turnarounds for fire trucks |

| Community | Score | Rating | Fire Station | Positives | Negatives |
|--|-------|---------|---|--|---|
| Snow Mountain Ranch/ YMCA (Map C-14, Appendix C) | 79 | High | Grand Fire Protection District No. 1 Red Dirt Station <ul style="list-style-type: none"> East Grand Fire Protection District No. 4 Tabernash Station | <ul style="list-style-type: none"> Visible fuels mitigation work Ingress/egress Fire station <5 mi from location Fire hydrants throughout Metal roof or asphalt shingle throughout Underground gas and electric utilities | <ul style="list-style-type: none"> Lack of turnarounds for fire trucks Combustible building materials Non-reflective street signs |
| Sunset Ridge (Map C-2, Appendix C) | 121 | Extreme | <ol style="list-style-type: none"> East Grand Fire Protection District No. 4 Main Station East Grand Fire Protection District No. 4 Tabernash Station | <ul style="list-style-type: none"> Active fuels mitigation Reflective street signs Reflective house numbers Type A roofing materials | <ul style="list-style-type: none"> High fuel loads Limited water sources for suppression Combustible building materials Houses built near slopes Ingress/Egress Limited turnaround for fire trucks Limited defensible space >5 miles from a fire station |
| Tabernash *Also within Grand FPD No. 1 Boundary. (Map C-18, Appendix C) | 70 | High | East Grand Fire Protection District No. 4 Tabernash Station | <ul style="list-style-type: none"> Ingress/egress Reflective street signs Visible fuels reduction efforts Metal roof or asphalt shingle throughout Fire hydrants <5 mi to fire station | <ul style="list-style-type: none"> Lack of turnarounds for fire trucks Combustible building materials 2+ roads in and out |

| Community | Score | Rating | Fire Station | Positives | Negatives |
|--|-------|--------|---|--|---|
| Winter Park Resort (Map C-8, Appendix C) | 106 | High | East Grand Fire Protection District No. 4 Main Station | <ul style="list-style-type: none">• Reflective street signs• Visible fire hydrants• Class A Roofing Materials• Ingress/egress | <ul style="list-style-type: none">• Homes built on slopes• High fuel loads• >5 miles from a fire station• Limited defensible space• Lack of turnarounds for fire trucks• Combustible building materials |



Figure 1.9. Structures built on slope, power line throughout.



Figure 1.10. Home on sloped landscape with surrounding fuels.



Figure 1.11. Home within FPD with hydrant in proximity.



Figure 1.12. Example of a VAR in the FPD, Winter Park Ski Resort.

Emergency Response Capacity

The East Grand Fire Protection District staffs and maintains two fulltime stations while sharing a third, the Red Dirt station, with the Grand Fire Protection District. The headquarters station is located just north of Winter Park on Hwy 40, while the Tabernash station is located within the town on county road 60 (EGFPD 2010a). The Red Dirt Station lies within GFPD jurisdiction on county road 85 at the entrance to the YMCA Snow Mountain Ranch (Figures 1.13 and 1.15).

The District's response resources include a fleet of 13 vehicles. This includes two aerial engines equipped with hydraulic ladders and high flow hoses; two type one engines; three 2,000-gallon water tenders, three type six wildland engines, and 3 utility vehicles (EGFPD 2020b; Table 1.4)

East Grand FPD No. 4 maintains a mutual aid agreement with all Grand County Fire Protection Districts, Clear Creek County Emergency Service District, and Mountain area- Northwest Colorado. Additionally, the district provides automatic aid to all other Fire Protection Districts in the county (EGFPD 2020a).

Table 1.4. East Grand FPD No. 4 Response Resources

| Fire Protection District Statistics: | | | | |
|--|---|--------------------------------|-----------------------------------|-----------------------|
| <u>Fire Protection District:</u> East Grand Fire Protection District No. 4 | | | | |
| <u>Fulltime Firefighters:</u> 5 | | <u>On-call Firefighters:</u> 0 | <u>Volunteer Firefighters:</u> 34 | |
| <u>Water Tender:</u> | | <u>Wildland Engines</u> | | |
| Type 1: 3 | | <u>Total Number:</u> | <u>4WD/AWD:</u> | <u>Brush Breaker:</u> |
| Type 2: 0 | | Type 3: 0 | 0 | 0 |
| Type 3: 0 | | Type 4: 1 | 1 | - |
| <u>Structure Engines:</u> | | Type 5: 0 | 0 | 0 |
| Type 1: 3 | | Type 6: 2 | 2 | - |
| Type 2: 0 | | Type 7: 0 | 0 | 0 |
| <u>Port-A-Tanks:</u> | <ul style="list-style-type: none">• 3- 2,500 gallon• 1- 2,100 gallon | | | |
| <u>Portable Pumps:</u> | 6 | | | |
| <u>Fire Shelters:</u> | 45 | | | |
| Suggested Mitigation Focus Areas: | | | | |
| <u>Areas of Concern (Figure 1.14):</u> | | | | |
| <ul style="list-style-type: none">• South of Snow Mountain Ranch, west of Ice Box, Fraser, and Winter Park Resort, east of Ptarmigan Peak and north of Byers Creek.• Edge of western section of FPD, area of concern east of Church Park Rd, area of concern also located in Grand FPD No. 1 and Hot Sulphur Springs/Parshall FPD No. 3.• The area east of Junction Ranch, Sunset Ridge, and Fraser/Winter Park, surrounding Ranch Creek, north of NF-149, Denver Water Board Rd. is within most of this area of concern.• Fire Department General Areas of Concern: Narrow drainages with limited access and large grasslands that were previously heavy timber. | | | | |
| <u>Fire Department Concerns:</u> | | | | |
| <ul style="list-style-type: none">• Need for continued fuel treatments.• Need for hardening of structures. | | | | |

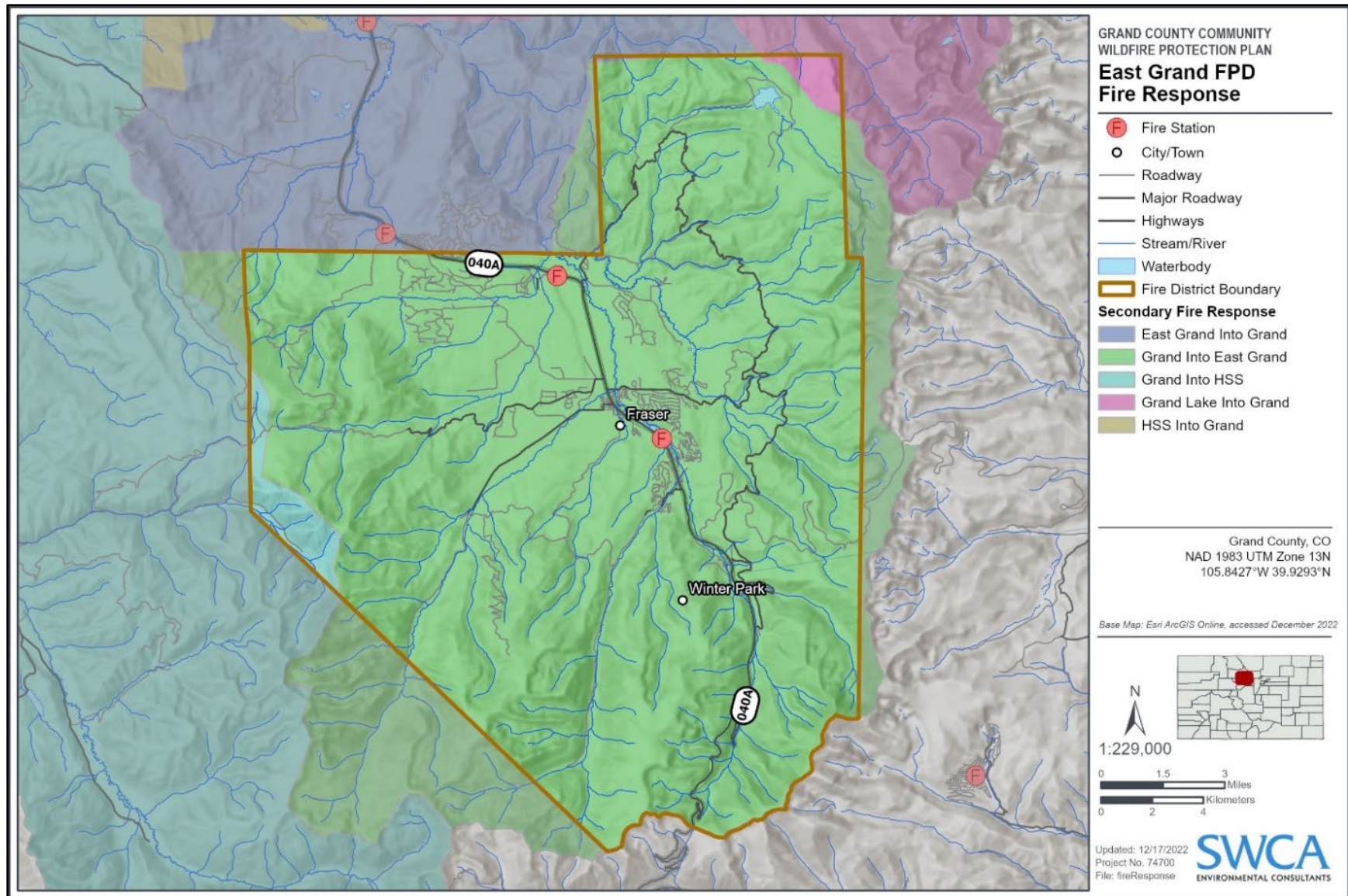


Figure 1.13. East Grand FPD No. 4's boundaries.

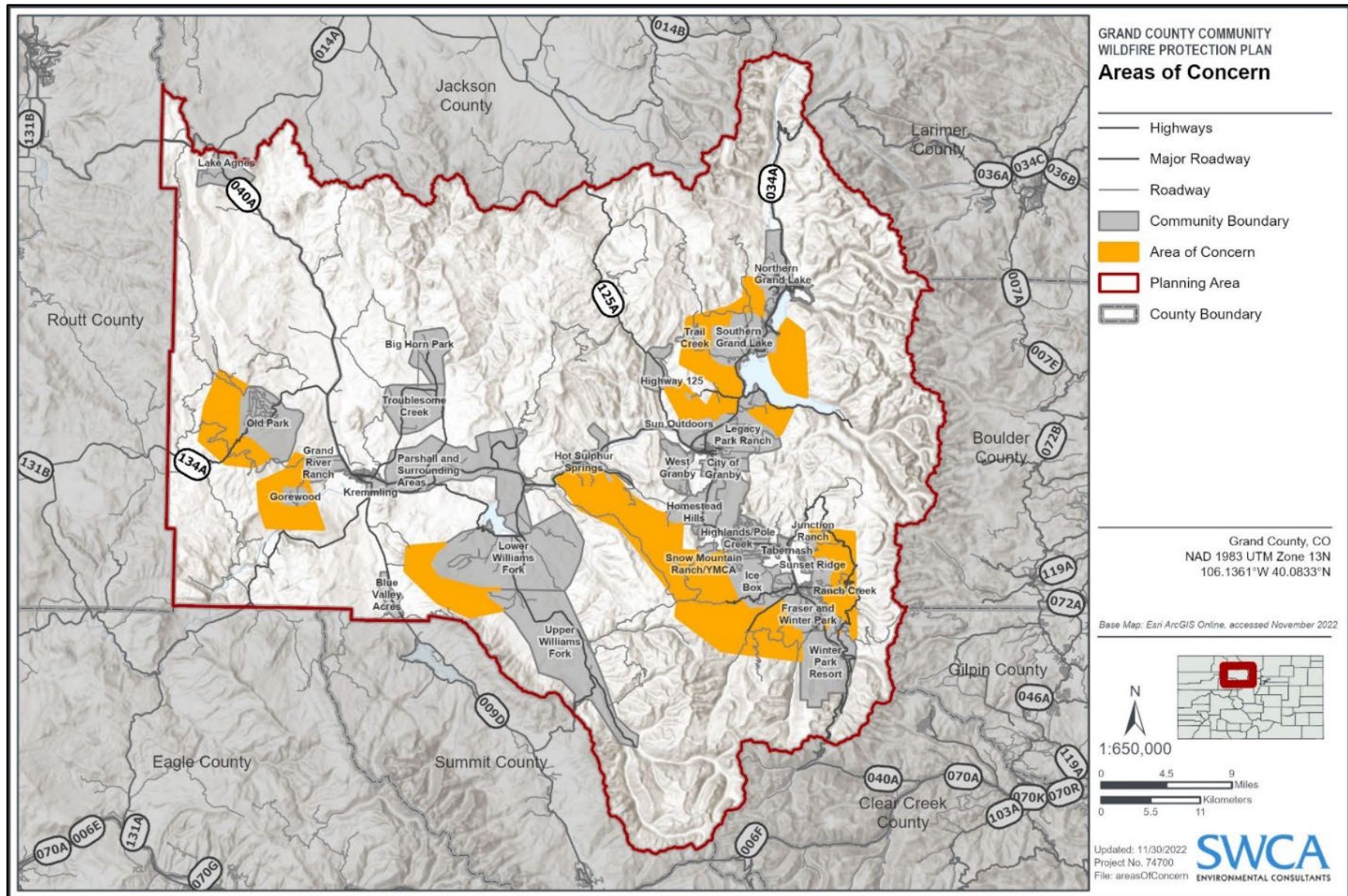


Figure 1.14. Grand County Identified Areas of Concern.

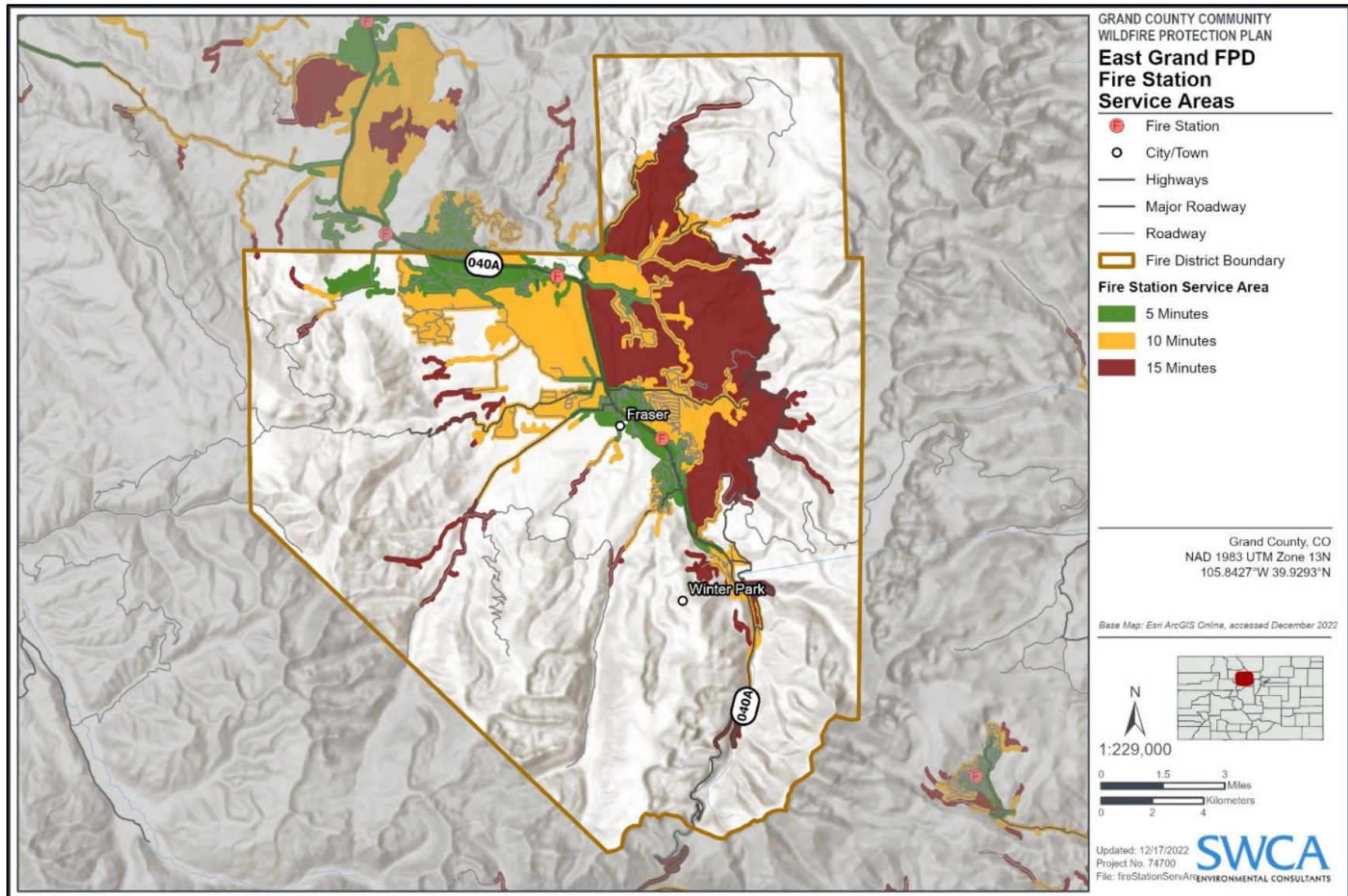


Figure 1.15. East Grand FPD No. 4's fire station service areas.

Evacuation

Evacuation relies on both cooperative planning and the capability of residents to effectively implement plans. In the event of an incident within the FDP that requires evacuation, the FPD Fire Chief is responsible for issuing an evacuation notice through appropriate communication pathways. However, if a wildfire occurs within the FPD and exceeds the District's response capabilities, the County Sheriff will act as the primary incident commander and be responsible for declarations of evacuation (GACC 2022). In many cases, pre-evacuation orders informing residents of potential upcoming evacuations will be distributed prior to evacuation orders. Residents will receive pre-evacuation and evacuation orders through the County's CodeRED system, Emergency Alert System (EAS), or Wireless Emergency Alert System (WEA). A county-wide evacuation map is also available through the County's website, and can be accessed here: <https://gcgeo.maps.arcgis.com/apps/webappviewer/index.html?id=ca4f74421b69416da9be1b9b92166534>

It is recommended that residents familiarize themselves with their evacuation zone and evacuation preparedness planning which both can reduce strain on emergency response systems and crews during an incident. Additional information can be found in the Fire Response Capabilities section of Appendix B: Community Background and Resources.

Evacuation within the FPD has the potential to be complicated by road infrastructure. Many high and extreme risk roads within the District are narrow, steep, and winding with blind corners and few turnaround areas for larger vehicles. These can become congested and potentially dangerous if emergency response crews are attempting to respond to a wildfire that residents are evacuating from. Furthermore, many of these high and extreme risk roads in the FPD are also located in lodgepole pine forests, which can yield tall flame lengths and cause falling trees during a wildfire. These hazards can block potential escape routes and/or result in entrapment for commuter and emergency vehicles in the event of a wildfire. Residential, recreational, and ex-urban areas with high and extreme risk roads should take proactive approaches in their evacuation planning. This can include designating escape routes and implementing roadside fuel reduction projects. Areas of concern in the East Grand FPD No. 4 are predominately ex-urban areas and include, but are not limited to, the road systems in the foothills of the Indian Peaks east of Fraser and Winter Park and in the foothills of the Vasquez Mountains south-west of Fraser and Winter Park (Figure 1.16).

Critical Infrastructure and Community Values at Risk

The East Grand FPD No. 4 boundaries encompass numerous cultural, natural, and socioeconomic values at risk. These include important water resources (including the Fraser River) which are relied on by both the local community and Denver-metro area. Other examples are ski areas, power lines, railroads, oil and gas pipelines, a powerplant, a hospital, communication towers, fish and wildlife habitat, and frequently used trails. Figures 1.17, 1.18, 1.19, and 1.20 below provide a spatial representation of these values at risk.

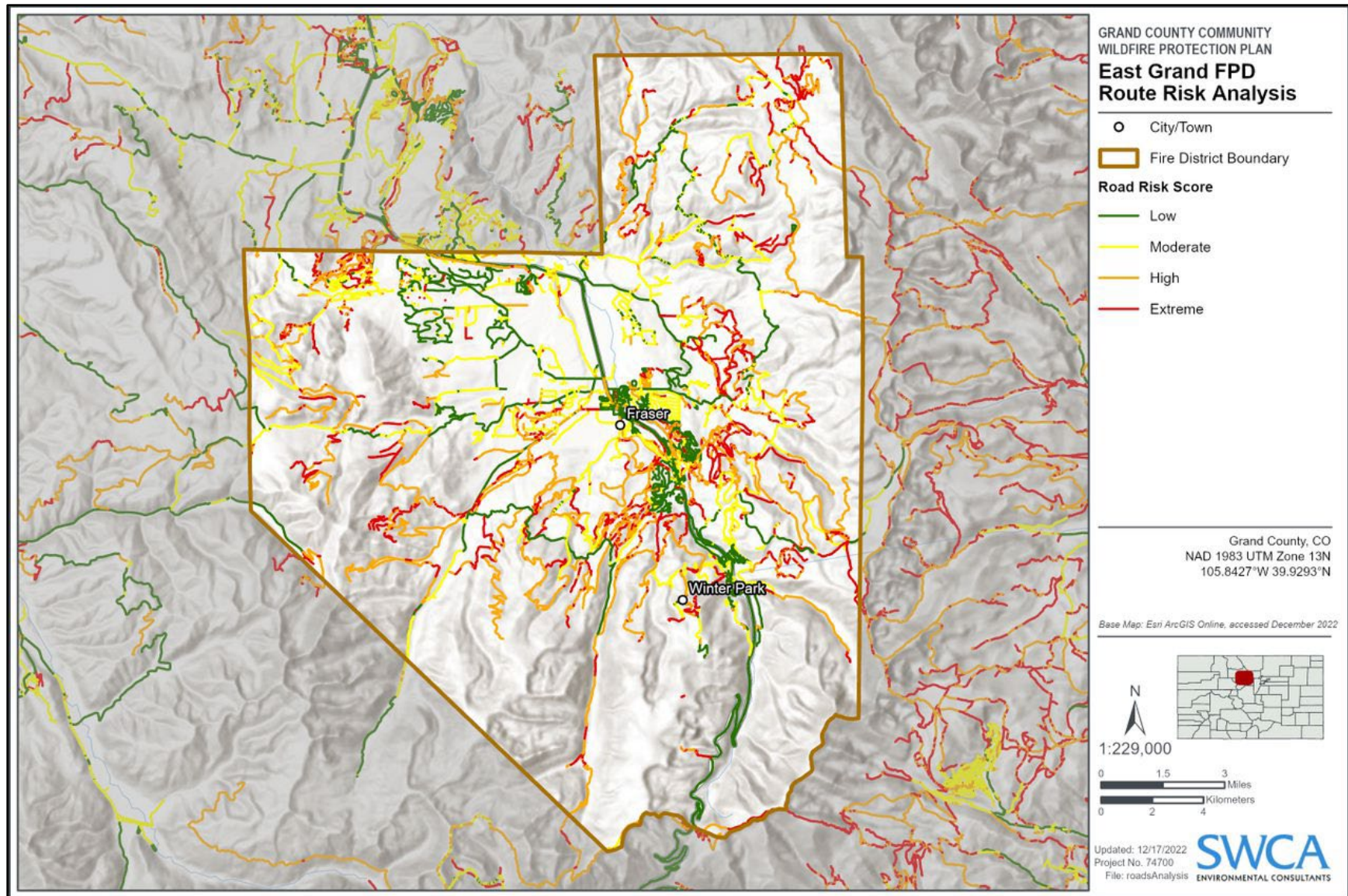


Figure 1.16. East Grand FPD No. 4 route risk analysis.

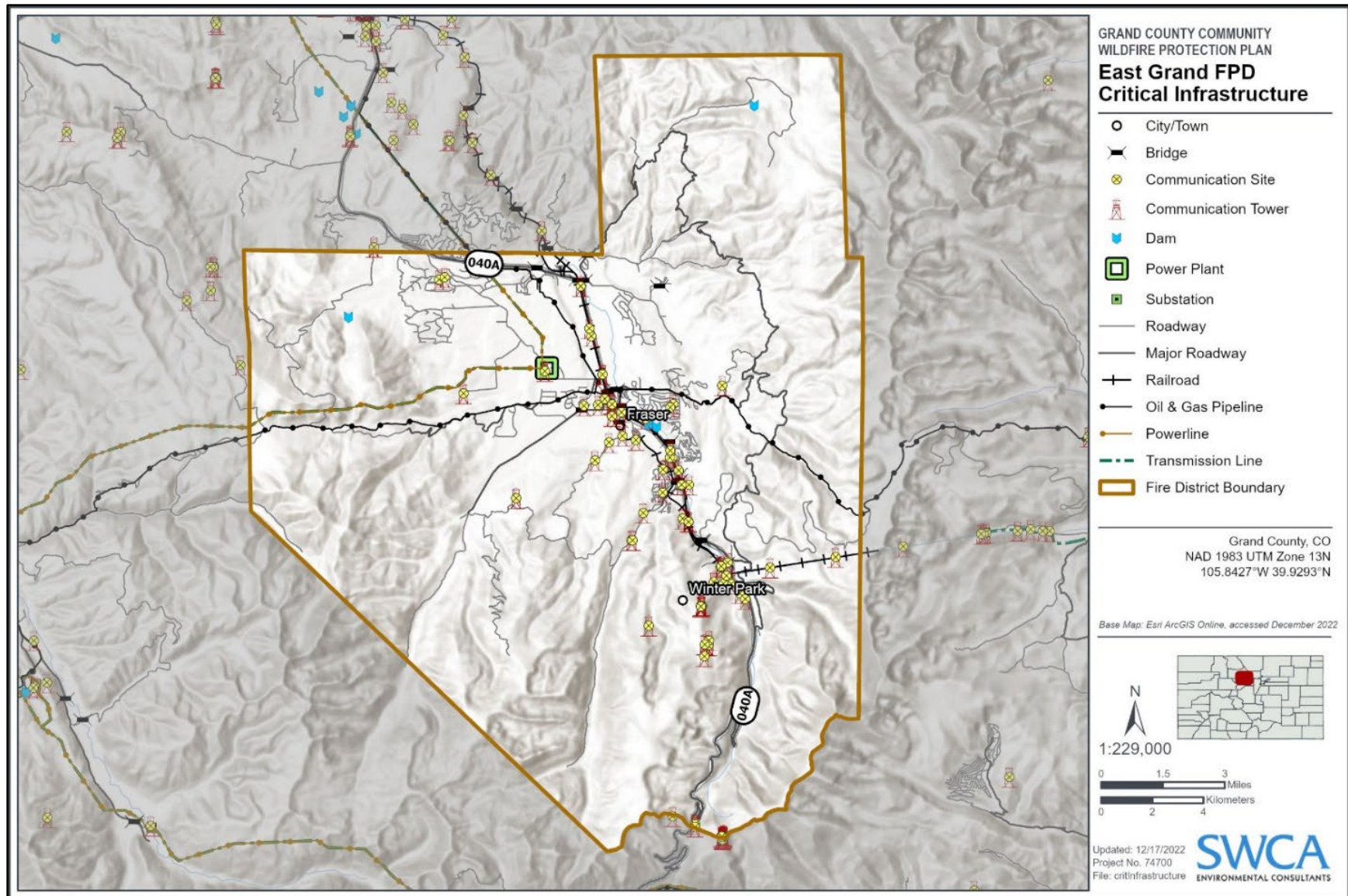


Figure 1.17. East Grand FPD No. 4 critical infrastructure.

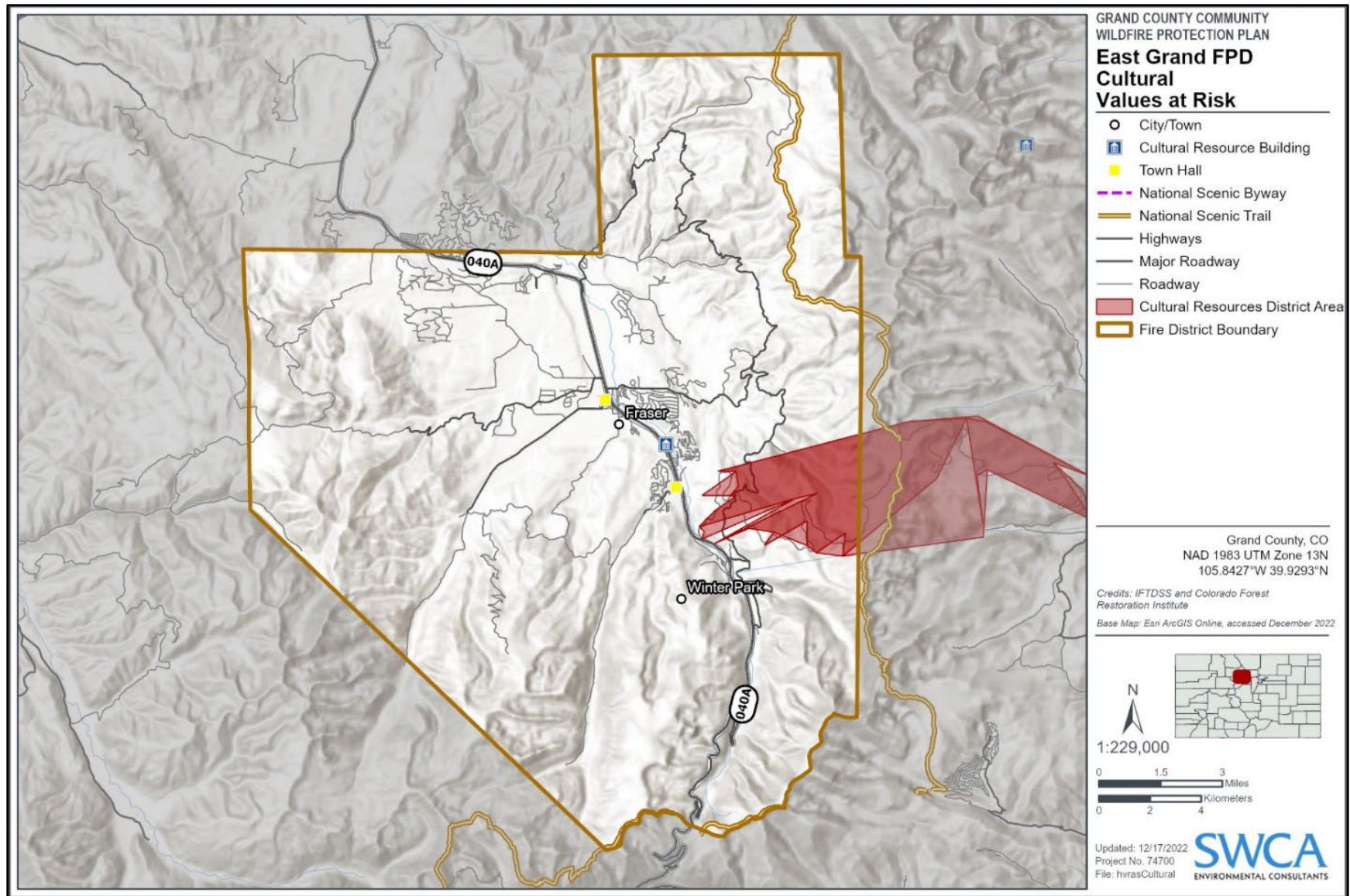


Figure 1.18. East Grand FPD No. 4 cultural values at risk.

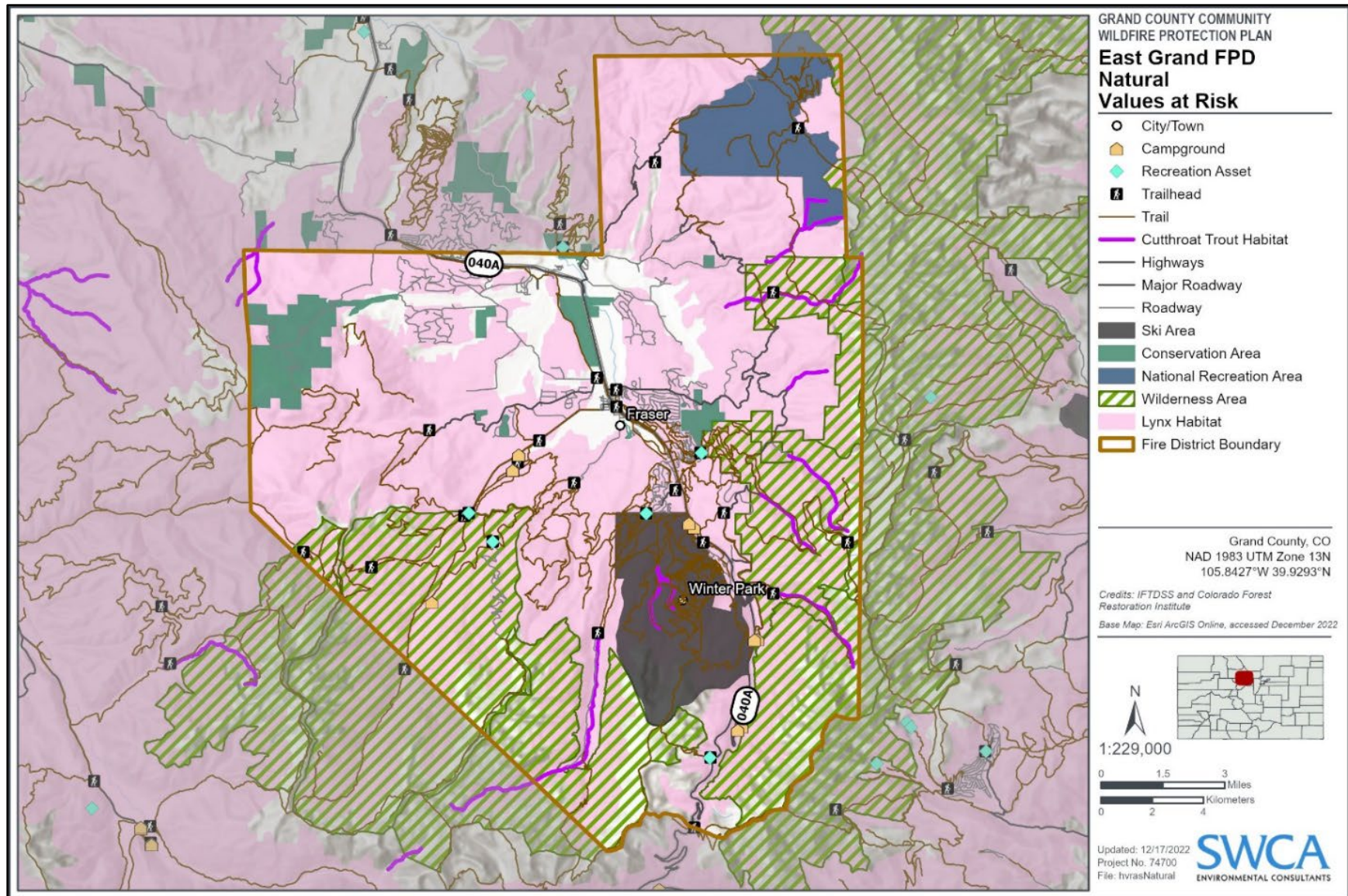


Figure 1.19. East Grand FPD No. 4 natural values at risk.

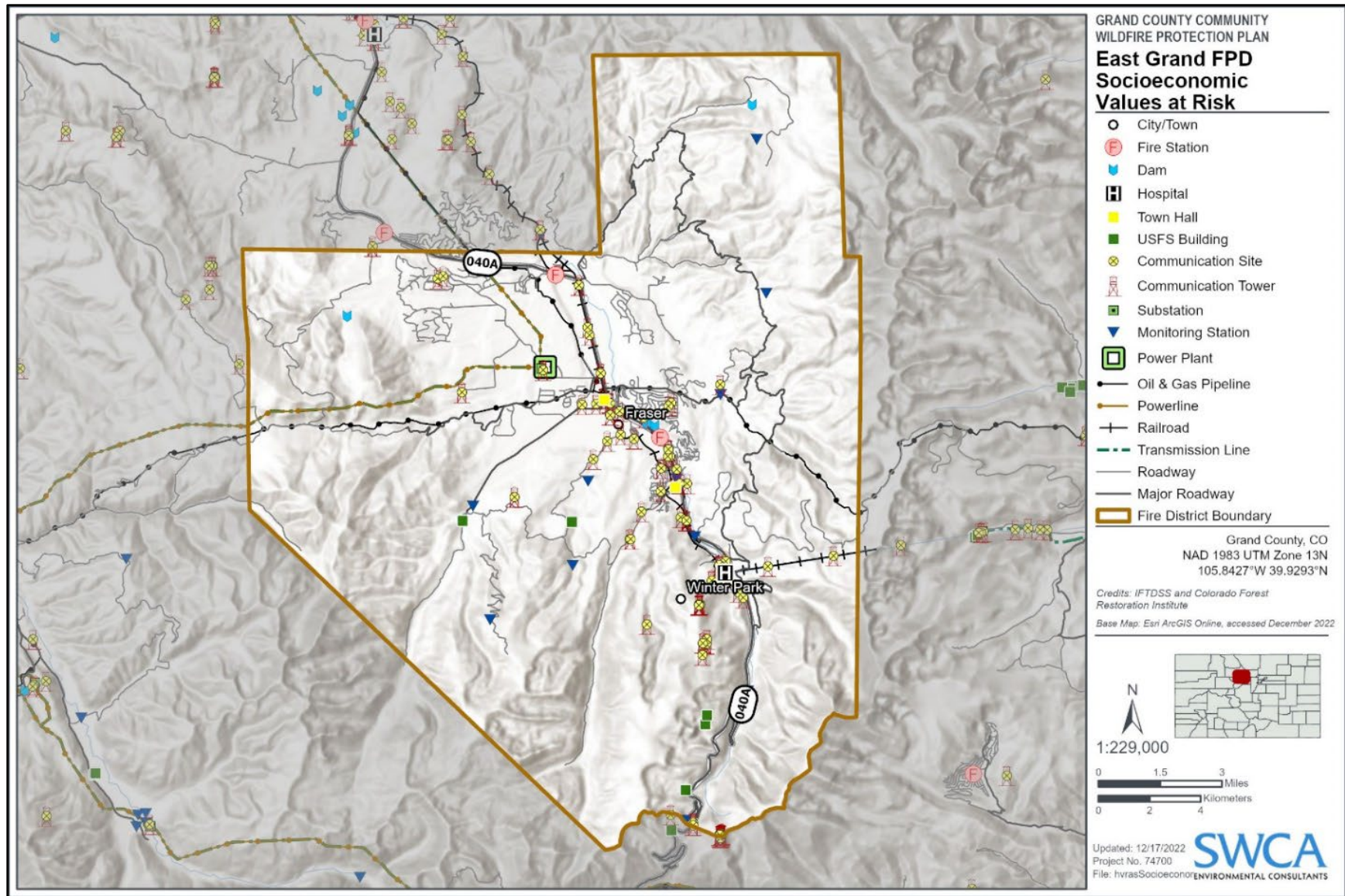


Figure 1.20. East Grand FPD No. 4 socioeconomic values at risk.

Public Education and Outreach Programs

The East Grand FPD No. 4 regularly engages with the public through outreach activities such as attending high school sporting games and local community events. The District's Facebook page typically announces upcoming and past outreach and can be accessed here:

<https://www.facebook.com/EastGrandFire/>

The FPD's website also contains a wealth of information, including useful links, for residents on fire safety, wildland fire prevention, and emergency preparedness. The website can be accessed here:

<https://eastgrandfire.com/>

Policies, Regulations, Ordinances, and Codes

Please refer to the most recent County General Plan for recent information regarding local policies, ordinances, regulations, and codes.

Mitigation Projects and Prioritizations

All mitigation projects applicable to the community, including relevant information such as responsible parties, possible funding sources, priorities, project description, etc., broken into 3 CWS tables.

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Table 1.5. Recommended Projects for Creating Resilient Landscapes (Fuel Reduction Projects) in the East Grand Fire Protection District

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|----------------------------|--------|------------------|---------------------|---|---|--|--|---|---|--|
| East Grand FPD No. 4 RL #1 | | M | 0-5 years | Wildfire risk reduction for homes and communities in high- and extreme- risk areas throughout the FPD | East Grand FPD No 4 Communities to prioritize include Fraser, Winter Park, Highlands/Pole Creek, Homestead Hills, Ice Box, Junction Ranch, Ranch Creek, Snow Mountain Ranch, Sunset Ridge, and Tabernash | Federal, state, and local agencies. Fire protection district. | <p>Prioritize wildfire risk reduction and fuel treatments in high-risk communities and areas of concern.</p> <ul style="list-style-type: none">Continue existing treatment projectsImplement new treatment projects, where needed. Reference the 2023 Grand County CWPP Areas of Concern.Monitor and assess old treatments and determine need for retreatment.Collaboratively identify forest, vegetation, and fuels management needs based on the 2023 Grand County CWPP risk/hazard assessment.Aim for 300-foot shaded fuel breaks around communities,Locate parcels on private and public lands where targeted fuel treatments can be performed that will connect and maximize the effectiveness of planned or pre-existing treatments. Parcels located in forested ex-urban areas should be prioritized (e.g., Snow Mountain Ranch off CR 8).Work should emphasize the following: reducing potential for grass fires, especially along busy roadways; reducing standing dead trees (lodgepole, spruce, and aspen), and reducing fuel loading in understory.Utilize mechanical fuel reduction treatments in more populated areas. Consider prescribe burns (including burn piles) in less populated areas. | Improve forest health, reduce wildfire risk within the WUI, and decrease risk to life and property. | <p>Annual review of completed projects including project description and amount of land treated</p> <p>Assessment and monitoring of current and future conditions</p> <p>Ongoing monitoring of completed projects</p> | <ul style="list-style-type: none">Building Resilient Infrastructure and Communities (BRIC) GrantsNational Fire Plan (NFP) GrantsWildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |
| East Grand FPD No. 4 RL #2 | | M | 0-5 years | Improve fuel treatment capabilities | East Grand FPD No. 4 | Private, CSFS, and local FPD | <ul style="list-style-type: none">Develop equipment needs to accomplish work (including maintenance) and pursue funding opportunities for purchase.Cultivate and support partnerships with NGOs and volunteer groups to support implementation of projects.Encourage citizens to proactive in reducing fire risk in their communities and on their property through education and outreach.Seek out funding to employ greater personnel within the FPD to support these projects. | Increase local capacity to complete wildfire mitigation projects | <p>Conduct annual inventory of current equipment</p> <p>Annual review of success of community outreach to gain volunteer support</p> | <ul style="list-style-type: none">BRICNFPWildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|----------------------------|--------|------------------|---------------------|---|--|---|--|--|--|--|
| East Grand FPD No. 4 RL #3 | | | | Continue old and implement new fuel treatments in Areas of Concern (AOC) | Refer to AOC map in Chapter 4 (figure 4.2) | Federal, state, and local agencies. Fire Protection District | Areas of Concern typically require greater attention and display heavy fuel loading with high to extreme wildfire risk. Land management and access (e.g., Wilderness area) could prevent more aggressive actions <ul style="list-style-type: none">Consider prescribed burning program.Align timber and forest management objectives with wildfire risk reduction.Restore natural fire regimes in wilderness areas.Consider land use and pre-existing land management designations when designing treatments.Assess timber sale potential in these areas of concern. | Reduce risk to life and property Improve forest health | Implement and design treatment protocols and management objectives in AOC | <ul style="list-style-type: none">Colorado Healthy Forests and Vibrant Communities ActForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |
| East Grand FPD No. 4 RL#4 | | H | 0-5 years | West Fraser WUI forest health improvement and wildfire risk reduction project | West Fraser and associated communities | Federal, state, and local agencies. Fire Protection District | West Fraser has many communities located in high and extreme risk areas. Primary fire risks include lodgepole pine forests transitioning into seasonally dry grasslands <ul style="list-style-type: none">Aim for 300-foot shaded fuel breaks around communities.Utilize pre-existing infrastructure to function as fuel breaks (e.g., larger county roads).Combine timber stand improvement projects with fuel reduction projects to reduce cost and increase efficiency.Utilize mechanical fuel reduction treatments to reduce heavy fuel loading (e.g., dead and/or down trees) within community.Prioritize creating defensible spaces around structures.Consider mechanical and chemical removal of fine, flashy invasive species, which could contribute to high rates of spread. Treatments should prioritize areas fuels loading near homes, structures, and busy roads. | Improve forest health, reduce wildfire risk within the WUI, reduce threat to life and property | Implement and design a post treatment assessment monitoring protocol. Monitoring should focus on the regeneration of hazardous fuels and the establishment of invasive species | <ul style="list-style-type: none">Building Resilient Infrastructure and Communities (BRIC) GrantsNational Fire Plan (NFP) GrantsFirewise GrantsColorado Healthy Forests and Vibrant Communities ActForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |



| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|---------------------------|--------|------------------|---------------------|---|-------------|---|---|---|---|--|
| East Grand FPD No. 4 RL#5 | | M | 0-5 years | East Fraser WUI forest health improvements, wildfire risk reduction, and watershed protection | East Fraser | Federal, state, and local agencies. Fire Protection District | <p>East Fraser has many communities located in high- and extreme-risk areas. Primary fire risks include homes and structures near heavy fuel loading from lodgepole pine forests and spruce-fir forests</p> <ul style="list-style-type: none">Aim for 300-foot shaded fuel breaks around communities.Locate parcels on private and public lands where targeted fuel treatments can be performed that will connect and maximize the effectiveness of planned or pre-existing treatments. Parcels located in forested ex-urban areas should be prioritized (e.g., homes and communities located off CR 8).Combine timber stand improvement projects with fuel reduction projects to reduce cost and increase efficiency.Utilize mechanical fuel reduction treatments to reduce heavy fuel loading (e.g., dead and/or down trees) within community.Prioritize creating defensible spaces around homes/structures.Utilize pre-existing infrastructure to function as fuel breaks (e.g., larger county roads).Focus fuel treatments upslope of important watersheds. Efforts should focus on reducing wildfire severity and mitigating post wildfire erosion and debris flow potential. Areas with steep slopes, potential for high severity fire, and soils prone to erosion (e.g., gravely and sandy soils) should be prioritized. | <p>Improve forest health, reduce wildfire risk within the WUI, reduce risk to life and property</p> <p>Minimize post wildfire damages to local watersheds</p> <p>Create and maintain accountability with local landowners</p> | <p>Implement and design a post-treatment assessment monitoring protocol.</p> <p>Monitoring should focus on the regeneration of hazardous fuels and the establishment of invasive species.</p> | <ul style="list-style-type: none">Building Resilient Infrastructure and Communities (BRIC) GrantsNational Fire Plan (NFP) GrantsFirewise GrantsUSFS Community Assistant Funds Adjacent to National ForestColorado Healthy Forests and Vibrant Communities ActForests to Faucets (CFRI and Denver Water)Forest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |

Table 1.6. Recommendations for Creating Fire-Adapted Communities (public education and structural ignitability)

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|-----------------------------|--------|------------------|---------------------|---|---|---|--|--|---|--|
| East Grand FPD No. 4 FAC#1 | | | | Monitor and enforce defensible space standards | Fire Protection District | Private, local FPD, County | <ul style="list-style-type: none">• Create or continue a defensible space program. Include pre-determined inspection frequency and education/outreach efforts.• Consider adhering to CSFS recommended defensible space standards (e.g., enforce 100 ft of defensible space) if not already.• Work with insurance companies to determine the potential to provide incentives for defensible space associated with reduced insurance premiums.• Consider green waste pickup/disposal options• Plan and account for unresponsive and non-compliant secondary homeowners | Reduce loss of life and structures through defensible space. | Annual program evaluation and updates as necessary. Consider updates to the building code, where needed. | <ul style="list-style-type: none">• Firewise• FP&S (FEMA)• EPA Environmental Education Grants• CWDG• BRIC• Wildfire Mitigation Incentives for Local Government (CSFS)• Wildfire Mitigation Resources & Best Practices (CSFS) |
| East Grand FPD No. 4 FAC #2 | | | | Encourage and provide opportunities for homeowners to fire harden their homes | Notable communities that could have improved home hardening include Fraser, Winter Park, Highlands/Pole Creek, Homestead Hills, Ice Box, Snow Mountain Ranch, Sunset Ridge, Tabernash | Private, County Planning Commission, Local FPDs, HOA's and community leaders Grand County Wildfire Council | <ul style="list-style-type: none">• Make sure new homes/structures are made with non-combustible materials (i.e. encourage structural hardening).• Encourage retrofitting pre-existing homes/structures.• Efforts should aim to reduce the occurrence of combustible siding materials, wooden fences, wooden roofs, and wooden side decks.• Pursue grants and incentives to make efforts affordable.• Educate homeowners on actions that could mitigate their wildfire hazard and risk. | Reduce risk to life and property. | Annual tracking of improvements made and lessons learned | <ul style="list-style-type: none">• Wildfire Mitigation Incentive for Local Government (CSFS)• Firewise Grants• FP&S• CWDG• EPA Environmental Education Grants• Wildfire Mitigation Resources & Best Practices (CSFS) |



| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|--------------------------|--------|------------------|---------------------|--|--------------------------|---|---|---|--|--|
| East Grand FRD FAC #3 | | | | Improve evacuation zone education and outreach | Fire Protection District | Federal, State, and Local agencies. Fire Protection Districts Grand County Wildfire Council | <ul style="list-style-type: none">Develop and distribute public education and outreach materials concerning evacuation zones and routes and best practices.Provide handouts on preparing "Go Bags" – an emergency supply bag that can be accessed in cases of evacuationUtilize common information resources to spread information on evacuation best practices and routes such as social media, news, nextdoor, twitter, and others.Engage HOA's and neighborhoods in community-specific education.With all partners, develop evacuation exercises and practice runs for incident pre-planning purposes.Familiarize public with FEMA's Integrated Public Alert and Warning System (IPAWS)Communicate CodeRED red to county residents and visitors (e.g., flyers at recreation sites and relevant weblinks). Encourage people to register their phone numberCommunicate the role the Emergency Alert System (EAS) to County residents, homeowners, and visitors (e.g., flyers and relevant weblinks).Encourage partners (tv and radio stations) to display EAS messages.Explore opportunities to enhance the reverse 911 system. | Ensure public and first responder safety in the event of a wildfire or other emergency. | Develop and distribute a survey to understand and adapt best practices for communication and teaching. Assess and adapt methodologies and current information annually to ensure information is up to date. | <ul style="list-style-type: none">FEMA Building Resilient Infrastructure and Communities GrantsUSFS Community Wildfire Defense GrantFEMA FP&S GrantsWildfire Mitigation Incentive for Local Government (CSFS)Firewise Communities Grants |
| East Grand FRD FAC #4 | | | | Identify funding sources for underserved homeowners and vulnerable populations | Fire Protection District | Fire Protection District, HOA's, community leaders Grand County Wildfire Council | <ul style="list-style-type: none">Identify vulnerable populations (elderly, disabled, low income) and underserved homeowners who may need additional help to mitigate home hazards and to evacuate during a wildfire.Seek grant opportunities to support assistance for relevant populations. | Protect life and property of the most vulnerable members of the community | Annual review of number of actions taken to address vulnerable populations and underserved homeowners | <ul style="list-style-type: none">BRICFirewise grantsNational Urban and Community Forest ProgramChallenge Cost Share Grant ProgramCommunity Wildfire Defense Grants |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|--------------------------|--------|------------------|---------------------|---|--------------------------|---|---|--|--|--|
| East Grand FRD FAC #5 | | | | Public outreach and education aimed at reducing human-caused wildfire | Fire Protection District | Local, State, and Federal agencies Grand County Wildfire Council | <div>Inform and educate the public about methods to reduce human-caused wildfire ignitions.<ul style="list-style-type: none">Educate around sources of human-caused wildfire ignitions (e.g., driving through or parking in tall, dry vegetation; discarded cigarette butts; fireworks; campfires, etc.).Communicate hazardous conditions surrounding homes/structures (e.g., exposed propane tanks, electrical hazards, hazard trees, limited defensible place, etc.)Provide materials with resources for the public to understand how and with what funding they can take action to reduce risks.Utilize Appendix G of the CWPP: Homeowner Resources</div> | <div>Recue risk of human-caused wildfire ignitions. Educate citizens about wildfire hazards. Empower local communities and visitors.</div> | <div>Track successes and learnings from outreach campaigns and enact changes with each wildfire season. Assess and utilize current popular information sources such as nextdoor, social media, news outlets, and more.</div> | <ul style="list-style-type: none">Wildfire Mitigation Incentive for Local Government (CSFS)Firewise Communities GrantsWildfire Mitigation Resources & Best Practices Grants (CSFS)EPA Environmental Education GrantsFEMA BRIC Grants |

Table 1.7. Recommendations for Safe and Effective Wildfire Response

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------------------------|--------|------------------|---------------------|---|---|-----------------------------|--|--|--|---|
| East Grand FPD No. 4 FR#1 | | | | Asses select roads for fire access improvement (improve community ingress and egress) | Notable communities that have narrow, steep, and unpaved roads include Fraser, Winter Park, Highlands/Pole Creek, Homestead Hills, Ice Box, Junction Ranch, Ranch Creek, Snow Mountain Ranch, Sunset Ridge, and Tabernash | Private, municipal, County | <ul style="list-style-type: none">Prioritize road improvements in high population areas with potentially hazardous road conditionsIncrease width of roads where appropriateProvide more locations for truck turnaroundsConsider pavement for higher traffic volume roadsContinue reflective house numbering effortsEnsure there are 2+ roads in and out from each community | <div>Provides for safe and effective wildfire response capabilities Provides safe and effective means of evacuation in case of emergencies</div> | <div>Assessment of current road conditions Regular monitoring and maintenance to ensure roads are drivable for emergency response vehicles</div> | <ul style="list-style-type: none">BRICNFPRCPFirewise Grants2022 Infrastructure Investments and Jobs ActForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|---------------------------|--------|------------------|---------------------|--|--|---|--|---|---|--|
| East Grand FPD No. 4 FR#2 | | | | Improve number of available water sources for fire suppression | Notable communities that may have limited water supplies for fire suppression include Ice Box, Junction Ranch, Ranch Creek, Sunset Ridge | Private, municipal, county, neighboring landowners/managers | <ul style="list-style-type: none">Map out and delineate nearest available and reliable water sources (e.g., fire hydrants, creeks, streams, pools, ponds, etc...) that can be used in emergency scenarios within an online GIS application.Improve existing fire flows in remote areas to meet fire flow requirementsEnsure fire flows in new developments meet fire flow requirementsInstall water tanks where feasible. In locations water tanks cannot be installed, have tanks filled and pre-loaded to be transported to areas of need in the event of a fireInstall hand pumps or other methods independent of the grid for accessing private well water | Provides for safe and effective wildfire response capabilities Increases resilience of local communities | Detailed assessment of currently available water resources | <ul style="list-style-type: none">BRICNFPRCPFirewise Grants2022 Infrastructure Investments and Jobs ActForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |
| East Grand FPD No. 4 FR#3 | | | | Add a wildland fire division to the FPD | Fire Protection District | County, state | <ul style="list-style-type: none">Consider adding a hired wildland division to FPD or jointly operate one with a nearby FPD (e.g., Grand FPD and/or Hot Sulphur Springs).If a crew cannot be hired, have a designated volunteer division. | Increase wildfire suppression capabilities | Required funding and additional equipment | <ul style="list-style-type: none">2022 Infrastructure Investments and Jobs ActForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS)Volunteer Fire Assistance (VFA) Grant (Colorado DFPC) |
| East Grand FPD No. 4 FR#4 | | | | Improve street signage to ease fire response navigation | Notable communities that could improve ease of navigation include Highlands/Pole Creek, Ranch Creek, and Snow Mountain Ranch/YMCA. | Private, municipal, county | <ul style="list-style-type: none">Install reflective street signs and house numbersEnsure roadside view of street signs and house numbers is not obstructed | Helps ensure safe and effective wildfire response capabilities | Assessment pf current conditions Outreach to property owners | <ul style="list-style-type: none">BRICNFPRCPFP&SFirewise GrantsForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |

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ANNEX 2

GRAND FIRE PROTECTION DISTRICT NO. 1

Organization and Jurisdiction

The Grand Fire Protection District (FPD) No. 1's jurisdictional boundaries extend from the neighborhoods surrounding the northwest end of Lake Granby south to the Snow Mountain Ranch-Tabernash area. Its boundaries also extend east past Granby to encompass the foothills of the Indian Peaks, and west to Drowsy Water Creek (Figure 2.1). The FPD is responsible for responding to incidents across 152 square miles ranging in elevation from 7761 ft river bottoms to 10,186 ft montane regions. Grand FPD No 1's response district encompasses the town of Granby and the Colorado River, Fraser River, and Willow Creek corridors, including Lake Granby, Willow Creek Reservoir, and Windy Gap Reservoir. The FPD has two response facilities with another currently under construction, scheduled for completion in July of 2023.

Outside of the town of Granby, higher population density areas within the FPD include the western shoreline of Lake Granby around Cutthroat, Stillwater, Fish, and Rainbow Bays, the eastern edge of the Granby Valley in the Granby Ranch area, and the north and south sides of Highway 40 in the Snow Mountain Ranch and Tabernash area. Significant amounts of recent development within the FPD have occurred in the ecotones between sagebrush steppe inter-mountain basins and lodgepole pine dominated forests, and most neighborhoods are only accessible via winding dirt roads branching off Highways 40, 34, and 125. Across its entire jurisdiction, the FPD includes 4128 buildings and has a building density of 27.58 units per square mile.

Although land in and adjacent to riparian areas is becoming increasingly dominated by housing developments, large swaths of agriculture and ranching land still exist throughout the FPD. Irrigated agriculture is most dominant within flatter and lower elevation corridors such as those found along Eight Mile Creek, Nine Mile Creek, Ten Mile Creek and the Fraser River. Cattle operations use these riparian regions seasonally, but grazing and ranching uses also extend into the foothill regions of the FPD, particularly those southwest of Granby and around Highway 125 as it climbs towards Willow Creek Pass. Although the Bureau of Land Management manages large swaths of property on the eastern and western edges of the FPD, and the Arapaho National Forest manages a large piece of land in the northwest corner of the FPD around Lake Granby, including Arapaho National Recreation Area. Considerable sections of the FPD are 1,000- to 3,000-acre private holdings (Figure 2.2).

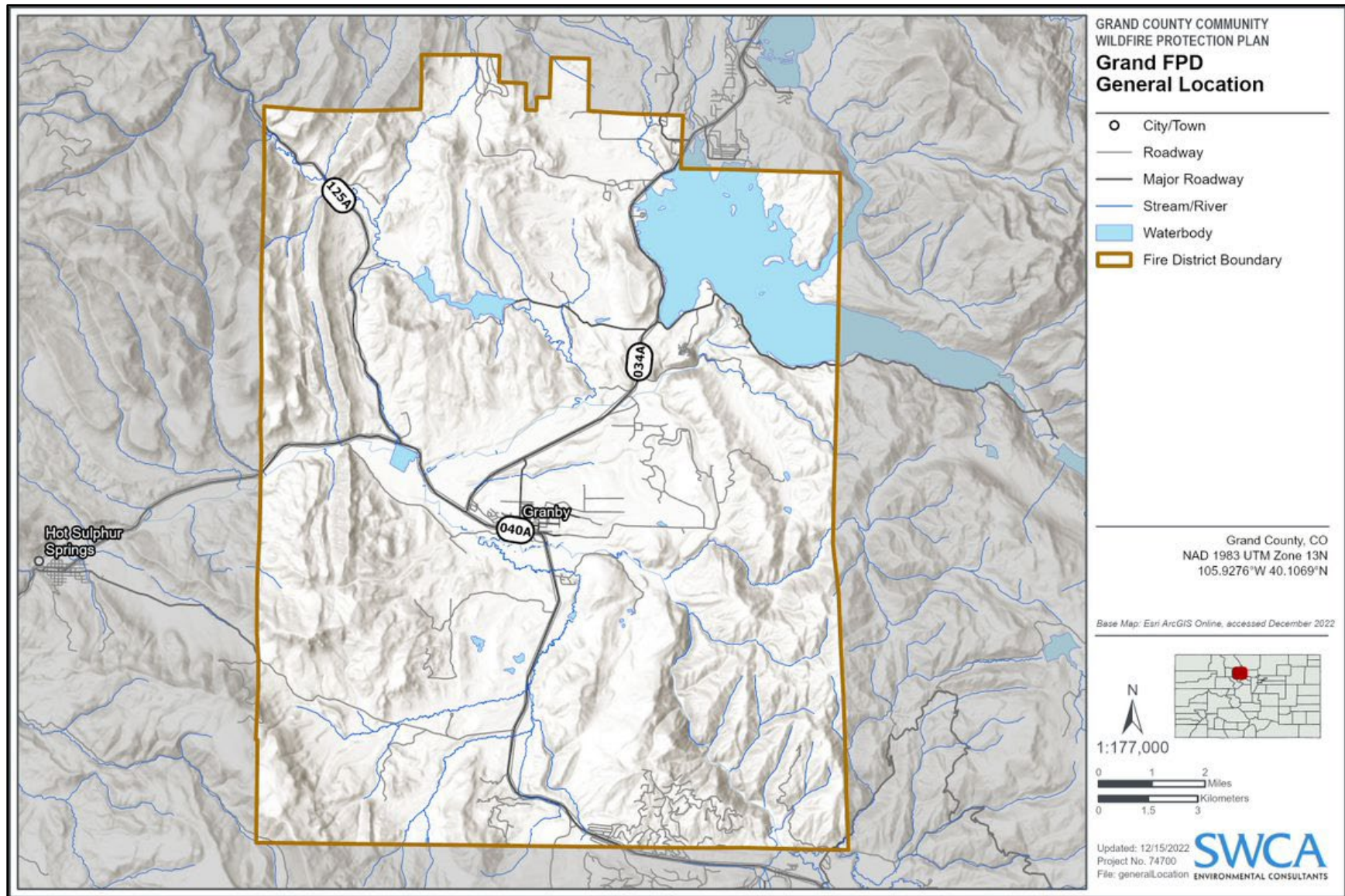


Figure 2.1. Grand FPD No. 1.

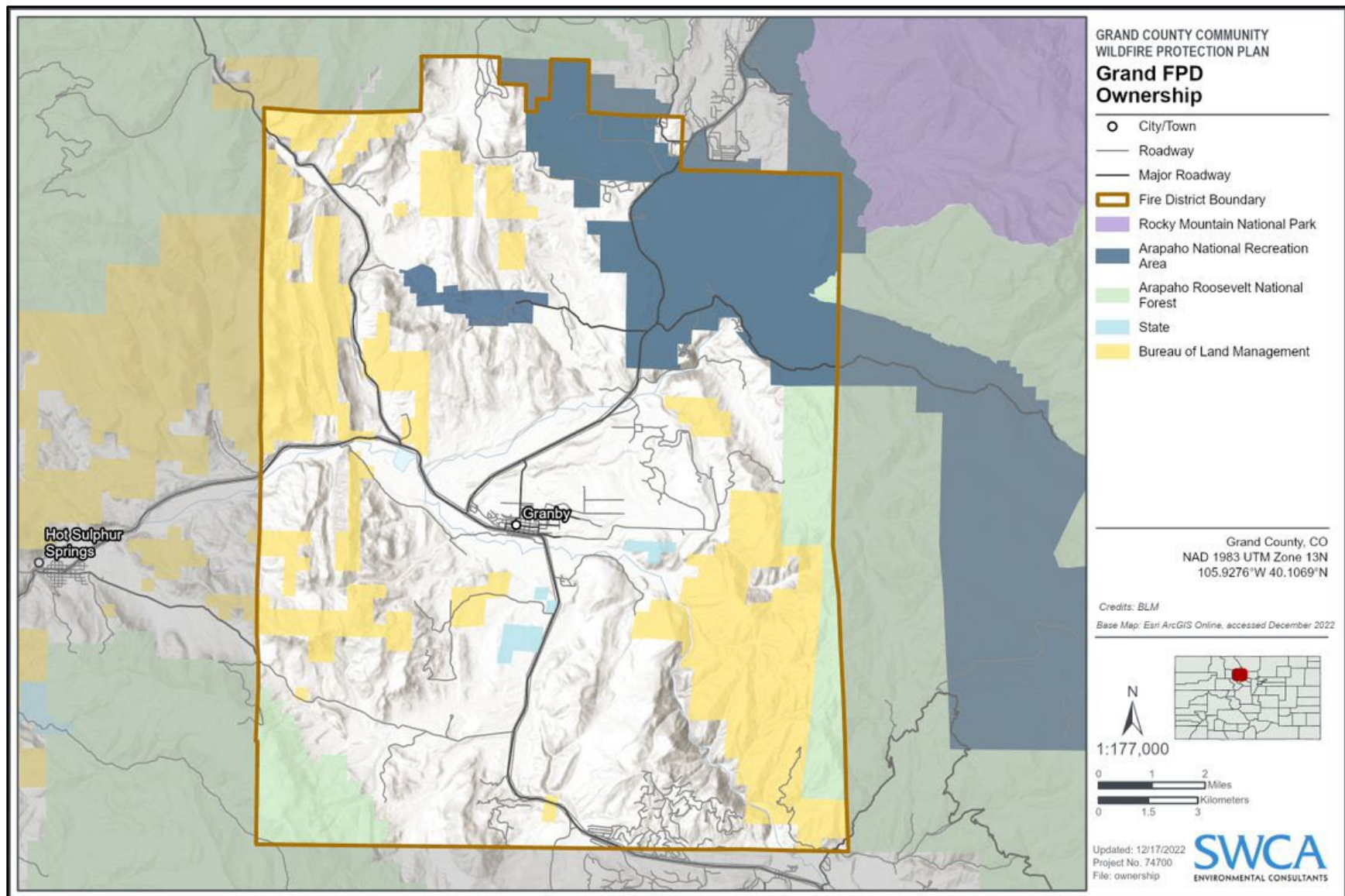


Figure 2.2 Grand FPD No. 1 land ownership.

WUI Area Description

The wildland urban interface (WUI) is composed of both interface and intermix communities and is defined as area where human habitation and development meet or intermix with wildland fuels (U.S. Department of the Interior and U.S. Department of Agriculture [USDA] 2001:752–753). Interface areas include housing developments that meet or are in the vicinity of continuous vegetation. Intermix areas are those areas where structures are scattered throughout a wildland area where the cover of continuous vegetation and fuels is often greater than cover by human habitation. WUI is further delineated through buffers and with a Low, Medium, High, or Extreme classification based on fuels and slope steepness. Buffers are derived from the general boundaries of where development meets wildland fuels, and more extreme classifications correspond to greater presence of wildland fuels and steeper slope angles.

The WUI in the Grand FPD No.1 is extensive and contains significant quantities of both interface and intermix development. Nearly the entire FPD falls within a 2.5-mile WUI buffer, and the vast majority also lies inside a 1-mile WUI buffer (Figure 2.3). Similar to areas classified as extreme in our Risk-Hazard Assessment (Figure 2.5), WUI classified as extreme lies primarily in the upper elevation reaches of ecotone zones where sagebrush steppe completes its transition into stands of lodgepole pine. This includes communities on the southeast edge of the Granby Valley (City of Granby, Highlands/Pole Creek, and Tabernash), in the headwaters of Eightmile Creek in the foothills south of CR 55 leading to Cottonwood Pass (Homestead Hills), in the foothills of Mount Chauncey (West Granby) and in the eastern flanks of the Rabbit Ears Range along Highway 125 (Highway 125). Communities in the FPD directly adjacent to those in extreme WUI zones generally have high WUI classifications and include Sun Outdoors, Legacy Park Ranch, and Southern Grand Lake, while the remaining lower elevation reaches of the FPD are predominately considered as having moderate WUI classifications. The community falling within the bounds of moderate classification is Trail Creek (Figure 2.4).

Risk-Hazard Summary

The purpose of the Risk-Hazard Assessment is to evaluate and provide information pertaining to the risk of wildland fires within the Grand FPD No. 1 jurisdictional land. For more information on the Risk-Hazard Assessment purpose and process, see Chapter 3 of the Grand County CWPP. The Composite Risk-Hazard Assessment is twofold and combines a geographic information system (GIS) model of hazard based on fire behavior and fuels modeling technology and a Core Team-generated assessment of on-the-ground community hazards and values at risk (VARs).

The Risk-Hazard Assessment considers:

- Fire behavior modeling outputs
- Fire history
- HVRAs
- Fire response

Figure 2.5 contains a visual summary of the Grand FPD No. 1 Risk-Hazard Assessment. Most of the high-risk areas identified are in unburned montane conifer forests along the fringes of inter-mountain basins. These include those surrounding the Jaquez BLM, Mt. Chauncey, and Table Mountain. The City of Granby also contains open spaces including Windy Gap Wildlife Viewing Area, Granby Mesa, and the Granby Trails system that are susceptible to wildfire damage. The low Risk-Hazard Assessment scores generally relate to waterbodies (namely Lake Granby, Windy Gap Reservoir, Willow Creek Reservoir, and the Colorado River) and their adjacent landscape.

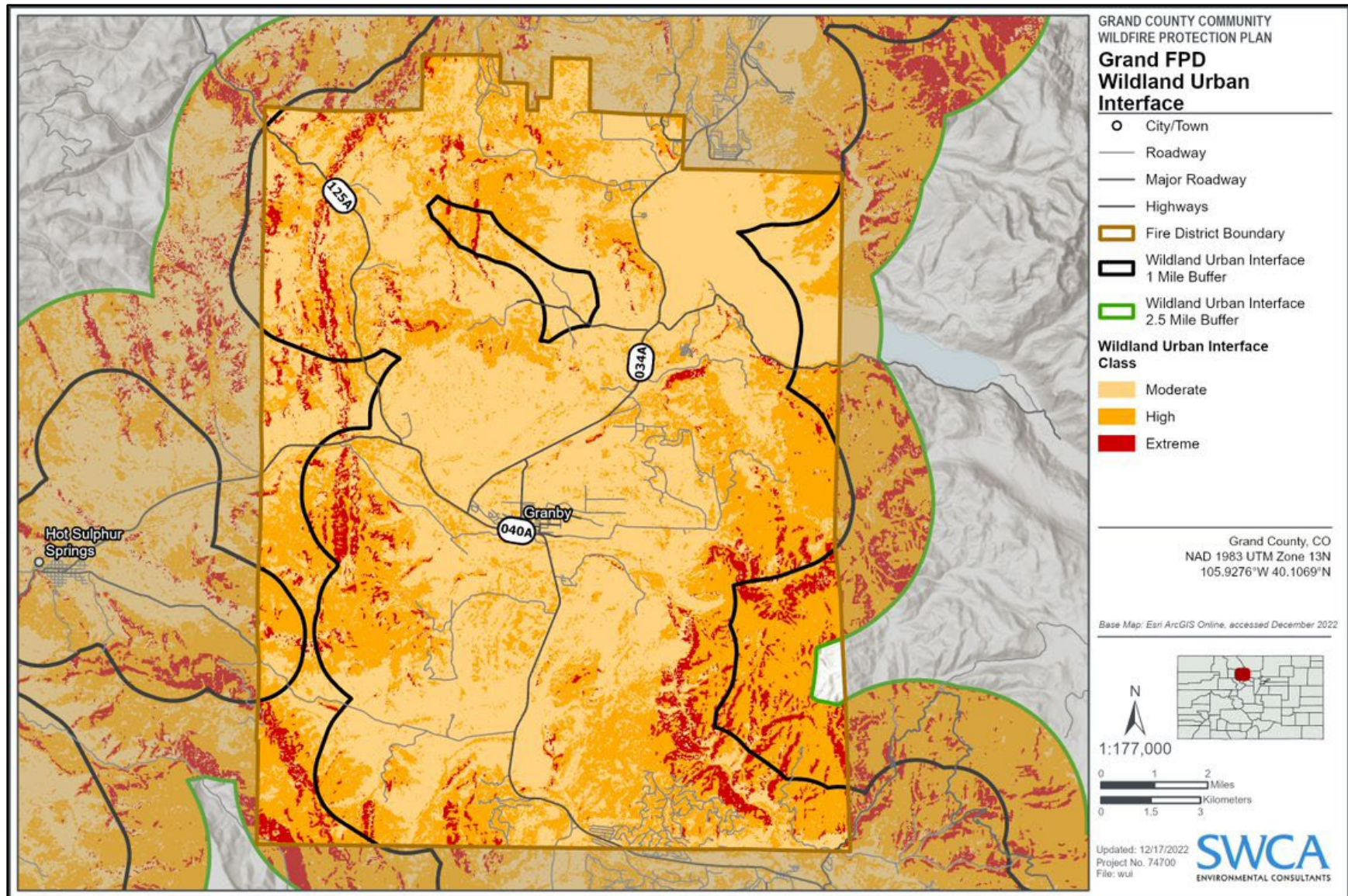


Figure 2.3. Grand FPD No. 1 WUI boundaries and associated risk.

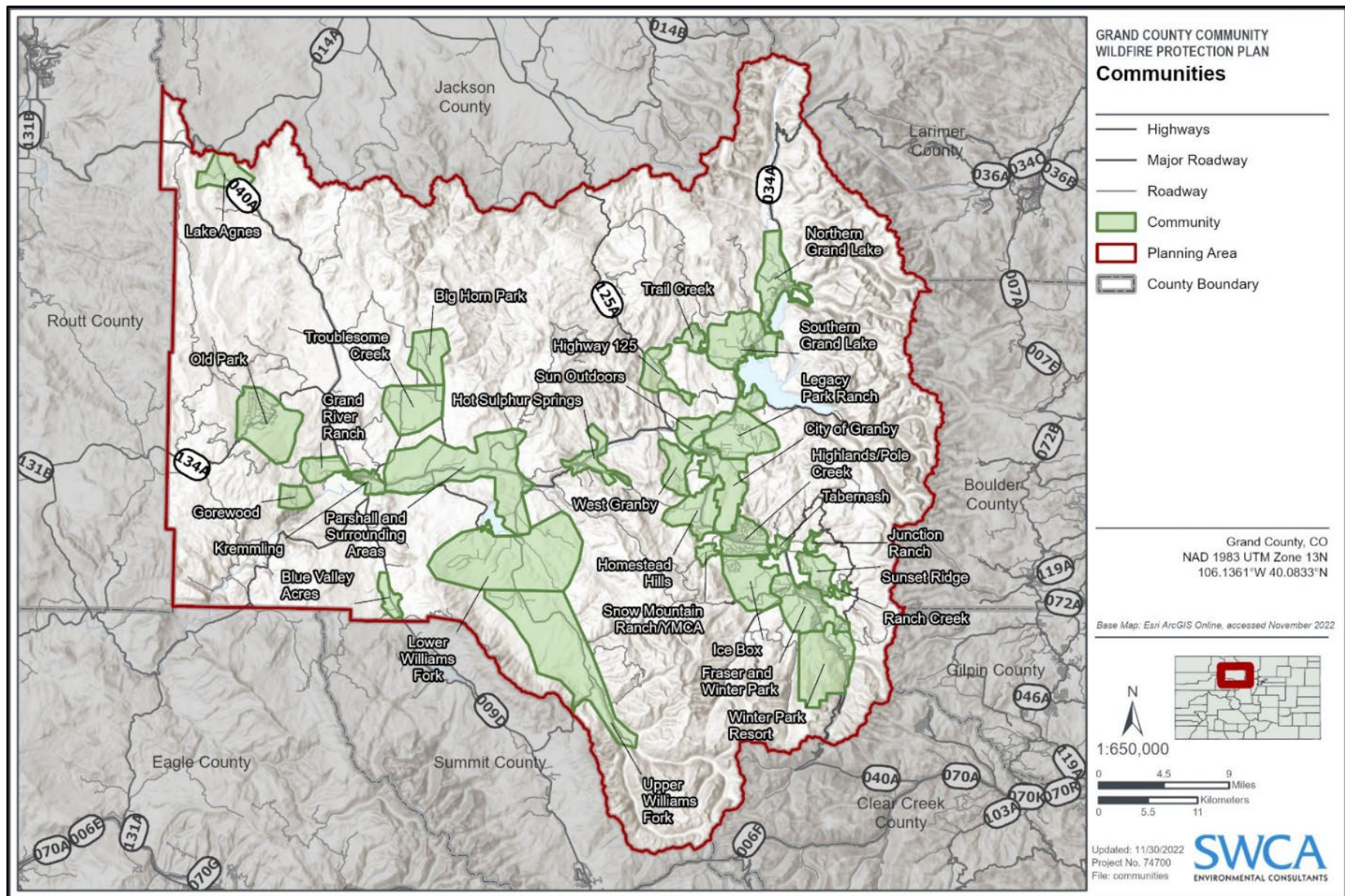


Figure 2.4. Grand County WUI communities.

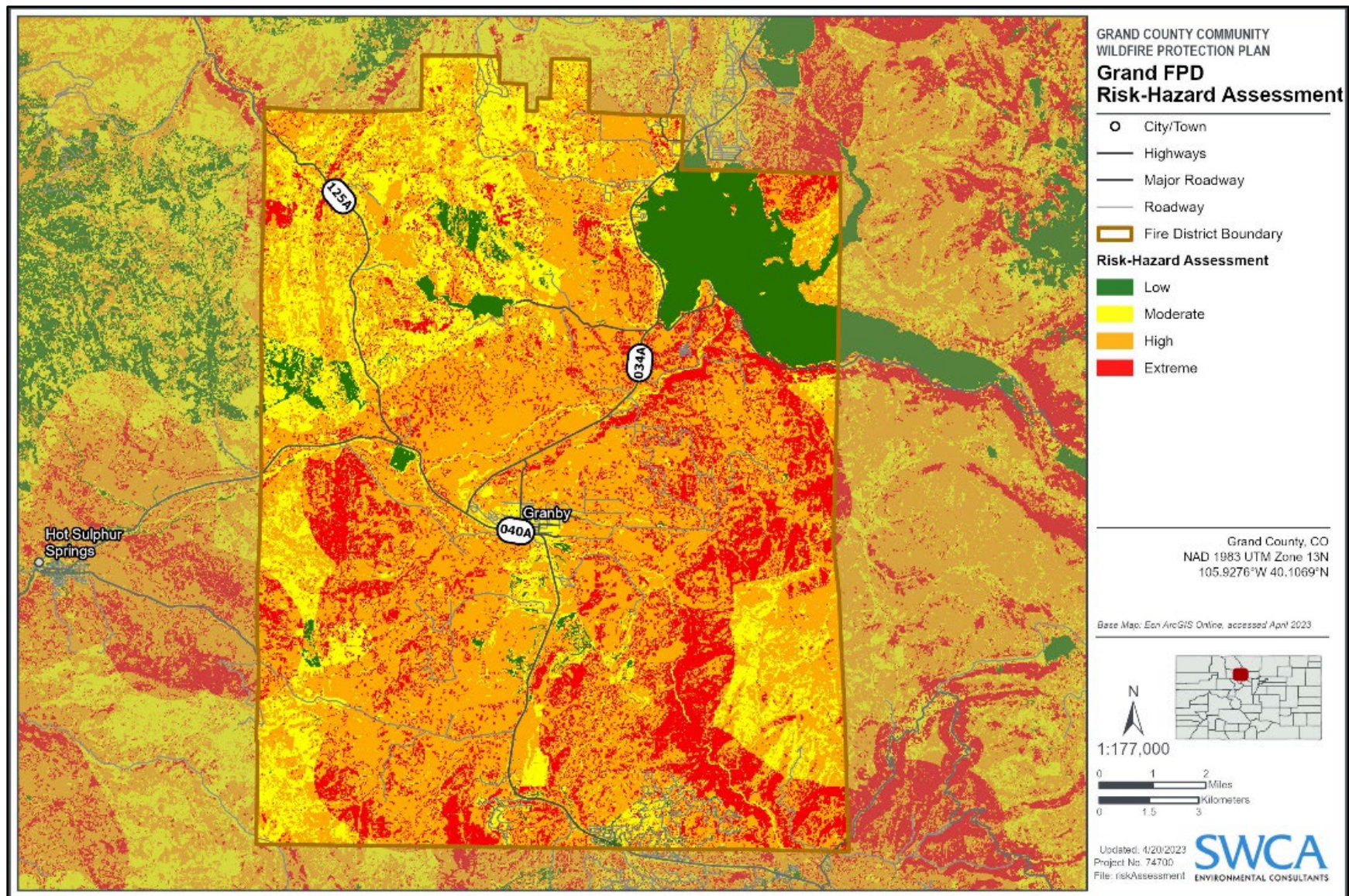


Figure 2.5. Grand FPD No. 1 Risk-Hazard Assessment.

Fire History

Large fires in Grand FPD No.1's boundaries were uncommon until recently. Although the FPD regularly responds to smaller structural and wildland ignitions (Figure 2.6), it wasn't until the East Troublesome Fire of 2020 that the FPD encountered a large wildland fire within its jurisdiction (Table 2.1, Figure 2.7).

Table 2.1. Recent Large Fire History of Grand FPD No. 1

| Fire Name | Location | Year | Acres Burned | Cause of Ignition |
|-----------------------|-------------------------|------|---|-------------------|
| East Troublesome Fire | Northwest region of FPD | 2020 | 193,813 (across all of Grand County) | Human |

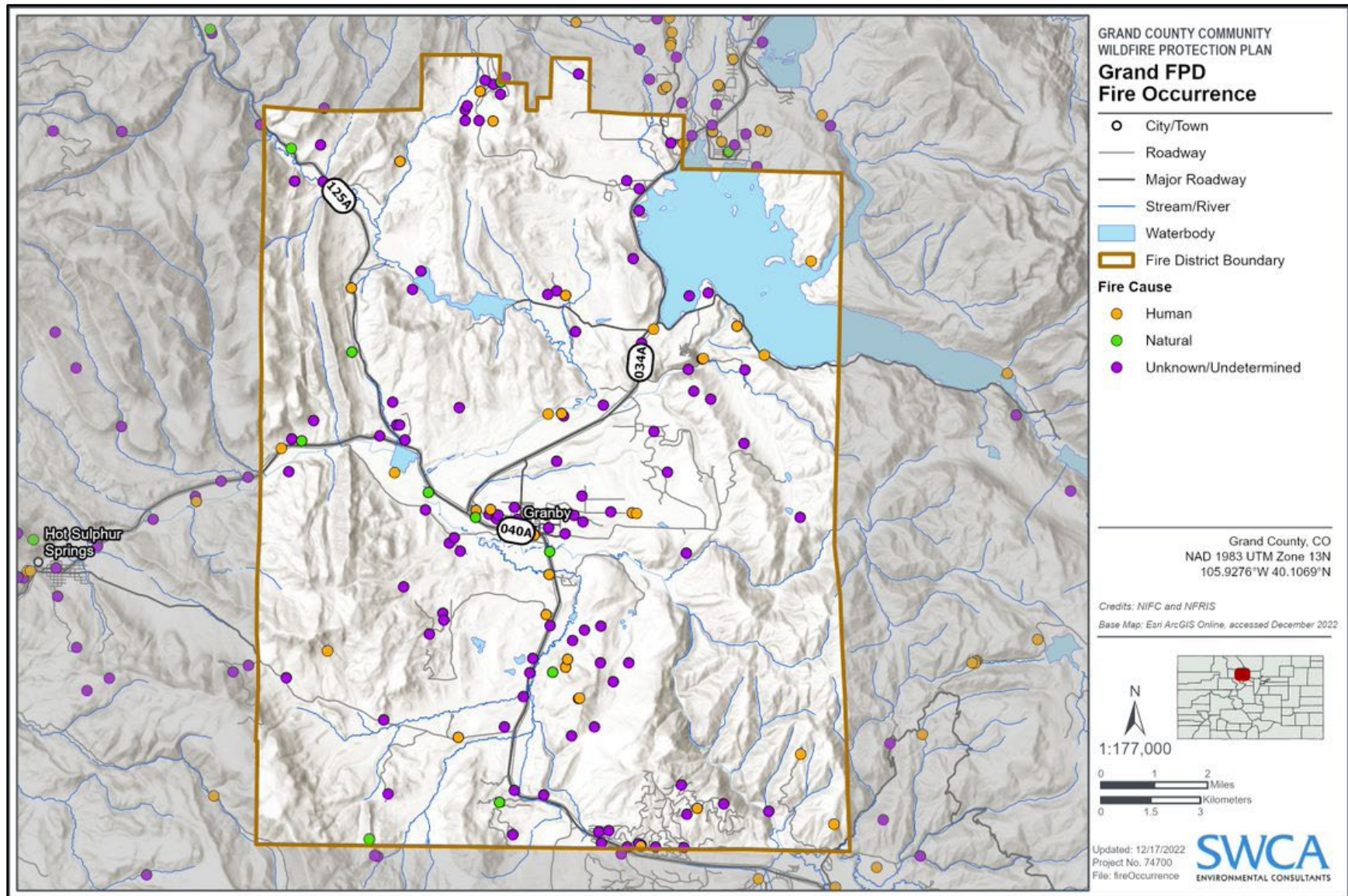


Figure 2.6. Grand FPD No. 1 fire occurrence.

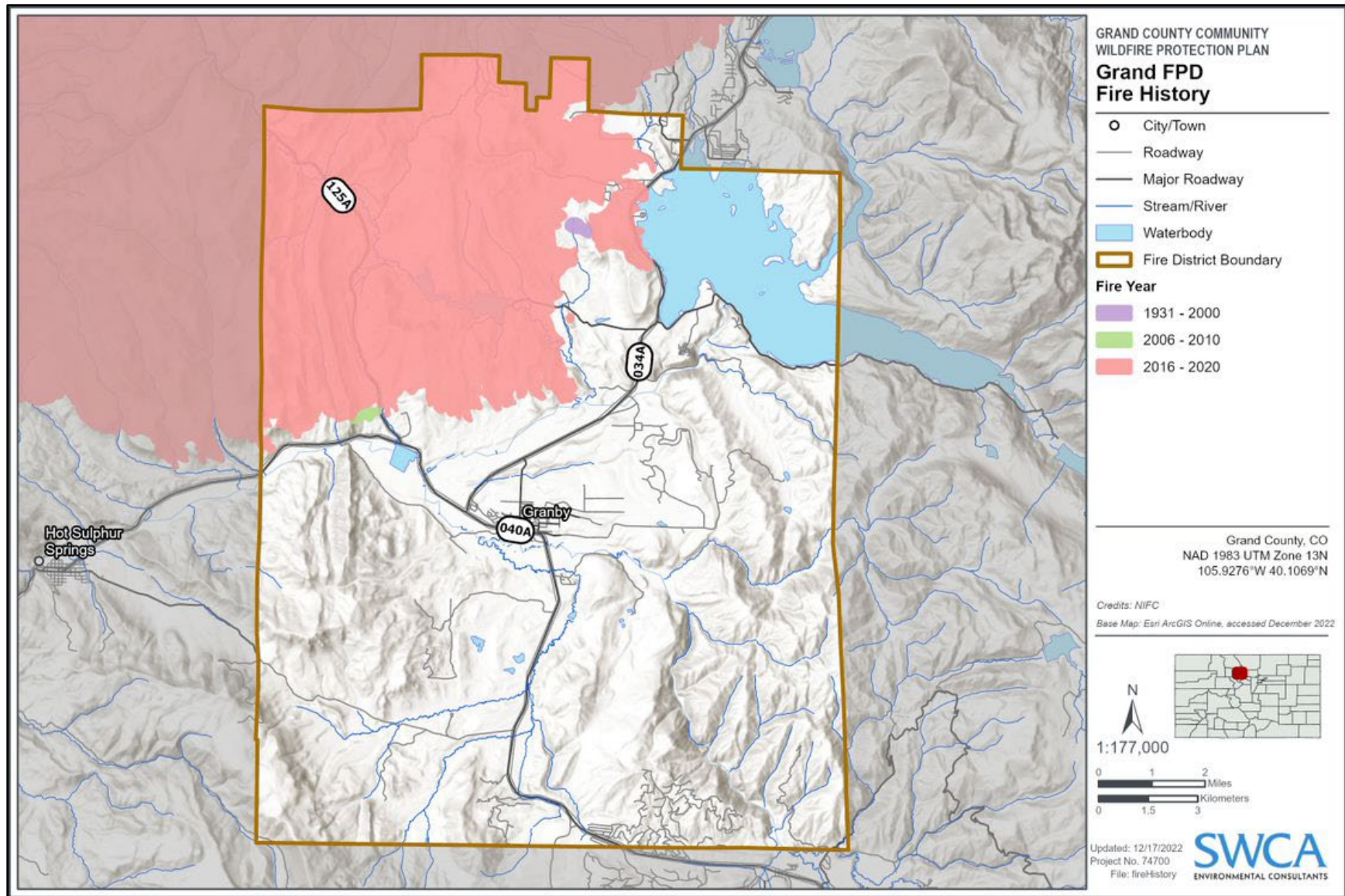


Figure 2.7. Grand FPD No. 1 fire history.

Hazardous Fuel Characteristics

Fuels found within the Grand FPD jurisdiction are listed below in Table 2.2 and illustrated in Figure 2.8. Please see Chapter 2, Fire Environment, for more information regarding fuels within the county.

Table 2.2. Fuel Types (Scott and Burgan 2005) in Grand FPD No. 1's Boundaries

| Existing Fuel Type | Acres | Percent |
|---|--------|---------|
| GS2 – Grass-shrub, Shrubs are 1 to 3 feet high, moderate grass load. Spread rate high; flame length moderate. | 19,883 | 20.75% |
| TU1 – Timber-understory, fuelbed is low load of grass and/or shrub with litter. Spread rate low; flame length low. | 10,397 | 10.85% |
| SB1 – Slash-blowdown, fine fuel load is 10 to 20 tons/acre, weighted toward fuels 1 to 3 inches diameter class, depth is less than 1 foot. Spread rate moderate; flame length low. | 9,815 | 10.25% |
| GS1 – Grass-shrub, shrubs are about 1 foot high, low grass load. Spread rate moderate; flame length low. | 9,598 | 10.02% |
| GR2 – Grass, moderately coarse continuous grass, average depth about 1 foot. Spread rate high; flame length moderate. | 9,321 | 9.73% |
| TL5 – Timber-litter, High load conifer litter; light slash or mortality fuel. Spread rate low; flame length low. | 6,100 | 6.37% |
| NB8 – Non burnable open water | 5,969 | 6.23% |
| TU5 – Timber-understory, fuelbed is high load conifer litter with shrub understory. Spread rate moderate; flame length moderate. | 5,154 | 5.38% |
| TL3 – Timber-litter, Moderate load conifer litter. Spread rate very low; flame length low. | 4,179 | 4.36% |
| GR1 – Grass, grass is short, patchy, and possibly heavily grazed. Spread rate moderate; flame length low. | 3,972 | 4.15% |
| NB1 – Non burnable urban or suburban development; insufficient wildland fuel to carry wildland fire | 2,776 | 2.90% |
| TL2 – Timber-litter, low load, compact. Spread rate very low; flame length very low. | 2,766 | 2.89% |
| TL1 – Timber-litter, light to moderate load, fuels 1 to 2 inches deep. Spread rate very low; flame length very low. | 2,576 | 2.69% |
| SH2 – Moderate shrub fuel load, depth about 1 foot, no grass fuel present. Spread rate low; flame length low. | 1,699 | 1.77% |
| Other* – Various fuel types | 1,598 | 1.67% |

*Other includes fuel types with <1% cover of the FPD. These include GR3, NB3, NB9, SH1, SH7, TL6, TL8, and TL9.

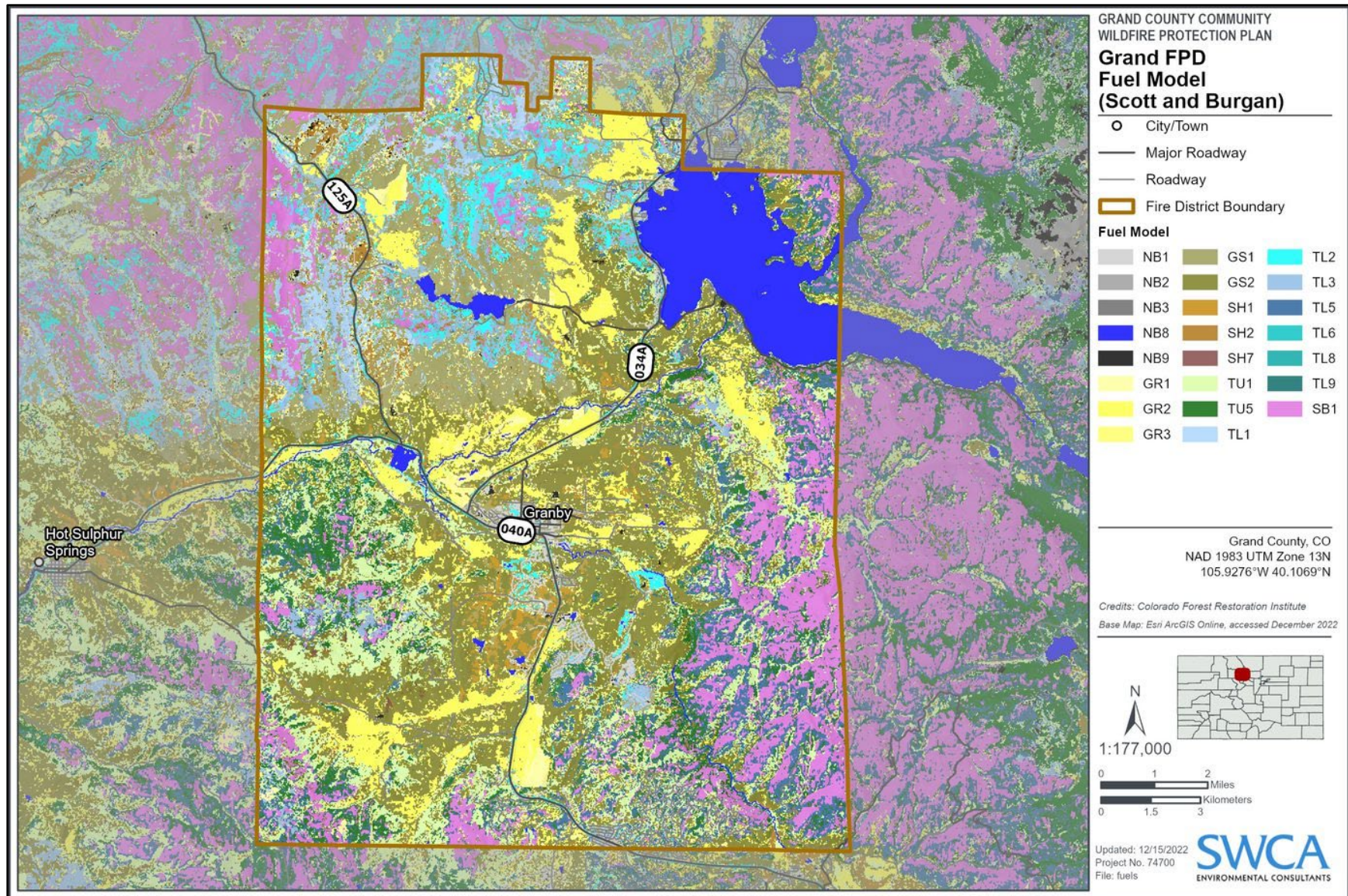


Figure 2.8. Grand FPD No. 1 Scott and Burgan fuels model.

Neighborhood and Structural Characteristics

The Grand Fire Protection District NFPA 1144 assessment results found that 3 of the 10 delineated communities had some defensible space around properties, while the other communities had limited defensible space around their structures. Most structures in the district are made of combustible building materials with metal roof or asphalt shingle. Most of the communities (7 of the 10) had visible water sources for suppression available. While the community has limited turnarounds for fire trucks, is difficult to navigate in some areas, and contains challenging ingress/egress, most of the community is less than 5 miles from the nearest fire station. See Table 2.3 and Figures 2.9, 2.10, 2.11, and 2.12 for more information on community specifics within the district. Scores correspond to the risk rating given during the Community Hazard Assessments as described in Chapter 3 of this Grand County CWPP.

Table 2.3. Grand FPD No. 1's Response Resources

| Community | Score | Fire Station | Positives | Negatives |
|---|-------|---|--|--|
| City of Granby (Map C-58, Appendix C) | 104 | Grand Fire Protection District No. 1 Headquarters Station | <ul style="list-style-type: none"> Ingress/egress Road width >24 ft Metal roof or asphalt shingle throughout Fire hydrants Fire station <5 mi from community | <ul style="list-style-type: none"> Limited turnarounds for fire trucks Limited defensible space Combustible building materials Many structures <30 ft to slope |
| Highlands/Pole Creek (Map C-16, Appendix C) | 111 | <ul style="list-style-type: none"> Grand Fire Protection District No. 1 Red Dirt Station East Grand Fire Protection District No. 4 Tabernash Station | <ul style="list-style-type: none"> Hydrants throughout Reflective street signs Visible fuels mitigation Metal roof or asphalt shingle throughout Fire station <5 mi from community | <ul style="list-style-type: none"> Difficult to navigate Lack of turnarounds for fire trucks Narrow, steep roads in places Combustible building materials Limited defensible space Homes built near slopes |
| Homestead Hills (Map C-12, Appendix C) | 110 | <ul style="list-style-type: none"> Grand Fire Protection District No. 1 Headquarters Station Grand Fire Protection District No. 1 Red Dirt Station | <ul style="list-style-type: none"> Reflective street signs Metal roof or asphalt shingle throughout Fire hydrants <5 mi from fire station | <ul style="list-style-type: none"> Challenging ingress/egress Limited fire truck turnarounds Homes built near slopes Combustible siding Limited defensible space |
| Highway 125 (Map C-60, Appendix C) | 102 | <ul style="list-style-type: none"> Grand Fire Protection District No. 1 Headquarters Station Grand Lake Fire Protection District No. 1 Station 3 – Soda Springs | <ul style="list-style-type: none"> Some defensible space around structures Metal roof or asphalt shingle throughout Structures >30 ft to slope | <ul style="list-style-type: none"> Limited turnarounds for fire trucks Non-reflective street signs Combustible building materials Limited water sources for suppression Fire station >5 mi from community |
| Legacy Park Ranch (Map C-41, Appendix C) | 107 | Grand Fire Protection District No. 1 Headquarters Station | <ul style="list-style-type: none"> 2+ roads in and out Metal roof or asphalt shingle throughout Some hydrants throughout | <ul style="list-style-type: none"> Non-surfaced, steep roads Limited turnarounds for fire trucks Limited defensible space Combustible building materials |

| Community | Score | Fire Station | Positives | Negatives |
|--|-------|--|---|---|
| Southern Grand Lake (Map C-46, Appendix C) | 109 | Grand Lake Fire Protection District No. 1 Station 3 – Soda Springs | <ul style="list-style-type: none"> • 2+ roads in and out • reflective street signs • Metal roof or asphalt shingle throughout • Fire hydrants • Fire station <5 mi from community | <ul style="list-style-type: none"> • Non-surfaced roads, >5% grade • Limited turnarounds for fire trucks • Limited defensible space • Combustible building materials • Many structures <30 ft to slope |
| Sun Outdoors (Map C-40, Appendix C) | 79 | Grand Fire Protection District No. 1 Headquarters Station | <ul style="list-style-type: none"> • Reflective street signs • Metal roof or asphalt shingle throughout • Fire hydrants throughout • Fire station <5 mi from community • Underground gas and electric utilities | <ul style="list-style-type: none"> • Limited turnarounds for fire trucks • Limited defensible space • Combustible housing materials |
| Tabernash (Map C-18, Appendix C) | 70 | East Grand County Fire Protection District No. 4 Tabernash Station | <ul style="list-style-type: none"> • Ingress/egress • Reflective street signs • Visible fuels reduction efforts • Metal roof or asphalt shingle throughout • Fire hydrants • <5 mi to fire station | <ul style="list-style-type: none"> • Lack of turnarounds for fire trucks • Combustible building materials • 2+ roads in and out |
| Trail Creek (Map C-48, Appendix C) | 104 | Grand Lake Fire Protection District No. 4 Station 3 – Soda Springs | <ul style="list-style-type: none"> • Present reflective street signs • In areas, good defensible space • Metal roof or asphalt shingle throughout • Many structures >30 ft to slope | <ul style="list-style-type: none"> • Ingress/egress • Limited turnarounds for fire trucks • Combustible building materials • Limited water sources for suppression • Fire station >5 mi from community |

| Community | Score | Fire Station | Positives | Negatives |
|--|-------|--|--|---|
| West Granby (Map C-10, Appendix C) | 105 | Grand Fire Protection District No. 1 Headquarters Station | <ul style="list-style-type: none">• Reflective road signs• Metal roof or asphalt shingle throughout• Some defensible space around structures | <ul style="list-style-type: none">• Limited roads in and out• Lack of turnaround for fire trucks• Combustible building materials• Lack of visible water sources for suppression• Fire station >5 mi from portions of community• Gas and electric utilities both above ground• Many houses <30 ft to slope |



Figure 2.9. House within FPD showing fuel continuity.

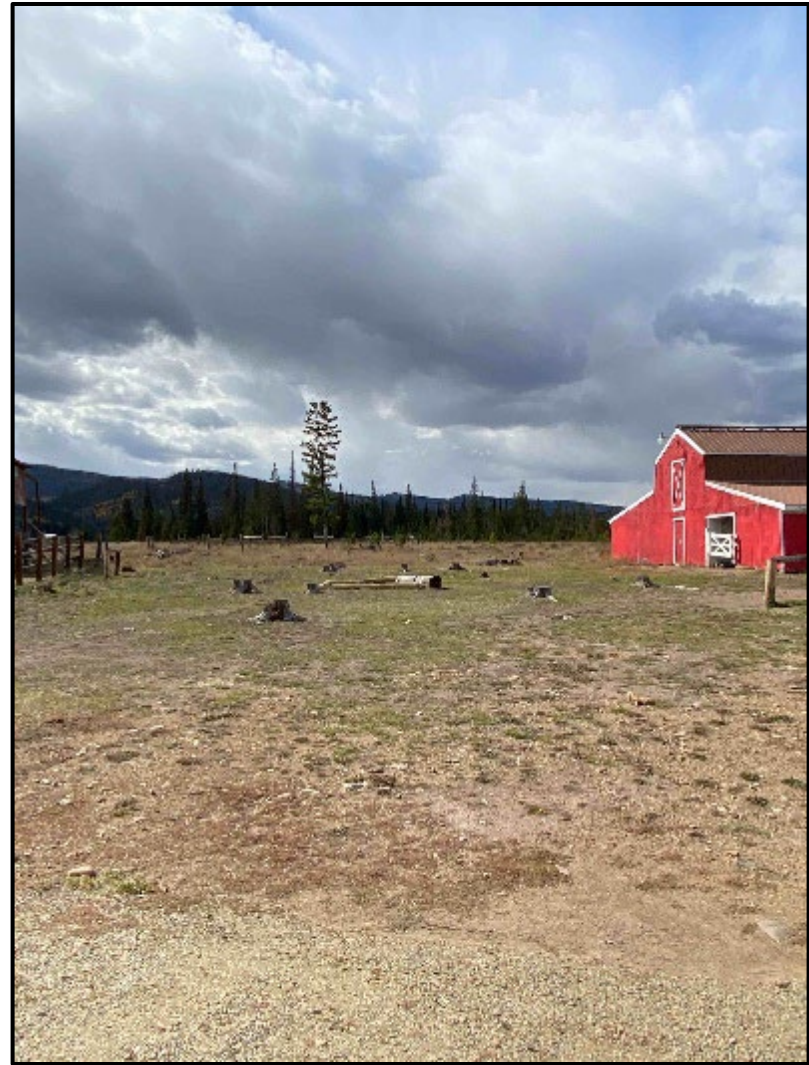


Figure 2.10. Example of building/structure materials.



Figure 2.11. Houses within the WUI of the FPD.

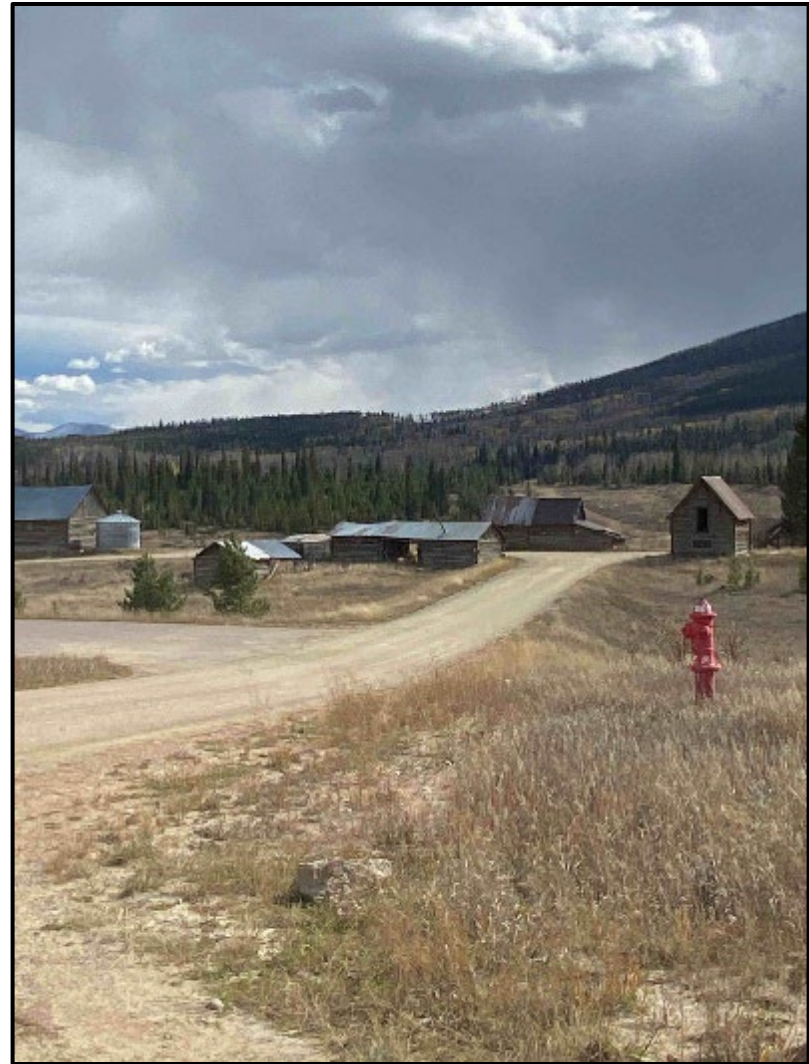


Figure 2.12. Example of water source for suppression.

Emergency Response Capacity

The Grand County Fire Protection district currently contains two fire stations with a third being constructed on the north end of the district that is expected to be completed in the summer of 2023. The two stations currently operating are the Red Dirt station and the Headquarters station. The Bud Wilson station will be located on County Road 40 at the northern end of the district (GFPD 2000). The Red Dirt Station is jointly operated with East Grand Fire Protection District under a mutual aid agreement while the Headquarters station is managed entirely by district. The headquarters station is located south of Granby along highway 40, relatively central for the district while the Red Dirt station is further south on highway 40 between Granby and Tabernash (Figures 2.17 and 2.19).

Apparatuses for the district included three pumper engines ranging from 1,250 to 1,500 gpm, one of which is also equipped with a ladder; one 4x4 pumper engine, one platform engine; two wildland brush trucks; one type three wildland engine, two 2,200-gallon tender engines, two SUVs, and two utility trucks (Table 2.4) The district has an additional wildland Type 3 engine on order (GFPD 2021) and an additional type 6 engine on order (GFPD 2022). Grand County FPD is part of an automatic aid agreement with the other four fire protection districts in the county.

The District has staffed seasonal firefighters as part of a Wildland Team since 2015 who have assisted local property owners with property assessments and mitigation, responded to wildland fire in the District, and are made available elsewhere in the state, region, or nationally when appropriate. National assignments play a crucial role in firefighter development and working within an incident management system, which has paid large dividends in our recent large fires. In 2022 the program was run jointly with Grand Lake Fire Protection District's wildland team leveraging the resources of both districts to the benefit of both districts. An overview of emergency response capabilities within the community, including fire suppression resources, distance from fire suppression resources, and water availability.

Table 2.4. Grand Fire Protection District No. 1 FPD Response Resources

| Fire Protection District Statistics: | | | | |
|--|----------------------|--------------------------------|-----------------|-----------------------------------|
| <u>Fire Protection District:</u> Grand Fire Protection District No. 1 | | | | |
| <u>Fulltime Firefighters:</u> 5 | | <u>On-call Firefighters:</u> - | | <u>Volunteer Firefighters:</u> 22 |
| <u>Water Tender:</u> | | <u>Wildland Engines</u> | | |
| Type 1: 0 | <u>Total Number:</u> | | <u>4WD/AWD:</u> | <u>Brush Breaker:</u> |
| Type 2: 2 | Type 3: 1 | | 1 | 1 |
| Type 3: 0 | Type 4: 0 | | 0 | 0 |
| <u>Structure Engines:</u> | | Type 5: 0 | 0 | 0 |
| Type 1: 4 | Type 6: 2 | | 2 | 2 |
| Type 2: 1 | Type 7: 0 | | 0 | 0 |
| <u>Port-A-Tanks:</u> | 2 | | | |
| <u>Portable Pumps:</u> | 6 | | | |
| <u>Fire Shelters:</u> | 30 | | | |
| Suggested Mitigation Focus Areas: | | | | |
| <u>Areas of Concern (Figure 2.14):</u> | | | | |
| <ul style="list-style-type: none">Northern section of the FPD, west of Highway 34 and Lake Granby, around southern portion of Highway 125 community, south of Trail Creek.East of Lake Granby, west of Knight Ridge and southeast of Shadow Mountain Lake (this area of concern is also located in Grand Lake FPD No. 2).South of Lake Granby and Monarch Lake Rd, north of Legacy Park Ranch community.Southwest portion of FPD, south of Cottonwood Pass Rd, west of East Fork Ninemile Creek.Fire Department General Areas of Concern: Winter Park Highlands, Bussey Hill, Legacy Park, GCR 56. | | | | |
| <u>Fire Department Concerns:</u> | | | | |
| <ul style="list-style-type: none">Alternate egress in many subdivisions, many are one way in, one way out.Defensible space and fuel breaks, including thinning around the egress areas.Education and action from absent property owners. | | | | |

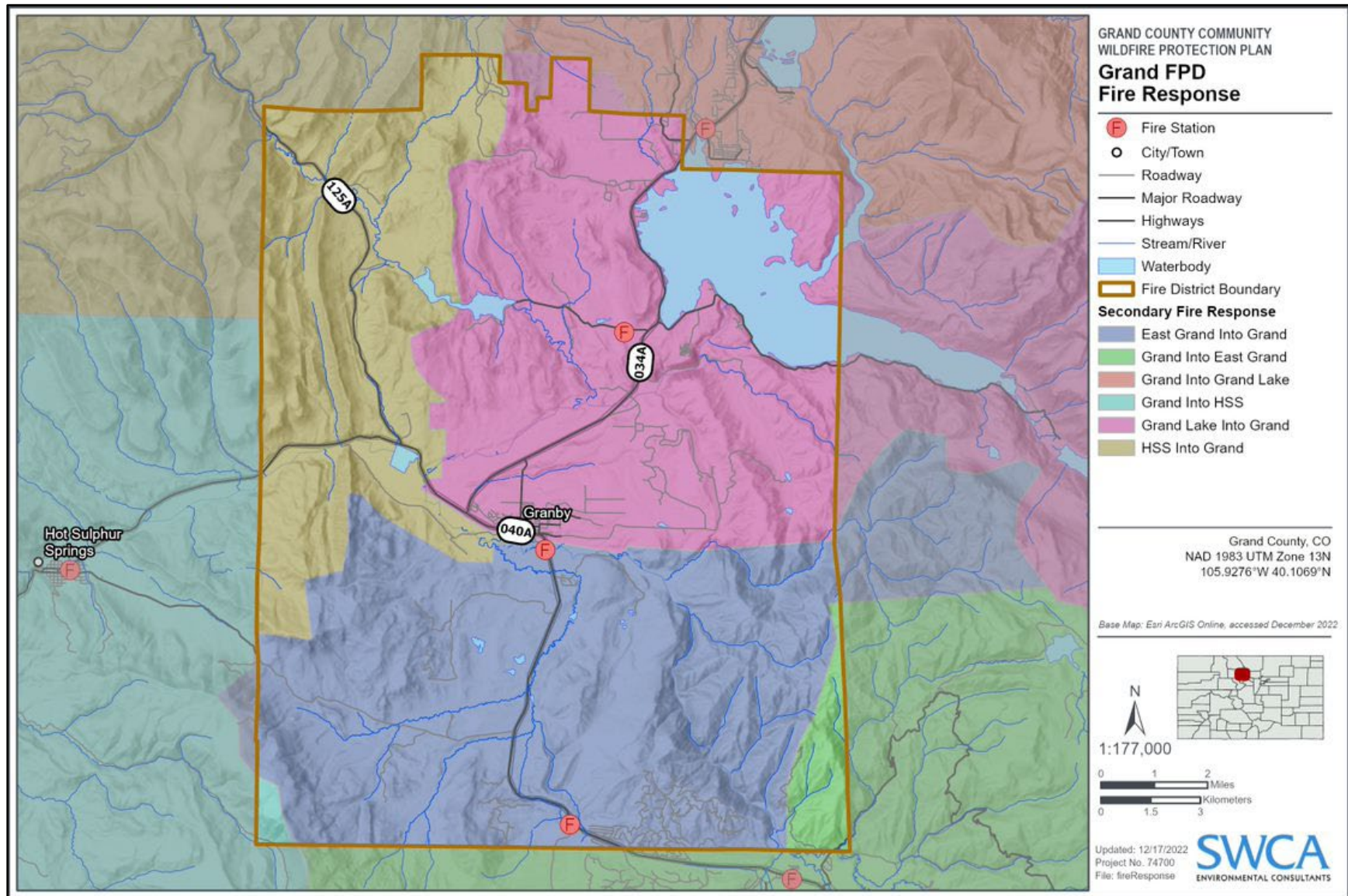


Figure 2.13. Grand FPD No. 1's boundaries.

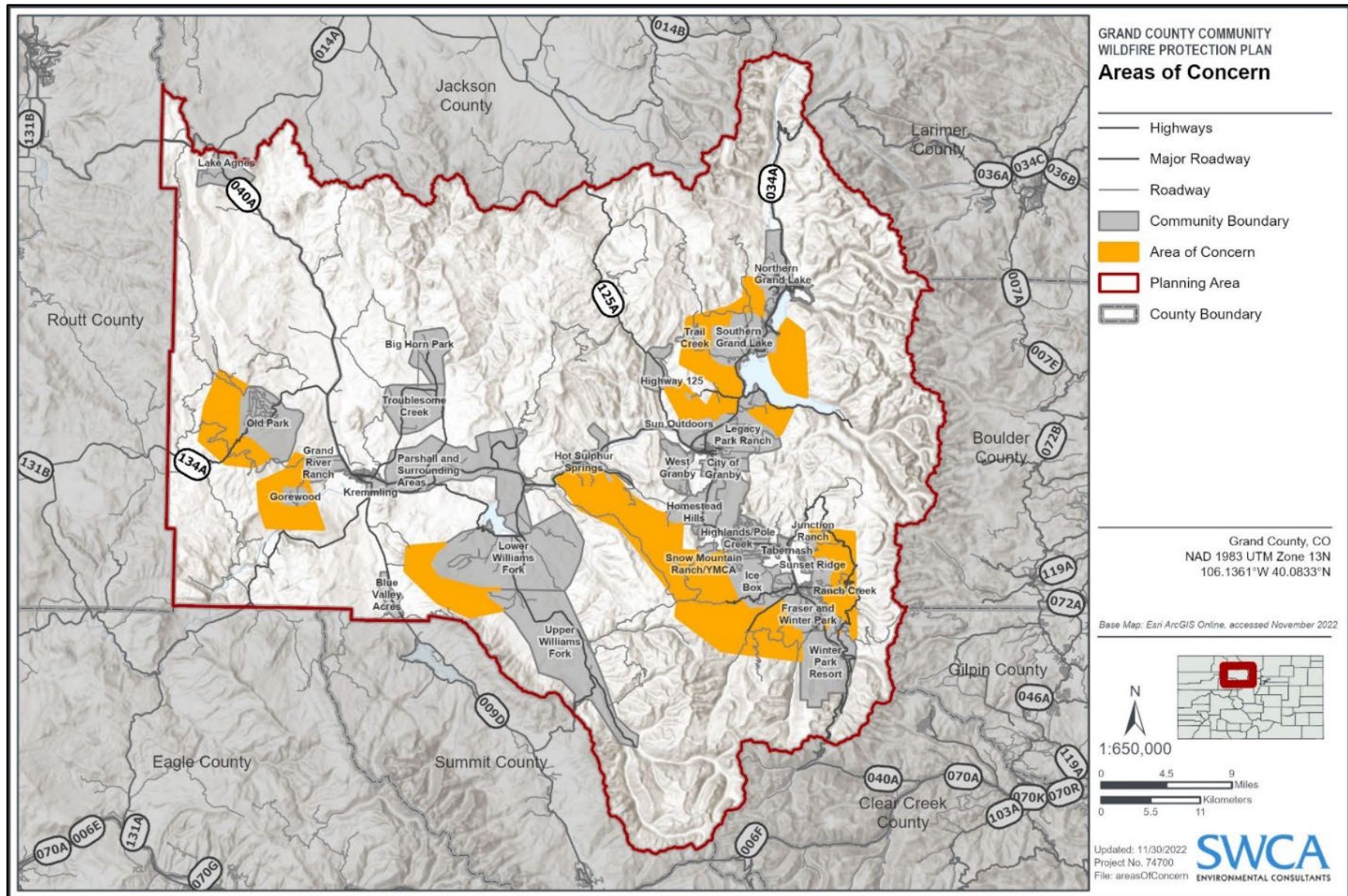


Figure 2.14 Grand County's identified areas of concern.

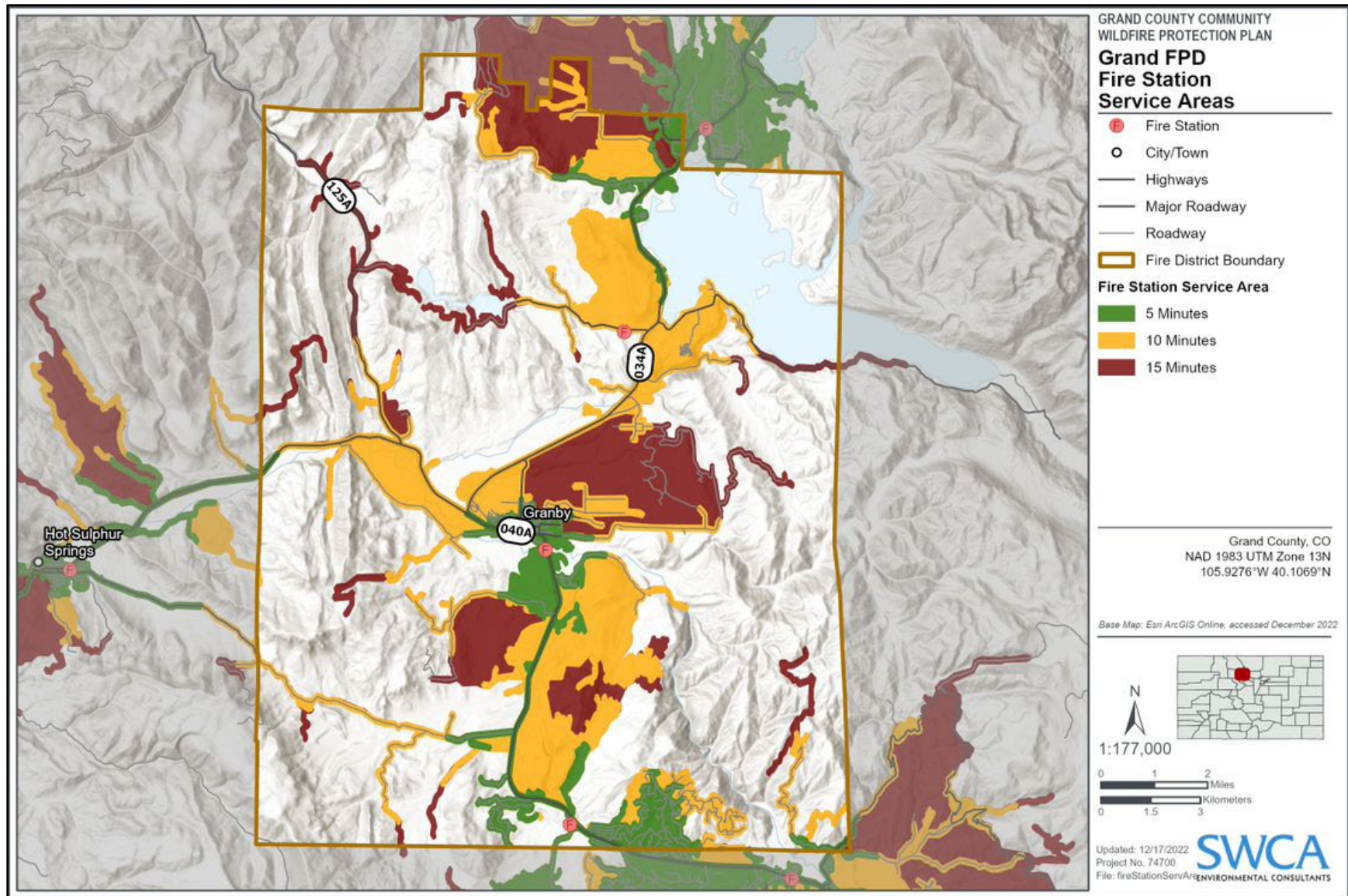


Figure 2.15. Grand FPD No. 1's fire station service areas.

Evacuation

Evacuation relies on both cooperative planning and the capability of residents to effectively implement plans. In the event of an incident within the FDP that requires evacuation, the FPD Fire Chief is responsible for issuing an evacuation notice through appropriate communication pathways. However, if a wildfire occurs within the FPD and exceeds the District's response capabilities, the County Sheriff will act as the primary incident commander and be responsible for declarations of evacuation (GACC 2022). In many cases, pre-evacuation orders informing residents of potential upcoming evacuations will be distributed prior to evacuation orders. Residents will receive pre-evacuation and evacuation orders through the County's CodeRED system, Emergency Alert System (EAS), or Wireless Emergency Alert System (WEA). A county-wide evacuation map is also available through the County's website, and can be accessed here: <https://gcgeo.maps.arcgis.com/apps/webappviewer/index.html?id=ca4f74421b69416da9be1b9b92166534>

It is recommended that residents familiarize themselves with their evacuation zone and evacuation preparedness planning, both of which can reduce strain on emergency response systems and crews during an incident. Additional information can be found in the Fire Response Capabilities section of Appendix B: Community Background and Resources.

Evacuation within the FPD has the potential to be complicated by road infrastructure. Many high and extreme risk roads within the District are narrow, steep, and winding with blind corners and few turnaround areas for larger vehicles. These can become congested and potentially dangerous if emergency response crews are attempting to respond to a wildfire that residents are evacuating from. Furthermore, many of these high and extreme risk roads in the FPD are also located in lodgepole pine forests, which can yield tall flame lengths and cause falling trees during a wildfire. These hazards can block potential escape route and/or result in entrapment for commuter and emergency vehicles in the event of a wildfire.

Residential, recreational, and ex-urban areas with high and extreme risk roads should take proactive approaches in their evacuation planning. This can include designating escape routes and implementing roadside fuel reduction projects. Areas of concern in the Grand FPD No. 1 include, but are not limited to, the road systems of Granby Ranch, the southern extent of Granby, the Snow Mountain Ranch area, and the District's various ex-urban areas (e.g., the eastern slope of Mt. Chauncey, the southern base of the Rabbit Ears Range, and the foothills of the Front Range southeast of Granby) (Figure 2.20).

Critical Infrastructure and Community Values at Risk

The Grand FPD No. 1's boundaries encompass numerous cultural, natural, and socioeconomic values at risk. These include important water resources such as Lake Granby, Willow Creek Reservoir, and pumping infrastructure that is relied on by both the local community and Denver-metro area, power lines, railroads, oil and gas pipelines, powerplants, hospitals, communication towers, scenic byways, fish and wildlife habitat, three schools, a small ski area, and much more. Figures 2.21, 2.22, 2.23, and 2.24 below provide a spatial representation of these values at risk.

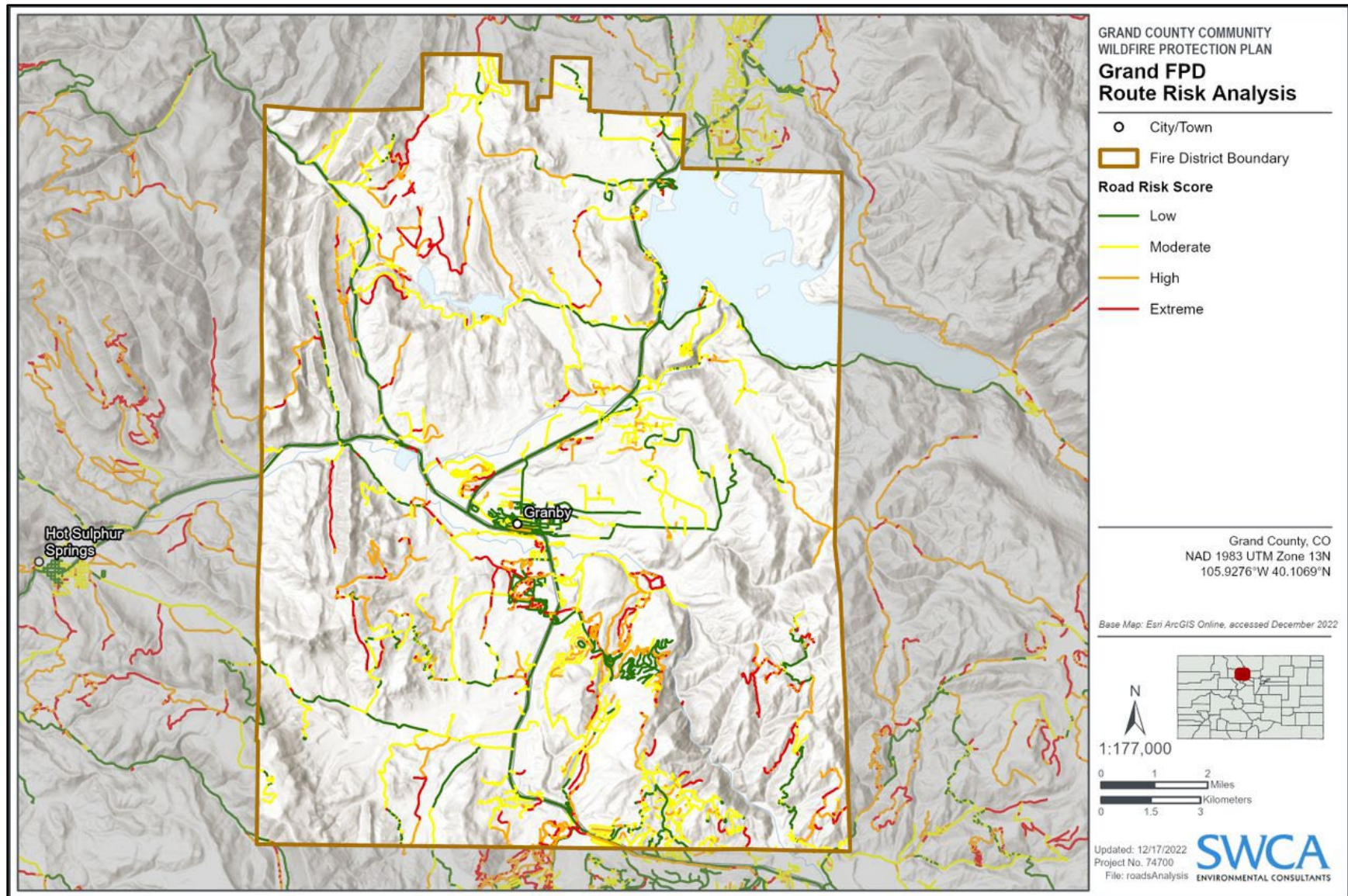


Figure 2.16. Grand FPD No. 1 route risk-hazard analysis.

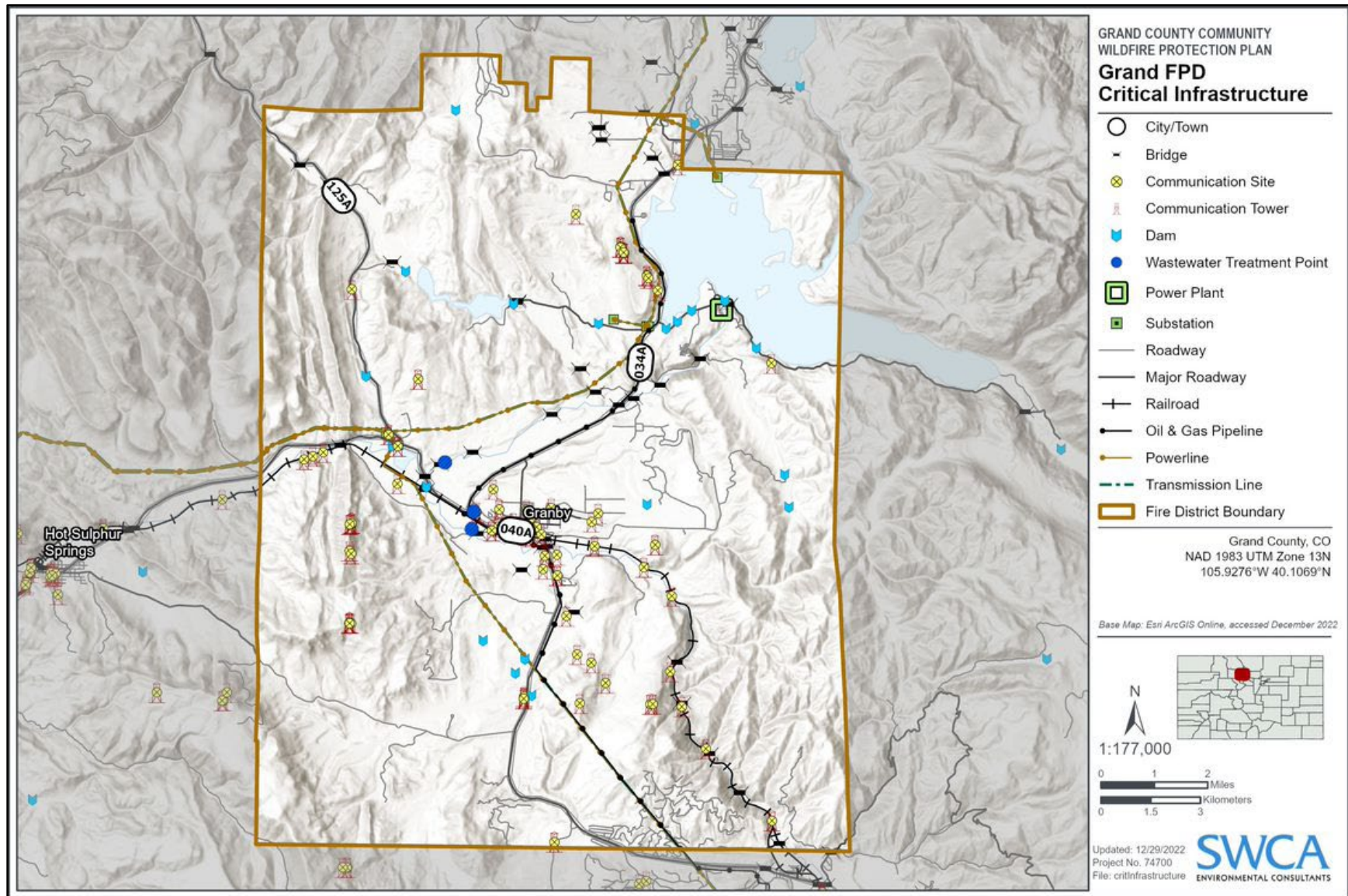


Figure 2.17. Grand FPD No. 1 critical infrastructure.

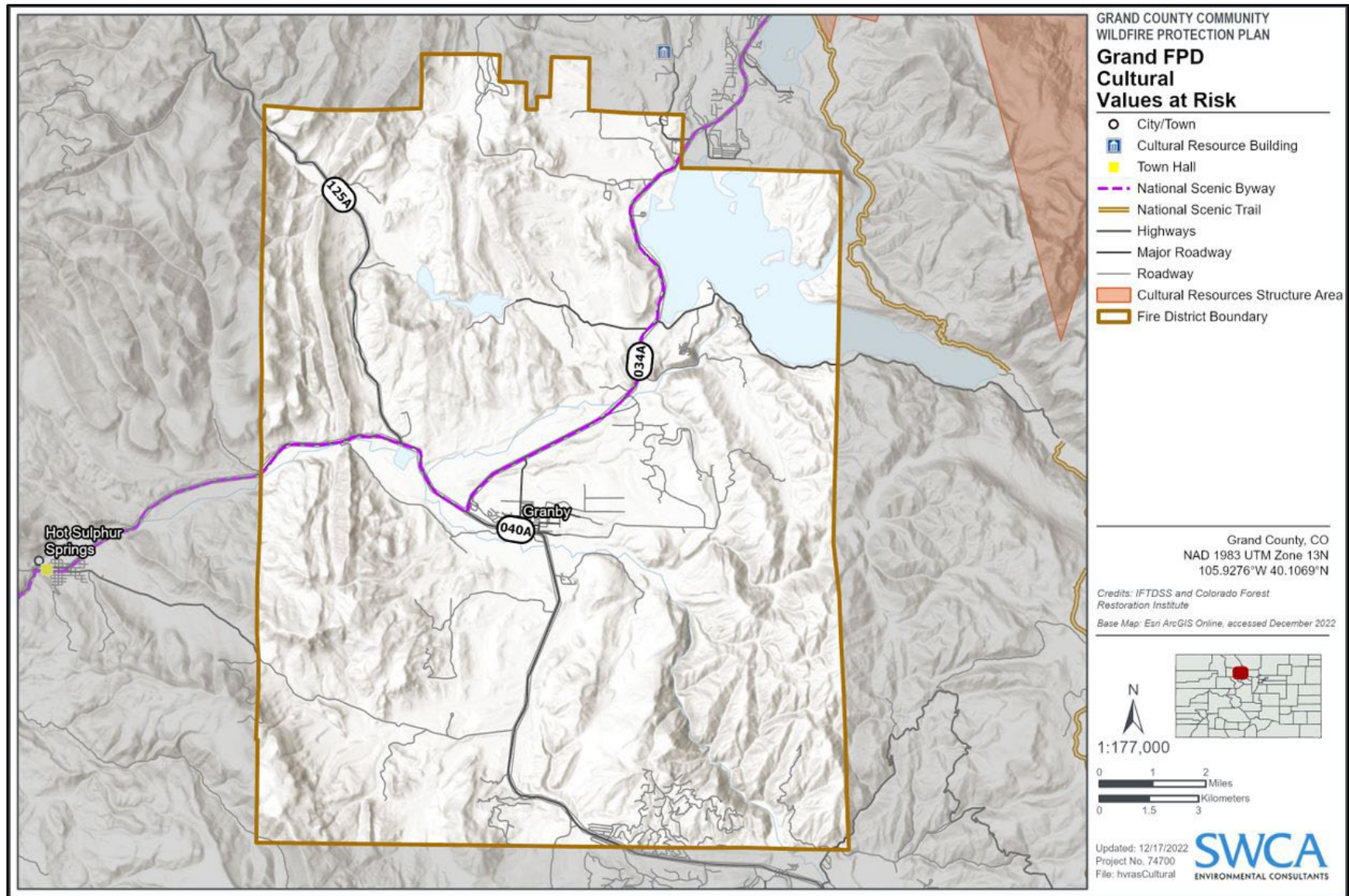


Figure 2.18. Grand FPD No. 1 cultural values at risk.

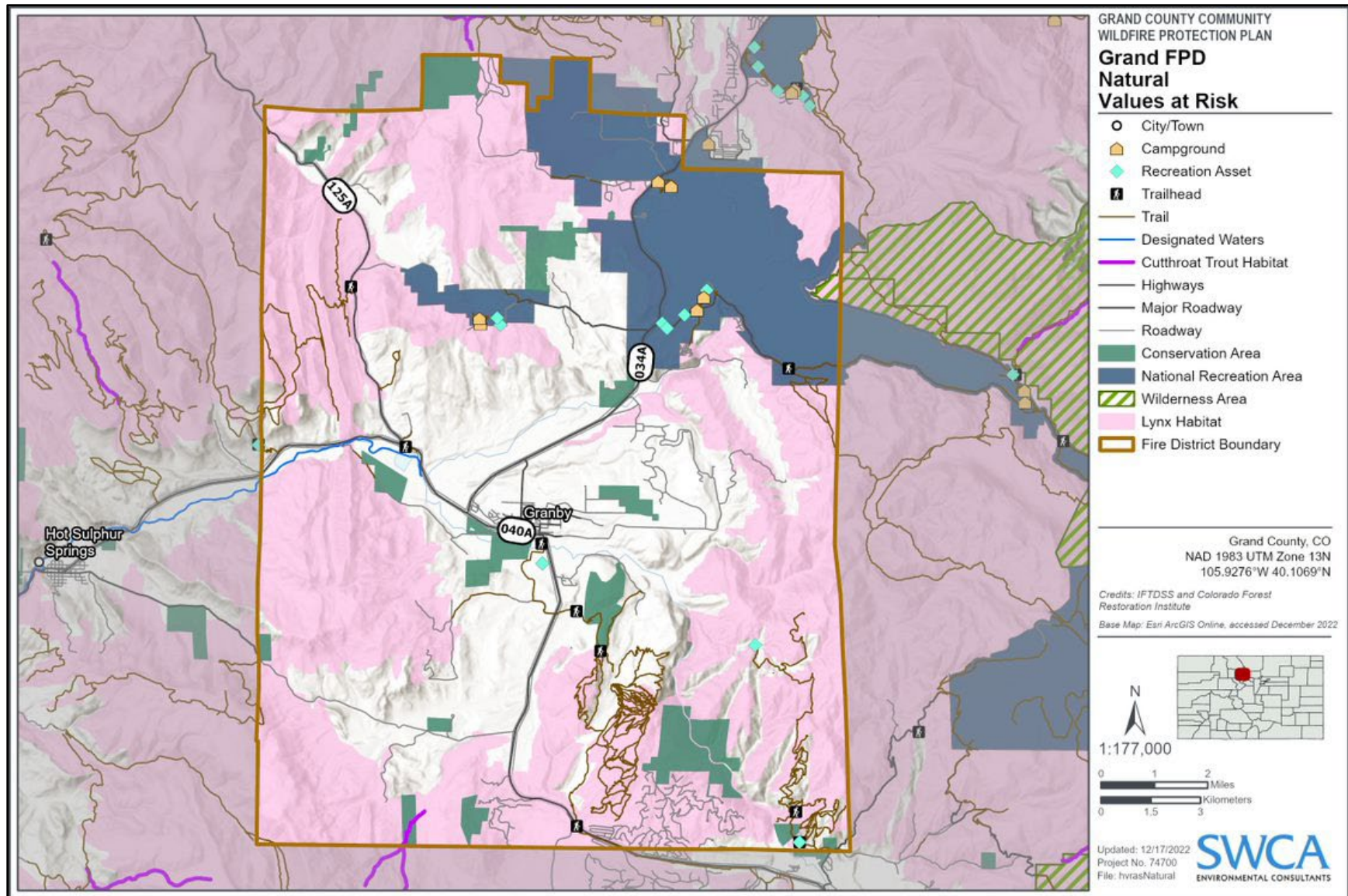


Figure 2.19. Grand FPD No. 1 natural values at risk.

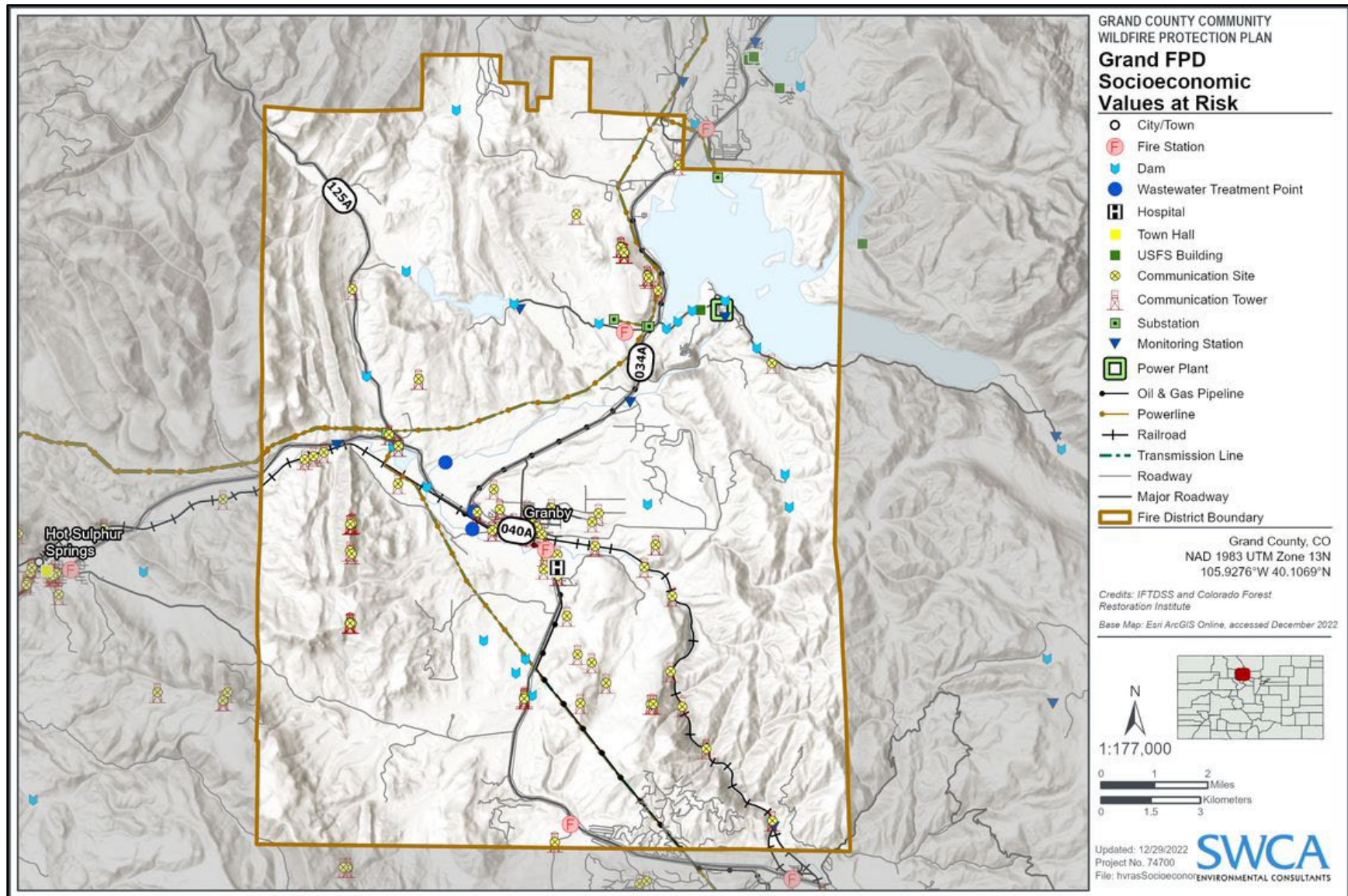


Figure 2.20. Grand FPD No. 1 socioeconomic values at risk.

Public Education and Outreach Programs

The Grand FPD No. 1 regularly engages with the public through outreach activities such as holiday events, open houses, and barbeques. The District's Facebook page announces upcoming events and can be accessed here: <https://www.facebook.com/grandfire1/>

The FPD's website also contains a wealth of information, including useful links, for residents on fire safety, wildland fire prevention, and emergency preparedness. The website can be accessed here: <https://grandfire.org/prevention-education>

Policies, Regulations, Ordinances, and Codes

Please refer to the most recent County General Plan for recent information regarding local policies, ordinances, regulations, and codes.

Mitigation Projects and Prioritizations

All mitigation projects applicable to the community, including relevant information such as responsible parties, possible funding sources, priorities, project description, etc., broken into three CWS tables.

Table 2.5. Recommended Projects for Creating Resilient Landscapes (Fuel Reduction Projects) in the Grand Fire Protection District No. 1

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|-----------------------|--------|------------------|---------------------|---|--|--|--|--|---|--|
| Grand FPD No. 1 RL #1 | | M | 0-5 years | Wildfire risk reduction for homes and communities in high and extreme risk areas throughout the FPD | Fire Protection District Communities to prioritize include Granby, Highlands/Pole Creeks, Highway 125, Homestead Hills, Southern Grand Lake, Sun Outdoors, Tabernash, Trail Creek, and West Granby | Local, state, and federal agencies. Fire Protection District. | <p>Prioritize wildfire risk reduction and fuel treatments in high-risk communities. Wildfire risk is heightened in forest fuels and grass-shrub fuels.</p> <ul style="list-style-type: none">Continue existing treatment projectsImplement new treatment project, where needed.Monitor and assess old treatments and determine need for retreatment.Collaboratively identify forests, vegetation and fuels management needs based on the risk/hazard assessment.Aim for 300-foot shaded fuel breaks around communitiesLocate parcels on private and public lands where targeted fuel treatments can be performed that will connect and maximize the effectiveness of needed, planned, and/or pre-existing treatments. Parcels located in forested ex-urban areas should be prioritized (e.g., Homestead Hills).Work should emphasize the following: reducing potential for grass and shrub fires (especially along busy roadways); reducing standing dead trees (lodgepole, spruce, and aspen), removing ladder fuels, and reducing fuel loading in understory.Utilize mechanical fuel reduction treatments in more populated areas. Consider prescribe burns (including burn piles) in less populated areas. | Improve forest health, reduce wildfire risk within the WUI, and reduce risk to life and property | <p>Annual review of completed projects including project description and amount of land treated</p> <p>Assessment and monitoring of current and future conditions</p> <p>Ongoing monitoring of completed projects</p> | <ul style="list-style-type: none">Building Resilient Infrastructure and Communities (BRIC) GrantsNational Fire Plan (NFP) GrantsWildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |
| Grand FPD No. 1 RL #2 | | M | 0-5 years | Improve fuel treatment capabilities | Grand FPD No. 1 | Private, CSFS, and local FPD | <ul style="list-style-type: none">Develop equipment needs to accomplish work (including maintenance) and pursue funding opportunities for purchase.Cultivate and support partnerships with NGOs and volunteer groups to support implementation of projectsEncourage citizens to proactive in reducing fire risk in their communities and on their propertyShare resources (equipment and people) with other local FPDs.Seek out funding to employ greater personnel within the FPD to support these projects. | Increase ability to address wildfire mitigation projects | <p>Conduct inventory of current equipment</p> <p>Conduct community outreach to gain volunteer support</p> | <ul style="list-style-type: none">BRICNFPWildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|-----------------------|--------|------------------|---------------------|--|--|--|--|--|--|---|
| Grand FPD No. 1 RL #3 | | | | Continue old and implement new fuel treatments in Areas of Concern (AOC) | Refer to AOC map in Chapter 4 (figure 4.2) | USFS, Private, CSFS, and local FPD | Areas of concern typically need greater attention and display heavy fuel loading with high to extreme wildfire risk. Land management and access (e.g., Wilderness area) could prevent more aggressive actions. <ul style="list-style-type: none">Consider prescribed burning program.Align timber and forest management objectives with wildfire risk reduction.Restore natural fire regimes in wilderness areas.Consider land use and pre-existing land management designations when designing treatments. | Protect local communities Improve forest health | Implement and design treatment protocols and management objectives in AOC | <ul style="list-style-type: none">Colorado Healthy Forests and Vibrant Communities ActForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |
| Grand FPD No. 1 RL #4 | | H | 0-5 years | West U.S. Highway 34 roadside fuel reductions | North of Grand Lake to Granby | Private, Grand FPD No. 1, CDOT, Federal agencies | Road ROW vegetation improvements to ensure road remains open during an emergency and functions as a fuel break. <ul style="list-style-type: none">Perform regular maintenance of Highway ROW vegetation and fuels.Treat surface fuels along roadways to create a 50ft buffer with little to no fire potential.Consider removing dead trees within 100 feet of roadside to reduce potential for hazard trees.Control for invasive species that may contribute to rapid fire spread (i.e., weeds and grasses) along roadsides.Consider use of herbicide or manual methods to control fine, flashy fuels (e.g., weeds and grasses).Utilize regular mowing to controls surface fuels along roadsidesTreatment areas should prioritize primary access points to ensure egress routes are maintainedTreatment areas should also focus on steep areas of the road so they can reduce the potential fast rates of spread and tall flames.Increase public education about potential of roadside ignitions and causes (e.g., pulling over/parking in tall grass, cigarette litter, sparks, etc.) | Maintain a primary ingress and egress route. Reduce potential for roadside ignitions/ Create effective fuel breaks/ Reduce risk to life and property. | Implement and design a pretreatment assessment protocol. Develop and implement a post treatment assessment and monitoring protocol. Monitoring should focus on the regeneration of hazardous fuels and the establishment of invasive species Monitoring should also analyze causes of roadside ignitions and then take appropriate mitigation actions | <ul style="list-style-type: none">BRICNFPRCPFirewise GrantsSFA and VFA2022 Infrastructure Investments and Jobs ActForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|-----------------|--------|------------------|---------------------|---|------------------|--|---|--|--|--|
| Grand FPD No. 1 | | L | 0-5 years | East Lake Granby WUI forest health improvements, wildfire risk reduction, and watershed protection. | East Lake Granby | Federal, state, and local agencies. Fire Protection District. | <p>The East Lake Granby area has considerable wildfire risk.</p> <ul style="list-style-type: none">• Collaboratively identify forest, vegetation, and fuels management needs based on the risk/hazard assessment.• Aim for 300-foot shaded fuel breaks around communities.• Locate parcels on private and public lands where targeted fuel treatments can be performed that will connect pre-existing treatments.• Combine timber stand improvement projects with fuel reduction projects to reduce cost and increase efficiency.• Consider mechanical and chemical removal of fine, flashy invasive species, which could contribute to high rates of spread. Treatments should prioritize areas fuels loading near homes and structures.• Develop equipment needs to accomplish work (including maintenance) and seek funding for purchase.• Create educational opportunities for landowners/mangers to address wildfire risk reduction.• Cultivate and support partnerships with NGOs and volunteer groups to support implementation of projects.• Focus fuel treatments upslope of important watersheds. Efforts should focus on reducing wildfire severity and mitigating post wildfire erosion. Areas with steep slopes, potential for high severity fire, and soils prone to erosion (e.g., gravelly and sandy soils) should be prioritized.• Conduct fire recovery monitoring efforts in upslope watersheds.• Assess local water quality and implement restoration/rehabilitation work where appropriate (e.g., areas experiencing substantial erosion, or lack of revegetation regeneration). | <p>Improve forest health, reduce wildfire risk within the WUI, and reduce risk to life and property.</p> <p>Restore landscapes impacted by East Troublesome Fire</p> <p>Mitigate post wildfire damages to local watersheds</p> <p>Create and maintain accountability with local landowners</p> | <p>Implement and design a post treatment assessment monitoring protocol.</p> <p>Post-treatment monitoring should focus on the regeneration of hazardous fuels and the establishment of invasive species</p> <p>Assessment of post-fire conditions</p> <p>Collaboration with post-fire experts and relevant land managers</p> | <ul style="list-style-type: none">• Building Resilient Infrastructure and Communities (BRIC) Grants• National Fire Plan (NFP) Grants• Firewise Grants• Regional Catastrophic Preparedness (RCP) grants• 2022 Infrastructure Investments and Jobs Act• USFS Community Assistant Funds Adjacent to National Forest• State Fire Assistance (SFA) and Volunteer Fire Assistance (VFA) programs• Colorado Healthy Forests and Vibrant Communities Act• Forests to Faucets (CFRI and Denver Water)• Forest Restoration & Wildfire Risk Mitigation (CSFS)• Wildfire Mitigation Incentives for Local Government (CSFS)• Wildfire Mitigation Resources & Best Practices (CSFS) |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|-----------------------|--------|------------------|---------------------|--|----------------------------|--------------------------------------|--|---|--|--|
| Grand FPD No. 1 RL #6 | | M/L | 5-10 years | Strawberry area WUI forest and rangeland health improvements and wildfire risk reduction | Strawberry Ranch areas | Private, USFS, BLM, CSFS, local FPD. | <p>The Strawberry region is generally characterized as grass-shrub rangelands with some lodgepole and aspen forests. Highest risk areas occur on steep slopes and where rangelands transition to forests.</p> <ul style="list-style-type: none">• Collaboratively identify forest, rangeland, vegetation, and fuels management needs based on the risk/hazard assessment.• Aim for 300-foot shaded fuel breaks around communities.• Locate parcels on private and public lands where targeted fuel treatments can be performed that will connect and maximize effectiveness of planned and pre-existing treatments.• Monitor post-wildfire recovery and implement work where needed rehabilitation.• Combine timber stand improvement projects with fuel reduction projects to reduce cost and increase efficiency.• Consider mechanical and chemical removal of fine, flashy invasive species, which could contribute to high rates of spread.• Consider mechanical fuel reduction project for larger fuels to reduce fuel buildup within the WUI (e.g., dead trees and down woody debris).• Prioritize reducing hazardous fuels next to homes and structures. | <p>Create resilient landscapes and reduce potential for extreme wildfire behavior</p> <p>Improve forest health, reduce wildfire risk within the WUI, and reduce risk to life and property.</p> <p>Create and maintain accountability with local landowners.</p> | <p>Implement and design (a post treatment assessment monitoring protocol.</p> <p>Post-treatment monitoring should focus on the regeneration of hazardous fuels and the establishment of invasive species</p> <p>Assessment of post-fire conditions</p> | <ul style="list-style-type: none">• Building Resilient Infrastructure and Communities (BRIC) Grants• National Fire Plan (NFP) Grants• Firewise Grants• Regional Catastrophic Preparedness (RCP) grants• 2022 Infrastructure Investments and Jobs Act• State Fire Assistance (SFA) and Volunteer Fire Assistance (VFA) programs• Colorado Healthy Forests and Vibrant Communities Act• Forest Restoration & Wildfire Risk Mitigation (CSFS)• Wildfire Mitigation Incentives for Local Government (CSFS)• Wildfire Mitigation Resources & Best Practices (CSFS) |
| Grand FPD No. 1 RL #7 | | H | 0-5 years | Blue Ridge forest health Improvements and wildfire risk reduction | Blue Ride (west of Fraser) | Private, USFS, BLM, CSFS, local FPD. | <p>Consider a landscape-level fuel treatment approach. The region primarily has forest fuels. Significant lodgepole die-off from bark beetles.</p> <ul style="list-style-type: none">• Create fuel breaks. Clear overhanging dead/dying trees and ladder fuels from side of larger roads at strategic landscape positions (e.g., ridgetops). Consider a 50ft buffer along high-risk roads.• Collaboratively identify vegetation and fuels management needs based on the risk/hazard assessment.• Utilize prescribed fire (where appropriate) and timber sales to reinforce natural fuel breaks. Prescribed fire should be used sparingly due the large degree of dead trees. | <p>Create resilient landscapes and reduce potential for extreme wildfire behavior</p> <p>Create and maintain accountability with local landowners</p> | <p>Implement and design a post treatment assessment monitoring protocol.</p> <p>Post-treatment monitoring should focus on the regeneration of hazardous fuels and the establishment of invasive species</p> | <ul style="list-style-type: none">• NFP• Firewise• RCP• SFA and VFA• Colorado Healthy Forests and Vibrant Communities Act• Forest Restoration & Wildfire Risk Mitigation (CSFS)• Wildfire Mitigation Incentives for Local Government (CSFS)• Wildfire Mitigation Resources & Best Practices (CSFS) |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|-----------------------|--------|------------------|---------------------|--|--|------------------------------------|--|--|---|--|
| Grand FPD No. 1 RL #8 | | | | Continue old and implement new fuel treatments in Areas of Concern (AOC) | Refer to AOC map in Chapter 4 (figure 4.2) | USFS, Private, CSFS, and local FPD | Areas of concern typically need greater attention and display heavy fuel loading. Land management and access (e.g., Wilderness area) could prevent more aggressive actions. <ul style="list-style-type: none">Consider prescribed burning program.Align timber, forest, and rangeland management objectives with wildfire risk reduction.Restore natural fire regimes in wilderness/roadless areas and prioritize treatments outside of wilderness.Consider land use and pre-existing land management designations when designing treatments. | Protect local communities Improve forest health | Implement and design treatment protocols and management objectives in AOC | <ul style="list-style-type: none">Colorado Healthy Forests and Vibrant Communities ActForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |

Table 2.6. Recommendations for Creating Fire-Adapted Communities (public education and structural ignitability)

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------------------|--------|------------------|---------------------|--|--|-----------------------------|---|--|--|--|
| Grand FPD No. 1 FAC #1 | | | | Monitor and Enforce Defensible Space Standards | Notable communities listed with inadequate defensible space include Granby, Highlands/Pole Creek, Homestead Hills, Southern Grand Lake, and Sun Outdoors | Private, local FPD, County | <ul style="list-style-type: none">Continue and/or create a defensible space program. Include pre-determined inspection frequency and education/outreach efforts.Consider adhering to CSFS recommended defensible space standards (e.g., enforce 100 ft of defensible space) if not already following it.Prioritize removal of ladder fuels.Work with insurance companies to determine the potential to provide incentives for defensible space associated with reduced insurance premiums.Consider green waste pickup/disposal options.Plan and account for unresponsive and non-compliant secondary homeowners. | Reduce loss of life and structures through defensible space. | Annual program evaluation and updates as necessary. Consider updates to the building code, where needed | <ul style="list-style-type: none">FirewiseFP&S (FEMA)EPA Environmental Education GrantsCWDGBRICWildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------------------|--------|------------------|---------------------|---|--|---|---|---|--|--|
| Grand FPD No. 1 FAC #2 | | | | Encourage and provide opportunities for homeowners to fire harden their homes | Notable communities that could have improved home hardening include Granby, Highlands/Pole Creek, Highway 125, Homestead Hills, Southern Grand Lake, Sun Outdoors, Tabernash, Trail Creek, and West Granby | Private, County Planning Commission, Local FPDs, HOAs, and community leaders | <ul style="list-style-type: none">• Ensure new homes/structures are made with non-combustible materials (i.e., encourage structural hardening).• Encourage retrofitting pre-existing homes/structures.• Efforts should aim to reduce the occurrence of combustible siding materials, wooden fences, wooden roofs, and wooden side decks.• Pursue grants and incentives to make efforts affordable. | Reduce risk to life and property. | Annual assessment of property owner outreach success. Annual collaborative meetings to align goals and planning between agencies and stakeholders. Updates to municipal ordinances as needed. | <ul style="list-style-type: none">• Wildfire Mitigation Incentive for Local Government (CSFS)• Firewise Grants• FP&S• CWDG• EPA Environmental Education Grants• Wildfire Mitigation Resources & Best Practices (CSFS) |
| Grand FPD No. 1 FAC #3 | | | | Improve evacuation zone education and outreach | Fire Protection District | Federal, State, and Local agencies. Fire Protection Districts Grand County Wildfire Council | <ul style="list-style-type: none">• Develop and distribute public education and outreach materials concerning evacuation zones and routes and best practices.• Provide handouts on preparing “Go Bags” – an emergency supply bag that can be accessed in cases of evacuation• Utilize common information resources to spread information on evacuation best practices and routes such as social media, news, nextdoor, twitter, and others.• Engage HOA’s and neighborhoods in community-specific education.• With all partners, develop evacuation exercises and practice runs for incident pre-planning purposes.• Familiarize public with FEMA’s Integrated Public Alert and Warning System (IPAWS)• Communicate CodeRED red to county residents and visitors (e.g., flyers at recreation sites and relevant weblinks). Encourage people to register their phone number• Communicate the role the Emergency Alert System (EAS) to County residents, homeowners, and visitors (e.g., flyers and relevant weblinks).• Encourage partners (tv and radio stations) to display EAS messages.• Explore opportunities to enhance the reverse 911 system. | Ensure public and first responder safety in the event of a wildfire or other emergency. | Develop and distribute a survey to understand and adapt best practices for communication and teaching. Assess and adapt methodologies and current information annually to ensure information is up to date. | <ul style="list-style-type: none">• FEMA Building Resilient Infrastructure and Communities Grants• USFS Community Wildfire Defense Grant• FEMA FP&S Grants• Wildfire Mitigation Incentive for Local Government (CSFS)• Firewise Communities Grants X |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|------------------------|--------|------------------|---------------------|--|--------------------------|---|--|--|---|--|
| Grand FPD No. 1 FAC #4 | | | | Identify funding sources for underserved homeowners and vulnerable populations | Fire Protection District | Fire Protection District, HOA's, community leaders Grand County Wildfire Council | <ul style="list-style-type: none">Identify vulnerable populations (elderly, disabled, low income) and underserved homeowners who may need additional help to mitigate home hazards and to evacuate during a wildfire.Seek grant opportunities to support assistance for relevant populations. | Protect life and property of the most vulnerable members of the community | Annual review of number of actions taken to address vulnerable populations and underserved homeowners | <ul style="list-style-type: none">BRICFirewise grantsNational Urban and Community Forest ProgramChallenge Cost Share Grant ProgramCommunity Wildfire Defense Grants |
| Grand FPD No. 1 FAC #5 | | | | Public outreach and education aimed at reducing human-caused wildfire | Fire Protection District | Local, State, and Federal agencies Grand County Wildfire Council | <p>Inform and educate the public about methods to reduce human-caused wildfire ignitions.</p> <ul style="list-style-type: none">Educate around sources of human-caused wildfire ignitions (e.g., driving through or parking in tall, dry vegetation; discarded cigarette butts; fireworks; campfires, etc.).Communicate hazardous conditions surrounding homes/structures (e.g., exposed propane tanks, electrical hazards, hazard trees, limited defensible place, etc.)Provide materials with resources for the public to understand how and with what funding they can take action to reduce risks.Utilize Appendix G of the CWPP: Homeowner Resources | <p>Recue risk of human-caused wildfire ignitions.</p> <p>Educate citizens about wildfire hazards.</p> <p>Empower local communities and visitors.</p> | <p>Track successes and learnings from outreach campaigns and enact changes with each wildfire season.</p> <p>Assess and utilize current popular information sources such as nextdoor, social media, news outlets, and more.</p> | <ul style="list-style-type: none">Wildfire Mitigation Incentive for Local Government (CSFS)Firewise Communities GrantsWildfire Mitigation Resources & Best Practices Grants (CSFS)EPA Environmental Education GrantsFEMA BRIC Grants |

Table 2.7. Recommendations for Safe and Effective Wildfire Response

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|-----------------------|--------|------------------|---------------------|---|---|-----------------------------|--|---|---|---|
| Grand FPD No. 1 FR #1 | | | | Asses select roads for fire access improvement (improve community ingress and egress) | Notable communities that have narrow, steep, and unpaved roads include Granby, Highlands/Pole Creek, Highway 125, Homestead Hills, Southern Grand Lake, Sun Outdoors, Tabernash, Trail Creek, and West Granby | Private, municipal, County | <ul style="list-style-type: none">Prioritize road improvements in high population areas with potentially hazardous road conditionsIncrease width of roads where appropriateProvide increased locations for truck turnaroundsConsider pavement for higher traffic volume roads | <p>Provides for safe and effective wildfire response capabilities</p> <p>Provides safe and effective means of evacuation in case of emergencies</p> | <p>Assessment of current road conditions</p> <p>Regular monitoring and maintenance to ensure roads are drivable for emergency response vehicles</p> | <ul style="list-style-type: none">BRICNFPRCPFirewise Grants2022 Infrastructure Investments and Jobs ActForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|-----------------------|--------|------------------|---------------------|---|---|---|---|---|---|--|
| Grand FPD No. 1 FR #2 | | | | Increase number of available water sources for fire suppression | Notable communities that may have limited water supplies for fire suppression include Highway 125, Trail Creek, and West Granby | Private, municipal, county, neighboring landowners/managers | <ul style="list-style-type: none">Map out and delineate nearest available and reliable water sources (e.g., fire hydrants, creeks, streams, pools, ponds, etc.) that can be used in emergency scenarios within an online GIS application.Improve existing fire flows in remote areas to meet fire flow requirementsMake sure fire flows in new developments meet fire flow requirementsInstall water tanks where feasible. In locations water tanks cannot be installed, have tanks filled and pre-loaded to be transported to areas of need in the event of a fireInstall hand pumps or other methods independent of the grid for accessing private well water | Provides for safe and effective wildfire response capabilities Increases resilience of local communities | Detailed assessment of currently available water resources | <ul style="list-style-type: none">BRICNFPRCPFirewise Grants2022 Infrastructure Investments and Jobs ActForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |
| Grand FPD No 4 FR #3 | | | | Add a wildland fire division to the FPD | Fire Protection District | County, state | <ul style="list-style-type: none">Add additional hired wildland staff to jointly operated divisions (e.g., East Grand FPD No. 4 and/or Hot Sulphur Springs/Parshall FPD No. 3).If a crew cannot be hired, have a designated volunteer division. | Increase wildfire suppression capabilities | Required funding and additional equipment | <ul style="list-style-type: none">2022 Infrastructure Investments and Jobs ActForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS)Volunteer Fire Assistance (VFA) Grant (Colorado DFPC) |
| Grand FPD No 4 FR #4 | | | | Improve street signage to ease fire response navigation | Notable communities that could improve ease of navigation include Highlands/Pole Creek, and other needed locations. | Private, municipal, county | <ul style="list-style-type: none">Install reflective street signs and house numbersEnsure roadside view of street signs and house numbers is not obstructed | Helps ensure safe and effective wildfire response capabilities | Assessment pf current conditions Outreach to property owners | <ul style="list-style-type: none">BRICNFPRCPFP&SFirewise GrantsForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |

ANNEX 3

GRAND LAKE FIRE PROTECTION DISTRICT NO. 2

Organization and Jurisdiction

The Grand Lake Fire Protection District (FPD) jurisdictional boundaries extend from the neighborhoods surrounding the north end of Lake Granby and encompassing Shadow Mountain and Grand Lakes, north to the Lake of the Clouds and Fairview Curve Viewpoint along Highway 34. Its boundaries also extend east and west along Highway 34 outside neighboring wilderness boundaries (Figure 3.1). The FPD is responsible for responding to incidents across nearly 201 square miles ranging in elevation from 7575 ft river bottoms to 11715 ft montane regions. The FPD's land is managed and owned predominately by the National Parks Service, followed by Forest Service, Private Landowners, BLM, and the Bureau of Reclamation (Figure 3.2) Grand Lake FPD No. 2 response district encompasses the town of Grand Lake, the north end of Lake Granby, Rocky Mountain National Park, Arapaho National Recreation Area, the eastern portion of Arapaho National Forest, the Colorado River and North Inlet corridors, Grand Lake, and Shadow Mountain Lake. The FPD has three response facilities.

Outside of the town of Granby, higher population density areas within the FPD include the north shore of Lake Granby around Cutthroat Bay, the town of Grand Lake, the areas surrounding Shadow Mountain Reservoir and Grand Lake, and along Highway 34. Grand FPD No. 1 contains one main transportation corridor - U.S. Highway 34. Across its entire jurisdiction, the FPD includes 3723 buildings and has a building density of 44.94 units per square mile.

WUI Area Description

The wildland urban interface (WUI) is composed of both interface and intermix communities and is defined as areas where human habitation and development meet or intermix with wildland fuels (U.S. Department of the Interior and U.S. Department of Agriculture [USDA] 2001:752–753). Interface areas include housing developments that meet or are in the vicinity of continuous vegetation. Intermix areas are those areas where structures are scattered throughout a wildland area where the cover of continuous vegetation and fuels is often greater than cover by human habitation. WUI is further delineated through buffers and with a Low, Medium, High, or Extreme classification based on fuels and slope steepness. Buffers are derived from the general boundaries of where development meets wildland fuels, and higher assigned classifications correspond to greater presences of wildland fuels and steeper slopes.

The WUI in the East Grand Lake FPD No. 2 is extensive and contains significant quantities of both interface and intermix development. The Southern portion of the FPD, including the area surrounding Grand Lake, falls within a 2.5-mile WUI buffer, and the Southwestern portion of the FDP lies within a 1 mile WUI buffer (Figure 3.3). Similar to areas classified as extreme in our Risk-Hazard Assessment (Figure 3.5), WUI classified as extreme lies primarily in the upper elevation reaches of ecotone zones where sagebrush steppe completes its transition into stands of lodgepole pine. These areas have a higher concentration of conifer stands that have yet to experience recent wildfire. This includes the community surrounding the Southern and Southeastern regions of Grand Lake (Southern Grand Lake) and those living along the Eastern edge of the 034A corridor (Northern Grand Lake; Figure 3.4). Both of the communities (Southern Grand Lake and Northern Grand Lake) are classified as high.

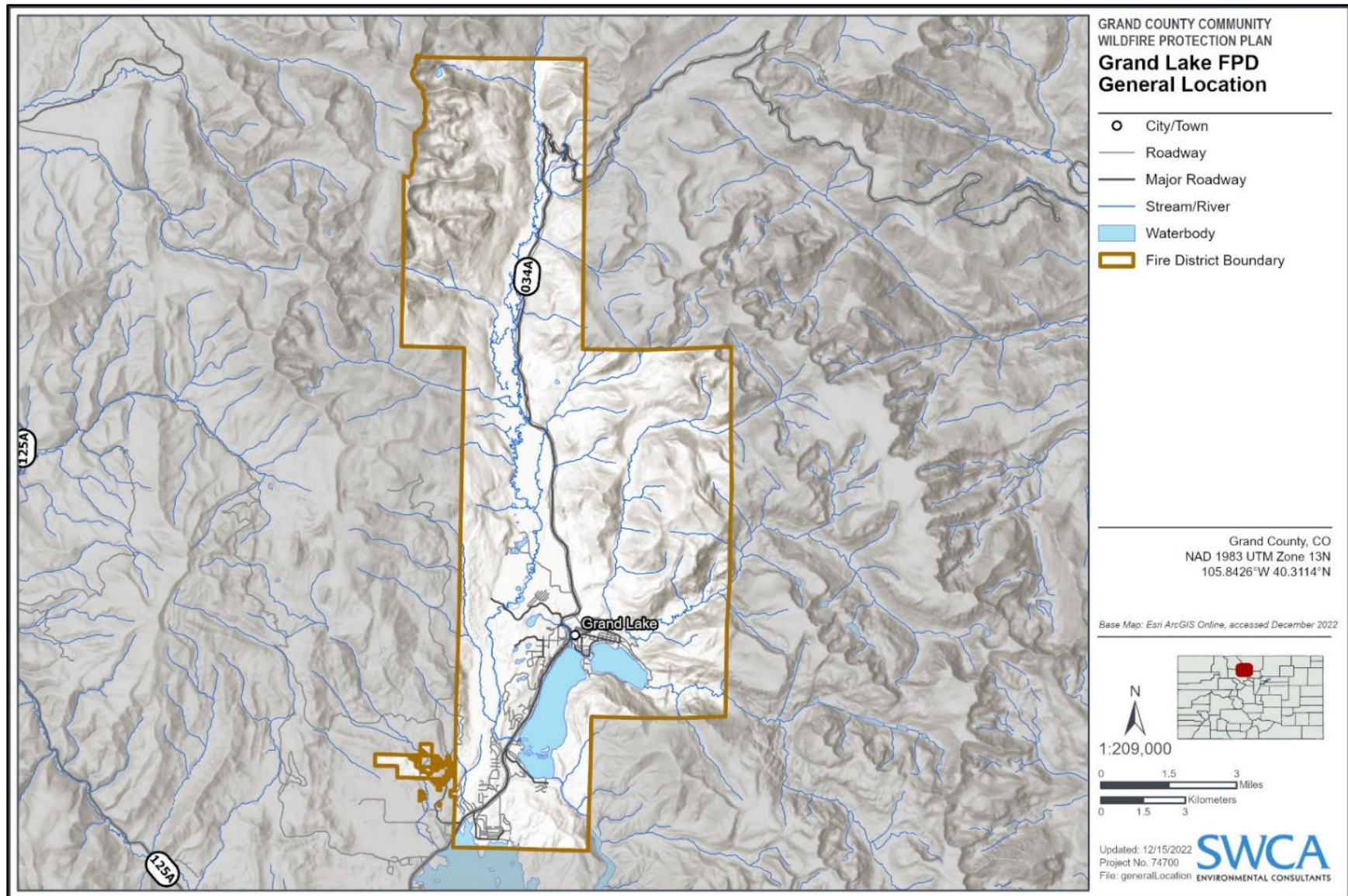


Figure 3.1. Grand Lake FPD No. 2.

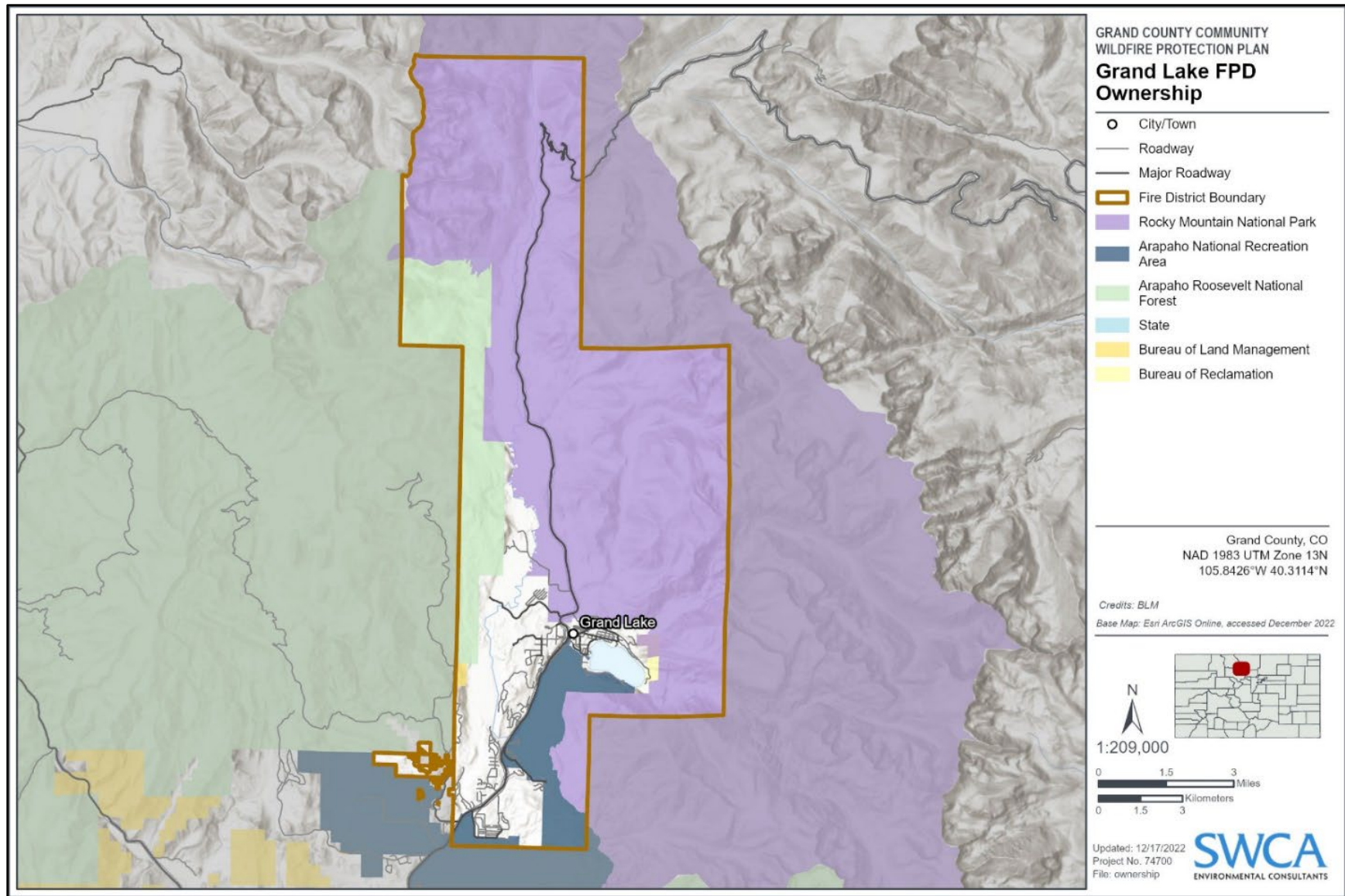


Figure 3.2. Grand Lake FPD No. 2 land ownership.

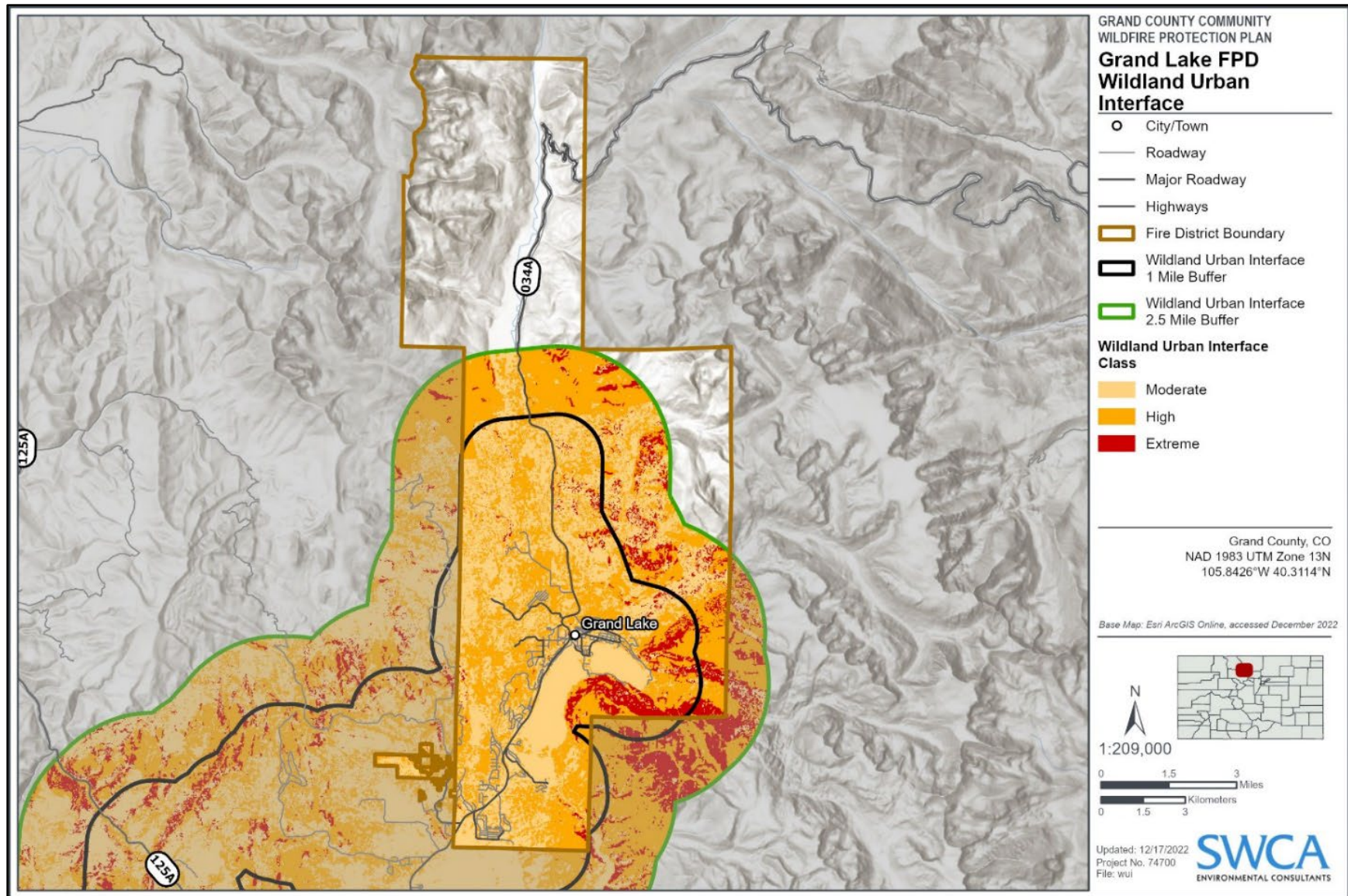


Figure 3.3. Grand Lake FDP WUI boundaries and associated risk.

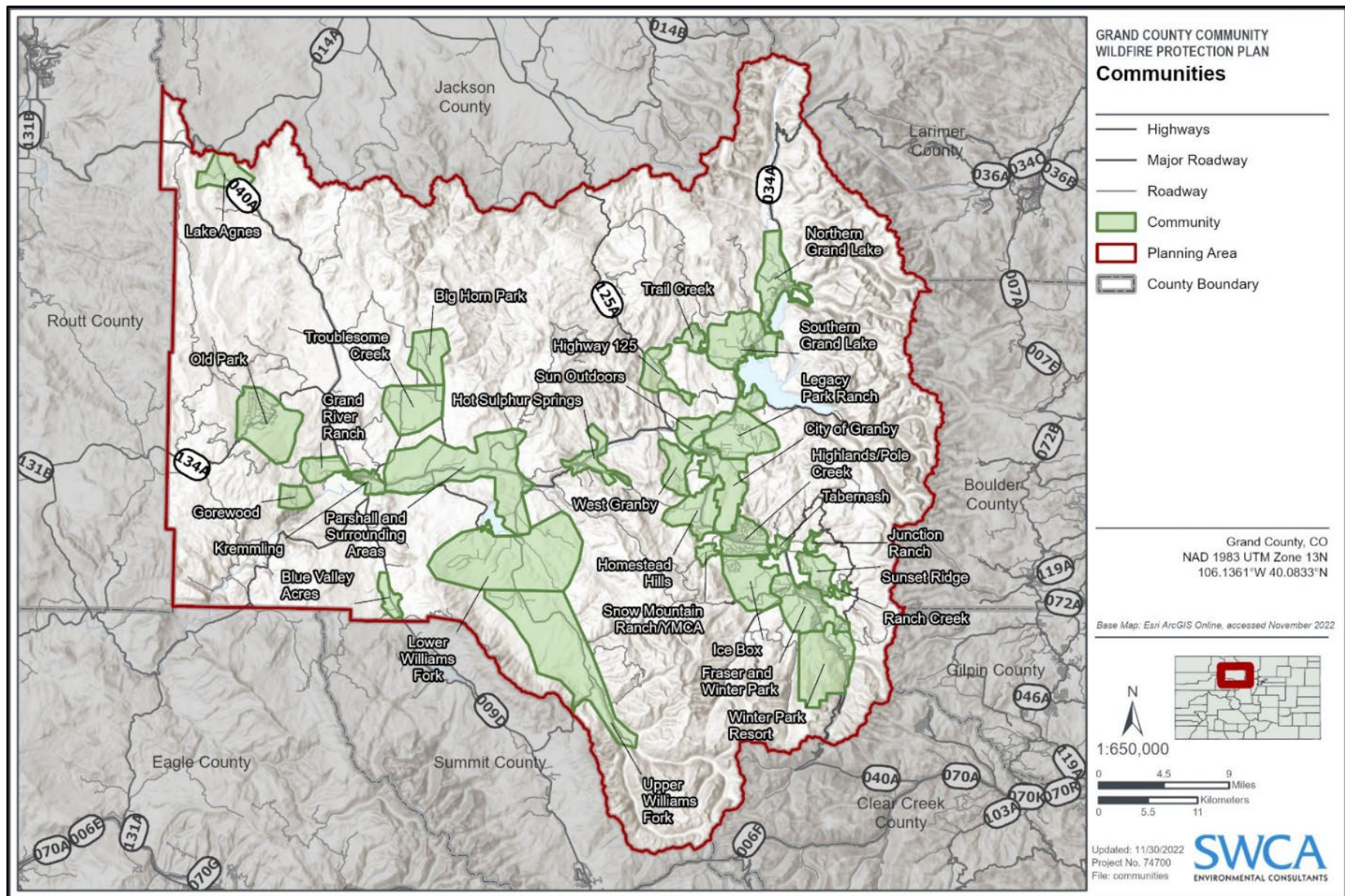


Figure 3.4. Grand County WUI communities.

Risk-Hazard Summary

The purpose of the Risk-Hazard Assessment is to evaluate and provide information pertaining to the risk of wildland fires within Grand Lake FPD No. 2 jurisdictional land. For more information on the Risk-Hazard Assessment purpose and process, see Chapter 3 of the Grand County CWPP. The Composite Risk-Hazard Assessment is twofold and combines a geographic information system (GIS) model of hazard based on fire behavior and fuels modeling technology and a Core Team-generated assessment of on-the-ground community hazards and values at risk (VARs).

The Risk-Hazard Assessment considers:

- Fire behavior modeling outputs
- Fire history
- HVRAs
- Fire response

Figure 3.5 contains a visual summary of the Grand Lake FPD No. 2 Risk-Hazard Assessment. Most of the high-risk areas identified are in unburned montane conifer forests along the fringes of inter-mountain basins. These include those surrounding Shadow Mountain, Mt. Bryant, Green Ridge, and Green Mountain. Most of the land within Grand Lake FPD No. 2 jurisdiction ranges from moderate to high risk. There are several low-risk areas within the fire district boundary, including Grand Lake, Shadow Mountain Lake, Columbine Lake, and Lake Granby.

Fire History

Large fires in Grand Lake FPD No. 2's boundaries were uncommon until recently. Although the FPD regularly responds to smaller structural and wildland ignitions (Figure 3.6), it wasn't until the East Troublesome Fire of 2020 that the FPD encountered a large wildland fire within its jurisdiction (Table 3.1, Figure 3.7).

Table 3.1. Large Wildland Fire History in Grand Lake FPD No. 2

| Fire Name | Location | Year | Acres Burned | Cause of Ignition |
|-----------------------|-----------------------|------|--------------------------------------|-------------------|
| East Troublesome Fire | Central region of FPD | 2020 | 193,813 (across all of Grand County) | Human |

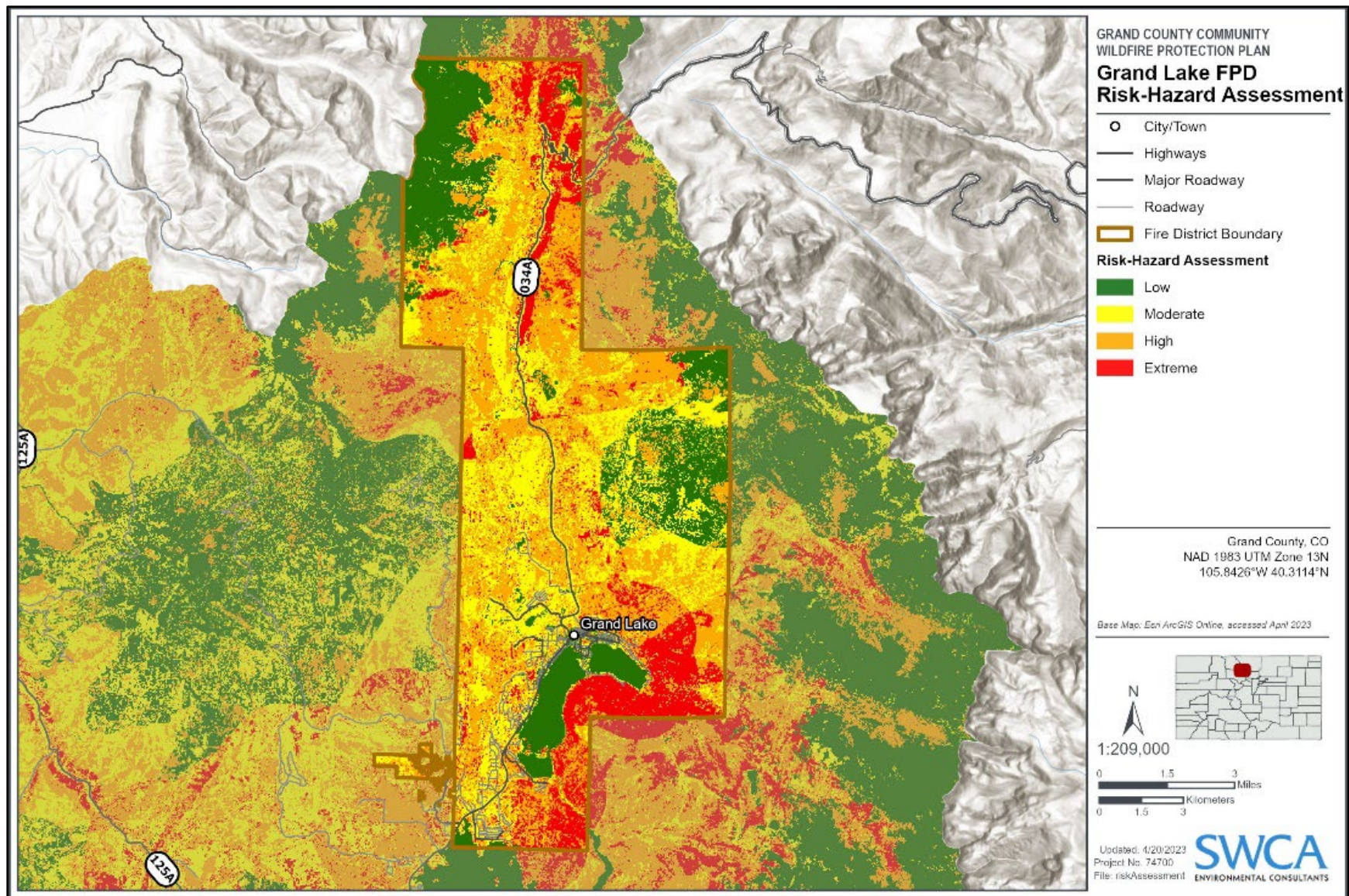


Figure 3.5. Grand Lake FPD No. 2 Risk-Hazard Assessment.

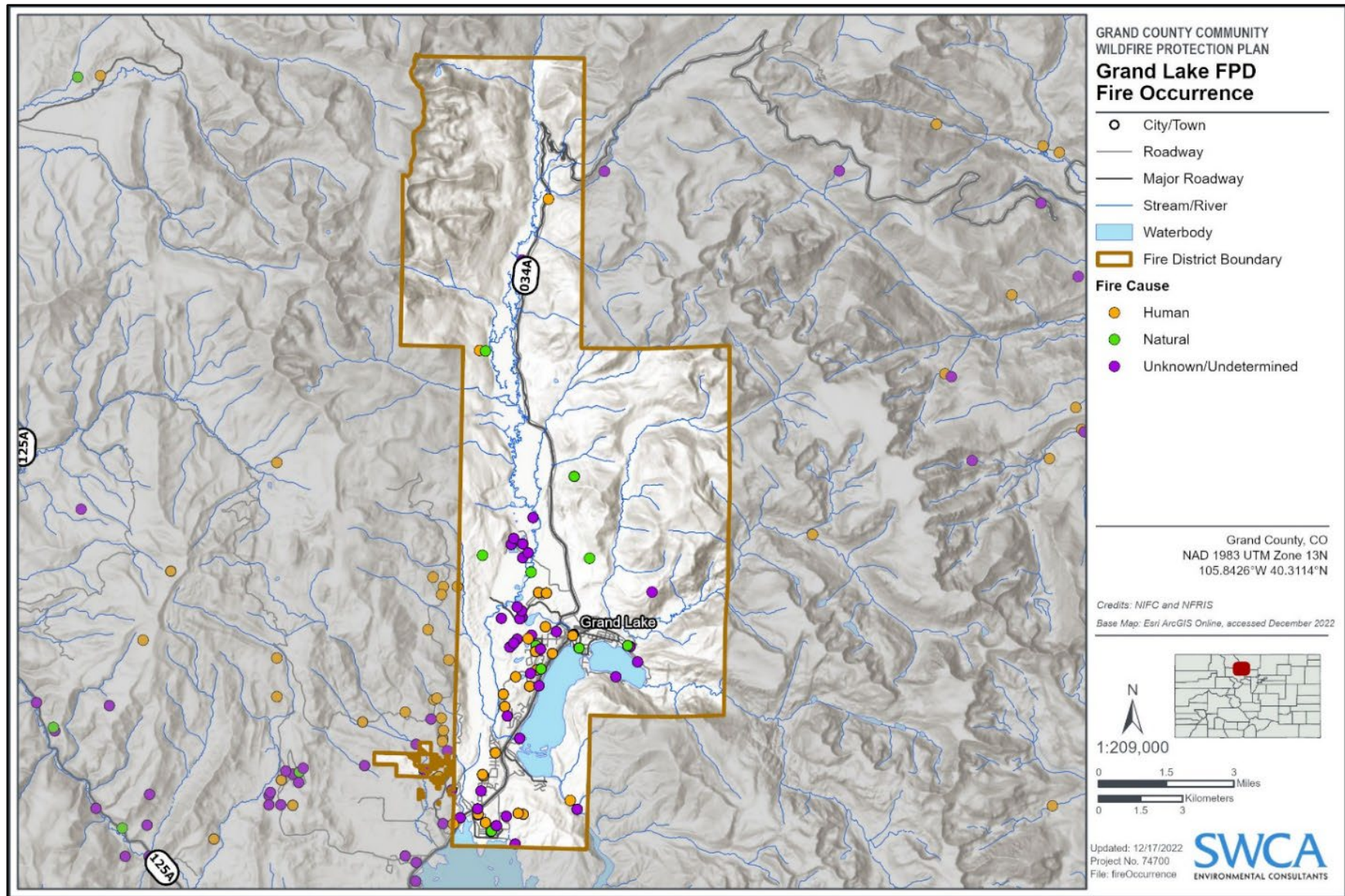


Figure 3.6. Grand Lake FPD No. 2 fire occurrence.

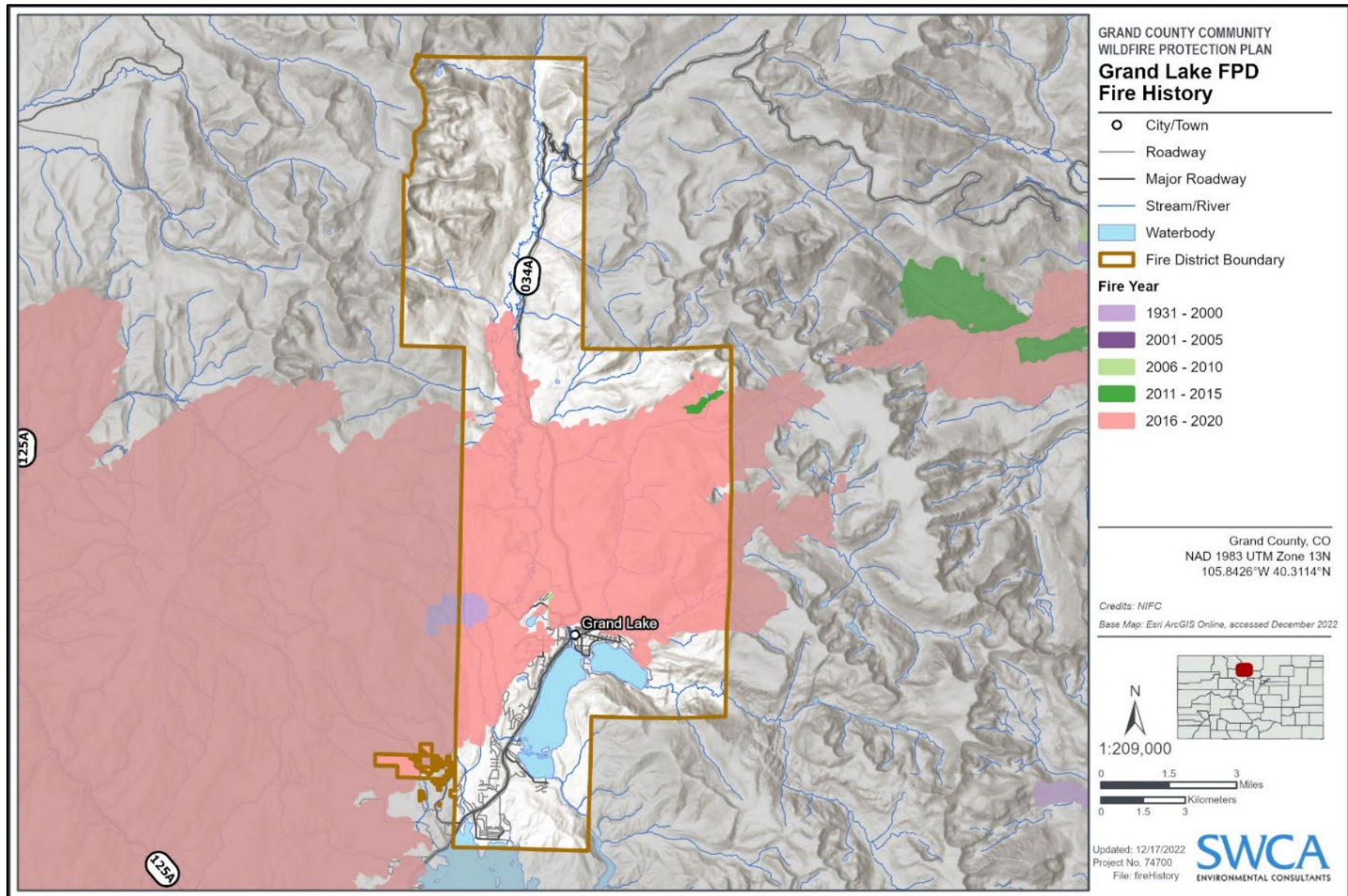


Figure 3.7. Grand Lake FPD No. 2 fire history.

Hazardous Fuel Characteristics

Fuels found within the Grand Lake FPD No. 2 jurisdiction are listed below in Table 3.2 and illustrated in Figure 3.8. Please see Chapter 2, Fire Environment, for more information regarding fuels within the County.

Table 3.2. Fuel Types (Scott and Burgan 2005) in Grand Lake FPD No. 2's Boundaries

| Existing Fuel Type | Acres | Percent |
|---|-------|---------|
| SB1 – Slash-blowdown, fine fuel load is 10 to 20 tons/acre, weighted toward fuels 1 to 3 inches diameter class, depth is less than 1 foot. Spread rate moderate; flame length low. | 9,347 | 17.63% |
| GS1 – Grass-shrub, shrubs are about 1 foot high, low grass load. Spread rate moderate; flame length low. | 6,541 | 12.34% |
| TU5 – Timber-understory, fuelbed is high load conifer litter with shrub understory. Spread rate moderate; flame length moderate. | 6,485 | 12.23% |
| TU1 – Timber-understory, fuelbed is low load of grass and/or shrub with litter. Spread rate low; flame length low. | 4,850 | 9.15% |
| TL5 – Timber-litter, High load conifer litter; light slash or mortality fuel. Spread rate low; flame length low. | 4,760 | 8.98% |
| TL3 – Timber-litter, Moderate load conifer litter. Spread rate very low; flame length low. | 4,046 | 7.63% |
| TL2 – Timber-litter, low load, compact. Spread rate very low; flame length very low. | 2,847 | 5.37% |
| NB8 – Non burnable open water | 2,064 | 3.89% |
| NB1 – Non burnable urban or suburban development; insufficient wildland fuel to carry wildland fire | 1,817 | 3.43% |
| GS2 – Grass-shrub, Shrubs are 1 to 3 feet high, moderate grass load. Spread rate high; flame length moderate. | 1,698 | 3.2% |
| NB9 : Bare ground. | 1,584 | 2.99% |
| TL1 – Timber-litter, light to moderate load, fuels 1 to 2 inches deep. Spread rate very low; flame length very low. | 1,423 | 2.68% |
| SH2 – Moderate shrub fuel load, depth about 1 foot, no grass fuel present. Spread rate low; flame length low. | 1,121 | 2.11% |
| GR1 – Grass, grass is short, patchy, and possibly heavily grazed. Spread rate moderate; flame length low. | 1,005 | 1.9% |
| GR2 – Grass, moderately coarse continuous grass, average depth about 1 foot. Spread rate high; flame length moderate. | 571 | 1.08% |
| Other* – Various fuel types | 146 | 0.26% |

*Other includes fuel types with <1% cover of the FPD. These include GR3, NB3, SH1, SH7, TL6, TL8, and TL9.

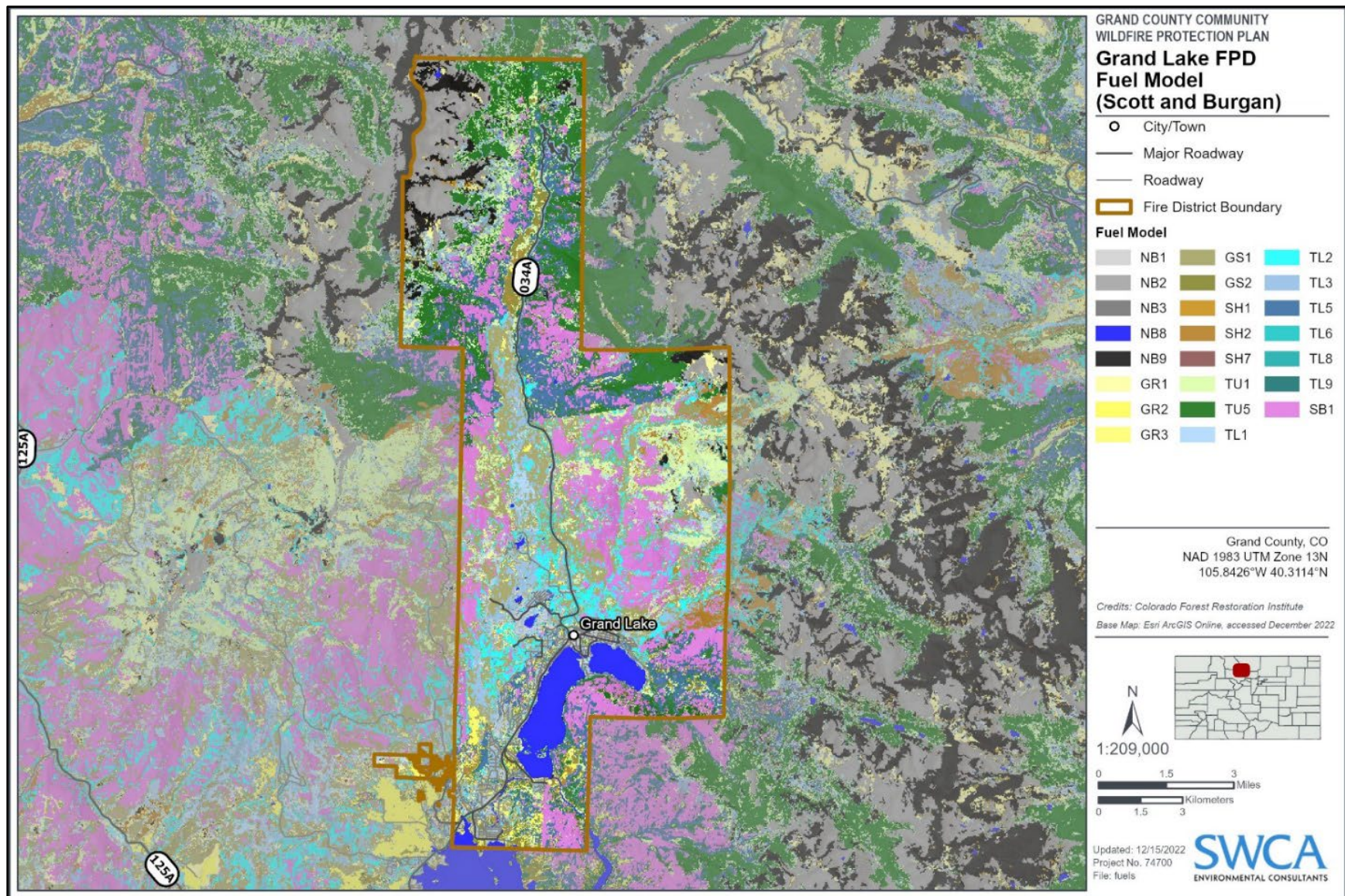


Figure 3.8. Grand Lake FPD No. 2 Scott and Burgan fuels model.

Neighborhood and Structural Characteristics

The FPD is accessible with 2+ roads in and out of the communities, and the nearest fire station is <5 miles from each community. Within the FPD, defensible space around structures is limited, and there are dense fuel loads in areas that were not affected by the East Troublesome fire in 2020. Water sources for suppression were visible throughout the communities, and street signs were visible and reflective. Table 3.3 and Figures 3.9, 3.10, and 3.11 below outline information on community specifics within the district.

Table 3.3. Grand Lake FPD No. 2 NFPA 1144 Assessment Results

| Community | Score | Rating | Fire Station | Positives | Negatives |
|---|-------|--------|--|--|---|
| Northern Grand Lake (Map C-44, Appendix C) | 101 | High | <ul style="list-style-type: none"> Grand Lake Fire Protection District No. 2 Station 2 – Columbine Grand Lake Fire Protection District No. 2 | <ul style="list-style-type: none"> 2+ roads in and out Reflective street signs Metal roof or asphalt shingle throughout Many structures >30 ft to slope Hydrants and water tanks throughout Station <5 mi from community | <ul style="list-style-type: none"> Limited turnarounds for fire trucks Limited defensible space In areas that remain unburned, dense fuel loads Combustible building materials |
| Southern Grand Lake *Also in Grand FPD No. 1 Boundary. (Map C-46, Appendix C) | 109 | High | Grand Lake Fire Protection District No. 2 Station 3 – Soda Springs | <ul style="list-style-type: none"> 2+ roads in and out Reflective street signs Metal roof or asphalt shingle throughout Fire hydrants Fire station <5 mi from community | <ul style="list-style-type: none"> Non-surfaced roads, >5% grade Limited turnarounds for fire trucks Limited defensible space Combustible building materials Many structures <30 ft to slope |



Figure 3.9. Landscape and fuels within Grand Lake FPD No. 2.



Figure 3.10 New construction in previously burned area.



Figure 3.11 Structure and road within the FPD.

Emergency Response Capacity

Grand lake Fire protection District provides fire and emergency response to the northeast portion of the county, including the town of Grand Lake and extending north to the boarder with Rocky Mountain National Park. The District staffs their stations 24/7 with a staff of 16 fulltime and 10 volunteer firefighters (GLFPD 2021). The main station is conveniently located in downtown Grand Lake off Hwy 34. Station two is located on county road 49, near Columbine Lake, while station three is south of Grand Lake on Hwy 34 (Figures 3.12 and 3.14). The District is part of an automatic aid agreement with the four other fire protections districts of the county.

GLFPD is equipped to respond to a variety of emergency situations and includes a dedicated wildland division to efficiently coordinate and respond to wildland fires and conduct inspections. The District maintains 2 type one engines, two type three engines, two type two water tenders, 1 aerial engine, 2 type six wildland engines, and two utility vehicles (GLFPD 2021; Table 3.4).

Table 3.4. Grand Lake FPD No. 2 Response Resources

| Fire Protection District Statistics: | | | | |
|---|----------------------|--------------------------------|-----------------|----------------------------------|
| <u>Fire Protection District:</u> Grand Lake Fire Protection District No. 2 | | | | |
| <u>Fulltime Firefighters:</u> 11 | | <u>On-call Firefighters:</u> 3 | | <u>Volunteer Firefighters:</u> 6 |
| <u>Water Tender:</u> | | <u>Wildland Engines</u> | | |
| Type 1: 0 | <u>Total Number:</u> | | <u>4WD/AWD:</u> | <u>Brush Breaker:</u> |
| Type 2: 2 | Type 3: 2 | | 2 | - |
| Type 3: 0 | Type 4: 0 | | 0 | 0 |
| <u>Structure Engines:</u> | | Type 5: 0 | 0 | 0 |
| Type 1: 2 | Type 6: 2 | | 2 | - |
| Type 2: 0 | Type 7: 0 | | 0 | 0 |
| <u>Port-A-Tanks:</u> 3 | | | | |
| <u>Portable Pumps:</u> 3 | | | | |
| <u>Fire Shelters:</u> 20 | | | | |
| Suggested Mitigation Focus Areas: | | | | |
| <u>Areas of Concern (Figure 3.13):</u> | | | | |
| <ul style="list-style-type: none">• West of Northern Grand Lake community, south of South Supply Rd. This area of concern is also within Grand FPD No. 1 northwest of the Trail Creek community.• Southeast area of FPD, southeast of Shadow Mountain Lake, east of Arapahoe Dr. The Colorado River runs through this area of concern, this area is also within Grand FPD No. 1.• Fire Department General Area of Concern: Mountain Shadow Estates. | | | | |
| <u>Fire Department Concerns:</u> | | | | |
| <ul style="list-style-type: none">• Needs for Defensible Space and Fuels Thinning. | | | | |

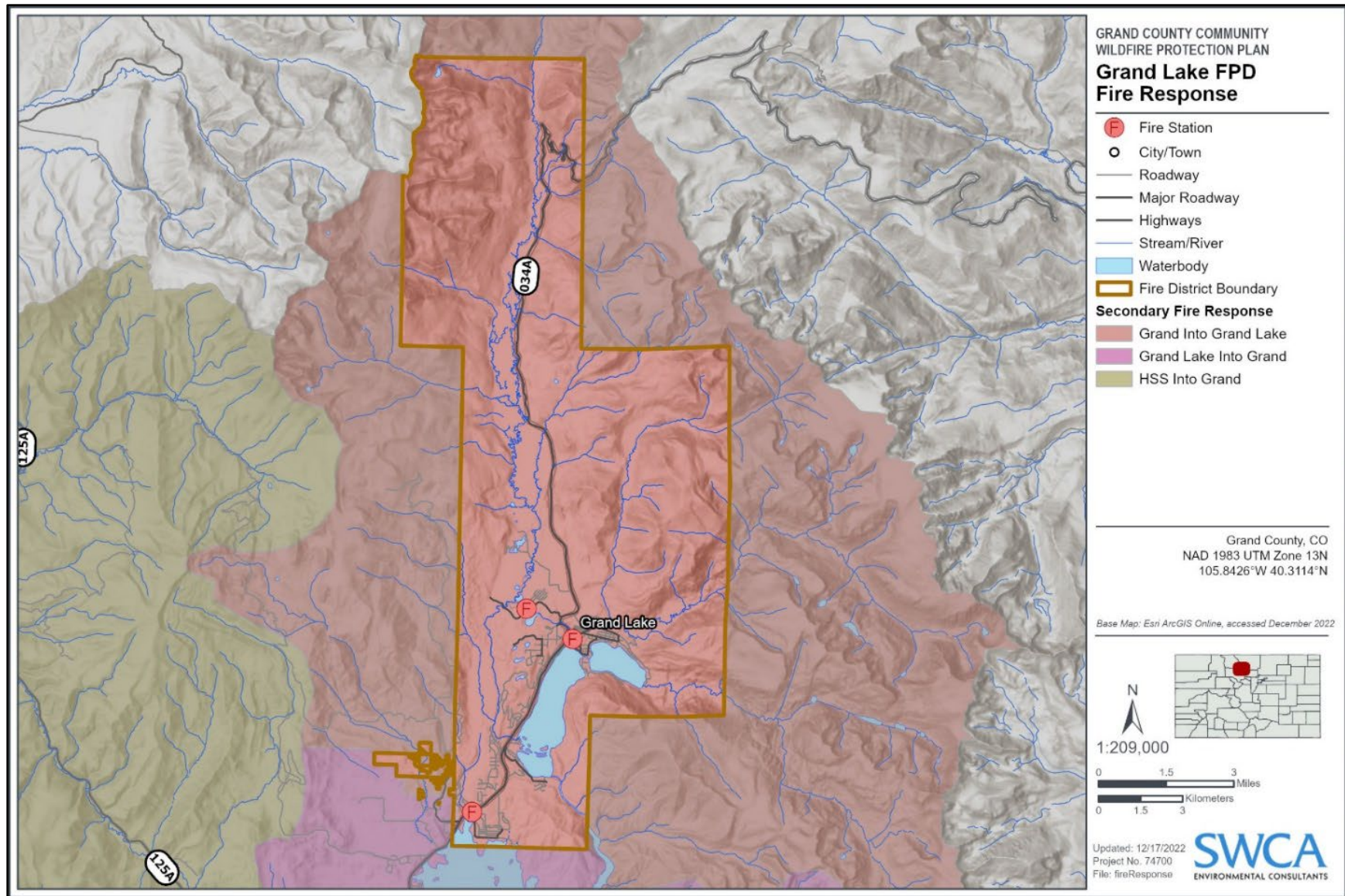


Figure 3.12. Grand Lake FPD No. 2s boundaries.

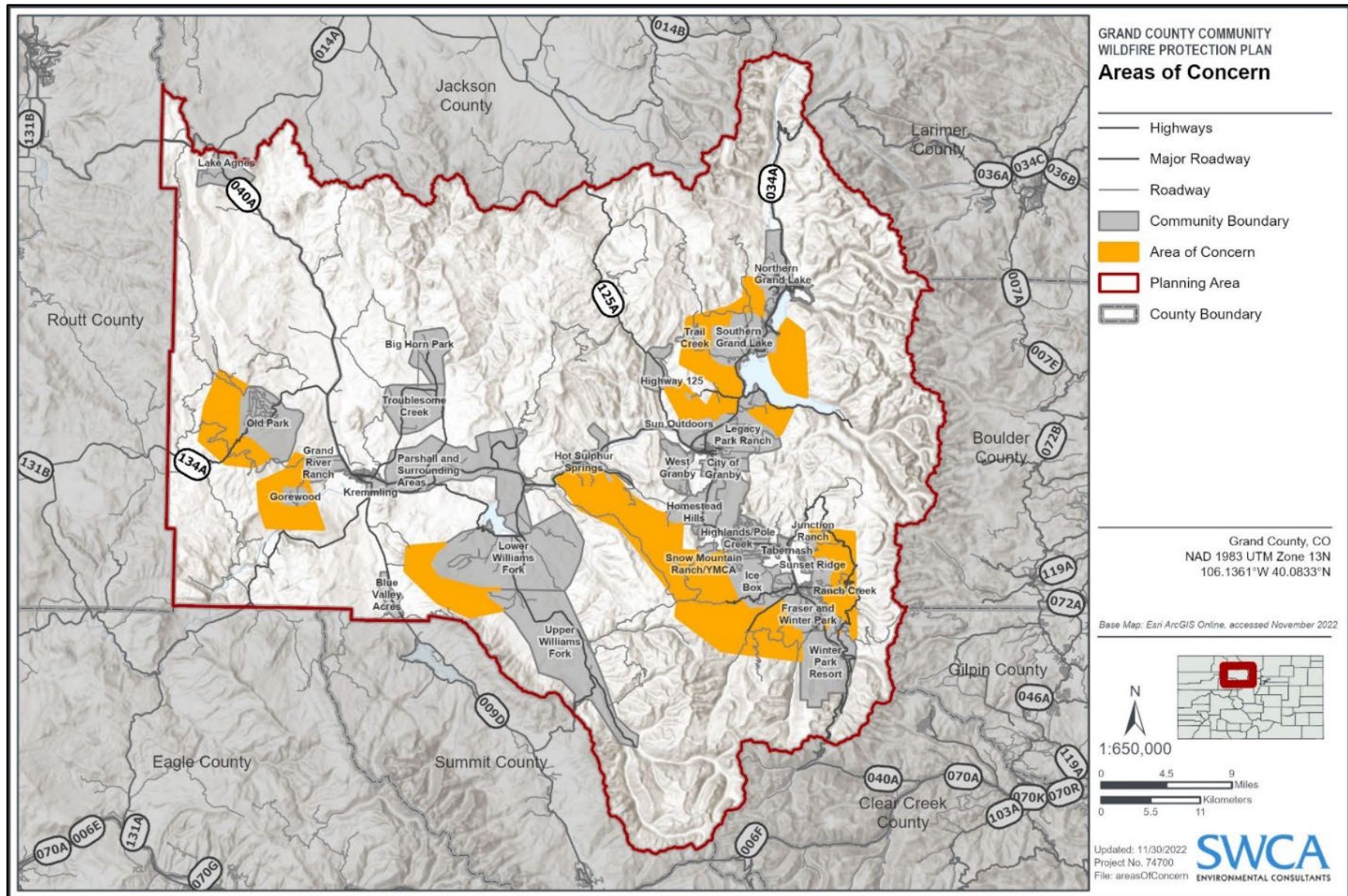


Figure 3.13. Grand County's identified areas of concern.

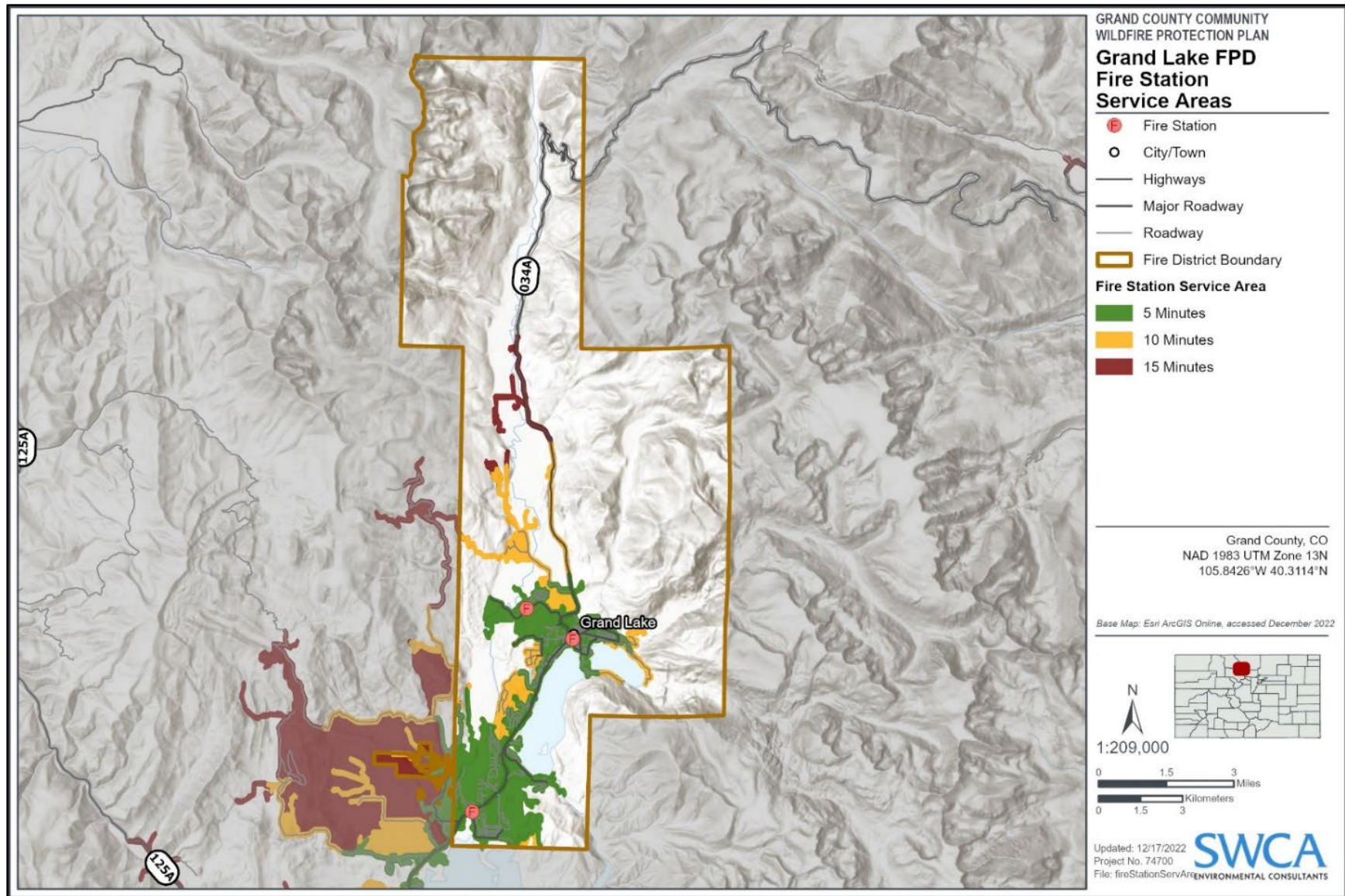


Figure 3.14. Grand Lake FPD No. 2's fire station service areas.

Evacuation

Evacuation relies on both cooperative planning and the capability of residents to effectively implement plans. In the event of an incident within the FDP that requires evacuation, the FPD Fire Chief is responsible for issuing an evacuation notice through appropriate communication pathways. However, if a wildfire occurs within the FPD that exceeds the District's response capabilities, the County Sheriff will act as the primary incident commander and be responsible for declarations of evacuation (GACC 2022). In many cases, pre-evacuation orders informing residents of potential upcoming evacuations will be distributed prior to evacuation orders. Residents will receive pre-evacuation and evacuation orders through the County's CodeRED system, Emergency Alert System (EAS), or Wireless Emergency Alert System (WEA). A county-wide evacuation map is also available through the County's website, and can be accessed here: <https://gcgeo.maps.arcgis.com/apps/webappviewer/index.html?id=ca4f74421b69416da9be1b9b92166534>

It is recommended that residents familiarize themselves with their evacuation zone and evacuation preparedness planning that can reduce strain on emergency response systems and crews during an incident. Additional information can be found in the Fire Response Capabilities section of Appendix B: Community Background and Resources.

Evacuation within the FPD has the potential to be complicated by road infrastructure. Many high and extreme risk roads within the District are narrow, steep, and winding with blind corners and few turnaround areas for larger vehicles. These can become congested and potentially dangerous if emergency response crews are attempting to respond to a wildfire that residents are evacuating from. Furthermore, many of these high and extreme risk roads in the FPD are also located in lodgepole pine forests, which can yield tall flame lengths and cause falling trees during a wildfire. These hazards can block potential escape routes and/or result in entrapment for commuter and emergency vehicles in the event of a wildfire. Residential, recreational, and ex-urban areas with high and extreme risk roads should take proactive approaches in their evacuation planning. This can include designating escape routes and implementing roadside fuel reduction projects. Areas with evacuation concerns in the Grand Lake FPD No. 2 are predominately ex-urban areas and include, but are not limited to, the road systems north of Grand Lake branching off the Rocky Mountain National Park entrance corridor, and in the neighborhoods around Shadow Mountain Reservoir (Figure 3.15).

Critical Infrastructure and Community Values at Risk

The Grand Lake FPD No. 2 boundaries encompass numerous cultural, natural, and socioeconomic values at risk. These include important water resources such as the Granby Pump Canal, Shadow Mountain Reservoir, Grand Lake, and the Adams Tunnel that are relied on by both the local community and Denver-metro area, power lines, campgrounds, communication towers, fish and wildlife habitat, frequently used trails, and much more. Figures 3.16, 3.17, 3.18, and 3.19 below provide an spatial representation of these values at risk.

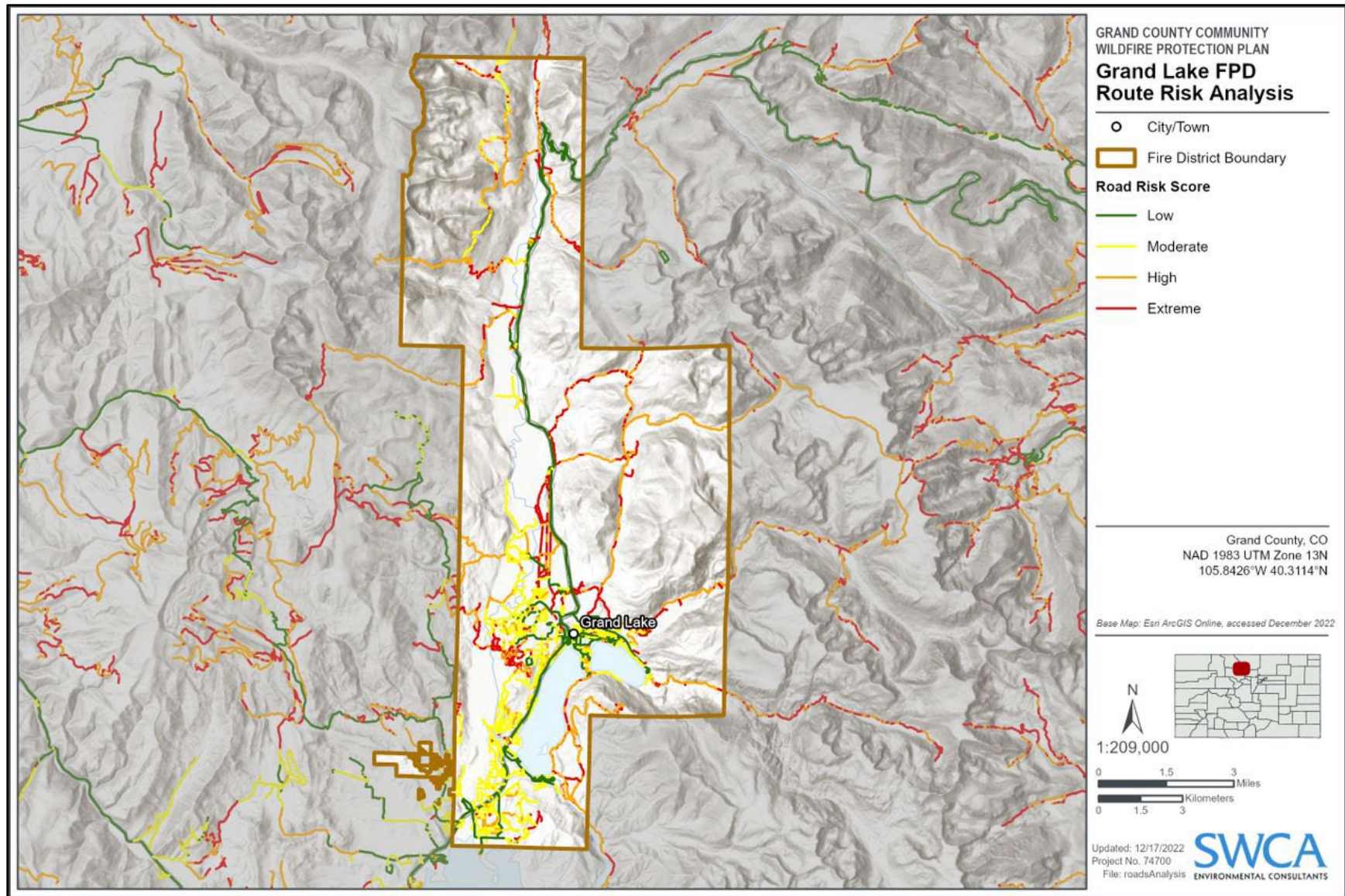


Figure 3.15. Grand Lake FPD No. 2 route risk-hazard analysis.

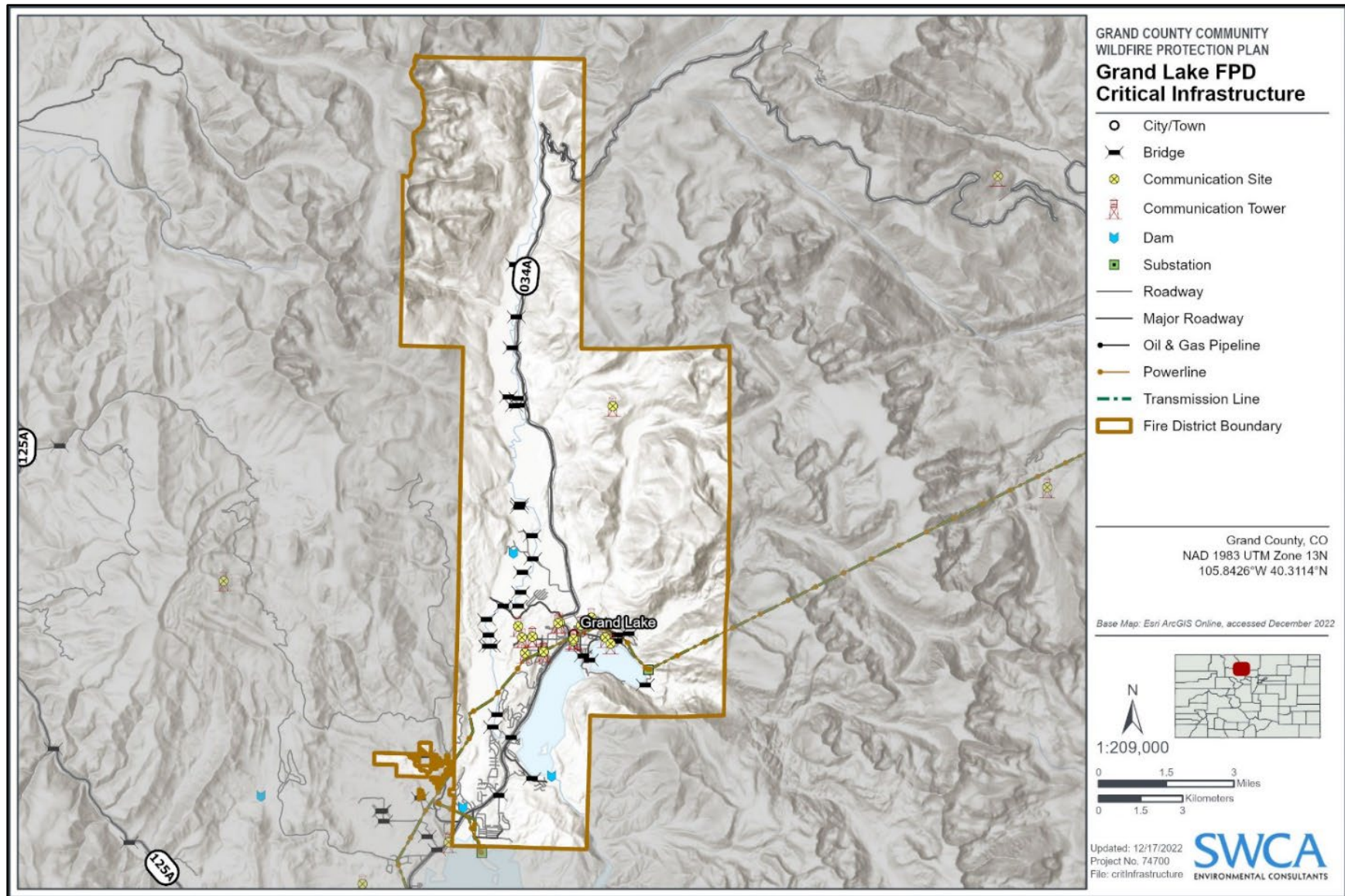


Figure 3.16. Grand Lake FPD No. 2 critical infrastructure.

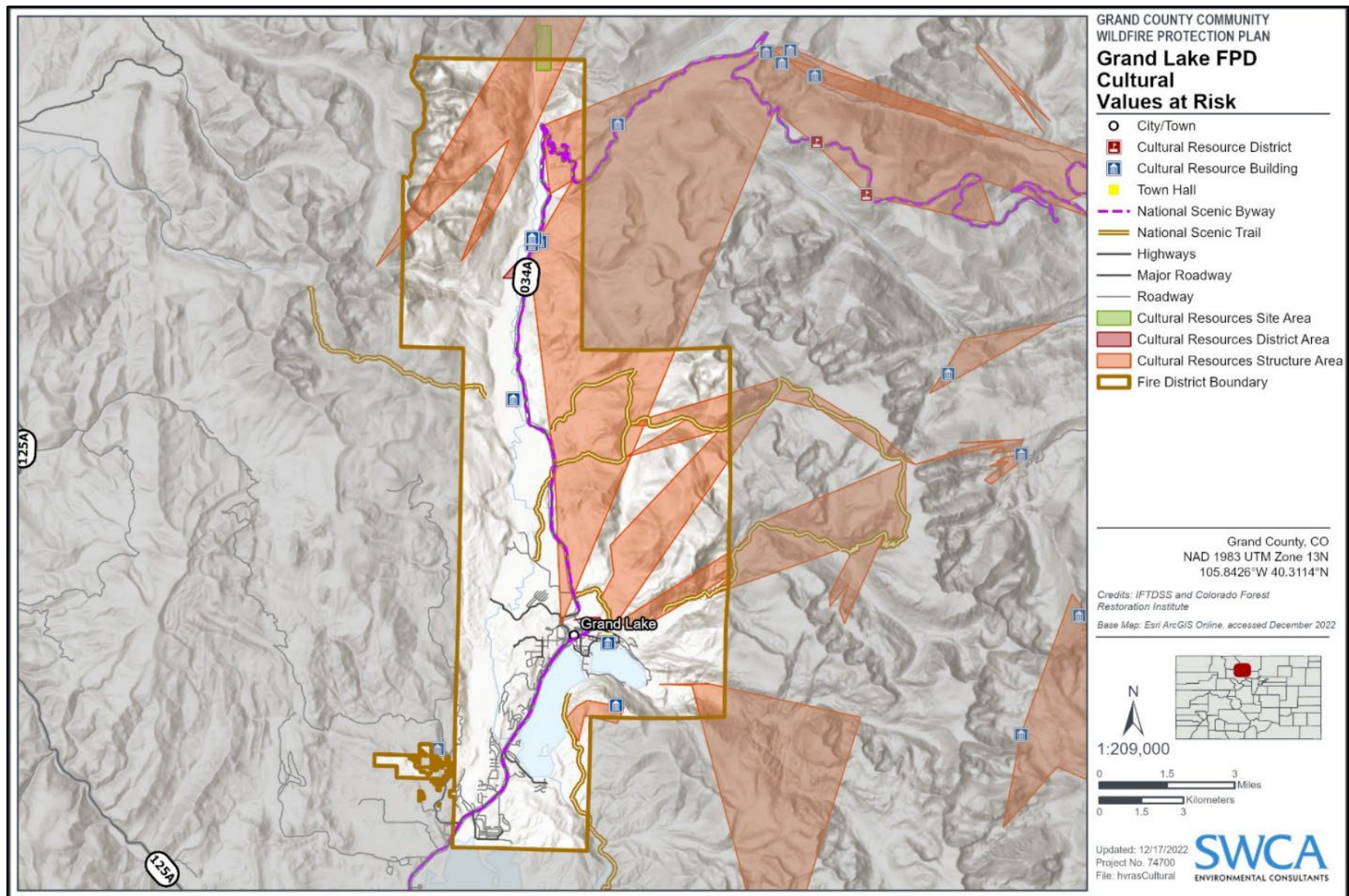


Figure 3.17. Grand Lake FPD No. 2 cultural values at risk.

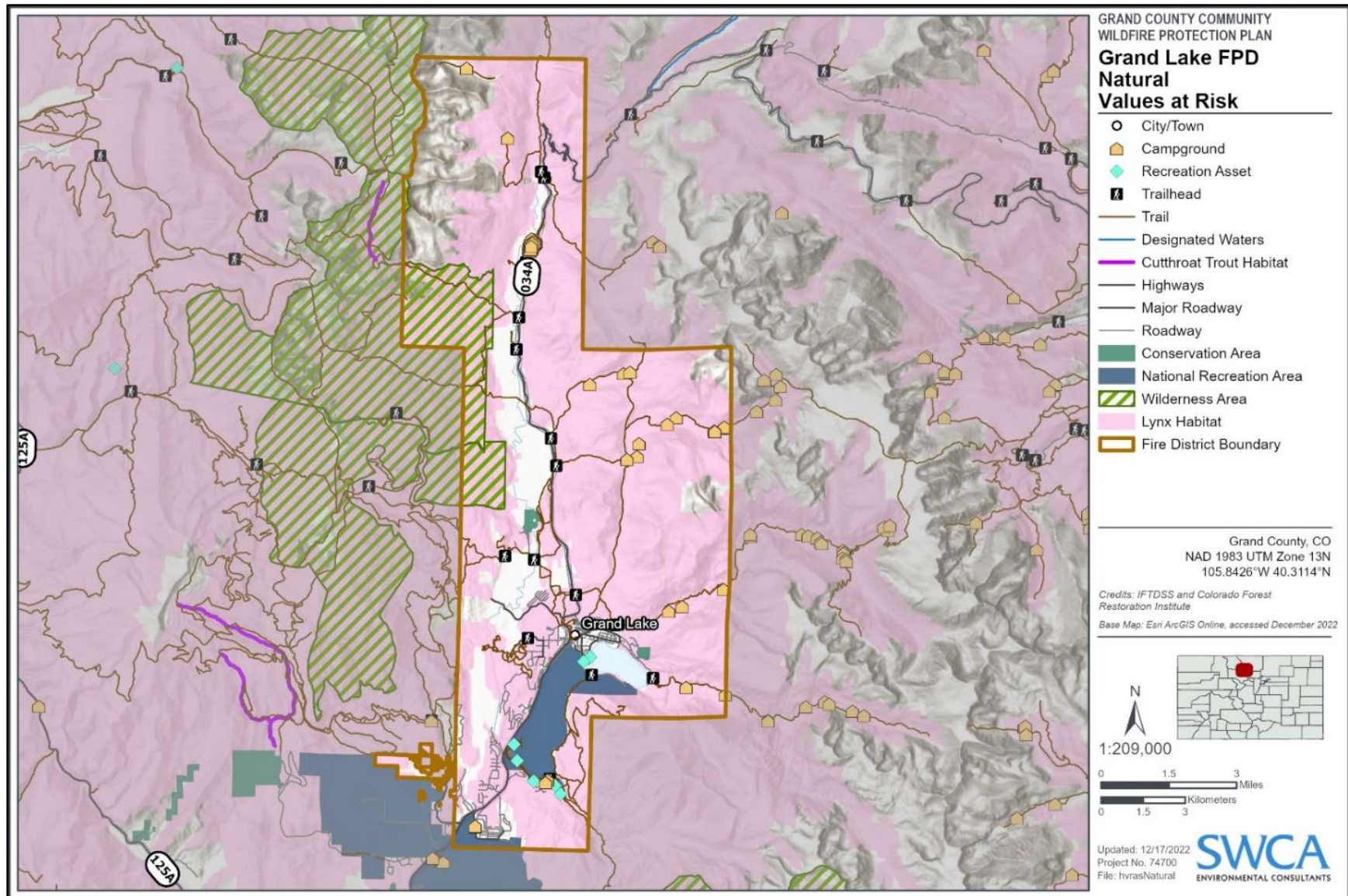


Figure 3.18. Grand Lake FPD No. 2 natural values at risk.

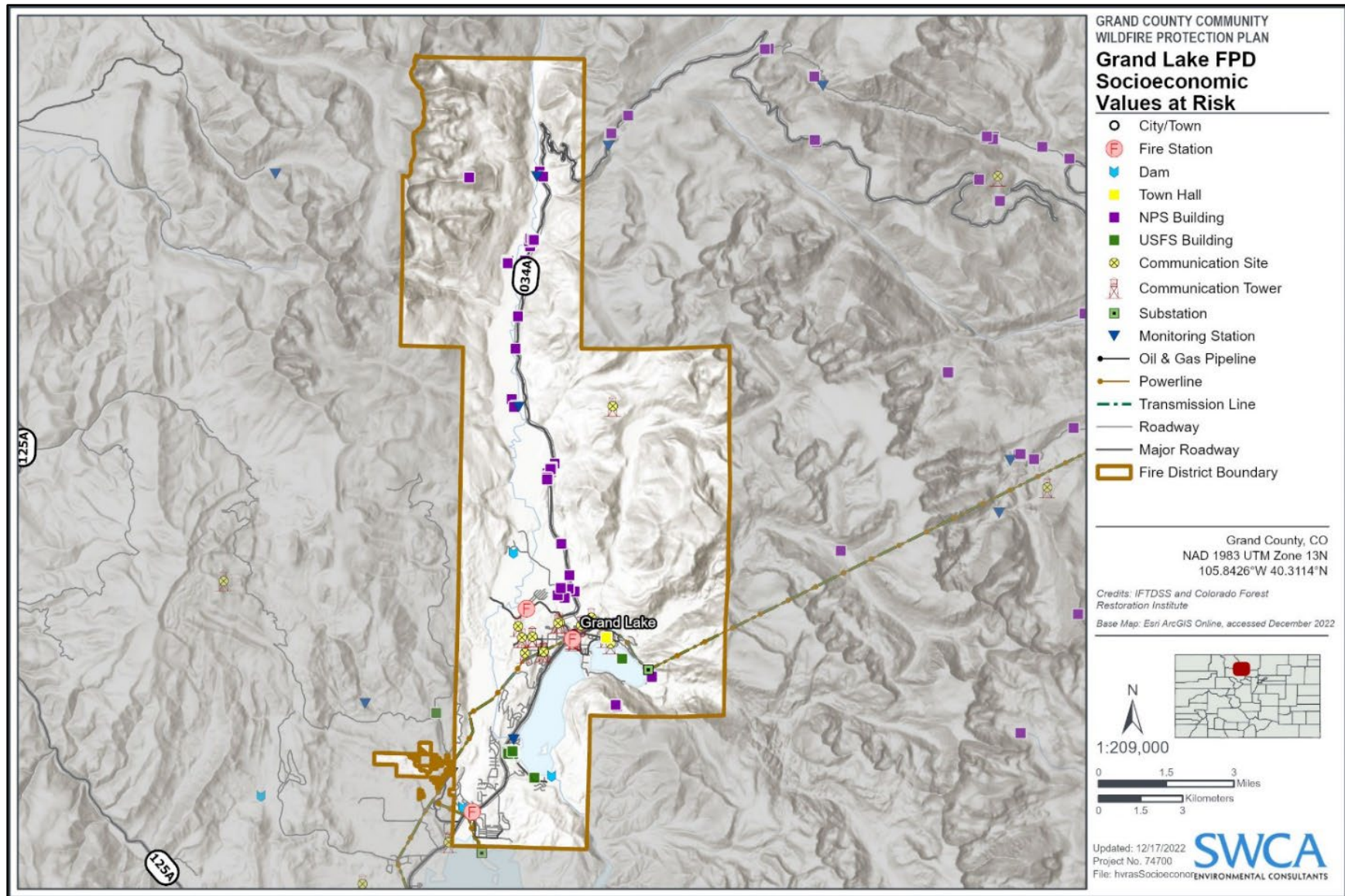


Figure 3.19. Grand Lake FPD No. 2 socioeconomic values at risk.

Public Education and Outreach Programs

The Grand Lake FPD No. 2 regularly engages with the public through outreach activities such as holiday events and open houses. The District's Facebook page announces upcoming events and can be accessed here: <https://www.facebook.com/GrandLakeFire/>

The FPD's website also contains a wealth of information, including useful links, for residents on fire safety, wildland fire prevention, and emergency preparedness. The website can be accessed here: <https://www.grandlakefire.org/>

Policies, Regulations, Ordinances, and Codes

Please refer to the most recent County General Plan for recent information regarding local policies, ordinances, regulations, and codes.

Mitigation Projects and Prioritizations

All mitigation projects applicable to the community, including relevant information such as responsible parties, possible funding sources, priorities, project description, etc., broken into three CWS tables.

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Table 3.5. Recommended Projects for Creating Resilient Landscapes (Fuel Reduction Projects) in the Grand Lake Fire Protection District

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|----------------------------|--------|------------------|---------------------|---|---|--|---|---|---|--|
| Grand Lake FPD No. 2 RL #1 | | M | 0-5 years | Wildfire risk reduction for homes and communities in high and extreme risk areas throughout the FPD | Fire Protection District Communities to prioritize include Northern Grand Lake and Southern Grand Lake | Federal, state, and local agencies. Fire Protection District. | <p>Prioritize wildfire risk reduction and fuel treatments in high-risk communities. Wildfire risk is heightened in unburned forested fuels, especially with dead/dying lodgepole pine.</p> <ul style="list-style-type: none">Continue existing treatment projects.Collaborate with National Park Service on wildfire mitigation within the WUI.Implement new treatment projects, where needed.Monitor for invasive species in WUI within the burn scar. Implement control where needed to help control establishment of fine-flashy fuels in post-fire environment and reduce the potential of a secondary event.Monitor and assess old treatments (if still relevant after E. Troublesome fire) and determine need for retreatment.Collaboratively identify fuel management needs based on the risk/hazard assessment.Aim for 300-foot shaded fuel breaks around communities.Locate parcels on private land adjacent to public lands where targeted fuel treatments can be performed that will connect and maximize the effectiveness of needed, planned, and/or pre-existing treatments. Parcels located in forested ex-urban areas should be prioritized.Work should emphasize the following: reducing potential for grass and shrub fires (especially along busy roadways); reducing standing dead trees (lodgepole, spruce, and aspen), removing ladder fuels, and reducing fuel loading in understory.Utilize mechanical fuel reduction treatments in more populated areas. Consider prescribe burns (including burn piles) in less populated areas. | Improve forest health, reduce wildfire risk within the WUI, reduce risk to life and property. | <p>Annual review of completed projects including project description and amount of land treated</p> <p>Assessment and monitoring of current and future conditions</p> <p>Ongoing monitoring of completed projects</p> | <ul style="list-style-type: none">Building Resilient Infrastructure and Communities (BRIC) GrantsNational Fire Plan (NFP) GrantsWildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|----------------------------|--------|------------------|---------------------|---|-------------------------------------|---|---|--|--|--|
| Grand Lake FPD No. 2 RL #2 | | H | 0-10 years | Conduct post-wildfire mitigation work in areas impacted by the East Troublesome and Williams's Fork fires | Regions of the FPD impacted by fire | Federal, state, and local agencies. Fire Protection District | Efforts should focus on post-wildfire landscape rehabilitation in the WUI and important watersheds. <ul style="list-style-type: none">Determine current status of completed BAER and BAR work and assess needs for future efforts.Work with a forest hydrologist to address restoration efforts in valued watersheds and WUI areas to accelerate forest recovery. Work such as revegetation and tree planting can reduce debris flow risk, flooding risk, erosion, sedimentation, and protect water quality.Conduct regular post-fire monitoring efforts. Track forest/vegetation recovery and succession. Utilize management interventions in degraded areas to ensure successful recovery (e.g., monitor and control for invasive plants, plant native plants in areas experiencing erosion).Consider fuel reduction projects in WUI areas with considerable slash and blow down. Will reduce potential for future wildfire as recovery proceeds.Conduct public outreach and education concerning post-wildfire hazards (e.g., falling trees, heightened flooding risk, and higher likelihood of road washout). | Aid in restoration and rehabilitation of fire impacted landscape. Reduce risk to life and property. | Regular monitoring of post-fire environment. Assessment of WUI and watersheds at risk in the post-fire environment. Committed long-term effort to tracking post-wildfire recovery and assessing post-wildfire risks. | <ul style="list-style-type: none">Forest Restoration & Wildfire Risk Mitigation (CSFS)U.S. Endowment for Forestry and CommunitiesColorado Healthy Forests and Vibrant Communities ActEnvironmental Quality Incentives Program (EQIP)2022 Infrastructure Investments and Jobs Act |
| Grand Lake FPD No. 2 RL #3 | | M | 0-5 years | Improve fuel treatment capabilities. | Grand Lake FPD No. 2 | Private, CSFS, and local FPD. | <ul style="list-style-type: none">Develop equipment needs to accomplish work (including maintenance) and pursue funding opportunities for purchase.Cultivate and support partnerships with NGOs and volunteer groups to support implementation of projects.Encourage citizens to proactive in reducing fire risk in their communities and on their property.Share resources (equipment and people) with other local FPDs.Assess and build staff capacity. | Increase ability to address wildfire mitigation projects | Conduct annual inventory of current equipment and staff capacity. Conduct community outreach to gain volunteer support. | <ul style="list-style-type: none">BRICNFPWildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|----------------------------|--------|------------------|---------------------|--|--|--|---|--|---|---|
| Grand Lake FPD No. 2 RL #4 | | | | Continue old and implement new fuel treatments in Areas of Concern (AOC) | Refer to AOC map in Chapter 4 (figure 4.2) | Federal, state, and local agencies. Fire Protection District. | Areas of concern typically need greater attention and display heavy fuel loading with high to extreme wildfire risk. Land management and access (e.g., Wilderness area) could prevent more aggressive actions. <ul style="list-style-type: none">Consider prescribed burning program.Align timber and forest management objectives with wildfire risk reduction.Restore natural fire regimes in wilderness areas.Consider land use and pre-existing land management designations when designing treatments to reduce conflictPrioritize treatments in Green Ridge AOC. | Protect local communities. Improve forest health. | Implement and design treatment protocols and management objectives in AOC. | <ul style="list-style-type: none">Colorado Healthy Forests and Vibrant Communities ActForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |
| Grand Lake FPD No. 2 RL #5 | | H | 0-5 years | West U.S. Highway 34 roadside fuel reductions | North of Grand Lake to Granby | Private, Grand FPD No. 1, CDOT, Federal agencies | Road ROW vegetation improvements to ensure road remains open during an emergency and functions as a fuel break. <ul style="list-style-type: none">Perform regular maintenance of Highway ROW vegetation and fuels.Treat surface fuels along roadways to create a 50ft buffer with little to no fire potential.Consider removing dead trees within 100 feet of roadside to reduce potential for hazard trees.Control for invasive species that may contribute to rapid fire spread (i.e., weeds and grasses) along roadsides.Consider use of herbicide or manual methods to control fine, flashy fuels (e.g., weeds and grasses).Utilize regular mowing to controls surface fuels along roadsides.Treatment areas should prioritize primary access points to ensure egress routes are maintained.Treatment areas should also focus on steep areas of the road so they can reduce the potential fast rates of spread and tall flames.Increase public education about potential of roadside ignitions and causes (e.g., pulling over/parking in tall grass, cigarette litter, sparks, etc.). | Maintain a primary ingress and egress route. Reduce potential for roadside ignitions. Create effective fuel breaks. Reduce potential for wildfire spread. | Implement and design a pretreatment assessment protocol. Have a post-treatment assessment and monitoring protocol. Monitoring should focus on the regeneration of hazardous fuels and the establishment of invasive species. Monitoring should also analyze causes of roadside ignitions and then take appropriate mitigation actions. | <ul style="list-style-type: none">BRICNFPRCPFirewise GrantsSFA and VFA2022 Infrastructure Investments and Jobs ActForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |

Table 3.6. Recommendations for Creating Fire-Adapted Communities (public education and structural ignitability)

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|-----------------------------|--------|------------------|---------------------|---|--|--|---|--|--|--|
| Grand Lake FPD No. 2 FAC #1 | | | | Monitor and enforce defensible space standards | Communities in and around Grand Lake. Prioritize ex-urban communities. | Private, local FPD, County | <ul style="list-style-type: none">• Create a defensible space program. Include pre-determined inspection frequency and education/outreach efforts.• Consider adhering to CSFS recommended defensible space standards (e.g., enforce 100 ft of defensible space) if not already.• Prioritize removal of ladder fuels.• Work with insurance companies to determine the potential to provide incentives for defensible space associated with reduced insurance premiums.• Consider green waste pickup/disposal options.• Plan and account for unresponsive and non-compliant secondary homeowners | Reduce loss of life and structures through defensible space. | Annual program evaluation and updates as necessary. Consider updates to the building code, where needed | <ul style="list-style-type: none">• Firewise• FP&S (FEMA)• EPA Environmental Education Grants• CWDG• BRIC• Wildfire Mitigation Incentives for Local Government (CSFS)• Wildfire Mitigation Resources & Best Practices (CSFS) |
| Grand Lake FPD No. 2 FAC #2 | | | | Encourage and provide opportunities for homeowners to fire harden their homes | Communities in and around Grand Lake | Private, County Planning Commission, Local FPDs, HOA's and community leaders | <ul style="list-style-type: none">• Ensure new homes/structures are made with non-combustible materials (i.e., encourage structural hardening)• Encourage retrofitting pre-existing homes/structures.• Efforts should aim to reduce the occurrence of combustible siding materials, wooden fences, wooden roofs, and wooden side decks.• Pursue grants and incentives to make efforts affordable.• Educate homeowners on real actions that could mitigate their wildfire hazard and risk. | Lowers likelihood of property damage and loss. | Property owner outreach. Communication and collaboration. Updates to municipal ordinances. | <ul style="list-style-type: none">• Wildfire Mitigation Incentive for Local Government (CSFS)• Firewise Grants• FP&S• CWDG• EPA Environmental Education Grants• Wildfire Mitigation Resources & Best Practices (CSFS) |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|-----------------------------|--------|------------------|---------------------|--|--------------------------|---|---|---|--|--|
| Grand Lake FPD No. 2 FAC #3 | | | | Improve evacuation zone education and outreach | Fire Protection District | Federal, State, and Local agencies. Fire Protection Districts Grand County Wildfire Council | <ul style="list-style-type: none">Develop and distribute public education and outreach materials concerning evacuation zones and routes and best practices.Provide handouts on preparing "Go Bags" – an emergency supply bag that can be accessed in cases of evacuationUtilize common information resources to spread information on evacuation best practices and routes such as social media, news, nextdoor, twitter, and others.Engage HOA's and neighborhoods in community-specific education.With all partners, develop evacuation exercises and practice runs for incident pre-planning purposes.Familiarize public with FEMA's Integrated Public Alert and Warning System (IPAWS)Communicate CodeRED red to county residents and visitors (e.g., flyers at recreation sites and relevant weblinks). Encourage people to register their phone numberCommunicate the role the Emergency Alert System (EAS) to County residents, homeowners, and visitors (e.g., flyers and relevant weblinks).Encourage partners (tv and radio stations) to display EAS messages.Explore opportunities to enhance the reverse 911 system. | Ensure public and first responder safety in the event of a wildfire or other emergency. | Develop and distribute a survey to understand and adapt best practices for communication and teaching. Assess and adapt methodologies and current information annually to ensure information is up to date. | <ul style="list-style-type: none">FEMA Building Resilient Infrastructure and Communities GrantsUSFS Community Wildfire Defense GrantFEMA FP&S GrantsWildfire Mitigation Incentive for Local Government (CSFS)Firewise Communities Grants |
| Grand Lake FPD No. 2 FAC #4 | | | | Identify funding sources for underserved homeowners and vulnerable populations | Fire Protection District | Fire Protection District, HOA's, community leaders Grand County Wildfire Council | <ul style="list-style-type: none">Identify vulnerable populations (elderly, disabled, low income) and underserved homeowners who may need additional help to mitigate home hazards and to evacuate during a wildfire.Seek grant opportunities to support assistance for relevant populations. | Protect life and property of the most vulnerable members of the community | Annual review of number of actions taken to address vulnerable populations and underserved homeowners | <ul style="list-style-type: none">BRICFirewise grantsNational Urban and Community Forest ProgramChallenge Cost Share Grant ProgramCommunity Wildfire Defense Grants |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|-----------------------------|--------|------------------|---------------------|---|--------------------------|---|---|--|---|--|
| Grand Lake FPD No. 2 FAC #5 | | | | Public outreach and education aimed at reducing human-caused wildfire | Fire Protection District | Local, State, and Federal agencies Grand County Wildfire Council | <div>Inform and educate the public about methods to reduce human-caused wildfire ignitions.<ul style="list-style-type: none">Educate around sources of human-caused wildfire ignitions (e.g., driving through or parking in tall, dry vegetation; discarded cigarette butts; fireworks; campfires, etc.).Collaborate with the National Park Service on education and outreach for recreators and visitors.Communicate hazardous conditions surrounding homes/structures (e.g., exposed propane tanks, electrical hazards, hazard trees, limited defensible place, etc.)Provide materials with resources for the public to understand how and with what funding they can take action to reduce risks.Utilize Appendix G of the CWPP: Homeowner Resources</div> | <div>Recue risk of human-caused wildfire ignitions. Educate citizens about wildfire hazards. Empower local communities and visitors.</div> | <div>Track successes and learnings from outreach campaigns and enact changes with each wildfire season. Assess and utilize current popular information sources such as nextdoor, social media, news outlets, and more. Annual coordination meeting with federal agencies.</div> | <ul style="list-style-type: none">Wildfire Mitigation Incentive for Local Government (CSFS)Firewise Communities GrantsWildfire Mitigation Resources & Best Practices Grants (CSFS)EPA Environmental Education GrantsFEMA BRIC Grants |

Table 3.7. Recommendations for Safe and Effective Wildfire Response

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|----------------------------|--------|------------------|---------------------|--|--------------------------------------|-----------------------------|---|--|--|---|
| Grand Lake FPD No. 2 FR #1 | | | | Assess select roads for fire access improvement (improve community ingress and egress) | Communities in and around Grand Lake | Private, municipal, County. | <ul style="list-style-type: none">Prioritize road improvements in high population areas with potentially hazardous road conditions.Increase width of roads where appropriate.Provide more locations for truck turnarounds.Consider pavement for higher traffic volume roads.Educate homeowners on real actions that could mitigate neighborhood roads wildfire hazards and risk (e.g, regular mowing of weeds along roadsides, or community clean-up days). | <div>Provides for safe and effective wildfire response capabilities Provides safe and effective means of evacuation in case of emergencies</div> | <div>Assessment of current road conditions Regular monitoring and maintenance to ensure roads are drivable for emergency response vehicles</div> | <ul style="list-style-type: none">BRICNFPRCPFirewise Grants2022 Infrastructure Investments and Jobs ActForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|----------------------------|--------|------------------|---------------------|---|---|---|--|---|---|--|
| Grand Lake FPD No. 2 FR #2 | | | | Increase number of available water sources for fire suppression | Notable communities that may have limited water supplies for fire suppression include Highway 125, Trail Creek, and West Granby | Private, municipal, county, neighboring landowners/managers | <ul style="list-style-type: none">Map out and delineate nearest available and reliable water sources (e.g., fire hydrants, creeks, streams, pools, ponds, etc.) that can be used in emergency scenarios using an online spatial application.Improve existing fire flows in remote areas to meet fire flow requirements.Make sure fire flows in new developments meet fire flow requirements.Install water tanks where feasible. In locations water tanks cannot be installed, have tanks filled and pre-loaded to be transported to areas of need in the event of a fire.Install hand pumps or other methods independent of the grid for accessing private well water. | Provides for safe and effective wildfire response capabilities Increases resilience of local communities | Detailed assessment of currently available water resources | <ul style="list-style-type: none">BRICNFPRCPFirewise Grants2022 Infrastructure Investments and Jobs ActForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |
| Grand Lake FPD No. 2 FR #3 | | | | Add a wildland fire division to the FPD | Fire Protection District | County, state | <ul style="list-style-type: none">Consider adding a hired wildland division to FPD or jointly operate one with a nearby FPD (e.g., East Grand FPD No. 4 and/or Hot Sulphur Springs/Parshall FPD No. 3).If a crew cannot be hired, have a designated volunteer division. | Increase wildfire suppression capabilities | Required funding and additional equipment | <ul style="list-style-type: none">2022 Infrastructure Investments and Jobs ActForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS)Volunteer Fire Assistance (VFA) Grant (Colorado DFPC) |
| Grand Lake FPD No. 2 FR #4 | | | | Improve street signage to ease fire response navigation | Communities in and around Grand Lake. | Private, municipal, county | <ul style="list-style-type: none">Install reflective street signs and house numbersEnsure roadside view of street signs and house numbers is not obstructed | Helps ensure safe and effective wildfire response capabilities | Assessment pf current conditions Outreach to property owners | <ul style="list-style-type: none">BRICNFPRCPFP&SFirewise GrantsForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |

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ANNEX 4

HOT SULPHUR SPRINGS/PARSHALL FIRE PROTECTION DISTRICT NO. 3

Organization and Jurisdiction

The Hot Sulphur Springs/Parshall Protection District (FPD) jurisdictional boundaries extend from just north of the town of Hot Sulphur Springs and south to FMI Henderson mining area. Its boundaries also extend east to Cottonwood Pass, and west to include the town of Parshall (Figure 4.1). The FPD is responsible for responding to incidents across nearly 162 square miles ranging in elevation from 6726 ft river bottoms to 9981 ft mountain ridges and peaks. The FPD's land is managed and owned by the Forest Service, private landowners, BLM, and the State (Figure 4.2). Hot Sulphur FPD response district encompasses the town of Hot Sulphur Springs, Parshall, Hot Sulphur Springs Wildlife Area, portions of the Arapaho Roosevelt National Forest, the Colorado and Williams Fork River corridors, and Williams Fork Reservoir. The FPD has two response facilities.

Outside of the town of Hot Sulphur Springs, higher population density areas within the FPD include the town of Parshall, the Williams Fork Reservoir area and campground, and recreational use off of Highway 40 and Cottonwood Pass. Hot Sulphur Springs/Parshall FPD No. 3 contains several main transportation corridors U.S. Highway 40 and several paved County Roads. Across its entire jurisdiction, the FPD includes 1004 buildings and has a building density of 6.19 units per square mile.

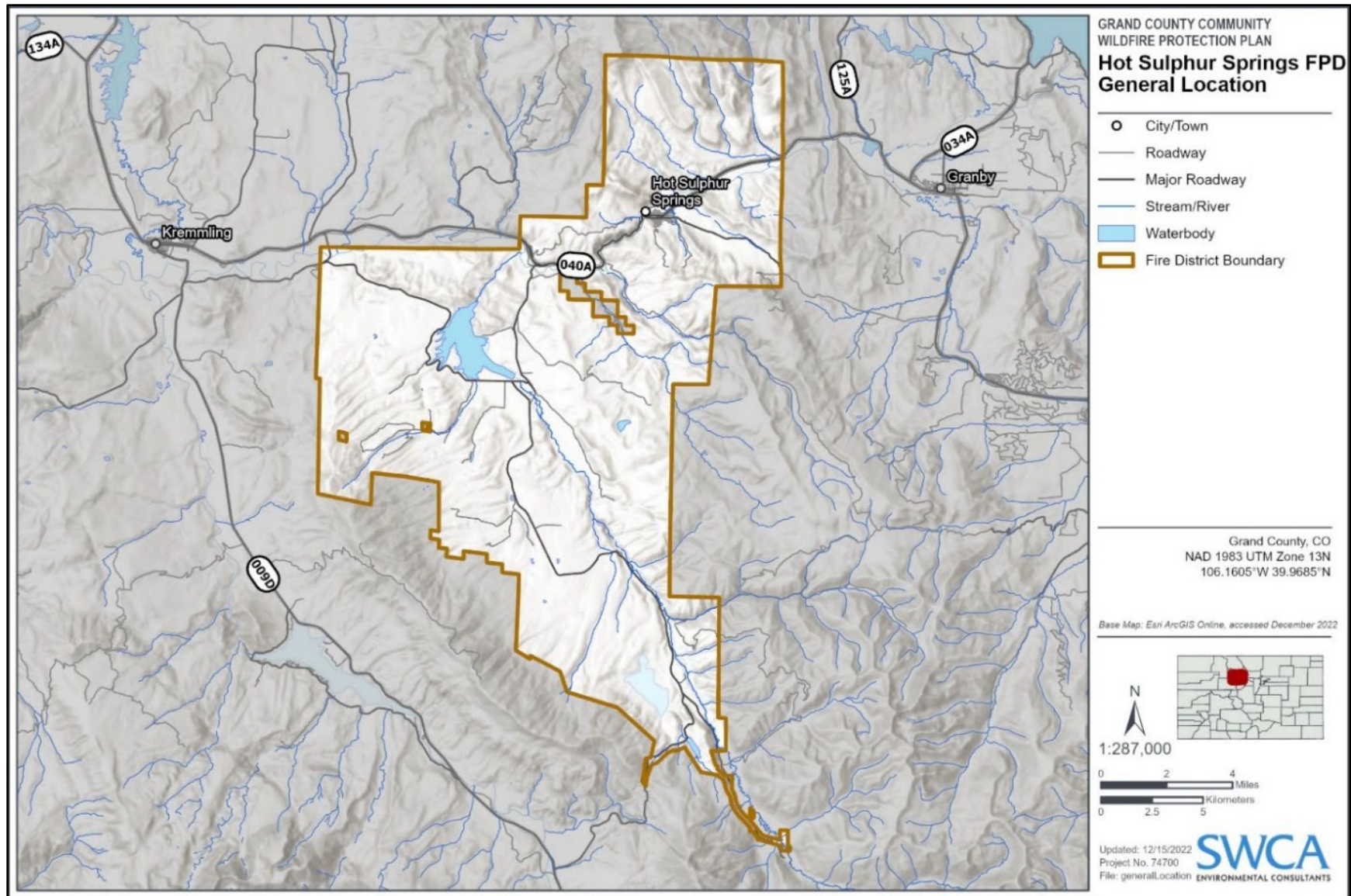


Figure 4.1. Hot Sulphur Springs/Parshall FPD No. 3.

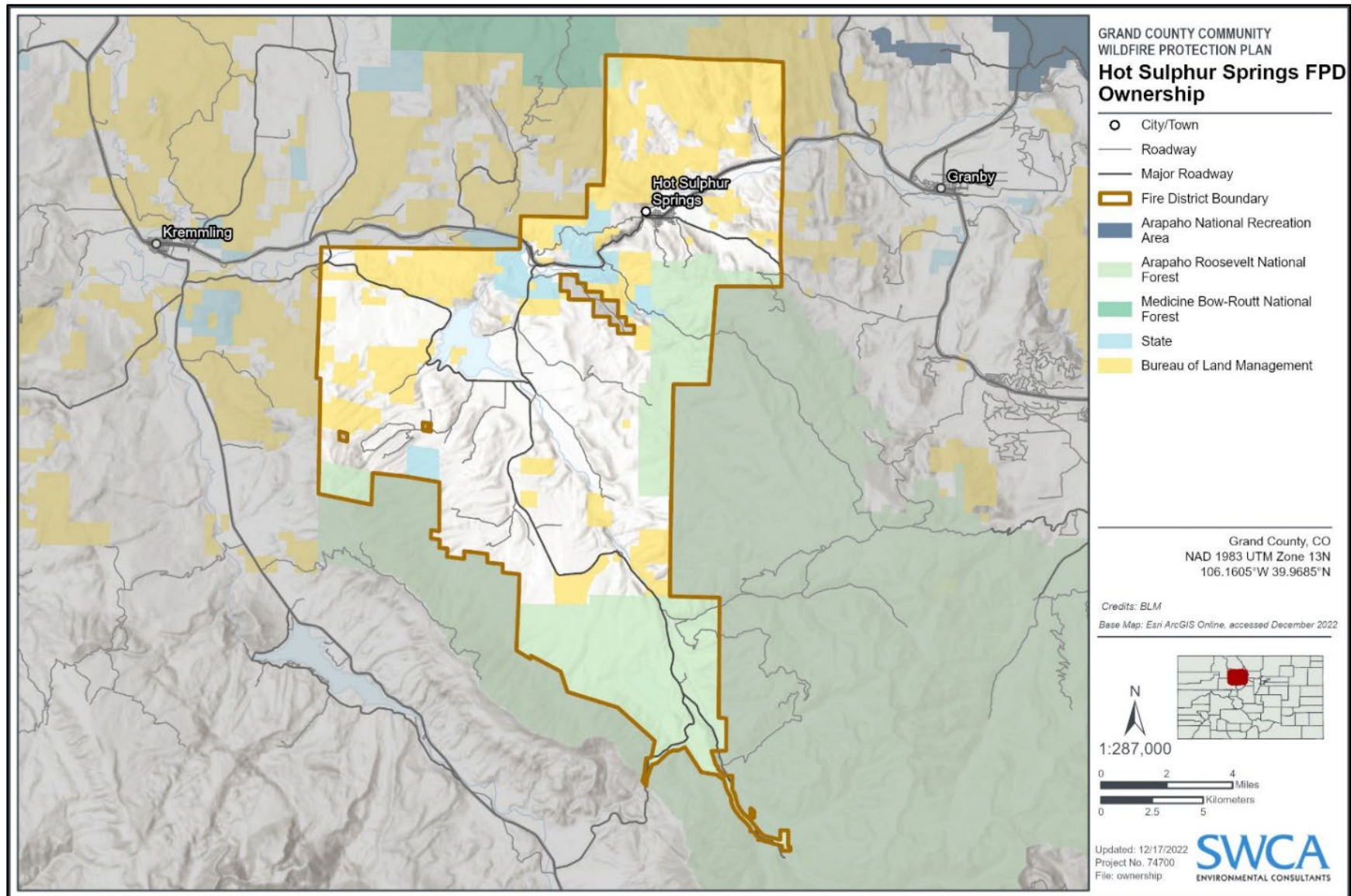


Figure 4.2 Hot Sulphur Springs/Parshall FPD No. 3 land ownership.

WUI Area Description

The wildland urban interface (WUI) is composed of both interface and intermix communities and is defined as areas where human habitation and development meet or intermix with wildland fuels (U.S. Department of the Interior and U.S. Department of Agriculture [USDA] 2001:752–753). Interface areas include housing developments that meet or are in the vicinity of continuous vegetation. Intermix areas are those areas where structures are scattered throughout a wildland area where the cover of continuous vegetation and fuels is often greater than cover by human habitation. WUI is further delineated through buffers and with a Low, Medium, High, or Extreme classification based on fuels and slope steepness. Buffers are derived from the general boundaries of where development meets wildland fuels, and higher assigned classifications correspond to greater presences of wildland fuels and steeper slope angles.

The WUI in the Hot Sulphur Springs/Parshall FPD No. 3 is extensive and contains significant quantities of both interface and intermix development. Nearly the entire FPD falls within a 2.5-mile WUI buffer, and the vast majority also lies inside a 1-mile WUI buffer (Figure 4.3). Similar to areas classified as extreme in our Risk-Hazard Assessment (Figure 4.5), WUI classified as extreme lies primarily in the upper elevation reaches of ecotone zones where sagebrush steppe completes its transition into stands of lodgepole pine. This extreme class within the WUI includes the Hot Sulphur Springs community and those living in the foothills along the Eastern edge of the Rd 3 corridor, within the Southern portion of the FPD (Upper Williams Fork). Communities in the FPD directly adjacent to those in extreme WUI zones generally have high WUI classifications and include Lower Williams Fork while the remaining lower elevation reaches of the FPD are predominately considered as having moderate WUI classifications (Figure 4.4).

Risk-Hazard Summary

The purpose of the Risk-Hazard Assessment is to evaluate and provide information pertaining to the risk of wildland fires within Hot Sulphur Springs/Parshall FPD No. 3 jurisdictional land. For more information on the Risk-Hazard Assessment purpose and process, see Chapter 3 of the Grand County CWPP main document. The Composite Risk-Hazard Assessment is twofold and combines a geographic information system (GIS) model of hazard based on fire behavior and fuels modeling technology and a Core Team-generated assessment of on-the-ground community hazards and values at risk (VARs).

The Risk-Hazard Assessment considers:

- Fire behavior modeling outputs
- Fire history
- HVRAs
- Fire response

Figure 4.5 contains a visual summary of the Hot Sulphur Springs/Parshall FPD No. 3 Risk-Hazard Assessment. Most of the high-risk areas identified are in unburned montane conifer forests within the Arapaho National Forest. Most of the land within the fire district boundary is rated as high-risk given the rural nature of the area and relatively undisturbed vegetation that borders the major highways.

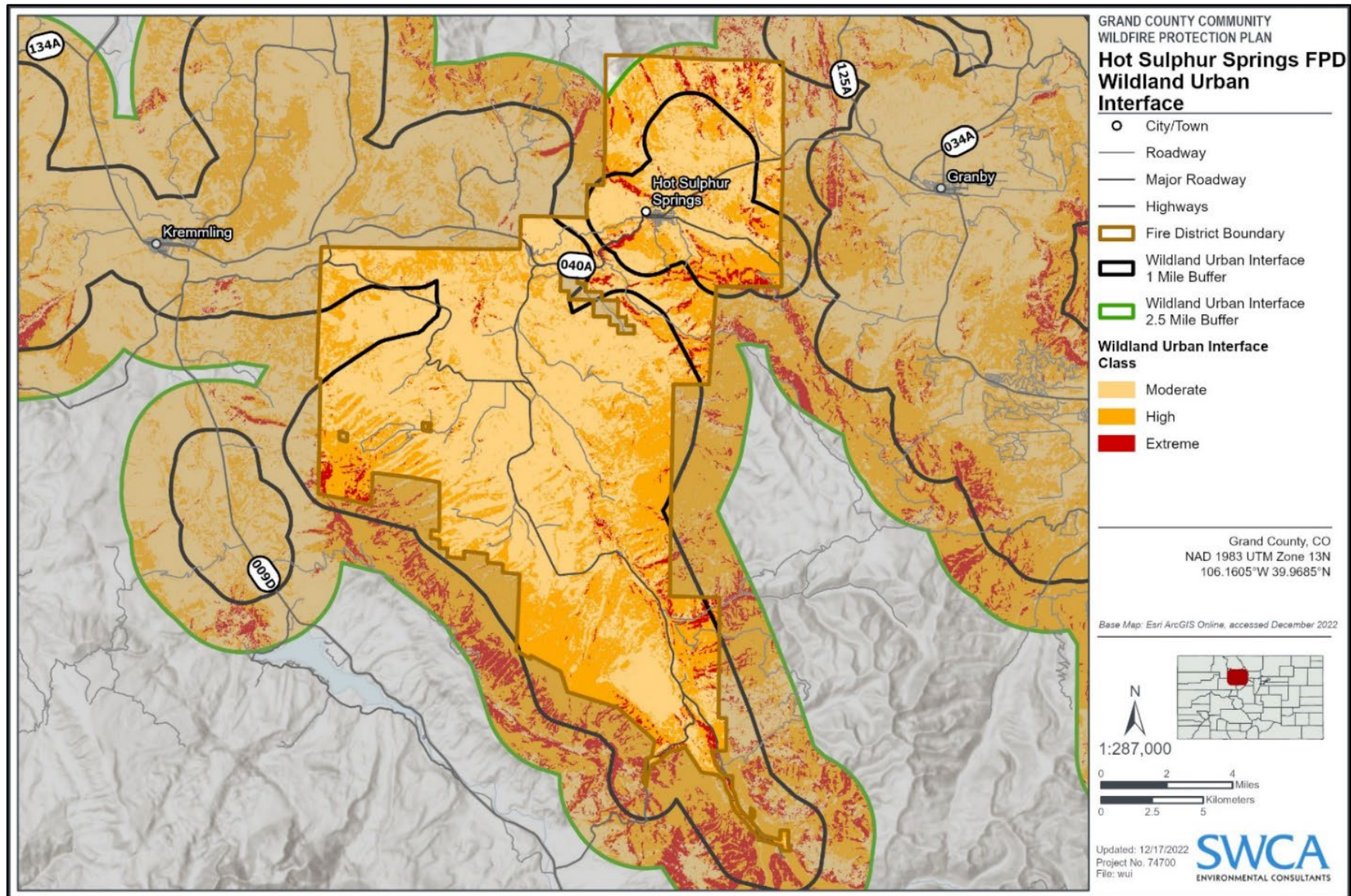


Figure 4.3. Hot Sulphur Springs/Parshall FDP WUI boundaries and associated risk.

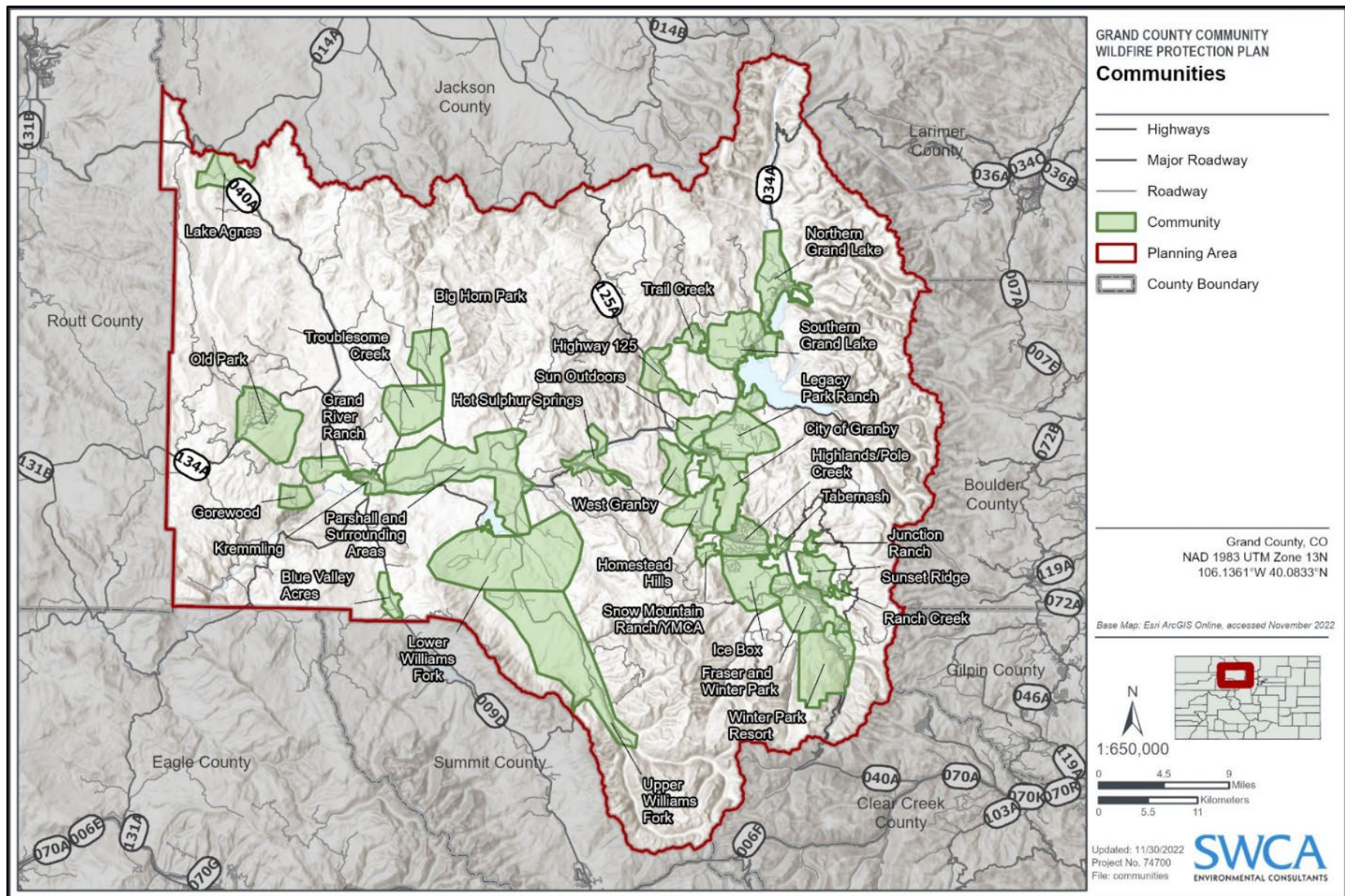


Figure 4.4. Grand County WUI communities.

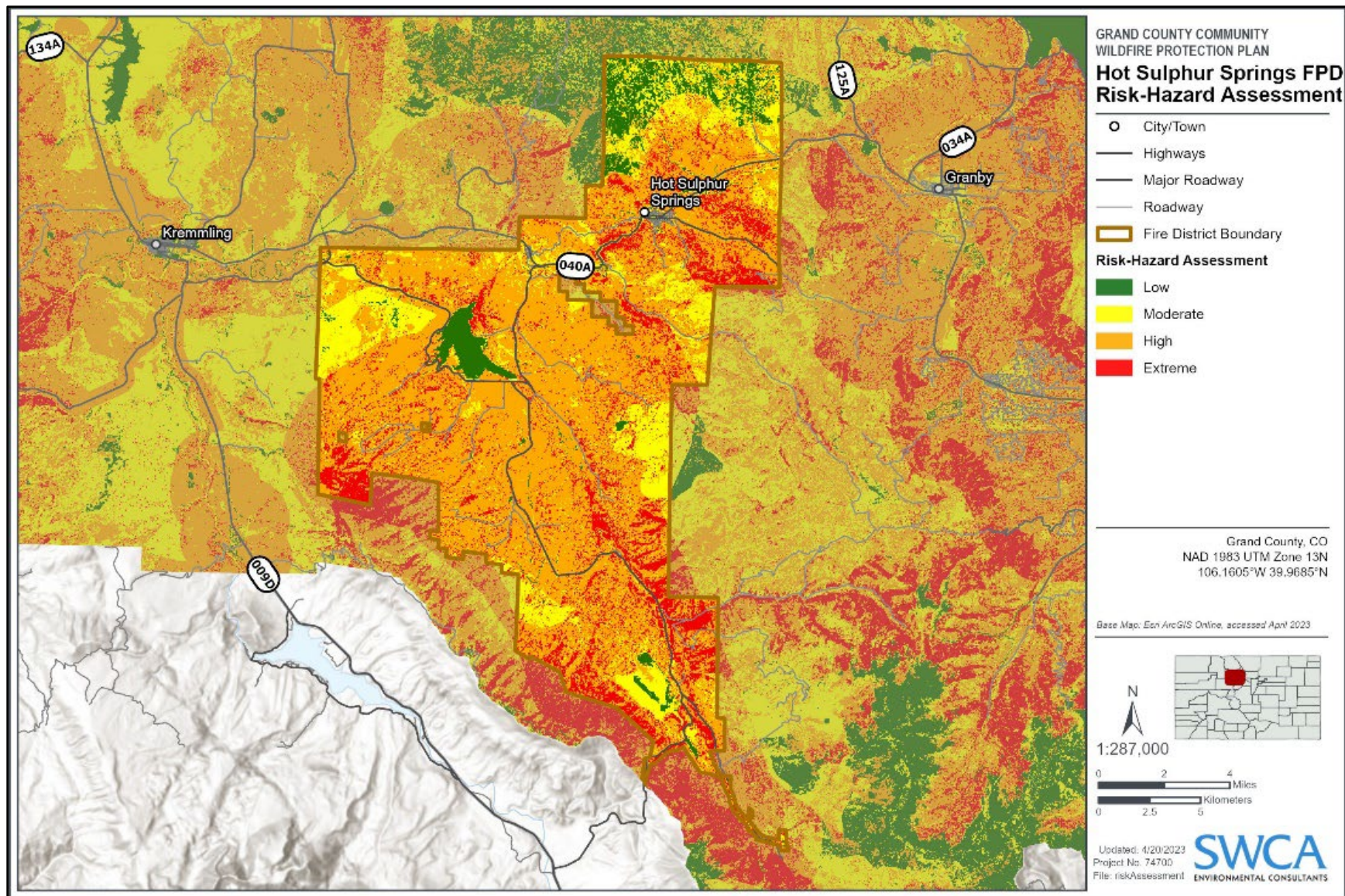


Figure 4.5. Hot Sulphur Springs/Parshall FPD No. 3 Risk-Hazard Assessment.

Fire History

Large fires in Hot Sulphur Springs/Parshall FPD No. 3's boundaries were uncommon until recently. Although the FPD regularly responds to smaller structural and wildland ignitions (Figure 4.6), it wasn't until the East Troublesome and Williams Fork Fires of 2020 that the FPD encountered large wildland fires within its jurisdiction (Table 4.1, Figure 4.7).

Table 4.1. Large Wildland Fire History in Hot Sulphur Springs/Parshall FPD No. 3

| Fire Name | Location | Year | Acres Burned | Cause of Ignition |
|-----------------------|------------------|------|---|-------------------|
| East Troublesome Fire | North end of FPD | 2020 | 193,813 (across all of Grand County) | Human |
| Williams Fork Fire | South end of FPD | 2020 | 14,833 (across all of Grand County) | Human |

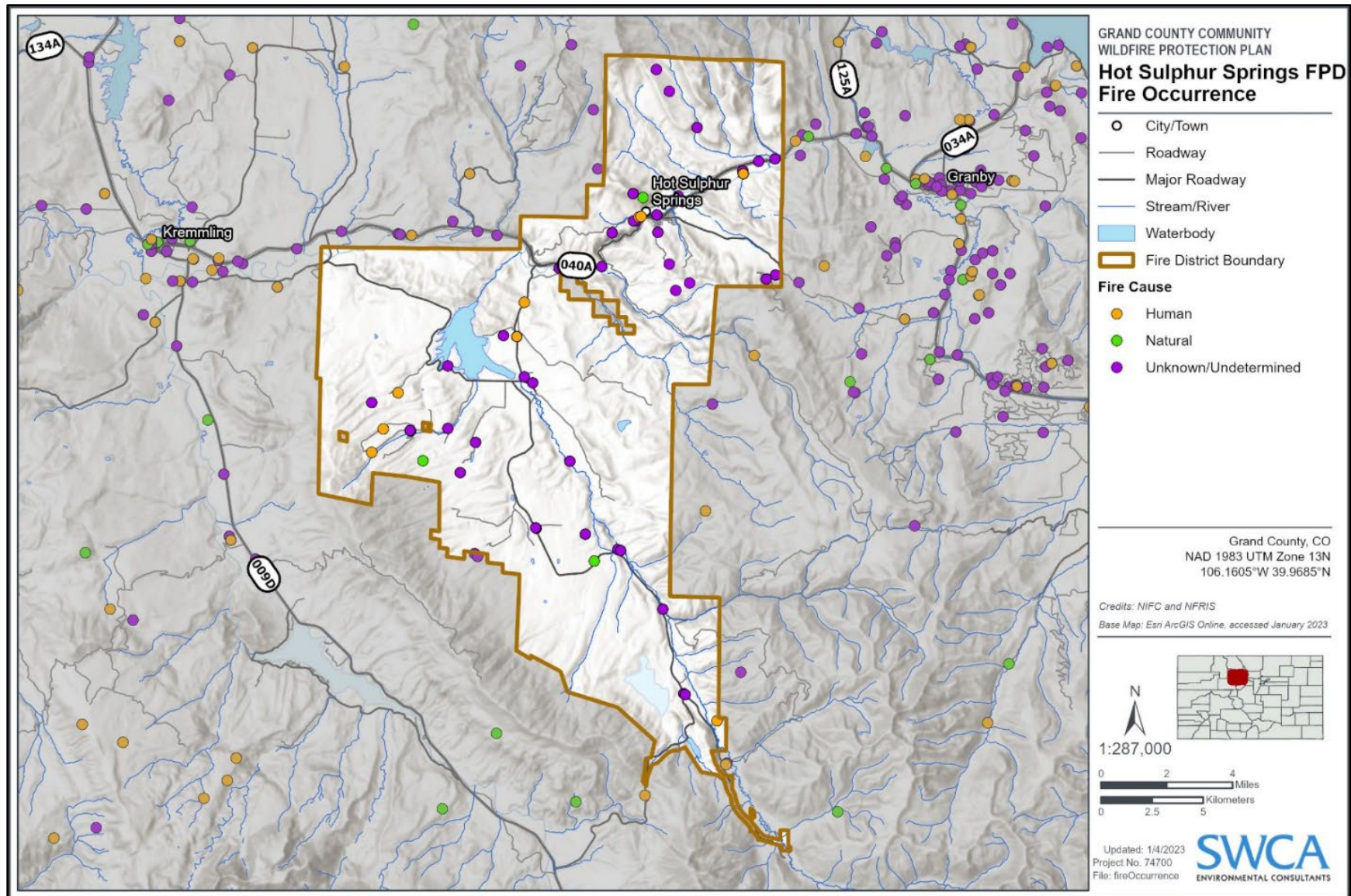


Figure 4.6. Hot Sulphur Springs/Parshall FPD No. 3 fire occurrence.

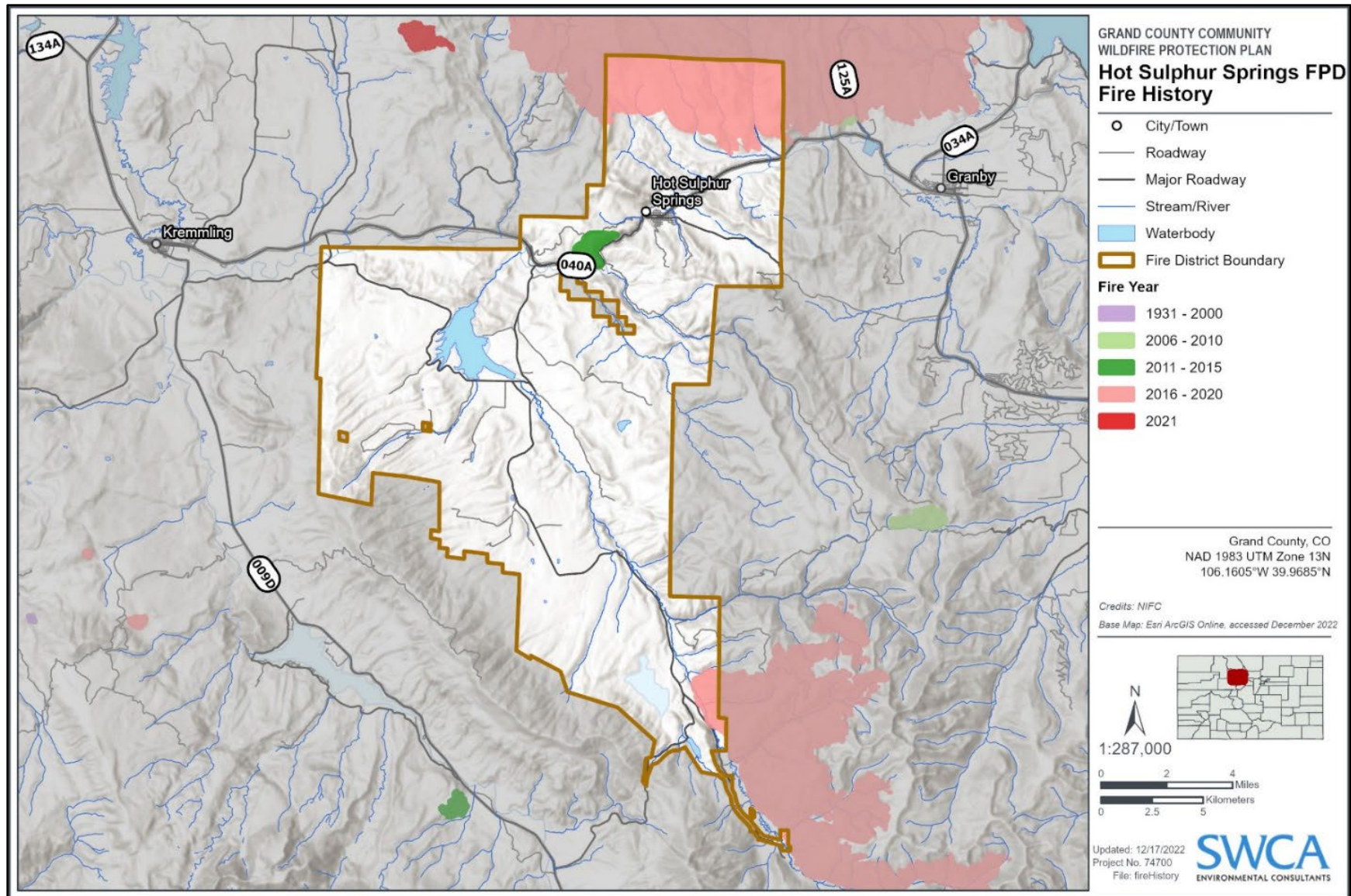


Figure 4.7. Hot Sulphur Springs/Parshall FPD No. 3 fire history.

Hazardous Fuel Characteristics

Fuels found within the Hot Sulfur Springs FPD jurisdiction are listed below in Table 4.2 and illustrated in Figure 4.8. Please see Chapter 2, Fire Environment, for more information regarding fuels within the county.

Table 4.2. Fuel Types (Scott and Burgan 2005) in Hot Sulphur Springs/Parshall FPD No. 3's Boundaries

| Existing Fuel Type | Acres | Percent |
|---|---------|---------|
| GS2 – Grass-shrub, Shrubs are 1 to 3 feet high, moderate grass load. Spread rate high; flame length moderate. | 37, 902 | 36.54% |
| TU1 – Timber-understory, fuelbed is low load of grass and/or shrub with litter. Spread rate low; flame length low. | 15, 298 | 14.75% |
| GR2 – Grass, moderately coarse continuous grass, average depth about 1 foot. Spread rate high; flame length moderate. | 9,040 | 8.72% |
| Other* – Various fuel types | 6,796 | 6.55% |
| GS1 – Grass-shrub, shrubs are about 1 foot high, low grass load. Spread rate moderate; flame length low. | 6,039 | 5.82% |
| SB1 – Slash-blowdown, fine fuel load is 10 to 20 tons/acre, weighted toward fuels 1 to 3 inches diameter class, depth is less than 1 foot. Spread rate moderate; flame length low. | 5,813 | 5.6% |
| TL5 – Timber-litter, High load conifer litter; light slash or mortality fuel. Spread rate low; flame length low. | 4,966 | 4.79% |
| SH1 : Low fuel load, depth about 1 foot, some grass fuels present. Spread rate very low (0–2 chains/hour); flame length very low (0–1 foot). | 4,438 | 4.28% |
| GR1 – Grass, grass is short, patchy, and possibly heavily grazed. Spread rate moderate; flame length low. | 4,432 | 4.27% |
| TU5 – Timber-understory, fuelbed is high load conifer litter with shrub understory. Spread rate moderate; flame length moderate. | 4,104 | 3.96% |
| TL3 – Timber-litter, Moderate load conifer litter. Spread rate very low; flame length low. | 2,788 | 2.69% |
| NB8 – Non burnable open water | 2,289 | 2.21% |
| TL1 – Timber-litter, light to moderate load, fuels 1 to 2 inches deep. Spread rate very low; flame length very low. | 1,947 | 1.88% |
| SH2 – Moderate shrub fuel load, depth about 1 foot, no grass fuel present. Spread rate low; flame length low. | 1,194 | 1.15% |
| NB1 – Non burnable urban or suburban development; insufficient wildland fuel to carry wildland fire | 1,110 | 1.07 |

*Other includes fuel types with <1% cover of the FPD. These include GR3, NB2, NB3, NB9, SH7, TL2, TL6, TL8, and TL9.

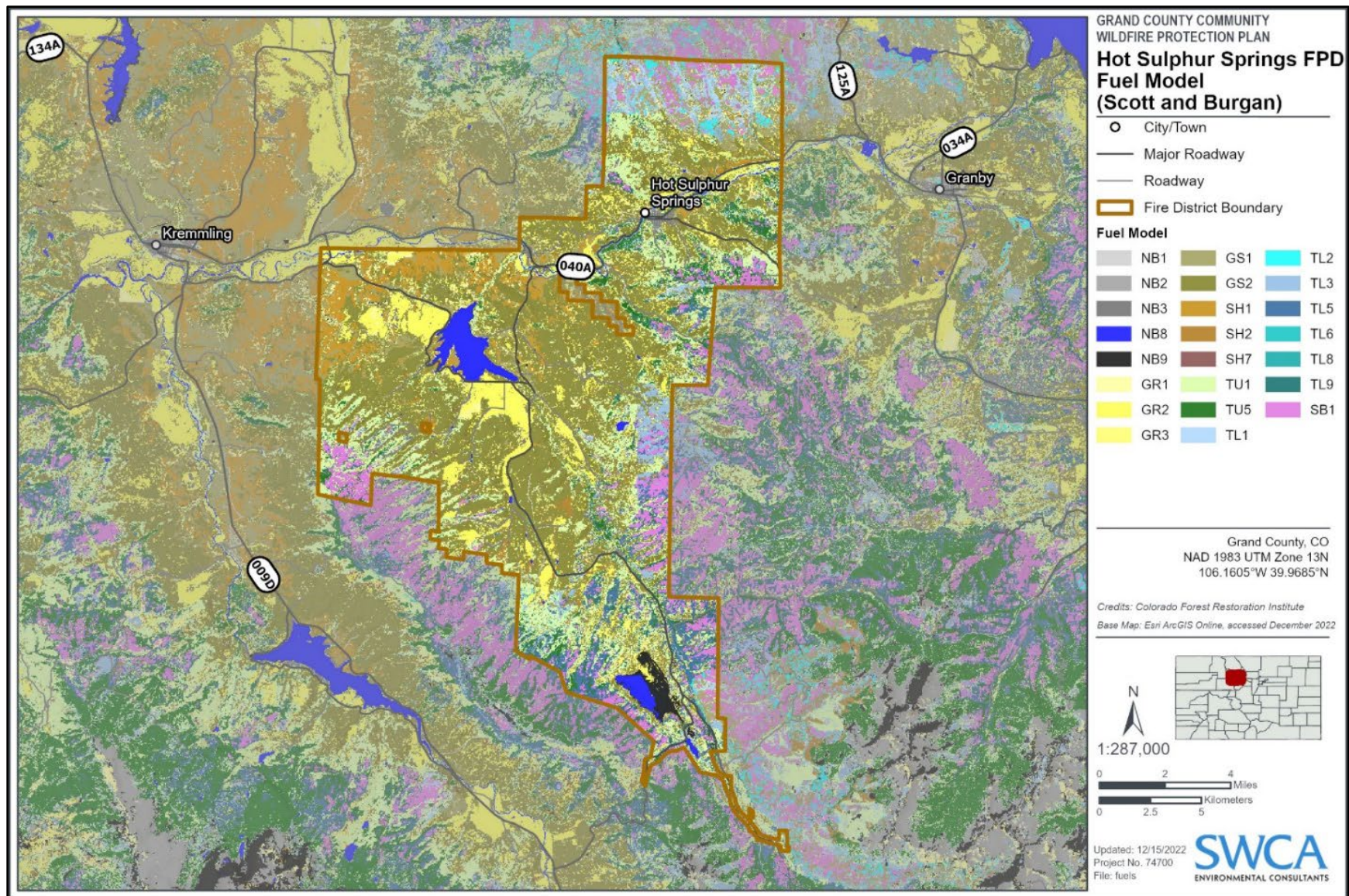


Figure 4.8. Hot Sulphur Springs/Parshall FPD No. 3 Scott and Burgan fuels model.

Neighborhood and Structural Characteristics

The Hot Sulphur Springs/Parshall FPD No. 3 communities have visible fuels mitigation efforts throughout the area. Much of the FPD is accessible with the majority of the jurisdiction having 2+ roads in and out of communities. However, the communities have limited turnarounds for fire trucks, limited water sources for suppression, and limited numbering and identifiers on structures. Additionally, 3 out of the 4 communities are >5 miles from the nearest fire station. See Table 4.3 and Figures 4.9 and 4.10 for more information on community specifics within the district.

Table 4.3. Hot Sulphur Springs/Parshall FPD No. 3 NFPA 1144 Assessment Results

| Community | Score | Rating | Fire Station | Positives | Negatives |
|--|-------|---------|---|--|---|
| Hot Sulphur Springs (Map C-24, Appendix C) | 102 | High | Hot Sulphur Springs/Parshall Fire Protection District No. 3 Station 1 | <ul style="list-style-type: none"> • 2+ roads in and out • Metal roof or asphalt shingle throughout • Fire hydrants • <5 mi from a fire station | <ul style="list-style-type: none"> • Limited turnarounds for fire trucks • Non-reflective street signs • Limited defensible space • Combustible housing materials |
| Lower Williams Fork (Map C-28, Appendix C) | 125 | Extreme | <ul style="list-style-type: none"> • Kremmling Fire Station • Hot Sulphur Springs/Parshall Fire Protection District No. 3 Station 1 | <ul style="list-style-type: none"> • Reflective street signs • Structures well-spaced • Metal roof or asphalt shingle throughout • Visible fuels mitigation efforts | <ul style="list-style-type: none"> • Ingress/egress • Limited housing numbering • Combustible housing materials • Limited water source for suppression • Fire station >5 mi from community • Above ground gas and electric utilities |
| Parshall and Surrounding Areas *Also in Kremmling FPD No. 5. (Map C-30, Appendix C) | 107 | High | <ul style="list-style-type: none"> • Kremmling Fire Station • Hot Sulphur Springs/Parshall Fire Protection District No. 3 Station 1 | <ul style="list-style-type: none"> • 2+ roads in and out • Reflective street signs • Visible fuels mitigation efforts • Metal roof or asphalt shingle throughout • Houses located on flat surfaces rather than slopes | <ul style="list-style-type: none"> • Limited turnarounds for fire trucks • Limited defensible space • Combustible housing materials • Limited water sources for suppression • Fire station >5 mi from community |

| Community | Score | Rating | Fire Station | Positives | Negatives |
|--|-------|---------|---|---|--|
| Upper Williams Fork (Map C-26, Appendix C) | 127 | Extreme | <ul style="list-style-type: none"> Kremmling Fire Station Hot Sulphur Springs/Parshall Fire Protection District No. 3 Station 1 Lower Blue Fire Protection District Station, Summit County | <ul style="list-style-type: none"> Visible fuels mitigation work Metal roof or asphalt shingle throughout | <ul style="list-style-type: none"> Ingress/egress Limited turnarounds for fire trucks Limited street signs Limited defensible space Combustible building materials Limited water sources for suppression Fire station >5 mi from community |



Figure 4.9. Hot Sulphur Springs community landscape and proximity to fuels.



Figure 4.10. Fuels mitigation in Upper Williams Fork Community.

Emergency Response Capacity

Hot Sulphur Springs/Parshall Fire Protection Districts is an all-hazards emergency response department serving a 257 square mile area in west central Grand County. The District operates out of two stations, one located at the northeast end of Hot Sulphur Springs on Hwy 40; the other is located west in the town of Parshall one block west of Hwy 40 on County Road 3 (Figures 4.11 and 4.13). The stations are staffed with a volunteer crew of fire fighters who are trained to respond to structure and wildland fires, vehicle accidents, rescues, and hazardous material incidents (HSSP 2022a).

The FPD has 8 vehicles divided between the two stations. The fleet includes one type one engine, two type three engines, one type four brush truck, two type six wildland brush trucks, one type 7 brush truck, and one type one water tender (Table 4.4). The district also has two command/ squad trucks, one at each station (HSSP 2022b). The District was recently able to purchase portable pumps, chainsaws and PPE, and a side by side ATV, all of which will bolster response resources for wildland fires. Additionally, the District recently installed two 35-thousand-gallon water tanks to add non municipal water supply for suppression needs (HSSP 2022c). HSSP is part of a mutual aid agreement with the five surrounding fire protection districts; this includes the Lake Dillion, Kremmling, Grand Lake, Grand, and East Grand Fire Protection Districts (HSSP 2022a).

Table 4.4. Hot Sulphur Springs/Parshall FPD No. 3 Response Resources

| Fire Protection District Statistics: | | | | |
|--|----|--------------------------------|-----------------|----------------------------------|
| <u>Fire Protection District:</u> Hot Sulphur Springs/Parshall FPD No. 3 | | | | |
| <u>Fulltime Firefighters:</u> 1 | | <u>On-call Firefighters:</u> 0 | | <u>Volunteer Firefighters:</u> 7 |
| <u>Water Tender:</u> | | <u>Wildland Engines</u> | | |
| Type 1: 1 | | <u>Total Number:</u> | <u>4WD/AWD:</u> | <u>Brush Breaker:</u> |
| Type 2: 0 | | Type 3: 0 | 0 | 0 |
| Type 3: 0 | | Type 4: 2 | 2 | - |
| <u>Structure Engines:</u> | | Type 5: 0 | 0 | 0 |
| Type 1: 2 | | Type 6: 2 | 2 | - |
| Type 2: 0 | | Type 7: 1 | 1 | - |
| <u>Port-A-Tanks:</u> | 4 | | | |
| <u>Portable Pumps:</u> | 5 | | | |
| <u>Fire Shelters:</u> | 15 | | | |
| Suggested Mitigation Focus Areas: | | | | |
| <u>Areas of Concern (Figure 4.12):</u> | | | | |
| <ul style="list-style-type: none">• South of the town of Hot Sulphur Springs, south of Highway 40, east of Beaver Creek up to the edge of the FPD, this area of concern is also located in the Grand FPD No. 1 and East Grand FPD No. 4.• Western edge of Lower Williams Fork and Upper Williams Fork communities, east of Highway 9, most of this area of concern is outside of the FPD but is within around the Williams Fork communities.• Fire Department General Area of Concern: Williams Fork Valley. | | | | |
| <u>Fire Department Concerns:</u> | | | | |
| <ul style="list-style-type: none">• Need for fuels thinning and defensible space from forested lands. | | | | |

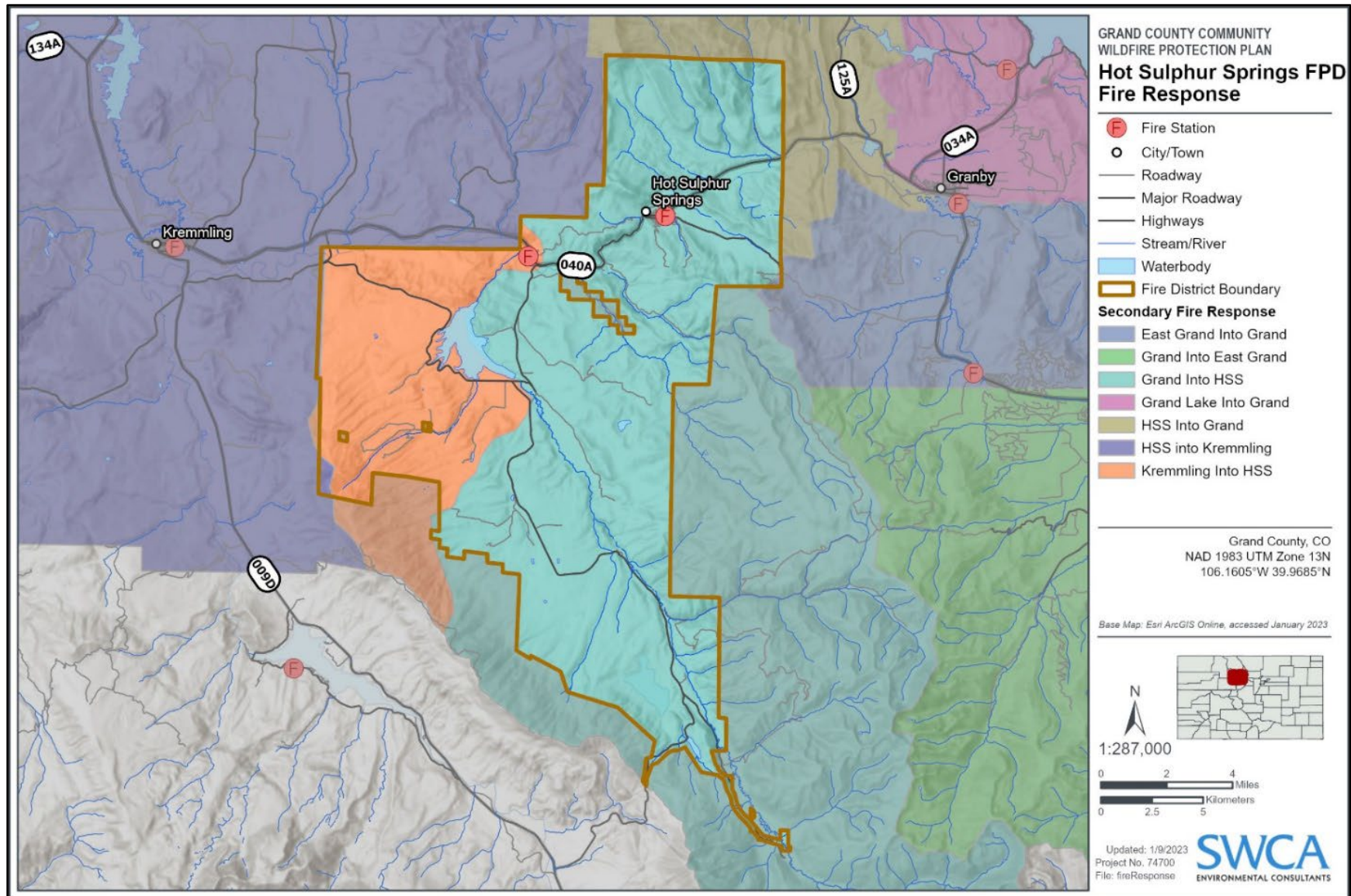


Figure 4.11. Hot Sulphur Springs/Parshall FPD No. 3 boundaries.

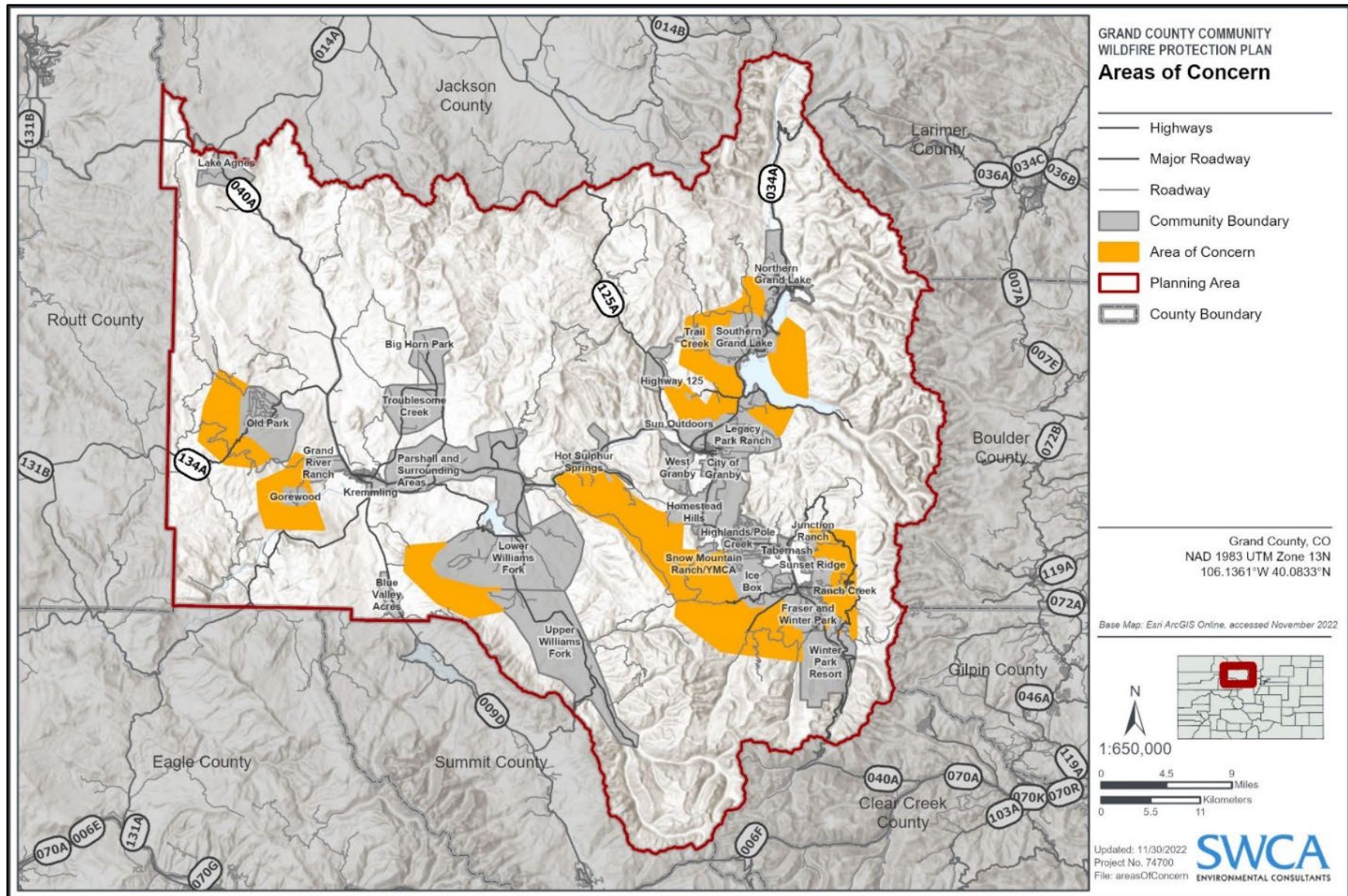


Figure 4.12. Grand County's identified areas of concern.

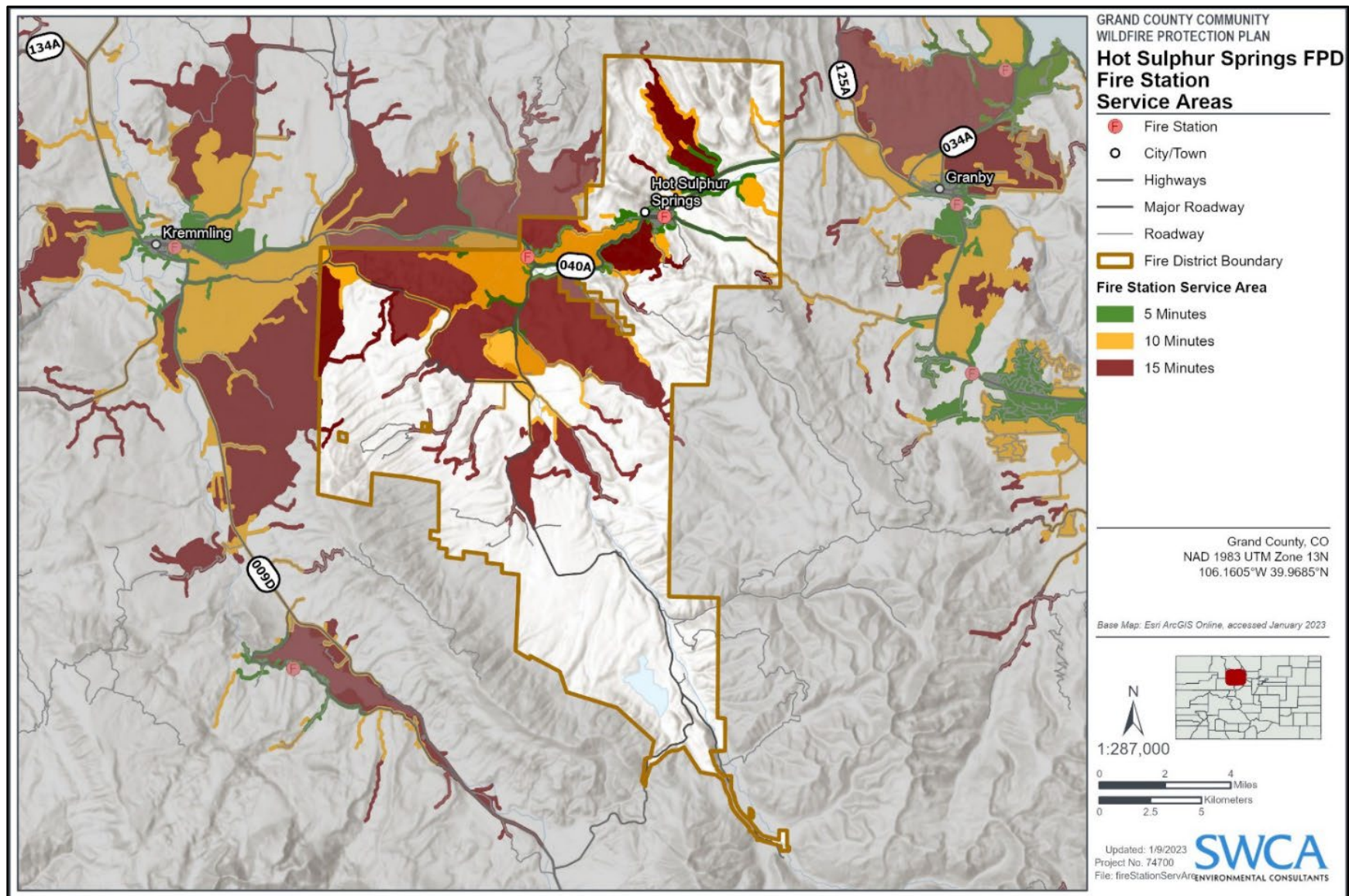


Figure 4.13. Hot Sulphur Springs/Parshall FPD No. 3 fire station service areas.

Evacuation

Evacuation relies on both cooperative planning and the capability of residents to effectively implement plans. In the event of an incident within the FDP that requires evacuation, the FPD Fire Chief is responsible for issuing an evacuation notice through appropriate communication pathways. However, if a wildfire occurs within the FPD that exceeds the District's response capabilities, the County Sheriff will act as the primary incident commander and be responsible for declarations of evacuation (GACC 2022). In many cases, pre-evacuation orders informing residents of potential upcoming evacuations will be distributed prior to evacuation orders. Residents will receive pre-evacuation and evacuation orders through the County's CodeRED system, Emergency Alert System (EAS), or Wireless Emergency Alert System (WEA). A county-wide evacuation map is also available through the County's website, and can be accessed here: <https://gcgeo.maps.arcgis.com/apps/webappviewer/index.html?id=ca4f74421b69416da9be1b9b92166534>

It is recommended that residents familiarize themselves with their evacuation zone and evacuation preparedness planning that can reduce strain on emergency response systems and crews during an incident. Additional information can be found in the Fire Response Capabilities section of Appendix B: Community Background and Resources.

Evacuation within the FPD has the potential to be complicated by road infrastructure. Many high and extreme risk roads within the District are narrow, steep, and winding with blind corners and few turnaround areas for larger vehicles. These can become congested and potentially dangerous if emergency response crews are attempting to respond to a wildfire that residents are evacuating from. Furthermore, many of these high and extreme risk roads in the FPD are also located in lodgepole pine forests, which can yield tall flame lengths and cause falling trees during a wildfire. These hazards can block potential escape routes and/or result in entrapment for commuter and emergency vehicles in the event of a wildfire.

Residential, recreational, and ex-urban areas with high- and extreme-risk roads should take proactive approaches in their evacuation planning. This can include designating escape routes and implementing roadside fuel reduction projects. Areas with evacuation challenges in the Hot Sulphur Springs/Parshall FPD No. 3 are predominately ex-urban areas and include, but are not limited to, the road systems in the eastern foothills of the Williams Fork Mountains, the southern foothills of the Rabbit Ears Range, and the area south of Hot Sulphur Springs leading up to Cottonwood Pass (Figure 4.14).

Critical Infrastructure and Community Values at Risk

The Hot Sulphur Springs/Parshall FPD No. 3's boundaries encompass numerous cultural, natural, and socioeconomic values at risk. These include important water resources such as the Colorado River and Williams Fork Reservoir, power lines, a power plant, oil and gas pipelines, campgrounds, communication towers, fish and wildlife habitat, frequently used trails, and much more. Figures 4.15, 4.16, 4.17, and 4.18 below provide an extensive spatial representation of these values at risk.

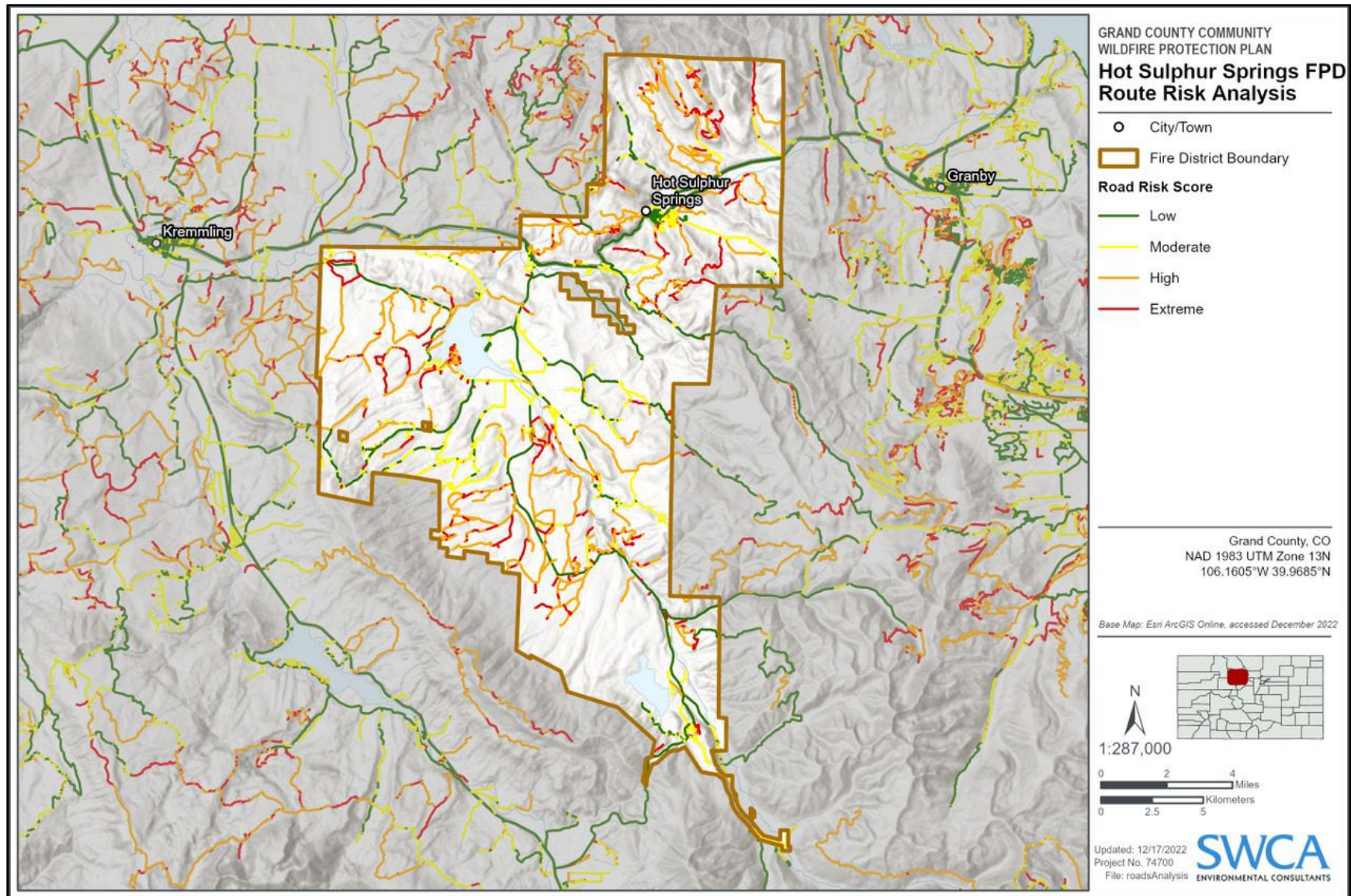


Figure 4.14. Hot Sulphur Springs/Parshall FPD No. 3 route risk-hazard analysis.

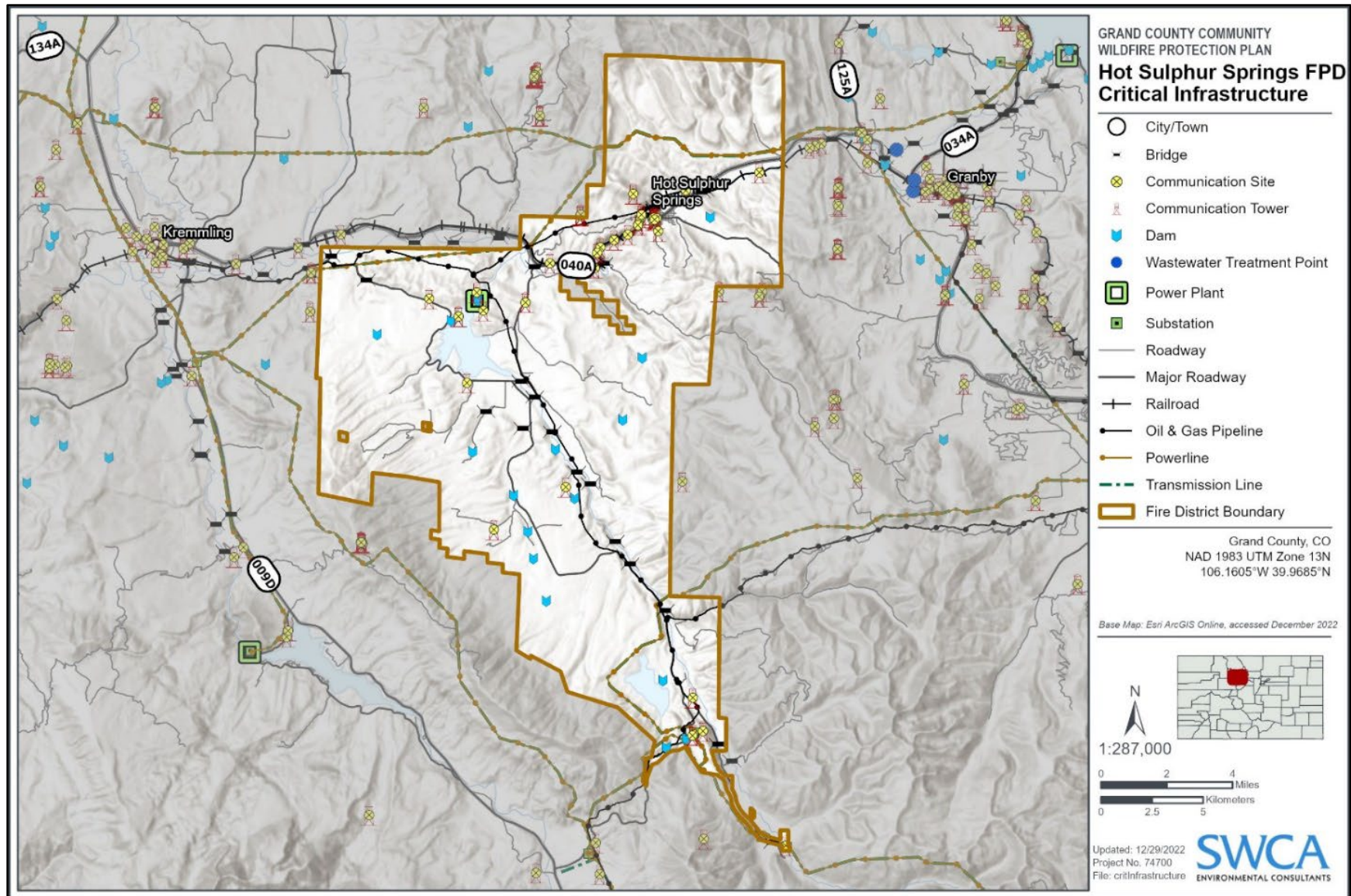


Figure 4.15. Hot Sulphur Springs/Parshall FPD No. 3 critical infrastructure.

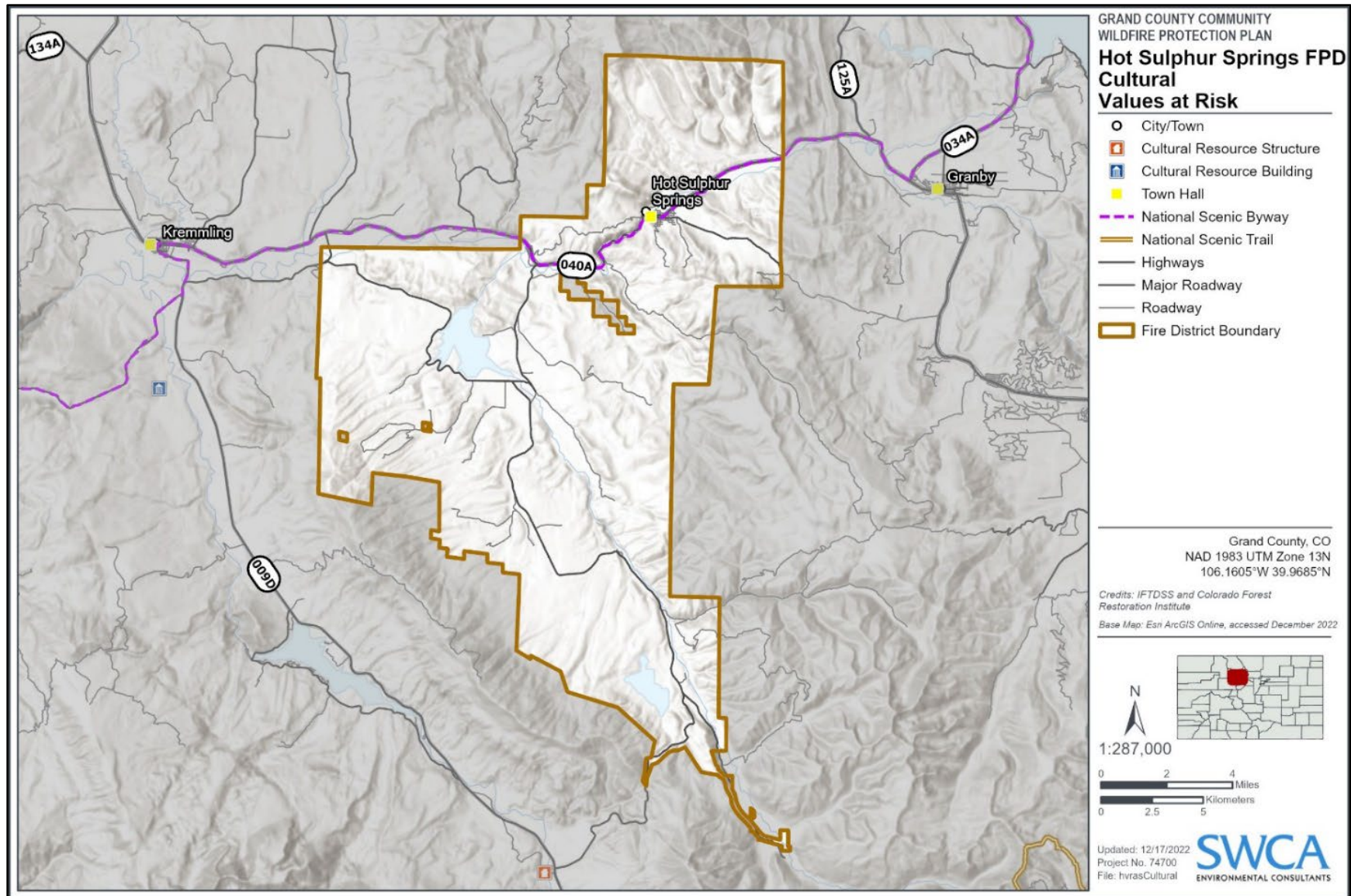


Figure 4.16. Hot Sulphur Springs/Parshall FPD No. 3 cultural values at risk.

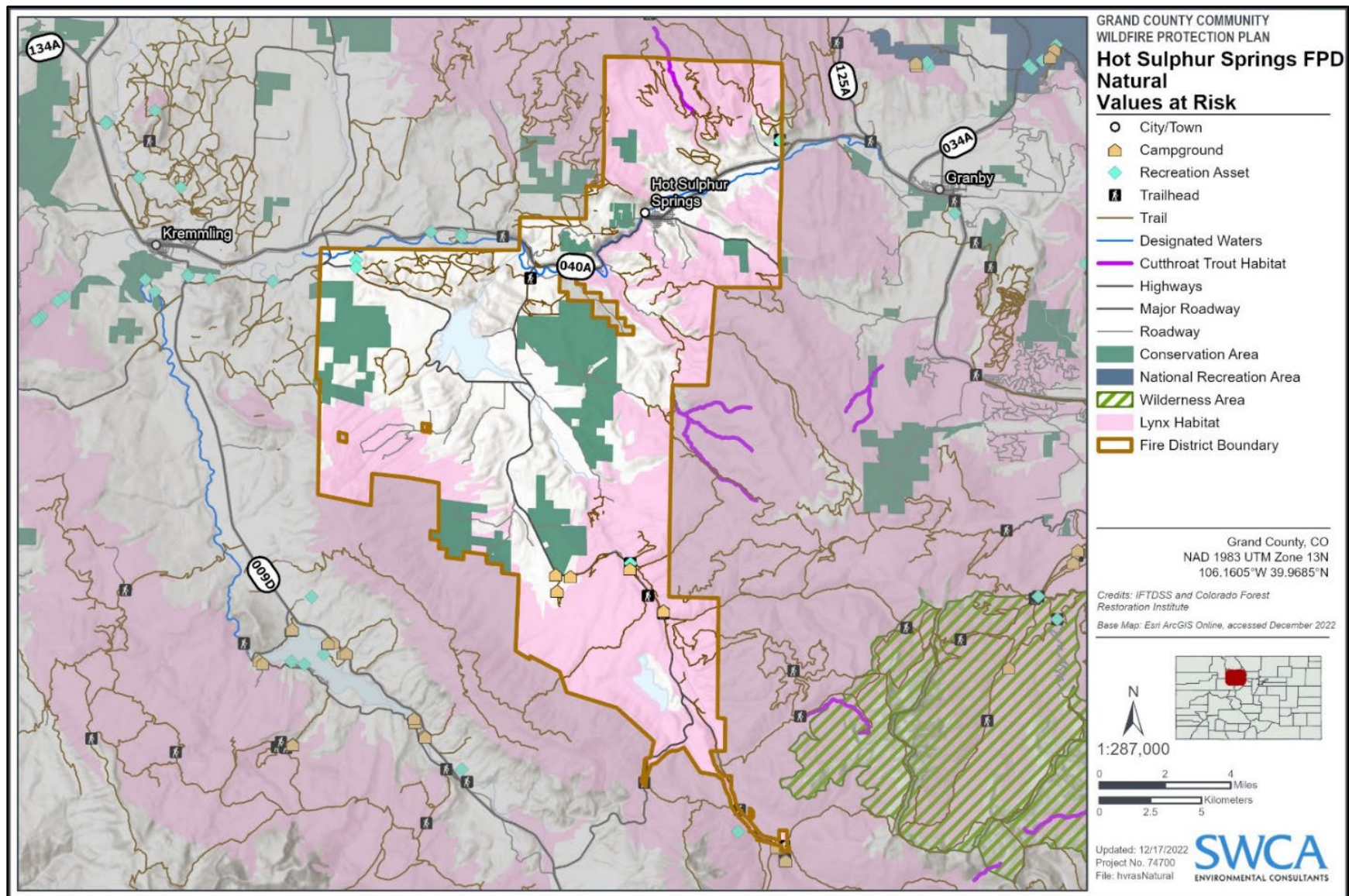


Figure 4.17. Hot Sulphur Springs/Parshall FPD No. 3 natural values at risk.

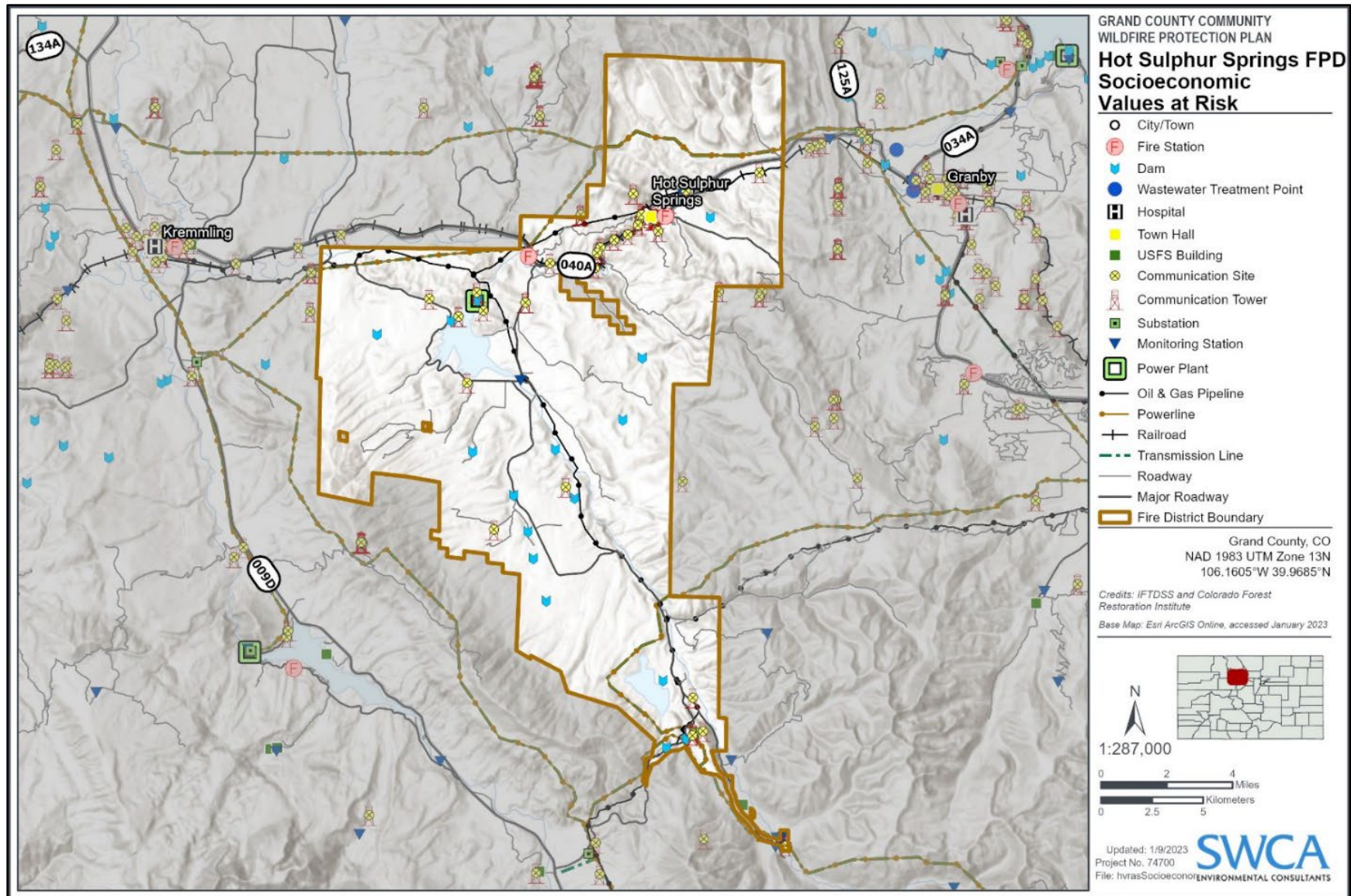


Figure 4.18 Hot Sulphur Springs/Parshall FPD No. 3 socioeconomic values at risk.

Public Education and Outreach Programs

The Hot Sulphur Springs/Parshall FPD No. 3 regularly engages with the public through outreach activities such as holiday events, community dinners, and parades. The District's Facebook page announces upcoming and past events and can be accessed here: <https://www.facebook.com/HSSFPD/>

The FPD's website also contains additional information for the public such as photographs and volunteer information. The website can be accessed here: <http://www.hotsulphurfire.com/>

Policies, Regulations, Ordinances, and Codes

Please refer to the most recent County General Plan for recent information regarding local policies, ordinances, regulations, and codes.

Mitigation Projects and Prioritizations

All mitigation projects applicable to the community, including relevant information such as responsible parties, possible funding sources, priorities, project description, etc., broken into three CWS tables.

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Table 4.5. Recommended Projects for Creating Resilient Landscapes (Fuel Reduction Projects) in the Hot Sulphur Springs / Parshall Fire Protection District

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|--|--------|------------------|---------------------|---|---|--|---|---|--|--|
| Hot Sulphur Springs/Parshall FPD No. 3 RL #1 | | M | 0-5 years | Wildfire risk reduction for homes and communities in high and extreme risk areas throughout the FPD | Fire Protection District Communities to prioritize include Hot Sulfur Springs, Lower Williams Fork, Parshall and Surrounding Areas, and Upper Williams Fork | Federal, state, and local agencies. Fire Protection District. | <p>Prioritize wildfire risk reduction and fuel treatments in high-risk communities. Wildfire risk is heightened in unburned forested fuels, especially with dead/dying lodgepole pine.</p> <ul style="list-style-type: none">Continue existing treatment projects.Implement new treatment projects, where needed.Monitor and assess old treatments and determine need for retreatment.Collaboratively identify fuel management needs based on the risk/hazard assessment.Aim for 300-foot shaded fuel breaks around communities.Locate parcels on private land adjacent to public lands where targeted fuel treatments can be performed that will connect and maximize the effectiveness of needed, planned, and/or pre-existing treatments. Parcels located in forested ex-urban areas should be prioritized.Work should emphasize the following: reducing potential for grass and shrub fires (especially along busy roadways); reducing standing dead trees (lodgepole, spruce, and aspen), removing ladder fuels, and reducing fuel loading in understory.Utilize mechanical fuel reduction treatments in more populated areas. Consider prescribe burns (including burn piles) in less populated areas. | Improve forest health, reduce wildfire risk within the WUI, and reduce risk to life and property. | <p>Annual review of completed projects including project description and amount of land treated.</p> <p>Assessment and monitoring of current and future conditions.</p> <p>Ongoing monitoring of completed projects.</p> | <ul style="list-style-type: none">Building Resilient Infrastructure and Communities (BRIC) GrantsNational Fire Plan (NFP) GrantsWildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |



| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|--|--------|------------------|---------------------|--|---|--|--|---|--|--|
| Hot Sulphur Springs/Parshall FPD No. 3 RL #2 | | H | 0-5 years | Blue Ridge Forest Health Improvements and wildfire risk reduction | Blue Ridge (southeast of Hot Sulfur Springs) | Federal, state, and local agencies. Fire Protection District. | <p>Consider a landscape level fuel treatment approach. The region primarily has forest fuels and significant lodgepole die-off from bark beetles.</p> <ul style="list-style-type: none">Consider use of fuel breaks. Clear overhanging dead/dying trees and ladder fuels from the side of larger roads at strategic landscape positions (e.g., ridgetops). Consider a 50ft buffer along chosen roads.Collaboratively identify vegetation and fuels management needs based on the risk/hazard assessment.Utilize prescribed fire (where appropriate) and timber sales to reinforce natural fuel breaks. Prescribed fire should be used sparingly due the large degree of dead trees. | <p>Create resilient landscapes and reduce potential for extreme wildfire behavior</p> <p>Create and maintain accountability with local landowners</p> | <p>Implement and design a post treatment assessment monitoring protocol.</p> <p>Post-treatment monitoring should focus on the regeneration of hazardous fuels and the establishment of invasive species</p> | <ul style="list-style-type: none">NFPFirewiseRCPSFA and VFAColorado Healthy Forests and Vibrant Communities ActForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |
| Hot Sulphur Springs/Parshall FPD No. 3 RL #3 | | M | 5-10 yrs | Copper Creek area WUI forest and rangeland health improvements and wildfire risk reduction | Copper Creek in the South William's Fork area | Private, BLM, local FPD. | <ul style="list-style-type: none">Collaboratively identify forests, rangeland, and riparian vegetation and fuels management needs based on the risk/hazard assessment.Consider riparian corridor fuels management (i.e., look at potential for riparian corridors to function as areas for fire spread). Control invasive grasses, weeds, and shrubs in the riparian zones.Locate parcels on private and public lands where targeted fuel treatments can be performed that will connect and maximize the effectiveness of needed, planned, and/or pre-existing treatments.Combine timber stand improvement projects with fuel reduction projects to reduce cost and increase efficiency.Consider mechanical and chemical removal of fine, flashy invasive species, which could contribute to high rates of spread. Focus control efforts near homes and structures.Develop equipment needs to accomplish work (including maintenance) and seek funding for purchase.Cultivate and support partnerships with NGOs and volunteer groups to support implementation of projects. | <p>Create resilient landscapes and reduce potential for extreme wildfire behavior</p> <p>Improve forest health, reduce wildfire risk within the WUI, and reduce risk to life and property.</p> <p>Create and maintain accountability with local landowners.</p> | <p>Implement and design a post-treatment assessment monitoring protocol.</p> <p>Monitoring should focus on the regeneration of hazardous fuels and the establishment of invasive species.</p> <p>Regular public outreach with landowners and real estate developers.</p> | <ul style="list-style-type: none">Building Resilient Infrastructure and Communities (BRIC) GrantsNational Fire Plan (NFP) GrantsFirewise GrantsRegional Catastrophic Preparedness (RCP) grants2022 Infrastructure Investments and Jobs ActState Fire Assistance (SFA) and Volunteer Fire Assistance (VFA) programsColorado Healthy Forests and Vibrant Communities ActForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|--|--------|------------------|---------------------|---|--------------------------|-----------------------------------|--|--|--|--|
| Hot Sulphur Springs/Parshall FPD No. 3 RL #4 | | H | 0-10 years | Conduct post-wildfire mitigation work in areas impacted by the East Troublesome and Williams's Fork fires | Regions impacted by fire | USFS, NPS, BLM, Private, and CSFS | <p>Efforts should focus on post-wildfire landscape rehabilitation in the WUI and important watersheds.</p> <ul style="list-style-type: none">Determine current status of completed BAER and BAR work and assess needs for future efforts.Work with a forest hydrologist or restoration group to address restoration efforts in valued watersheds and WUI areas to accelerate forest recovery. Work such as revegetation and tree planting can reduce debris flow risk, flooding risk, erosion, sedimentation, and protect water quality.Conduct regular post-fire monitoring efforts. Track forest/vegetation recovery and succession. Utilize management interventions in degraded areas to ensure successful recovery (e.g., monitor and control for invasive plants, plant native plants in areas experiencing erosion).Consider fuel reduction projects in WUI areas with considerable slash and blow down to reduce potential for future wildfire as recovery proceeds.Conduct public outreach and education concerning post-wildfire hazards (e.g., falling trees, heightened flooding risk, and higher likelihood of road washout). | Aid in restoration and rehabilitation of fire impacted landscape | <p>Regular monitoring of post-fire environment. Assessment of WUI and watersheds at risk in the post-fire environment.</p> <p>Committed long-term effort to tracking post-wildfire recovery and assessing post-wildfire risks.</p> | <ul style="list-style-type: none">Forest Restoration & Wildfire Risk Mitigation (CSFS)U.S. Endowment for Forestry and CommunitiesColorado Healthy Forests and Vibrant Communities ActEnvironmental Quality Incentives Program (EQIP)2022 Infrastructure Investments and Jobs Act |
| Hot Sulphur Springs/Parshall FPD No. 3 RL #5 | | M | 0-5 years | Improve fuel treatment capabilities | Hot Sulfur Springs FPD | Private, CSFS, and local FPD | <ul style="list-style-type: none">Develop equipment needs to accomplish work (including maintenance) and pursue funding opportunities for purchase.Assess and improve staff capacity through grant funding.Cultivate and support partnerships with NGOs and volunteer groups to support implementation of projects.Encourage citizens to proactive in reducing fire risk in their communities and on their property.Share resources (equipment and people) with other local FPDs. | Increase ability to address wildfire mitigation projects | <p>Annual inventory of current equipment and staff capacity</p> <p>Conduct community outreach to gain volunteer support</p> <p>Annual review of outreach success</p> | <ul style="list-style-type: none">BRICNFPWildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|--|--------|------------------|---------------------|--|--|------------------------------------|--|---|---|--|
| Hot Sulphur Springs/Parshall FPD No. 3 RL #6 | | | | Continue old and implement new fuel treatments in Areas of Concern (AOC) | Refer to AOC map in Chapter 4 (Figure 4.2) | USFS, Private, CSFS, and local FPD | <p>These areas typically need greater attention and display heavy fuel loading with high to extreme wildfire risk. Land management and access (e.g., Wilderness area) could prevent more aggressive actions.</p> <ul style="list-style-type: none">Consider prescribed burning program.Align timber and forest management objectives with wildfire risk reduction.Restore natural fire regimes in roadless areas.Consider land use and pre-existing land management designations when designing treatments to reduce conflict.Prioritize treatments in Blue Ridge AOC. | <p>Protect local communities</p> <p>Improve forest health</p> | Implement and design treatment protocols and management objectives in AOC | <ul style="list-style-type: none">Colorado Healthy Forests and Vibrant Communities ActForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |

Table 4.6. Recommendations for Creating Fire-Adapted Communities (public education and structural ignitability)

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|---|--------|------------------|---------------------|---|--|----------------------------------|--|---|--|--|
| Hot Sulphur Springs/Parshall FPD No. 3 FAC #1 | | | | Monitor and Enforce Defensible Space Standards | Notable communities listed with minimal defensible space include Hot Sulfur Springs, Parshall and surrounding areas, and Upper Williams Fork | Private, local FPD, County | <ul style="list-style-type: none">Create or continue a defensible space program. Include pre-determined inspection frequency and education/outreach efforts.Consider adhering to CSFS recommended defensible space standards (e.g., enforce 100 ft of defensible space) if not already.Prioritize removal of ladder fuels.Work with insurance companies to determine the potential to provide incentives for defensible space associated with reduced insurance premiums.Consider green waste pickup/disposal options. | <p>Reduce loss of life and structures through defensible space.</p> | <p>Annual program evaluation and updates as necessary.</p> <p>Consider updates to the building code, where needed.</p> | <ul style="list-style-type: none">FirewiseFP&S (FEMA)EPA Environmental Education GrantsCWDGBRICWildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |
| Hot Sulphur Springs/Parshall FPD No. 3 FAC #2 | | | | Reduce exposure of gas lines, powerlines, and propane tanks | Where needed (see examples above), but especially Lower Williams Fork | Local utilities, Private, County | <ul style="list-style-type: none">Consider burying gas and electric lines.Ensure ROWs are maintained and hazardous fuels are removed in regular frequency.Remove all accumulated fuels near propane tanks with regular frequency. | <p>Reduce exposure of utilities</p> <p>Reduce utility caused wildfire ignitions</p> | <p>Utility and property owner outreach</p> <p>Communication and collaboration</p> <p>Tracking of status of exposed utilities</p> | <ul style="list-style-type: none">FirewiseFP&S (FEMA)CWDGBRICWildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|---|--------|------------------|---------------------|---|--|---|---|---|--|--|
| Hot Sulphur Springs/Parshall FPD No. 3 FAC #3 | | | | Encourage and provide opportunities for homeowners to fire harden their homes | Communities with opportunities for home hardening include Hot Sulfur Springs, Lower Williams Fork, Parshall and surrounding areas, and Upper Williams Fork | Private, County Planning Commission, Local FPDs, HOA's and community leaders | <ul style="list-style-type: none">• Ensure new homes/structures are made with non-combustible materials (i.e., encourage structural hardening).• Encourage retrofitting pre-existing homes/structures.• Efforts should aim to reduce the occurrence of combustible siding materials, wooden fences, wooden roofs, and wooden side decks.• Pursue grants and incentives to make efforts affordable.• Educate homeowners on real actions that could mitigate their wildfire hazard and risk. | Lowers likelihood of property damage and loss | Property owner outreach Communication and collaboration Updates to municipal ordinances | <ul style="list-style-type: none">• Wildfire Mitigation Incentive for Local Government (CSFS)• Firewise Grants• FP&S• CWDG• EPA Environmental Education Grants• Wildfire Mitigation Resources & Best Practices (CSFS) |
| Hot Sulphur Springs/Parshall FPD No. 3 FAC #4 | | | | Improve evacuation zone education and outreach | Fire Protection District | Federal, State, and Local agencies. Fire Protection Districts Grand County Wildfire Council | <ul style="list-style-type: none">• Develop and distribute public education and outreach materials concerning evacuation zones and routes and best practices.• Provide handouts on preparing "Go Bags" – an emergency supply bag that can be accessed in cases of evacuation.• Utilize common information resources to spread information on evacuation best practices and routes such as social media, news, radio, nextdoor, twitter, and others.• Engage HOA's and neighborhoods in community-specific education.• With all partners, develop evacuation exercises and practice runs for incident pre-planning purposes.• Familiarize public with FEMA's Integrated Public Alert and Warning System (IPAWS).• Communicate CodeRED red to county residents and visitors (e.g., flyers at recreation sites and relevant weblinks). Encourage people to register their phone number.• Communicate the role the Emergency Alert System (EAS) to County residents, homeowners, and visitors (e.g., flyers and relevant weblinks).• Encourage partners (tv and radio stations) to display EAS messages.• Explore opportunities to enhance the reverse 911 system. | Ensure public and first responder safety in the event of a wildfire or other emergency. | Develop and distribute a survey to understand and adapt best practices for communication and teaching. Assess and adapt methodologies and current information annually to ensure information is up to date. | <ul style="list-style-type: none">• FEMA Building Resilient Infrastructure and Communities Grants• USFS Community Wildfire Defense Grant• FEMA FP&S Grants• Wildfire Mitigation Incentive for Local Government (CSFS)• Firewise Communities Grants |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|---|--------|------------------|---------------------|--|--------------------------|---|--|--|---|--|
| Hot Sulphur Springs/Parshall FPD No. 3 FAC #5 | | | | Identify funding sources for underserved homeowners and vulnerable populations | Fire Protection District | Fire Protection District, HOA's, community leaders Grand County Wildfire Council | <ul style="list-style-type: none">Identify vulnerable populations (elderly, disabled, low income) and underserved homeowners who may need additional help to mitigate home hazards and to evacuate during a wildfire.Seek grant opportunities to support assistance for relevant populations. | Protect life and property of the most vulnerable members of the community | Annual review of number of actions taken to address vulnerable populations and underserved homeowners | <ul style="list-style-type: none">BRICFirewise grantsNational Urban and Community Forest ProgramChallenge Cost Share Grant ProgramCommunity Wildfire Defense Grants |
| Hot Sulphur Springs/Parshall FPD No. 3 FAC #6 | | | | Public outreach and education aimed at reducing human-caused wildfire | Fire Protection District | Local, State, and Federal agencies Grand County Wildfire Council | <p>Inform and educate the public about methods to reduce human-caused wildfire ignitions.</p> <ul style="list-style-type: none">Educate around sources of human-caused wildfire ignitions (e.g., driving through or parking in tall, dry vegetation; discarded cigarette butts; fireworks; campfires, etc.).Communicate hazardous conditions surrounding homes/structures (e.g., exposed propane tanks, electrical hazards, hazard trees, limited defensible place, etc.)Provide materials with resources for the public to understand how and with what funding they can take action to reduce risks.Utilize Appendix G of the CWPP: Homeowner Resources | <p>Recue risk of human-caused wildfire ignitions.</p> <p>Educate citizens about wildfire hazards.</p> <p>Empower local communities and visitors.</p> | <p>Track successes and learnings from outreach campaigns and enact changes with each wildfire season.</p> <p>Assess and utilize current popular information sources such as nextdoor, social media, news outlets, and more.</p> | <ul style="list-style-type: none">Wildfire Mitigation Incentive for Local Government (CSFS)Firewise Communities GrantsWildfire Mitigation Resources & Best Practices Grants (CSFS)EPA Environmental Education GrantsFEMA BRIC Grants |

Table 4.7. Recommendations for Safe and Effective Wildfire Response

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|--|--------|------------------|---------------------|---|---|-----------------------------|--|---|---|---|
| Hot Sulphur Springs/Parshall FPD No. 3 FR #1 | | | | Asses select roads for fire access improvement (improve community ingress and egress) | Communities with opportunities to improve roads include Hot Sulfur Springs, Parshall and surrounding areas, and Upper Williams Fork | Private, municipal, County. | <ul style="list-style-type: none">Prioritize road improvements in high population areas with potentially hazardous road conditions.Increase width of roads where appropriate.Provide more locations for truck turnarounds.Consider pavement for higher traffic volume roads.Educate homeowners on real actions that could mitigate neighborhood roads wildfire hazards and risk (e.g., regular mowing of weeds along roadsides, or community clean-up days). | <p>Provides for safe and effective wildfire response capabilities</p> <p>Provides safe and effective means of evacuation in case of emergencies</p> | <p>Assessment of current road conditions</p> <p>Regular monitoring and maintenance to ensure roads are drivable for emergency response vehicles</p> | <ul style="list-style-type: none">BRICNFPRCPFirewise Grants2022 Infrastructure Investments and Jobs ActForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|--|--------|------------------|---------------------|---|--|---|--|---|---|--|
| Hot Sulphur Springs/Parshall FPD No. 3 FR #2 | | | | Increase number of available water sources for fire suppression | Notable communities that may have limited water supplies for fire suppression include Lower Williams Fork, Parshall and Surrounding Areas, and Upper Williams Fork | Private, municipal, county, neighboring landowners/managers | <ul style="list-style-type: none">Map out and delineate nearest available and reliable water sources (e.g., fire hydrants, creeks, streams, pools, ponds, etc.) that can be used in emergency scenarios using an online spatial application.Improve existing fire flows in remote areas to meet fire flow requirements.Make sure fire flows in new developments meet fire flow requirements.Install water tanks where feasible. In locations water tanks cannot be installed, have tanks filled and pre-loaded to be transported to areas of need in the event of a fire.Install hand pumps or other methods independent of the grid for accessing private well water. | Provides for safe and effective wildfire response capabilities Increases resilience of local communities | Detailed assessment of currently available water resources | <ul style="list-style-type: none">BRICNFPRCPFirewise Grants2022 Infrastructure Investments and Jobs ActForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |
| Hot Sulphur Springs/Parshall FPD No. 3 FR #3 | | | | Add a wildland fire division to the FPD | Fire Protection District | County, state | <ul style="list-style-type: none">Consider adding a hired wildland division to FPD or jointly operate one with a nearby FPD (e.g., East Grand FPD No. 4, Grand FPD No. 1, and Kremmling FPD No. 5).If a crew cannot be hired, have a designated volunteer division. | Increase wildfire suppression capabilities | Required funding and additional equipment | <ul style="list-style-type: none">2022 Infrastructure Investments and Jobs ActForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS)Volunteer Fire Assistance (VFA) Grant (Colorado DFPC) |
| Hot Sulphur Springs/Parshall FPD No. 3 FR #4 | | | | Improve street signage to ease fire response navigation | Communities with opportunities to improve street signage include Hot Sulfur Springs, Lower Williams Fork, and Upper Williams Fork. | Private, municipal, county | <ul style="list-style-type: none">Install reflective street signs and house numbers.Ensure roadside view of street signs and house numbers is not obstructed. | Helps ensure safe and effective wildfire response capabilities | Assessment pf current conditions Outreach to property owners | <ul style="list-style-type: none">BRICNFPRCPFP&SFirewise GrantsForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |

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ANNEX 5

KREMMLING FIRE PROTECTION DISTRICT NO. 5

Organization and Jurisdiction

The Kremmling Protection District (FPD) jurisdictional boundaries extend from the south end of Wolford Mountain Reservoir south to communities between Silverthorne and Kremmling along Highway 9. Its boundaries also extend east near Parshall, and west to Kremmling neighborhoods along Highway 134 and just upstream of the Gore Valley Overlook along the Colorado River (Figure 5.1). The FPD is responsible for responding to incidents across nearly 138 square miles ranging in elevation from 6,546 ft river bottoms to 8,897 ft mountain ridges. The FPD's land is managed and owned by private landowners, the BLM, the state, and a small portion of Medicine Bow-Routt National Forest (Figure 5.2). Kremmling FPD No. 5 response district encompasses the town of Kremmling, communities north of Silverthorne, the Colorado and Blue River corridors, and the southern portion of Wolford Mountain Reservoir into Muddy Creek. The FPD has one response facility.

Outside of the town of Kremmling, higher population density areas within the FPD include the communities north of Silverthorne, and other neighborhoods along the main transportation corridors in the FPD. Kremmling FPD No. 5 contains three main transportation corridors - U.S. Highway 9, U.S. Highway 40, and County Road 134. Across its entire jurisdiction, the FPD includes 2,033 buildings and has a building density of 14.79 units per square mile.

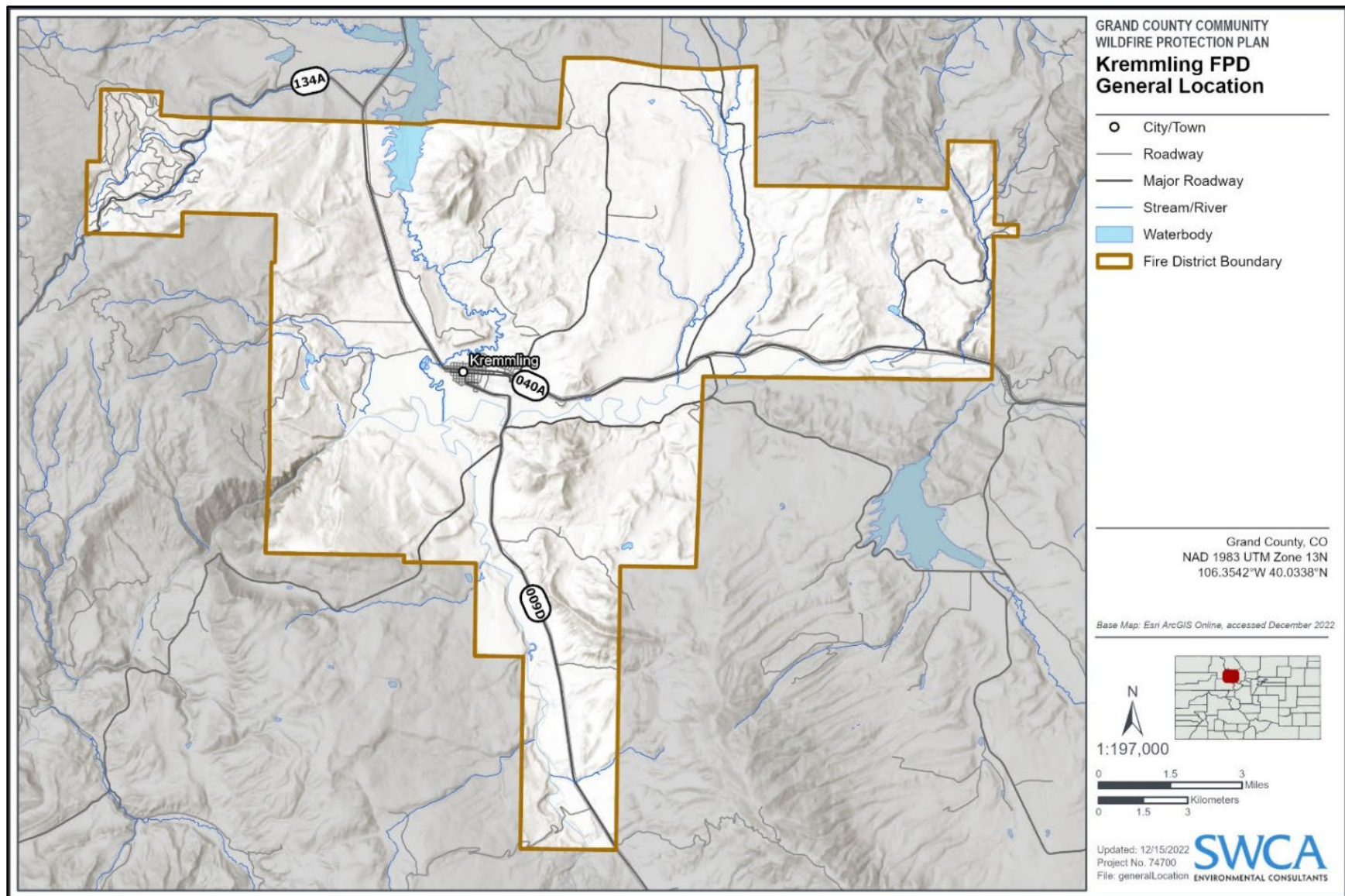


Figure 5.1 Kremmling FPD No. 5.

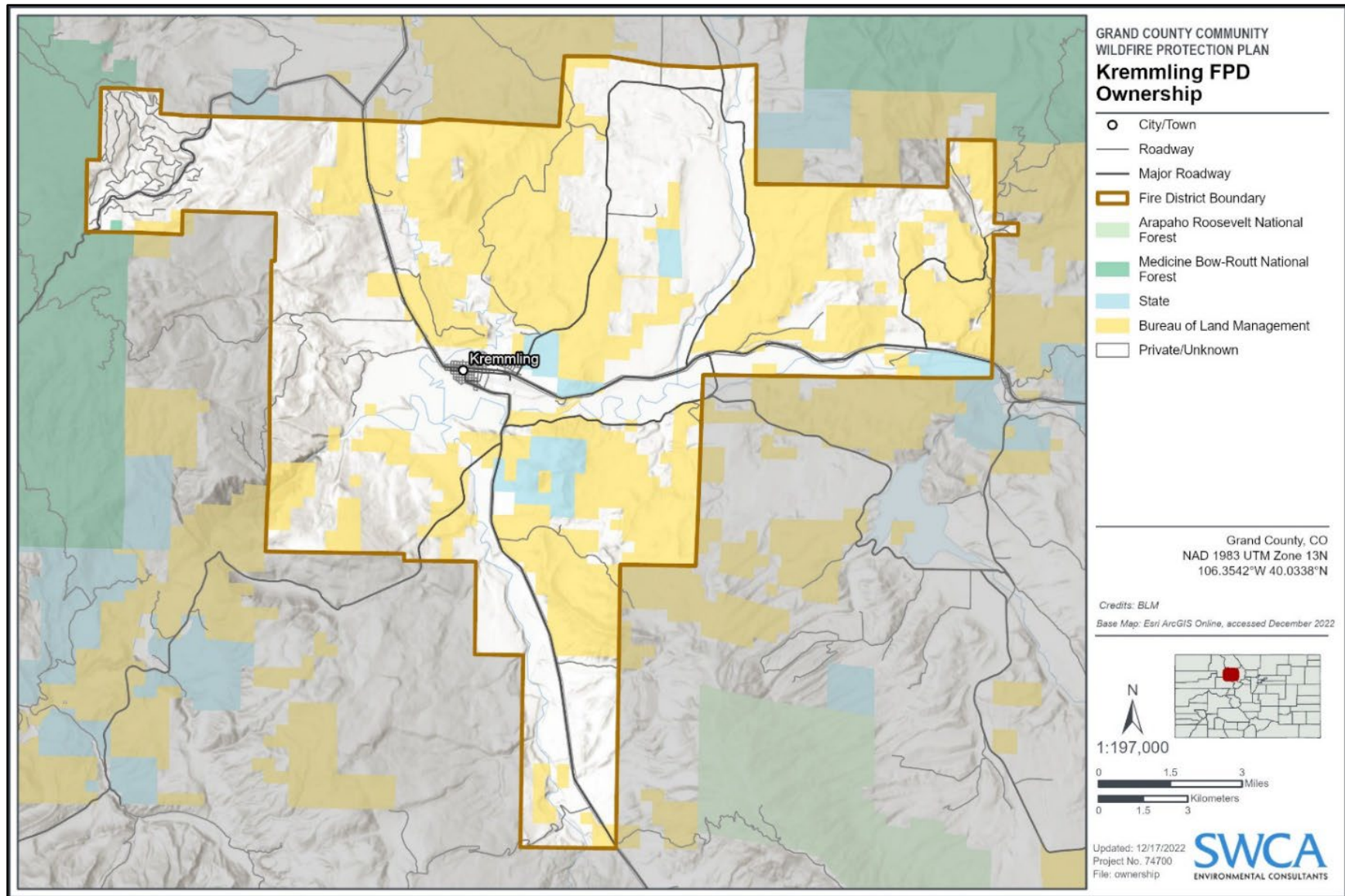


Figure 5.2 Kremmling FDP No. 5 land ownership.

WUI Area Description

The wildland urban interface (WUI) is composed of both interface and intermix communities and is defined as areas where human habitation and development meet or intermix with wildland fuels (U.S. Department of the Interior and U.S. Department of Agriculture [USDA] 2001:752–753). Interface areas include housing developments that meet or are in the vicinity of continuous vegetation. Intermix areas are those areas where structures are scattered throughout a wildland area where the cover of continuous vegetation and fuels is often greater than cover by human habitation. WUI is further delineated through buffers and with a Low, Medium, High, or Extreme classification based on fuels and slope steepness. Buffers are derived from the general boundaries of where development meets wildland fuels, and higher assigned classifications correspond to greater presences of wildland fuels and steeper slope angles.

The WUI in the Kremmling FPD No. 5 is extensive and contains significant quantities of both interface and intermix development. Nearly the entire FPD falls within a 2.5-mile WUI buffer, and the vast majority also lies inside a 1-mile WUI buffer (Figure 5.3). Similar to areas classified as extreme in our Risk-Hazard Assessment (Figure 5.5), WUI classified as extreme lies primarily in the upper elevation reaches of ecotone zones where sagebrush steppe completes its transition into stands of lodgepole pine. These areas have a high concentration of conifer stands that have yet to experience recent wildfire. This extreme class within the WUI includes housing along Lawson Ridge, communities around Junction Butte (Kremmling, Parshall and Surrounding Areas), the community surrounding the Wolford mountains (Troublesome Creek), and the community surrounding Gore Canyon (Gorewood). Communities in the FPD directly adjacent to those in extreme WUI zones generally have high WUI classifications and include Old Park, Big Horn Park, and Lake Agnes, while the remaining lower elevation reaches of the FPD are predominately considered as having moderate WUI classifications. The community falling within the bounds of moderate classification is Grand River Ranch (Figure 5.4).

Risk-Hazard Summary

The purpose of the Risk-Hazard Assessment is to evaluate and provide information pertaining to the risk of wildland fires within the Kremmling FPD No. 5 jurisdictional land. For more information on the Risk-Hazard Assessment purpose and process, see Chapter 3 of the Grand County CWPP main document. The Composite Risk-Hazard Assessment is twofold and combines a geographic information system (GIS) model of hazard based on fire behavior and fuels modeling technology and a Core Team-generated assessment of on-the-ground community hazards and values at risk (VARs).

The Risk-Hazard Assessment considers:

- Fire behavior modeling outputs
- Fire history
- HVRAs
- Fire response

Figure 5.5 contains a visual summary of the Kremmling FPD No. 5 Risk -Hazard Assessment. Most of the high-risk areas identified are in unburned montane conifer forests along the fringes of inter-mountain basins. These include those surrounding Sheep Mountain, San Toy Mountain, and the Gore Range. The Colorado River runs east to west through the fire district boundary, and the adjacent land has been designed high- to extreme-risk. The most prominent low-risk areas are associated with the town of Kremmling and Wolford Mountain Reservoir.

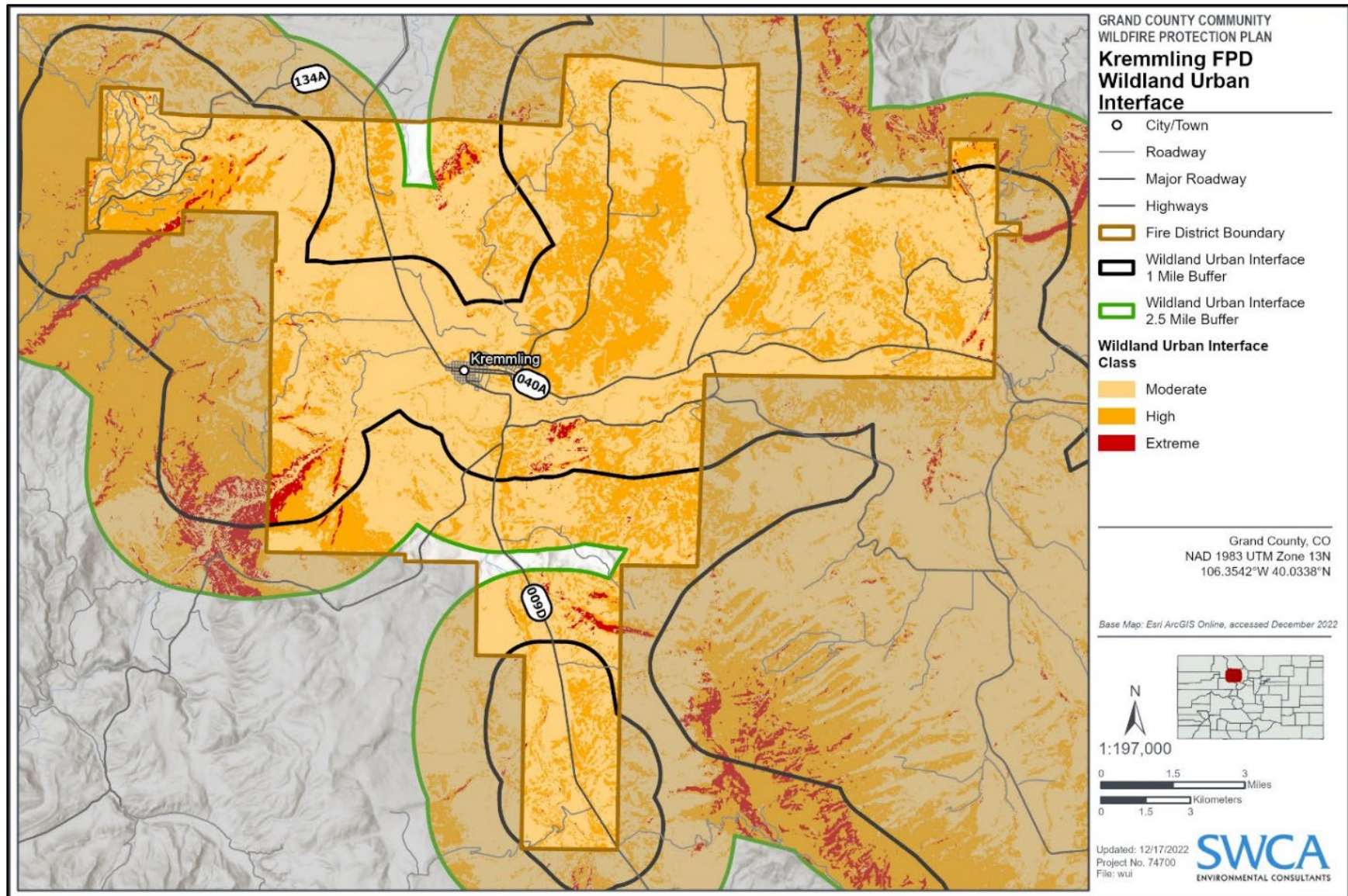


Figure 5.3. Kremmling WUI boundaries and associated risk.

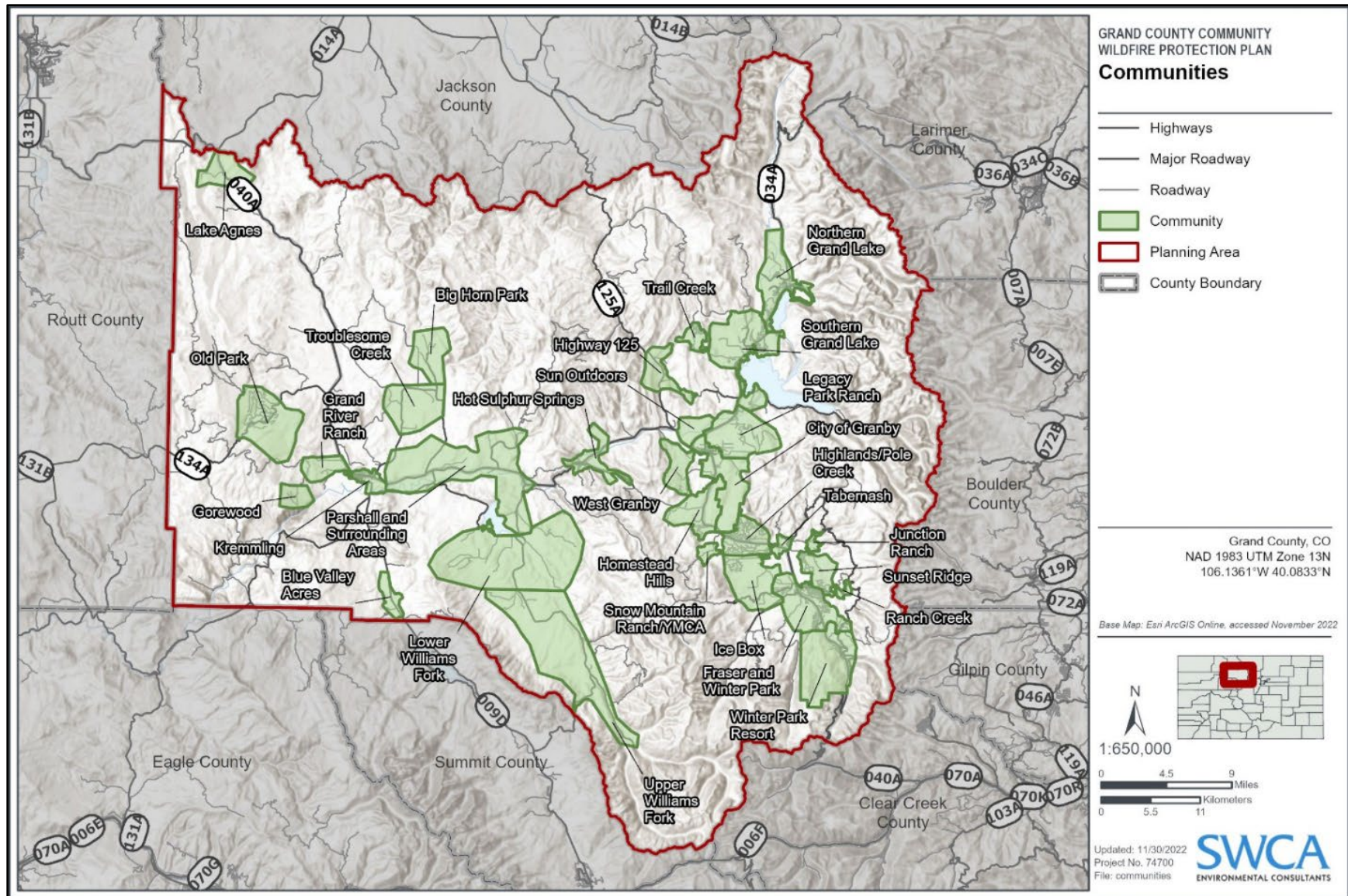


Figure 5.4. Grand County WUI communities.

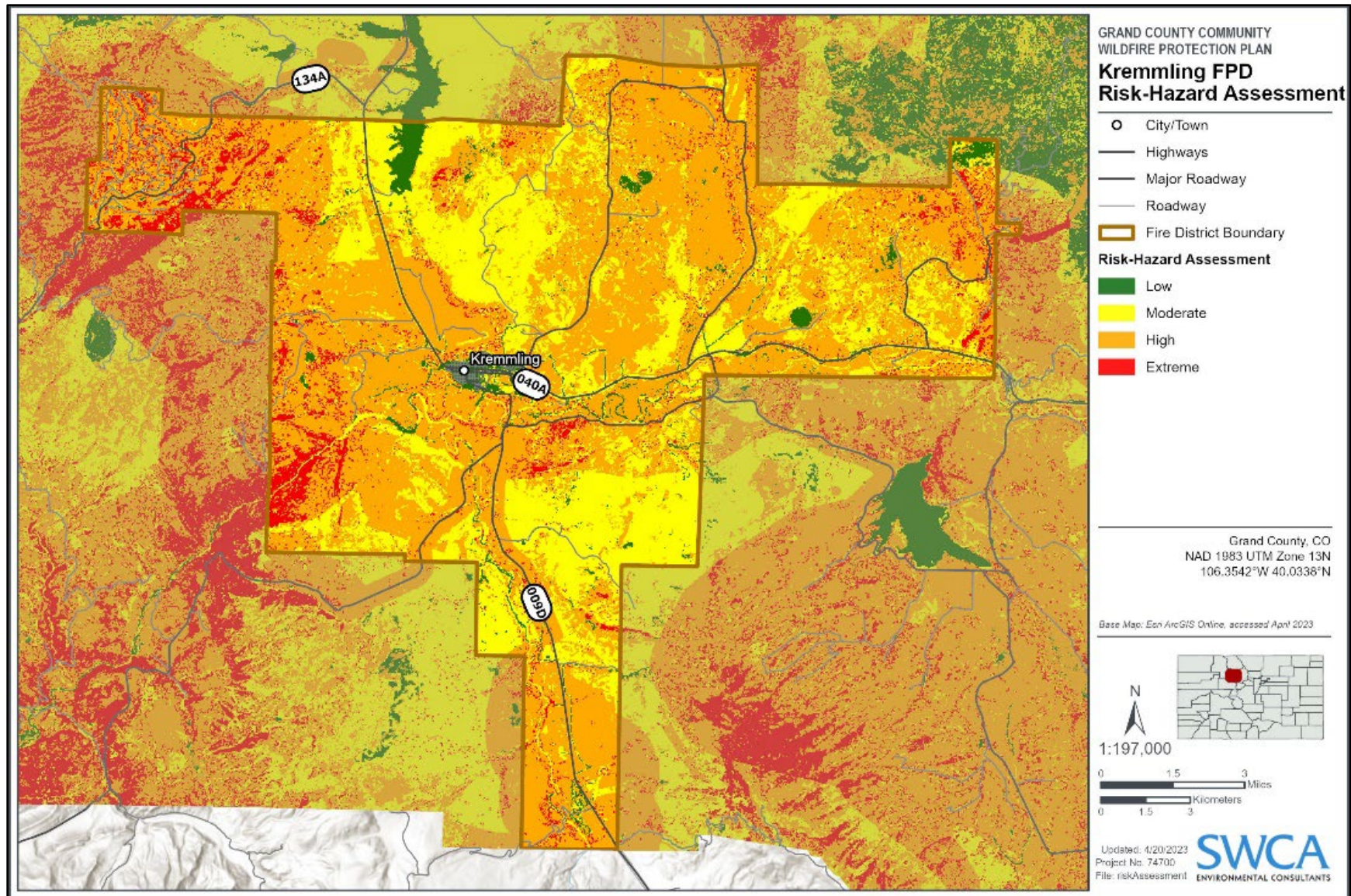


Figure 5.5. Kremmling FPD No. 5 Risk-Hazard Assessment.

Fire History

Although the Kremmling FPD No. 5 regularly responds to smaller structural and wildland ignitions (Figure 5.6), the District has never responded to a large wildland fire within its jurisdiction (Figure 5.7).

Hazardous Fuel Characteristics

Fuels found within the Kremmling FPD No. 5 jurisdiction are listed below in Table 5.1 and illustrated in Figure 5.8. Please see Chapter 2, Fire Environment, for more information regarding fuels within the county.

Table 5.1. Fuel Types (Scott and Burgan 2005) in Kremmling FPD No. 5's Boundaries

| Existing Fuel Type | Acres | Percent |
|---|--------|---------|
| GS2 – Grass-shrub, Shrubs are 1 to 3 feet high, moderate grass load. Spread rate high; flame length moderate. | 22,073 | 25.08% |
| GS1 – Grass-shrub, shrubs are about 1 foot high, low grass load. Spread rate moderate; flame length low. | 19,017 | 21.61% |
| SH1 : Low fuel load, depth about 1 foot, some grass fuels present. Spread rate very low (0–2 chains/hour); flame length very low (0–1 foot). | 16,705 | 18.98% |
| GR2 – Grass, moderately coarse continuous grass, average depth about 1 foot. Spread rate high; flame length moderate. | 12,507 | 14.21% |
| TU1 – Timber-understory, fuelbed is low load of grass and/or shrub with litter. Spread rate low; flame length low. | 5,500 | 6.25% |
| GR1 – Grass, grass is short, patchy, and possibly heavily grazed. Spread rate moderate; flame length low. | 4,658 | 5.29% |
| Other* – Various fuel types | 2,985 | 3.39% |
| NB1 – Non burnable urban or suburban development; insufficient wildland fuel to carry wildland fire | 1,793 | 2.04% |
| TU5 – Timber-understory, fuelbed is high load conifer litter with shrub understory. Spread rate moderate; flame length moderate. | 1,601 | 1.82% |
| NB8 – Non burnable open water | 1,161 | 1.32% |

*Other includes fuel types with <1% cover of the FPD. These include GR3, NB2, NB3, NB9, SH2, SH7, TL1, TL2, TL3, TL5, TL6, TL8, TL9, and SB1.

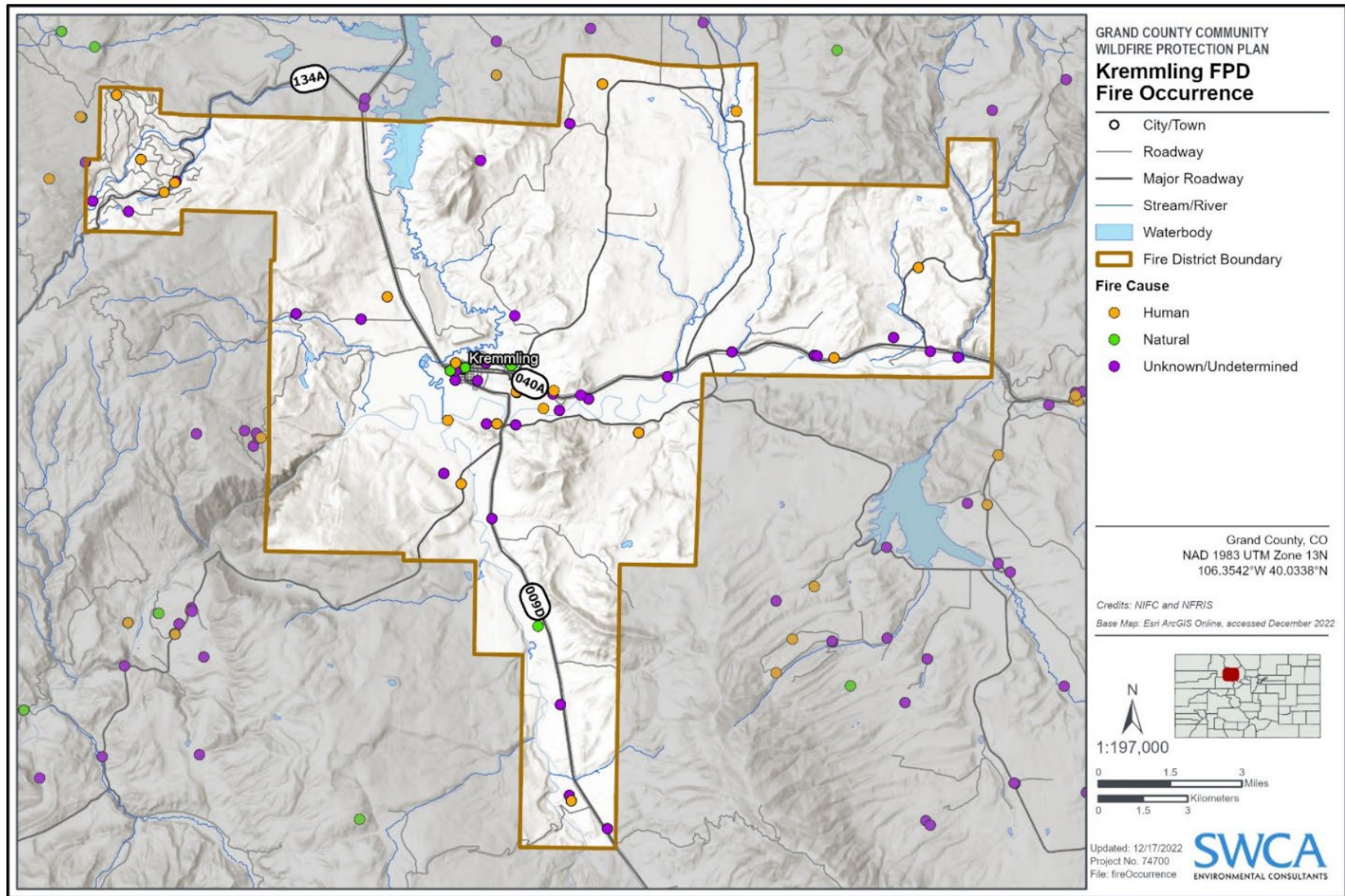


Figure 5.6. Kremmling FDP No. 5 fire occurrence.

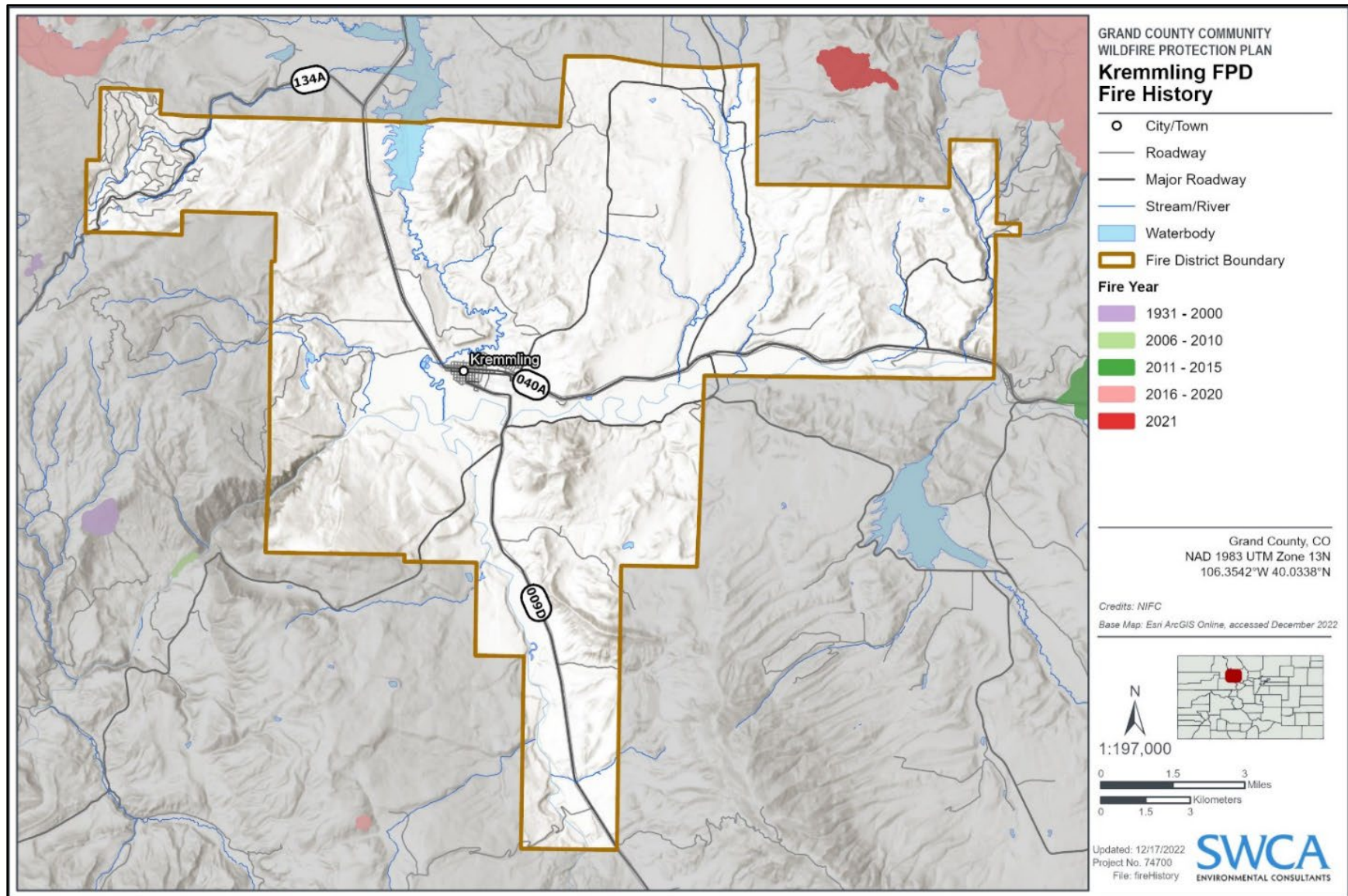


Figure 5.7. Kremmling FDP No. 5 fire history.

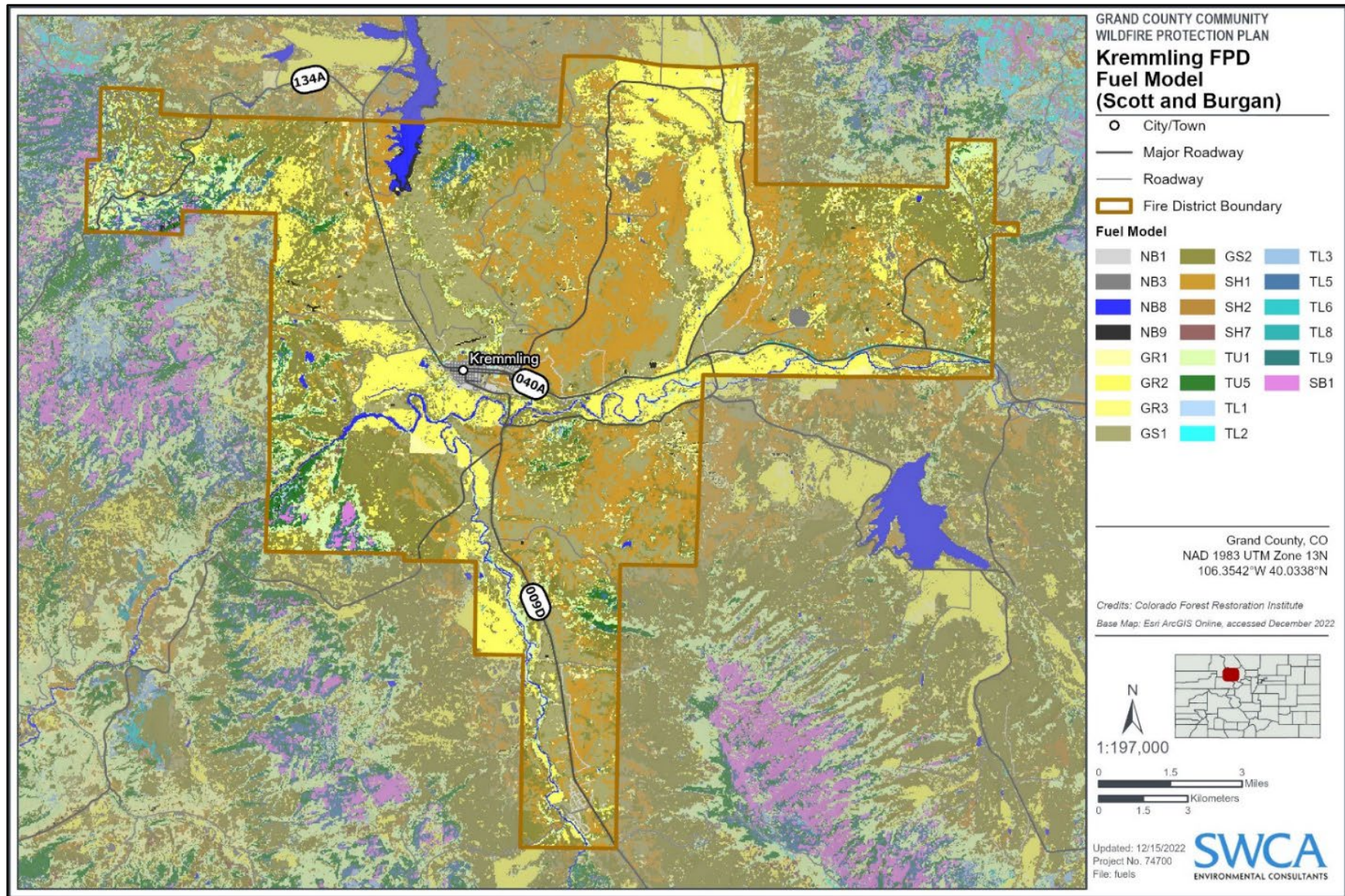


Figure 5.8. Kremmling FDP No. 5 Scott and Burgan fuels model.

Neighborhood and Structural Characteristics

Most of the Kremmling FPD No. 5 jurisdiction has some defensible space and visible fuels mitigation around structures. Most communities have limited water sources for suppression and limited turnarounds available for fire trucks. Additionally, in some communities, buildings were located <30 ft to the slope, and road width is <20 ft, creating access challenges in difficult terrain for fire behavior. See Table 5.2 and Figures 5.9 and 5.10 for more information on community specifics within the District.

Table 5.2. Kremmling FPD No. 5 NFPA 1144 Assessment Results

| Community | Score | Rating | Fire Station | Positives | Negatives |
|--|-------|---------|------------------------|--|---|
| Big Horn Park (Map C-32, Appendix C) | 132 | Extreme | Kremmling Fire Station | <ul style="list-style-type: none"> • Some visible fuels mitigation efforts around homes • Metal roof or asphalt shingle throughout | <ul style="list-style-type: none"> • Road width <20 ft • Limited turnarounds for fire trucks • Non-reflective street signs • Limited defensible space • Combustible housing materials • Buildings <30 ft to slope, many built on slopes • Limited water sources for suppression • Fire station >5 mi from community • Above ground gas and electric utilities |
| Blue Valley Acres (Map C-54, Appendix C) | 74 | High | Kremmling Fire Station | <ul style="list-style-type: none"> • Ingress/egress • Some defensible space • Metal roof or asphalt shingle throughout | <ul style="list-style-type: none"> • Limited turnarounds for fire trucks • Combustible building materials • Structures <30 ft to slope • Fire station >5 mi from community |

| Community | Score | Rating | Fire Station | Positives | Negatives |
|--|-------|----------|------------------------|---|---|
| Gorewood (Map C-36, Appendix C) | 125 | Extreme | Kremmling Fire Station | <ul style="list-style-type: none"> • Reflective street signs • Some visible fuels mitigation efforts • Metal roof or asphalt shingle throughout | <ul style="list-style-type: none"> • <2 roads in and out • Road width <20 ft • Limited turnarounds for fire trucks • Limited defensible space • Combustible building materials • Limited water sources for suppression • Above ground gas and electric utilities • Dense fuel loads |
| Grand River Ranch (Map C-56, Appendix C) | 67 | Moderate | Kremmling Fire Station | <ul style="list-style-type: none"> • Some defensible space around structures • Metal roof or asphalt shingle throughout • Structures <30 ft to slope | <ul style="list-style-type: none"> • Limited turnarounds for fire trucks • Non-reflective street signs • Combustible building materials |
| Kremmling (Map C-34, Appendix C) | 76 | High | Kremmling Fire Station | <ul style="list-style-type: none"> • Ingress/egress • Available turnarounds for fire trucks • Reflective street signs • Metal roof or asphalt shingle throughout • Fire hydrants | <ul style="list-style-type: none"> • Limited defensible space |

| Community | Score | Rating | Fire Station | Positives | Negatives |
|---|-------|---------|---|--|--|
| Lake Agnes (Map C-50, Appendix C) | 115 | Extreme | <ul style="list-style-type: none"> Kremmling Fire Station Steamboat Springs Fire Station, Routt County | <ul style="list-style-type: none"> 1 road in and out Class A roofing materials Spacing between structures | <ul style="list-style-type: none"> Ingress/egress Limited turnarounds for fire trucks Limited defensible space Steep slopes Combustible building materials Structures <30 ft to slope Fire station >5 mi from community |
| Old Park (Map C-38, Appendix C) | 107 | High | Kremmling Fire Station | <ul style="list-style-type: none"> Reflective street signs Some defensible space Metal roof or asphalt shingle throughout Many homes built on flat terrain | <ul style="list-style-type: none"> Ingress/egress Limited turnarounds for fire trucks Combustible building materials Limited water sources for suppression Fire station >5 mi from community Both gas and electric utilities above ground |
| Parshall and Surrounding Areas *Also in Hot Sulphur Springs/Parshall FPD No. 3. (Map C-30, Appendix C) | 107 | High | <ul style="list-style-type: none"> Kremmling Fire Station Hot Sulphur Springs/Parshall Fire Protection District No. 3 Station 1 | <ul style="list-style-type: none"> 2+ roads in and out Reflective street signs Visible fuels mitigation efforts Metal roof or asphalt shingle throughout Houses located on flat surfaces rather than slopes | <ul style="list-style-type: none"> Limited turnarounds for fire trucks Limited defensible space Combustible housing materials Limited water sources for suppression Fire station >5 mi from community |

| Community | Score | Rating | Fire Station | Positives | Negatives |
|--|-------|----------|------------------------|--|---|
| Troublesome Creek (Map C-52, Appendix C) | 69 | Moderate | Kremmling Fire Station | <ul style="list-style-type: none">• Ingress/egress• Some defensible space• Good spacing between structures• Metal roof or asphalt shingle throughout• Many structures >30 ft to slope | <ul style="list-style-type: none">• Limited turnarounds for fire trucks• Combustible building materials• Fire station >5 mi from community |



Figure 5.9. Kremmling landscape.



Figure 5.10. Access gate to Gorewood community.

Emergency Response Capacity

The Kremmling Fire Protection District's boundary covers an area of 136 square miles with a larger response area at 360 square miles. The District is staffed with three career fire fighters while the rest of the crew is staffed with volunteers (Kremmling Fire Protection District 2011). KFPD operates out of one station located in the town of Kremmling, one block south of Hwy 40 on Eagle Avenue (Figures 5.9 and 5.11). The District constructed a second station northwest of Kremmling in the community of Old Park but has not had the personnel or apparatus capacity to staff it. The District and its response area has a high number of residences far from hydrants and easy water access which may delay response and initial attack if water must be transported from off-site (Kremmling Fire Protection District 2011).

The Kremmling FPD No. 5 maintains a fleet of 9 vehicles to respond to fires and emergencies. The vehicles include two type one engines, one type 4 rescue engine, two type six wildland engines, one type one water tender, and two command and support vehicles (Table 5.3).

Table 5.3. Kremmling FPD Response Resources

| Fire Protection District Statistics: | | | | |
|---|----------------------|--------------------------------|-----------------|-----------------------------------|
| Fire Protection District: Kremmling Fire Protection District No. 5 | | | | |
| <u>Fulltime Firefighters:</u> 3 | | <u>On-call Firefighters:</u> 3 | | <u>Volunteer Firefighters:</u> 10 |
| <u>Water Tender:</u> | | <u>Wildland Engines</u> | | |
| Type 1: 1 | <u>Total Number:</u> | | <u>4WD/AWD:</u> | <u>Brush Breaker:</u> |
| Type 2: 0 | Type 3: 0 | | 0 | 0 |
| Type 3: 0 | Type 4: 0 | | 0 | 0 |
| <u>Structure Engines:</u> | | Type 5: 0 | 0 | 0 |
| Type 1: 2 | Type 6: 2 | | 2 | - |
| Type 2: 0 | Type 7: 0 | | 0 | 0 |
| <u>Port-A-Tanks:</u> | 1 | | | |
| <u>Portable Pumps:</u> | 3 | | | |
| <u>Fire Shelters:</u> | 20 | | | |
| Suggested Mitigation Focus Areas: | | | | |
| <u>Areas of Concern (Figure 5.10):</u> | | | | |
| <ul style="list-style-type: none">• Southwest of Grand River Ranch, surrounding Gorewood community, north of Colorado River Headwaters Byway and east of French Creek.• Though outside of FPD, west of the Old Park community is an area of concern.• Fire Department General Areas of Concern: Old Park and Big Horn Subdivisions. | | | | |
| <u>Fire Department Concerns:</u> | | | | |
| <ul style="list-style-type: none">• Defensible space, fuels thinning & other fuel treatments, public education. | | | | |

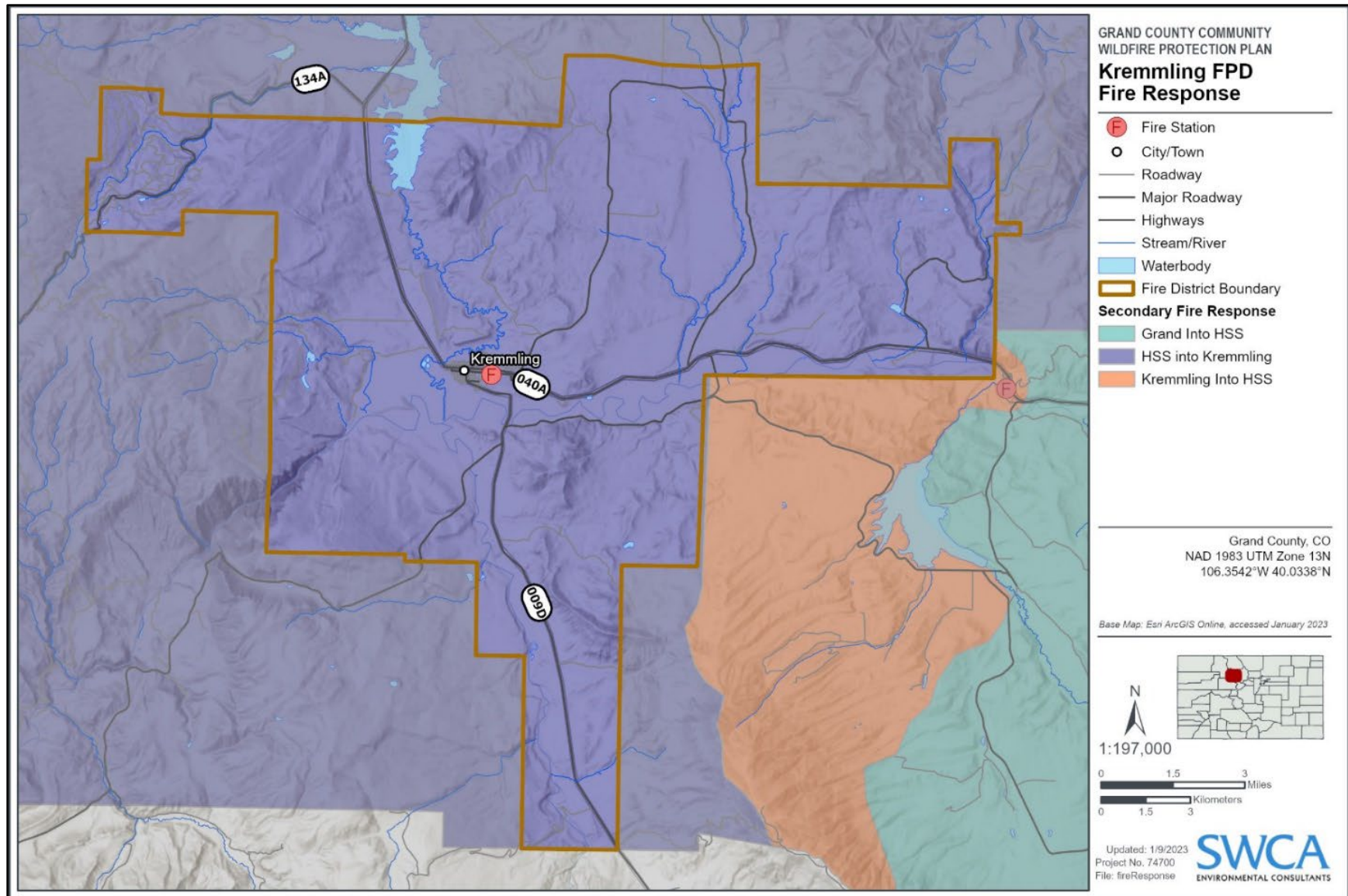


Figure 5.9. Kremmling FDP No. 5's boundaries.

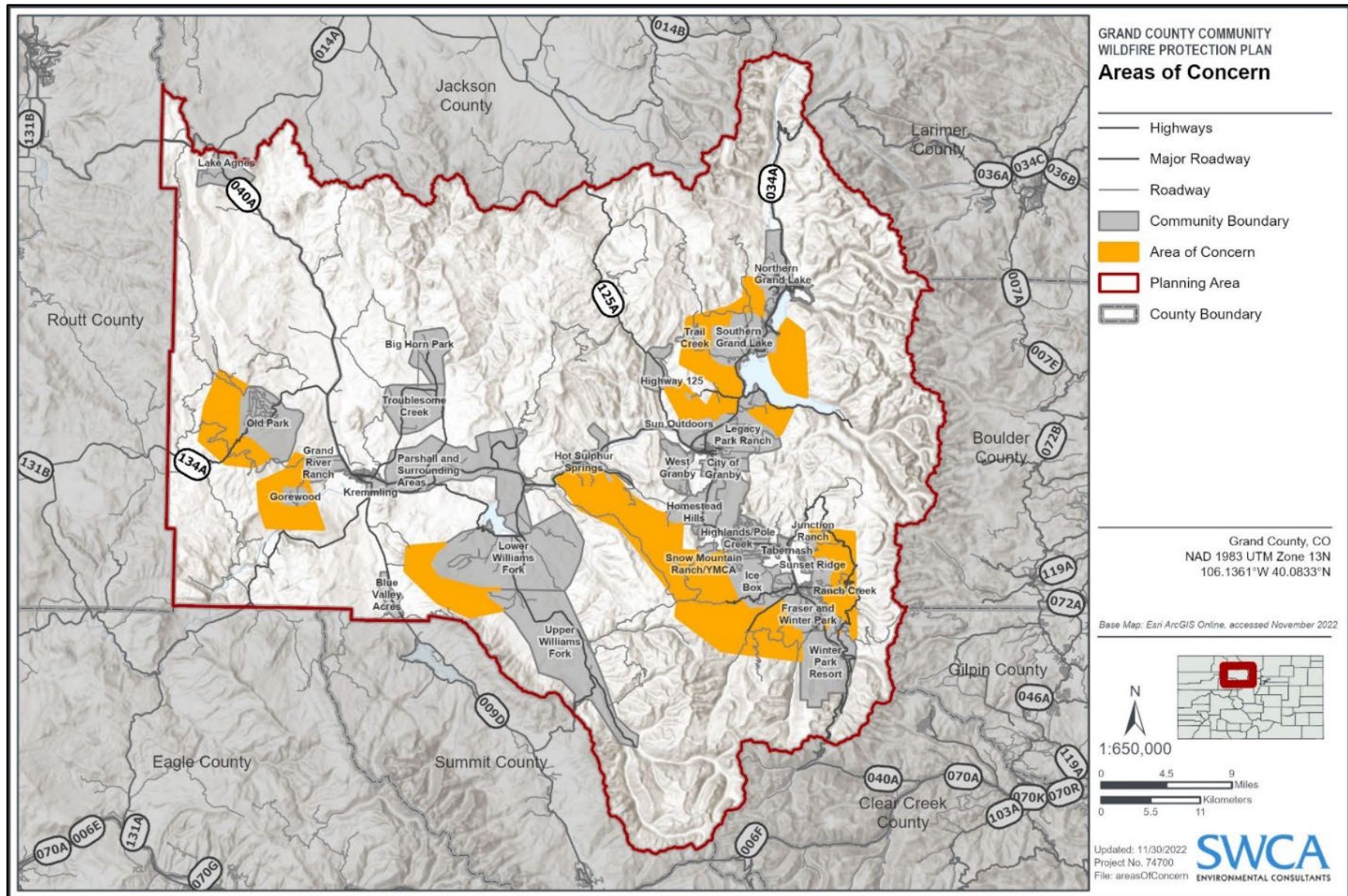


Figure 5.10. Grand County's identified areas of concern.

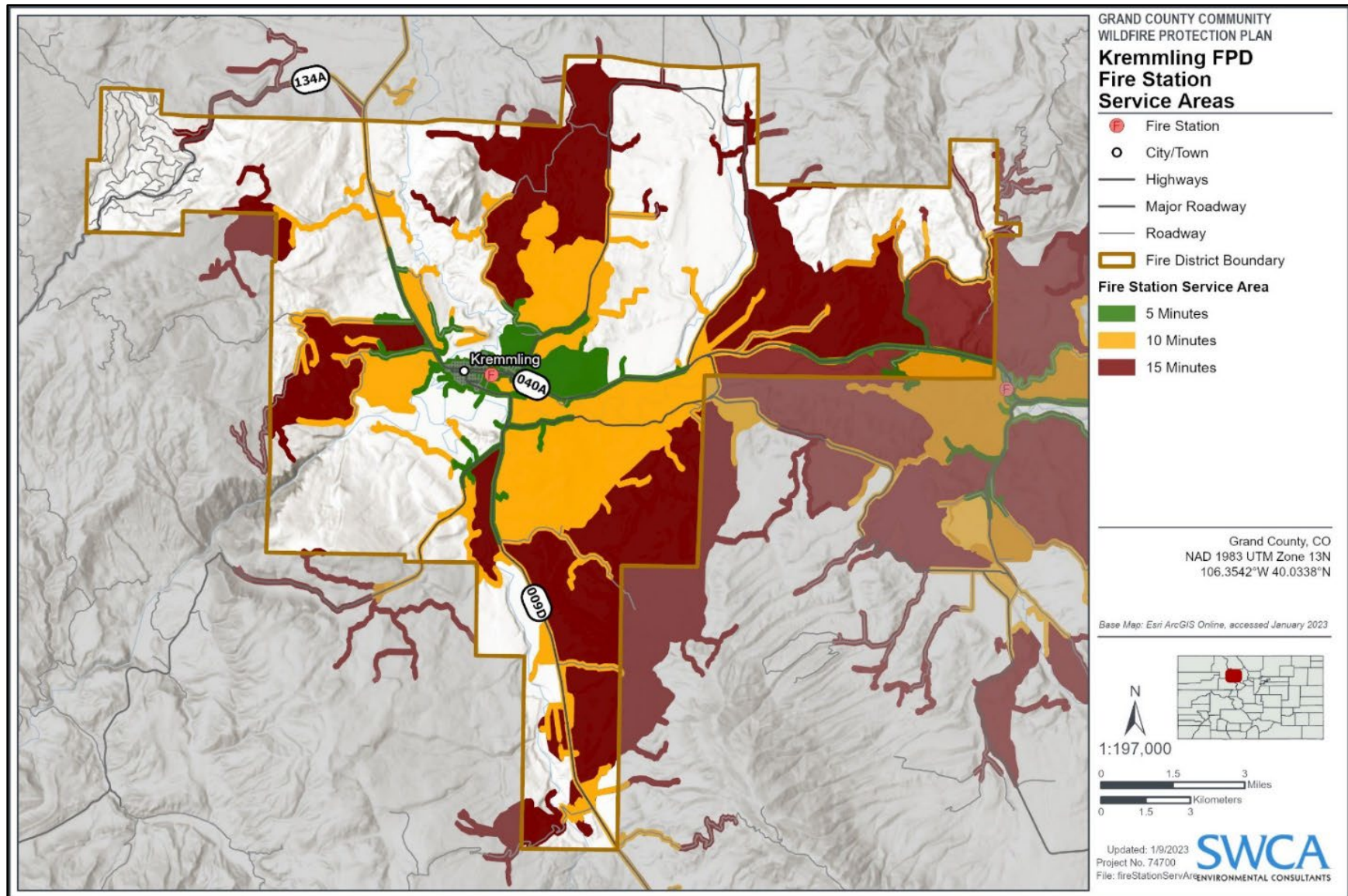


Figure 5.11. Kremmling FDP No. 5's fire station service areas.

Evacuation

Evacuation relies on both cooperative planning and the capability of residents to effectively implement plans. In the event of an incident within the FDP that requires evacuation, the FPD Fire Chief is responsible for issuing an evacuation notice through appropriate communication pathways. However, if a wildfire occurs within the FPD that exceeds the District's response capabilities, the County Sheriff will act as the primary incident commander and be responsible for declarations of evacuation (GACC 2022).

In many cases, pre-evacuation orders informing residents of potential upcoming evacuations will be distributed prior to evacuation orders. Residents will receive pre-evacuation and evacuation orders through the County's CodeRED system, Emergency Alert System (EAS), or Wireless Emergency Alert System (WEA). A county-wide evacuation map is also available through the County's website, and can be accessed here: <https://gcgeo.maps.arcgis.com/apps/webappviewer/index.html?id=ca4f74421b69416da9be1b9b92166534>

It is recommended that residents familiarize themselves with their evacuation zone and evacuation preparedness planning that can reduce strain on emergency response systems and crews during an incident. Additional information can be found in the Fire Response Capabilities section of Appendix B: Community Background and Resources.

Evacuation within the FPD has the potential to be complicated by road infrastructure. Many high and extreme risk roads within the District are narrow, steep, and winding with blind corners and few turnaround areas for larger vehicles. These can become congested and potentially dangerous if emergency response crews are attempting to respond to a wildfire that residents are evacuating from. Furthermore, many of these high and extreme risk roads in the FPD are also located in lodgepole pine forests, which can yield tall flame lengths and cause falling trees during a wildfire. These hazards can block potential escape routes and/or result in entrapment for commuter and emergency vehicles in the event of a wildfire. Residential, recreational, and ex-urban areas with high and extreme risk roads should take proactive approaches in their evacuation planning. This can include designating escape routes and implementing roadside fuel reduction projects. Areas with evacuation challenges in the Kremmling FPD No. 5 are predominately ex-urban areas and include, but are not limited to, the road systems just north of Kremmling, around Wolford Mountain, in the foothills of the Gore Range, and in the foothills of the northern Williams Fork Mountains (Figure 5.12).

Critical Infrastructure and Community Values at Risk

The Kremmling FPD No. 5's boundaries encompass numerous cultural, natural, and socioeconomic values at risk. These include important water resources such as Wolford Reservoir, the Blue River, and the Colorado River, power lines, oil and gas pipelines, communication towers, fish and wildlife habitat, frequently used trails, and much more. Figures 5.13, 5.14, 5.15, and 5.16 below provide an extensive spatial representation of these values at risk.

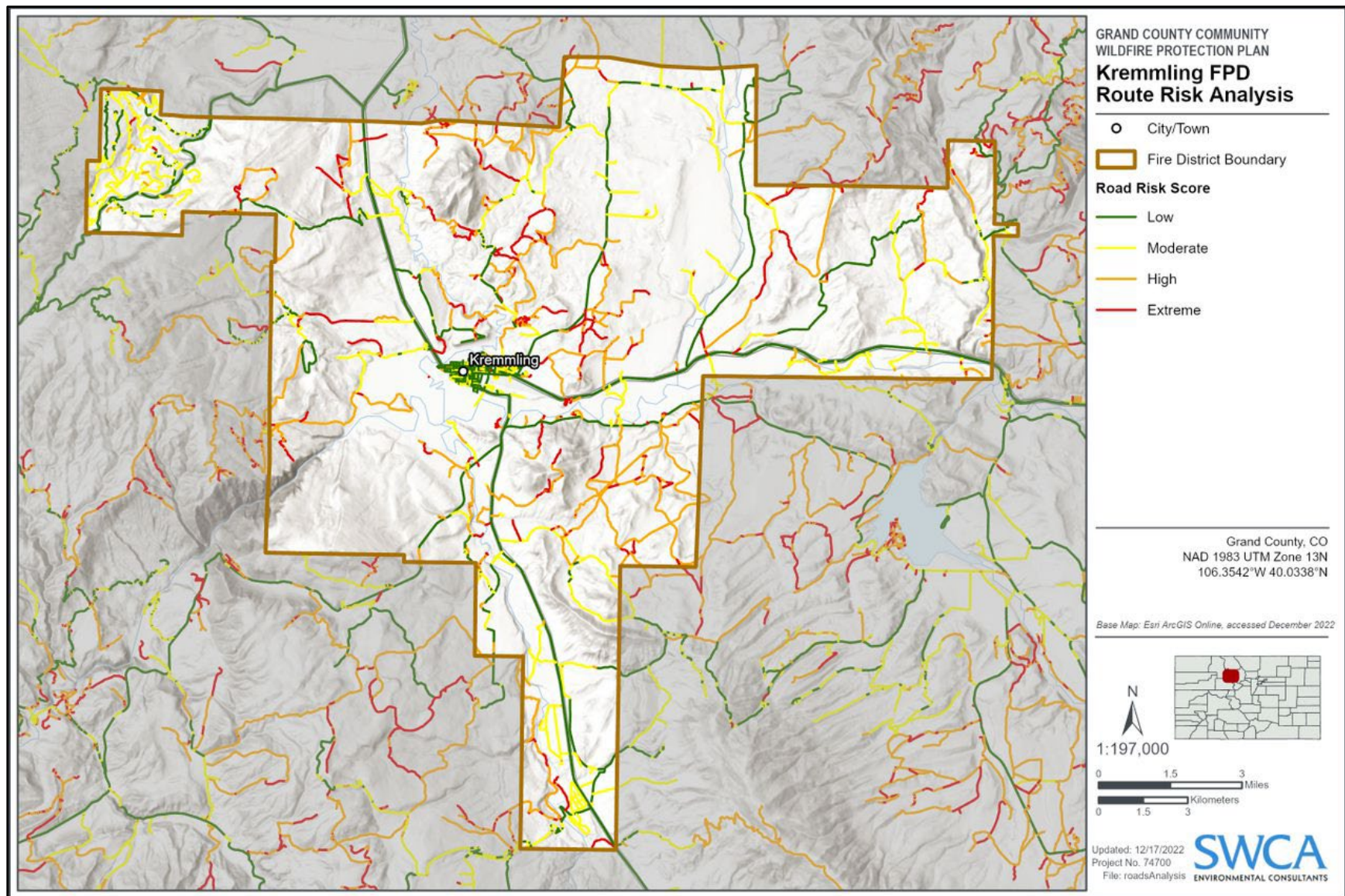


Figure 5.12. Kremmling FPD No. 5 route risk-hazard analysis.

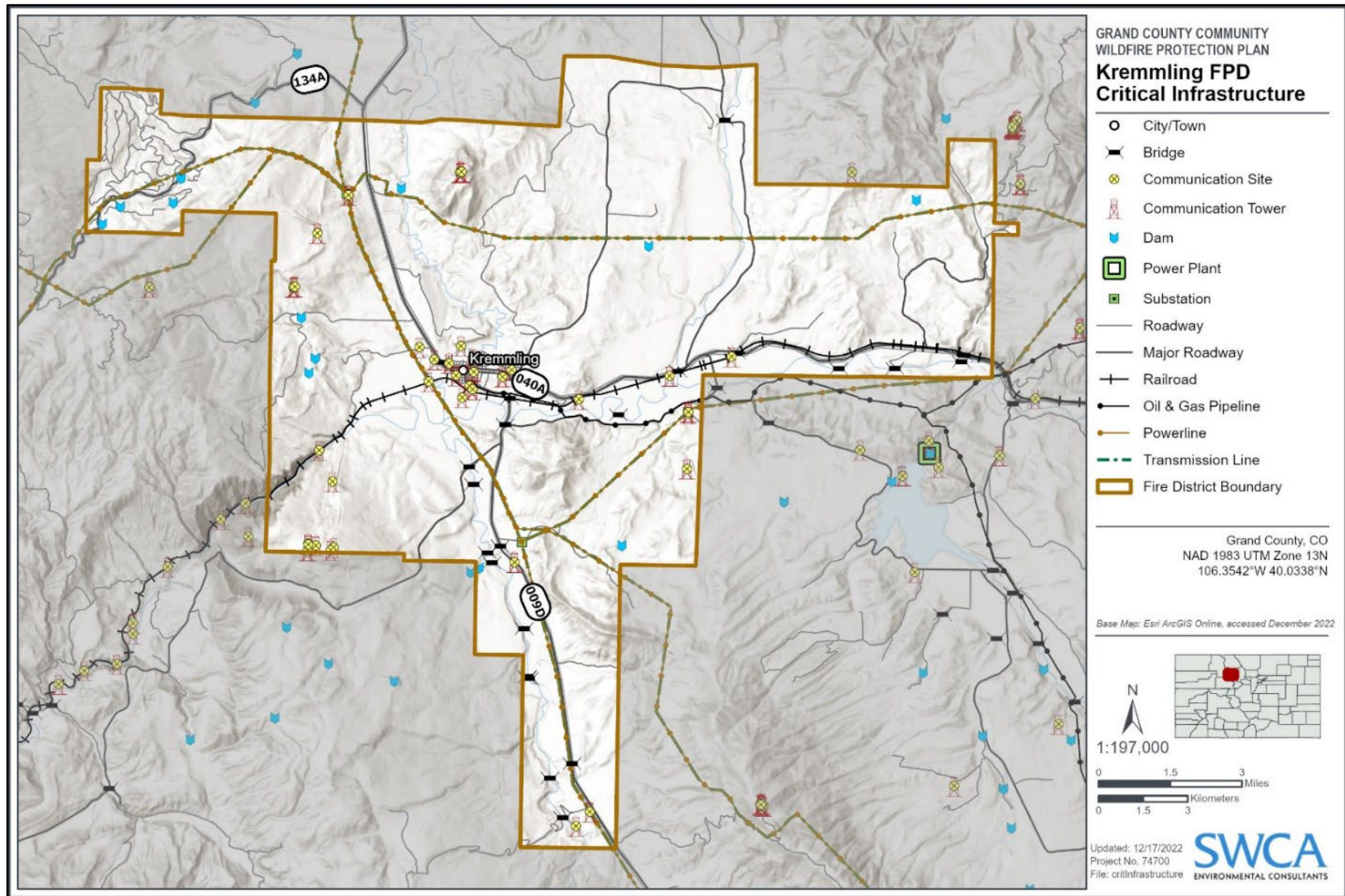


Figure 5.13. Kremmling FDP No. 5 critical infrastructure.

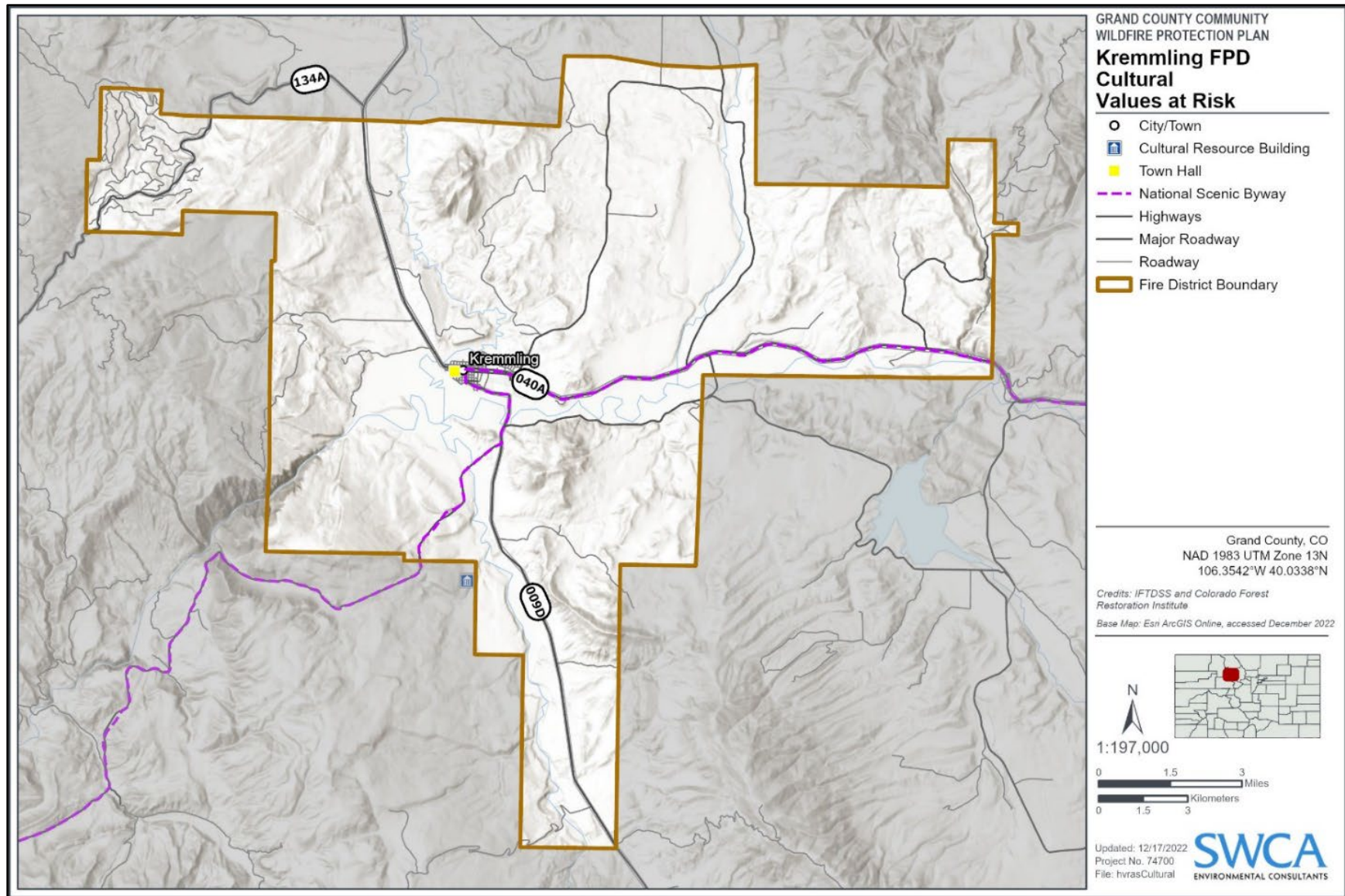


Figure 5.14. Kremmling FDP No. 5 cultural values at risk.

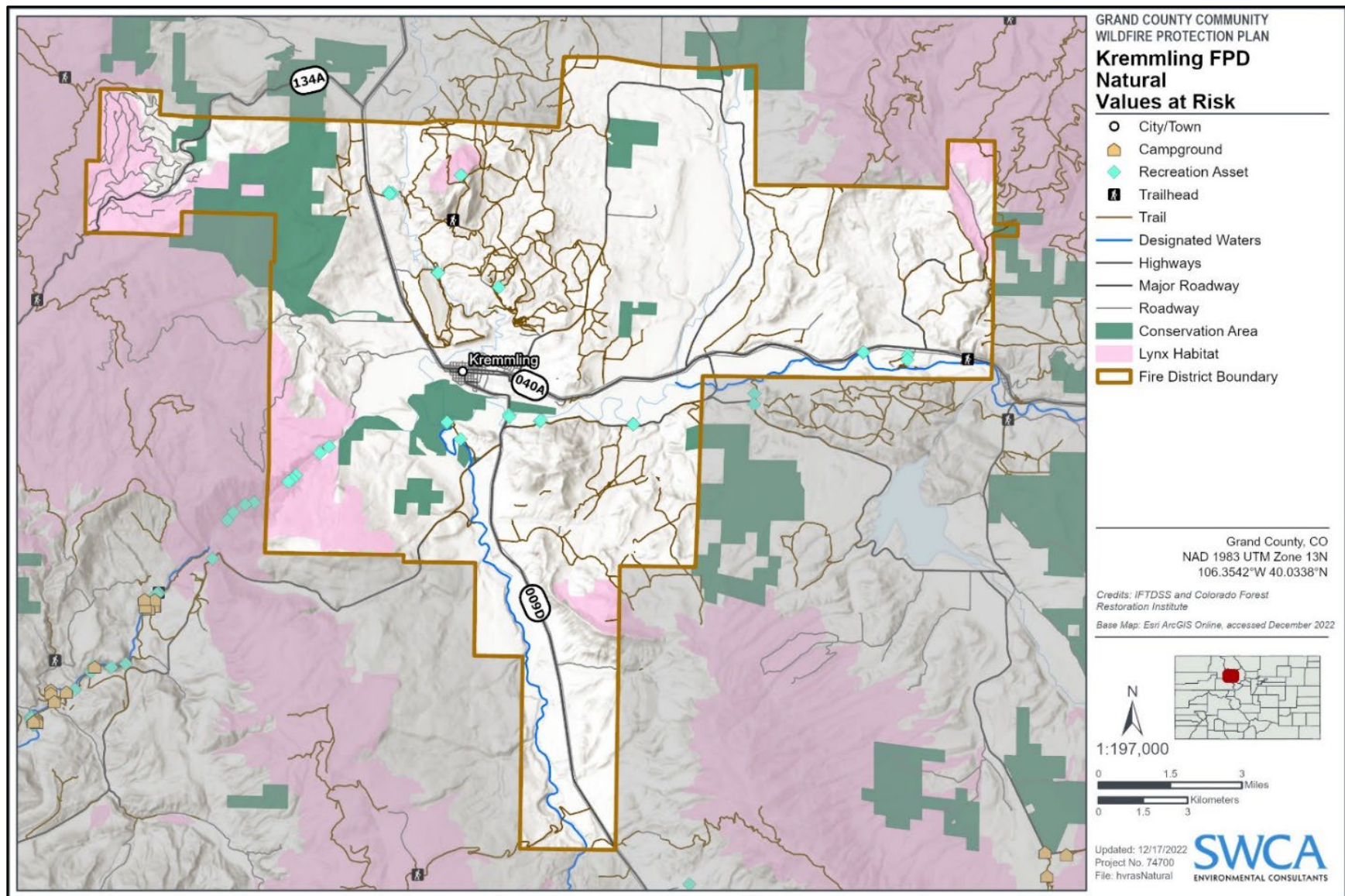


Figure 5.15. Kremmling FDP No. 5 natural values at risk.

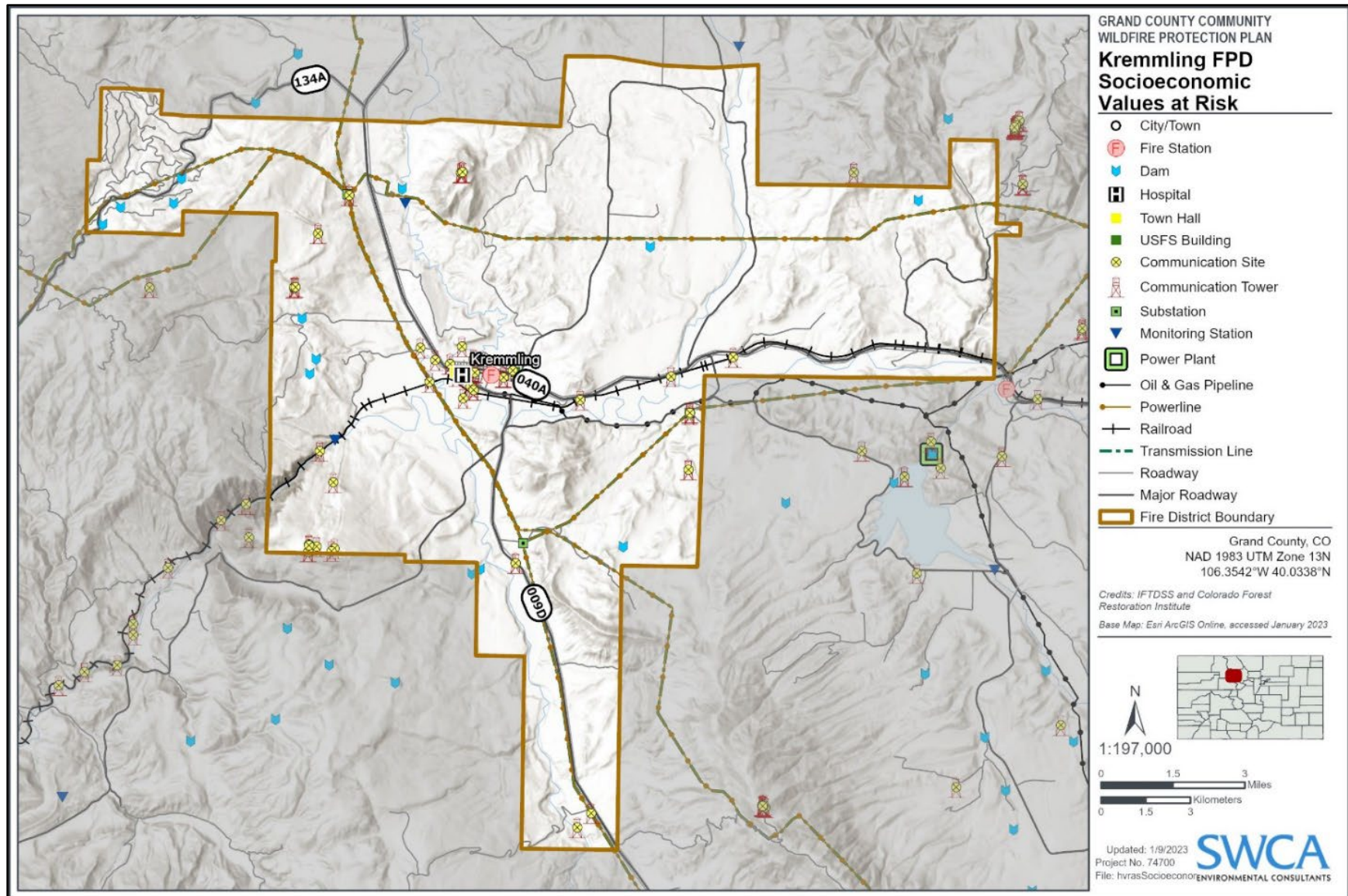


Figure 5.16. Kremmling FDP No. 5 socioeconomic values at risk.

Public Education and Outreach Programs

The Kremmling FPD No. 5 regularly engages with the public through outreach activities such as engaging with local classrooms and participating in parades. The District's Facebook page announces upcoming and past events and can be accessed here: <https://www.facebook.com/KremmlingFire/>

The FPD's website also contains a wealth of information, including useful links, for residents on fire safety, wildland fire prevention, and emergency preparedness. The website can be accessed here: <https://www.kremmlingfire.org/>

Policies, Regulations, Ordinances, and Codes

Please refer to the most recent County General Plan for recent information regarding local policies, ordinances, regulations, and codes.

Mitigation Projects and Prioritizations

All mitigation projects applicable to the community, including relevant information such as responsible parties, possible funding sources, priorities, project description, etc., broken into 3 CWS tables.

Table 5.5. Recommended Projects for Creating Resilient Landscapes (Fuel Reduction Projects) in the Kremmling FPD No. 5

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|--------------------------|--------|------------------|---------------------|---|---|--|---|---|--|--|
| Kremmling FPD No. 5 RL#1 | | M | 0-5 years | Wildfire risk reduction for homes and communities in high and extreme risk areas throughout the FPD | Fire Protection District Communities to prioritize include Big Horn Park, Blue Valley Acres, Gorewood, Grand River Ranch, Kremmling, Lake Agnes, Old Park, Parshall and Surrounding Areas, and Troublesome Creek. | Federal, state, and local agencies. Fire Protection District. | <p>Prioritize wildfire risk reduction and fuel treatments in high-risk communities. Wildfire risk is heightened in unburned forested fuels, especially with dead/dying lodgepole pine.</p> <ul style="list-style-type: none">Continue existing treatment projects.Implement new treatment projects, where needed.Monitor and assess old treatments and determine need for retreatment.Collaboratively identify fuel management needs based on the risk/hazard assessment.Aim for 300-foot shaded fuel breaks around communities.Locate parcels on private land adjacent to public lands where targeted fuel treatments can be performed that will connect and maximize the effectiveness of needed, planned, and/or pre-existing treatments. Parcels located in forested ex-urban areas should be prioritized.Work should emphasize the following: reducing potential for grass and shrub fires (especially along busy roadways); reducing standing dead trees (lodgepole, spruce, and aspen), removing ladder fuels, and reducing fuel loading in understory.Utilize mechanical fuel reduction treatments in more populated areas. Consider prescribe burns (including burn piles) in less populated areas. | Improve forest health, reduce wildfire risk within the WUI, and reduce risk to life and property. | <p>Annual review of completed projects including project description and amount of land treated.</p> <p>Assessment and monitoring of current and future conditions.</p> <p>Ongoing monitoring of completed projects.</p> | <ul style="list-style-type: none">Building Resilient Infrastructure and Communities (BRIC) GrantsNational Fire Plan (NFP) GrantsWildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |



| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|--------------------------|--------|------------------|---------------------|--|--|--------------------------------------|--|--|--|--|
| Kremmling FPD No. 5 RL#2 | | H | 0-5 years | Old Park exurban area WUI forest and rangeland health improvements and wildfire risk reduction | Old Park/Ex-urban communities in West Grand County | Private, USFS, BLM, CSFS, local FPD. | <ul style="list-style-type: none">• Collaboratively identify forests, rangeland, vegetation, and fuels management needs based on the risk/hazard assessment.• Locate parcels on private and public lands where targeted fuel treatments can be performed that will connect and maximize effectiveness of planned and pre-existing treatments.• Combine timber stand improvement projects with fuel reduction projects to reduce cost and increase efficiency.• Consider mechanical and chemical removal of fine, flashy invasive species, which could contribute to high rates of spread. Treatments should prioritize areas fuels loading near homes and structures.• Utilize mechanical fuel reduction treatments to reduce heavy fuel loading (e.g., dead and/or down trees) within community. Prioritize creating defensible spaces around structures.• Aim for 300-foot shaded fuel breaks around communities.• Consider prescribed burns on public lands adjacent to community to reduce severe wildfire potential. Collaborate with the BLM and USFS on prescribed burns.• Develop equipment needs to accomplish work (including maintenance) and seek funding for purchase.• Cultivate and support partnerships with NGOs and volunteer groups to support implementation of projects | <p>Create resilient landscapes and reduce potential for extreme wildfire behavior</p> <p>Improve forest health, reduce wildfire risk within the WUI, and reduce the potential for fire spread within the WUI</p> <p>Create and maintain accountability with local landowners</p> | <p>Implement and design a post-treatment assessment monitoring protocol.</p> <p>Monitoring should focus on the regeneration of hazardous fuels and the establishment of invasive species.</p> <p>Regular public outreach with landowners and real estate developers and annual review of successes and challenges.</p> | <ul style="list-style-type: none">• Building Resilient Infrastructure and Communities (BRIC) Grants• National Fire Plan (NFP) Grants• Firewise Grants• Regional Catastrophic Preparedness (RCP) grants• 2022 Infrastructure Investments and Jobs Act• State Fire Assistance (SFA) and Volunteer Fire Assistance (VFA) programs• Colorado Healthy Forests and Vibrant Communities Act• Forest Restoration & Wildfire Risk Mitigation (CSFS)• Wildfire Mitigation Incentives for Local Government (CSFS)• Wildfire Mitigation Resources & Best Practices (CSFS) |



| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|--------------------------|--------|------------------|---------------------|---|-------------------------------------|--|--|---|---|---|
| Kremmling FPD No. 5 RL#3 | | M | 5-10 years | Kremmling Water, exurban area WUI forest and rangeland health improvements, wildfire risk reduction, and watershed protection | Exurban areas north of Highway 134. | Federal, state, and local agencies. Fire Protection District. | <ul style="list-style-type: none">• Collaboratively identify forests, rangeland, vegetation, and fuels management needs based on the risk/hazard assessment.• Locate parcels on private and public lands where targeted fuel treatments can be performed that will connect and maximize the effectiveness of needed, planned and pre-existing treatments.• Combine timber stand improvement projects with fuel reduction projects to reduce cost and increase efficiency.• Consider mechanical and chemical removal of fine, flashy invasive species, which could contribute to high rates of spread. Treatments should prioritize areas fuels loading near homes and structures.• Utilize mechanical fuel reduction treatments to reduce heavy fuel loading (e.g., dead and/or down trees) within community. Prioritize creating defensible spaces around structures.• Aim for 300-foot shaded fuel breaks around communities.• Consider prescribed burns on public lands adjacent to community to reduce severe wildfire potential. Collaborate with the BLM and USFS on prescribed burns.• Focus fuel treatments upslope of important watersheds. Efforts should focus on reducing wildfire severity and mitigating post wildfire erosion. Areas with steep slopes, potential for high severity fire, and soils prone to erosion (e.g., gravely and sandy soils) should be prioritized.• Develop equipment needs to accomplish work (including maintenance) and seek funding for purchase.• Cultivate and support partnerships with NGOs and volunteer groups to support implementation of projects. | Create resilient landscapes and reduce potential for extreme wildfire behavior. Improve forest health, reduce wildfire risk within the WUI, and reduce risk to life and property. Create and maintain accountability with local landowners. | Implement and design a post-treatment assessment monitoring protocol. Monitoring should focus on the regeneration of hazardous fuels and the establishment of invasive species. Regular public outreach with landowners and real estate developers and annual review of successes and challenges. | <ul style="list-style-type: none">• Building Resilient Infrastructure and Communities (BRIC) Grants• Community Wildfire Defense Grants (USFS)• Wildfire Mitigation Incentives for Local Governments (CSFS)• Wildfire Mitigation Resources & Best Practices (CSFS)• Forest Restoration and Wildfire Mitigation (CSFS)• Fire Prevention and Safety Grants (FEMA) |



| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|--------------------------|--------|------------------|---------------------|--|--|------------------------------------|---|--|--|--|
| Kremmling FPD No. 5 RL#4 | | M | 0-5 years | Improve fuel treatment capabilities | Kremmling FPD No. 5 | Private, CSFS, and local FPD | <ul style="list-style-type: none">Develop equipment needs to accomplish work (including maintenance) and pursue funding opportunities for purchase.Assess and improve staff capacity.Cultivate and support partnerships with NGOs and volunteer groups to support implementation of projectsEncourage citizens to proactive in reducing fire risk in their communities and on their propertyShare resources (equipment and people) with other local FPDs. | Increase ability to address wildfire mitigation projects | Conduct inventory of current equipment Conduct community outreach to gain volunteer support | <ul style="list-style-type: none">BRICNFPWildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |
| Kremmling FPD No. 5 RL#5 | | | | Continue old and implement new fuel treatments in Areas of Concern (AOC) | Refer to AOC map in Chapter 4 (figure 4.2) | USFS, Private, CSFS, and local FPD | <p>These areas typically need greater attention and display heavy fuel loading with high to extreme wildfire risk. Land management and access (e.g., Wilderness area) could prevent more aggressive actions.</p> <ul style="list-style-type: none">Prioritize AOCs surrounding Gorewood and Old Park.Consider prescribed burning program.Align timber and forest management objectives with wildfire risk reduction.Restore natural fire regimes in roadless areas.Consider land use and pre-existing land management designations when designing treatments to reduce conflict.Prioritize treatments in Blue Ridge AOC. | Protect local communities. Improve forest health. | Implement and design treatment protocols and management objectives in AOC | <ul style="list-style-type: none">Colorado Healthy Forests and Vibrant Communities ActForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |

Table 5.6. Recommendations for Creating Fire-Adapted Communities (public education and structural ignitability)

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|----------------------------|--------|------------------|---------------------|---|--|--|--|--|---|--|
| Kremmling FPD No. 5 FAC #1 | | | | Monitor and enforce defensible space standards | Notable communities listed with inadequate defensible space include Big Horn Park, Kremmling, Lake Agnes, Parshall and surrounding areas. | Private, local FPD, County | <ul style="list-style-type: none">Create and/or continue defensible space program. Include pre-determined inspection frequency and education/outreach efforts.Consider adhering to CSFS recommended defensible space standards (e.g., enforce 100 ft of defensible space) if not already.Prioritize removal of ladder fuels.Work with insurance companies to determine the potential to provide incentives for defensible space associated with reduced insurance premiums.Consider green waste pickup/disposal options.Prioritize projects in extreme risk communities – Big Horn Park and Lake Agnes. | Reduce loss of life and structures through defensible space. | Annual program evaluation and updates as necessary. Consider updates to the building code, where needed. | <ul style="list-style-type: none">FirewiseFP&S (FEMA)EPA Environmental Education GrantsCWDGBRICWildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |
| Kremmling FPD No. 5 FAC #2 | | | | Reduce exposure of gas lines, powerlines, and propane tanks | Where needed, but especially Big Horn Park, Gorewood, and Old Park | Local utilities, Private, County | <ul style="list-style-type: none">Consider burying gas and electric lines.Ensure ROWs are maintained and hazardous fuels are removed regularly.Remove all accumulated fuels near propane tanks regularly. | Reduce exposure of utilities Reduce utility caused wildfire ignitions | Utility and property owner outreach Communication and collaboration Tracking of status of exposed utilities | <ul style="list-style-type: none">FirewiseFP&S (FEMA)CWDGBRICWildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |
| Kremmling FPD No. 5 FAC #3 | | | | Encourage and provide opportunities for homeowners to fire harden their homes | Communities with opportunities for home hardening include Big Horn Park, Blue Valley Acres, Gorewood, Grand River Ranch, Lake Agnes, Old Park, Parshall and Surrounding Areas, and Troublesome Creek | Private, County Planning Commission, Local FPDs, HOA's and community leaders | <ul style="list-style-type: none">Ensure new homes/structures are made with non-combustible materials (i.e., encourage structural hardening).Encourage retrofitting pre-existing homes/structures.Efforts should aim to reduce the occurrence of combustible siding materials, wooden fences, wooden roofs, and wooden side decks.Pursue grants and incentives to make efforts affordable.Educate homeowners on real actions that could mitigate their wildfire hazard and risk. | Lowers likelihood of property damage and loss | Property owner outreach Communication and collaboration Updates to municipal ordinances | <ul style="list-style-type: none">Wildfire Mitigation Incentive for Local Government (CSFS)Firewise GrantsFP&SCWDGEPA Environmental Education GrantsWildfire Mitigation Resources & Best Practices (CSFS) |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|----------------------------|--------|------------------|---------------------|--|--------------------------|---|--|---|--|--|
| Kremmling FPD No. 5 FAC #4 | | | | Improve evacuation zone education and outreach | Fire Protection District | Federal, State, and Local agencies. Fire Protection Districts Grand County Wildfire Council | <ul style="list-style-type: none">Develop and distribute public education and outreach materials concerning evacuation zones and routes and best practices.Provide handouts on preparing "Go Bags" – an emergency supply bag that can be accessed in cases of evacuationUtilize common information resources to spread information on evacuation best practices and routes such as social media, radio, news, nextdoor, twitter, and others.Engage HOA's and neighborhoods in community-specific education.With all partners, develop evacuation exercises and practice runs for incident pre-planning purposes.Familiarize public with FEMA's Integrated Public Alert and Warning System (IPAWS).Communicate CodeRED red to county residents and visitors (e.g., flyers at recreation sites and relevant weblinks). Encourage people to register their phone number.Communicate the role the Emergency Alert System (EAS) to County residents, homeowners, and visitors (e.g., flyers and relevant weblinks).Encourage partners (tv and radio stations) to display EAS messages.Explore opportunities to enhance the reverse 911 system. | Ensure public and first responder safety in the event of a wildfire or other emergency. | Develop and distribute a survey to understand and adapt best practices for communication and teaching. Assess and adapt methodologies and current information annually to ensure information is up to date. | <ul style="list-style-type: none">FEMA Building Resilient Infrastructure and Communities GrantsUSFS Community Wildfire Defense GrantFEMA FP&S GrantsWildfire Mitigation Incentive for Local Government (CSFS)Firewise Communities Grants |
| Kremmling FPD No. 5 FAC #5 | | | | Identify funding sources for underserved homeowners and vulnerable populations | Fire Protection District | Fire Protection District, HOA's, community leaders Grand County Wildfire Council | <ul style="list-style-type: none">Identify vulnerable populations (elderly, disabled, low income) and underserved homeowners who may need additional help to mitigate home hazards and to evacuate during a wildfire.Seek grant opportunities to support assistance for relevant populations. | Protect life and property of the most vulnerable members of the community | Annual review of number of actions taken to address vulnerable populations and underserved homeowners | <ul style="list-style-type: none">BRICFirewise grantsNational Urban and Community Forest ProgramChallenge Cost Share Grant ProgramCommunity Wildfire Defense Grants |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|----------------------------|--------|------------------|---------------------|---|--------------------------|---|---|--|--|--|
| Kremmling FPD No. 5 FAC #6 | | | | Public outreach and education aimed at reducing human-caused wildfire | Fire Protection District | Local, State, and Federal agencies Grand County Wildfire Council | <div>Inform and educate the public about methods to reduce human-caused wildfire ignitions.<ul style="list-style-type: none">Educate around sources of human-caused wildfire ignitions (e.g., driving through or parking in tall, dry vegetation; discarded cigarette butts; fireworks; campfires, etc.).Communicate hazardous conditions surrounding homes/structures (e.g., exposed propane tanks, electrical hazards, hazard trees, limited defensible place, etc.)Provide materials with resources for the public to understand how and with what funding they can take action to reduce risks.Utilize Appendix G of the CWPP: Homeowner Resources</div> | <div>Recue risk of human-caused wildfire ignitions. Educate citizens about wildfire hazards. Empower local communities and visitors.</div> | <div>Track successes and learnings from outreach campaigns and enact changes with each wildfire season. Assess and utilize current popular information sources such as nextdoor, social media, news outlets, and more.</div> | <ul style="list-style-type: none">Wildfire Mitigation Incentive for Local Government (CSFS)Firewise Communities GrantsWildfire Mitigation Resources & Best Practices Grants (CSFS)EPA Environmental Education GrantsFEMA BRIC Grants |

Table 5.7. Recommendations for Safe and Effective Wildfire Response

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|---------------------------|--------|------------------|---------------------|--|---|-----------------------------|--|--|--|---|
| Kremmling FPD No. 5 FR #1 | | | | Assess select roads for fire access improvement (improve community ingress and egress) | Communities with opportunities to improve roads include Big Horn Park, Blue Valley Acres, Gorewood, Grand River Ranch, Lake Agnes, Old Park, Parshall and Surrounding Areas, and Troublesome Creek. | Private, municipal, County | <ul style="list-style-type: none">Prioritize road improvements in high population areas with potentially hazardous road conditions.Increase width of roads where appropriate.Provide more locations for truck turnarounds.Consider pavement for higher traffic volume roads.Educate homeowners on real actions that could mitigate neighborhood roads wildfire hazards and risk (e.g., regular mowing of weeds along roadsides, or community clean-up days). | <div>Provides for safe and effective wildfire response capabilities Provides safe and effective means of evacuation in case of emergencies</div> | <div>Assessment of current road conditions Regular monitoring and maintenance to ensure roads are drivable for emergency response vehicles</div> | <ul style="list-style-type: none">BRICNFPRCPFirewise Grants2022 Infrastructure Investments and Jobs ActForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |

| Project ID | Status | Priority (H,M,L) | Timeline for Action | Project Description | Location | Land Ownership/ Lead Agency | Methodology/Approach | Serves To: | Monitoring/Maintenance Requirements | Funding Sources |
|---------------------------|--------|------------------|---------------------|---|---|---|--|---|---|--|
| Kremmling FPD No. 5 FR #2 | | | | Increase number of available water sources for fire suppression | Notable communities that may have limited water supplies for fire suppression include Big Horn Park, Gorewood, and Parshall and Surrounding Areas | Private, municipal, county, neighboring landowners/managers | <ul style="list-style-type: none">Map out and delineate nearest available and reliable water sources (e.g., fire hydrants, creeks, streams, pools, ponds, etc.) that can be used in emergency scenarios using an online spatial application.Improve existing fire flows in remote areas to meet fire flow requirements,Make sure fire flows in new developments meet fire flow requirements,Install water tanks where feasible. In locations water tanks cannot be installed, have tanks filled and pre-loaded to be transported to areas of need in the event of a fire,Install hand pumps or other methods independent of the grid for accessing private well water, | Provides for safe and effective wildfire response capabilities Increases resilience of local communities | Detailed assessment of currently available water resources | <ul style="list-style-type: none">BRICNFPRCPFirewise Grants2022 Infrastructure Investments and Jobs ActForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |
| Kremmling FPD No. 5 FR #3 | | | | Add a wildland fire division to the FPD | Fire Protection District | County, state | <ul style="list-style-type: none">Consider adding a hired wildland division to FPD or jointly operate one with a nearby FPD (e.g., East Grand FPD No. 4, Grand FPD No. 1, and Kremmling FPD No. 5).If a crew cannot be hired, have a designated volunteer division. | Increase wildfire suppression capabilities | Required funding and additional equipment | <ul style="list-style-type: none">2022 Infrastructure Investments and Jobs ActForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS)Volunteer Fire Assistance (VFA) Grant (Colorado DFPC) |
| Kremmling FPD No. 5 FR #4 | | | | Improve street signage to ease fire response navigation | Communities with opportunities to improve street signage include Big Horn Park, Grand River Ranch | Private, municipal, county | <ul style="list-style-type: none">Install reflective street signs and house numbersEnsure roadside view of street signs and house numbers is not obstructed | Helps ensure safe and effective wildfire response capabilities | Assessment pf current conditions Outreach to property owners | <ul style="list-style-type: none">BRICNFPRCPFP&SFirewise GrantsForest Restoration & Wildfire Risk Mitigation (CSFS)Wildfire Mitigation Incentives for Local Government (CSFS)Wildfire Mitigation Resources & Best Practices (CSFS) |