MUSSELSHELL COUNTY CWPP

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Data Product Disclaimer

The Musselshell County Community Wildfire Protection Plan (CWPP) is a living document that is regularly updated as new information becomes available. Updated versions of the CWPP and associated maps can be found at Disaster & Emergency Services (DES) - Musselshell County, which is a central location to find the most updated version of all CWPP material.

Acknowledgments

The Musselshell Community Wildfire Protection Plan Core Team members would like to thank all who contributed their time and expertise towards the development of this critical planning document, including individuals from Musselshell County Department of Emergency Services, and other Musselshell County officials and personnel, city government, city and rural fire departments, Montana Department of Natural Resources and Conservation, Lower Musselshell Conservation District, Bureau of Land Management, and many other engaged stakeholders and members of the public. These contributions were invaluable throughout the process and have created a well-rounded and effective document that will serve Musselshell County for years to come.

List of Acronyms

Acronym	Definition
BLM	Bureau of Land Management
cNVC	Conditional Net Value Change
CWDG	Community Wildfire Defense Grant
CWPP	Community Wildfire Protection Plan
eNVC	Expected Net Value Change
EVT	Existing Vegetation Type
FLAME	Federal Land Assistance, Management, and Enhancement Act of 2009
GIS	Geographic Information System
HFRA	Healthy Forests Restoration Act of 2003
HIFLD	Homeland Infrastructure Foundation-Level Database
HIZ	Home Ignition Zone
HUC	Hydrologic Unit Code
HVRA	Highly Valued Resources and Assets
MT DNRC	Montana Department of Natural Resources and Conservation
MWRA	Montana Wildfire Risk Assessment
NEPA	National Environmental Policy Act
NFP	National Fire Plan
NWCG	National Wildfire Coordinating Group
ROS	Rate of Spread
USDA	United States Department of Agriculture
WUI	Wildland Urban Interface

Musselshell County Community Wildfire Protection Plan

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Executive Summary

This document constitutes the updated version from 2007 Community Wildfire Protection Plan (CWPP) for Musselshell County. The Healthy Forests Restoration Act of 2003 (HFRA) encourages the development of CWPPs to help communities plan for, respond to, and recover from wildfire events.

This CWPP is a community-based plan focused on identifying and addressing the local threat of wildfire. This living document is updated as needed to utilize the best available information to characterize current conditions, identify resources and assets susceptible to wildfire, and identify and interpret wildfire risk throughout the County. Information regarding the CWPP can be found online at: Disaster & Emergency Services (DES) - Musselshell County

The successful development of the CWPP is the result of collaborative effort by an interdisciplinary CWPP "Core Team", the public, and other stakeholders who submitted feedback during public meetings, public engagement opportunities, and a formal public comment process. This feedback has resulted in a comprehensive CWPP that encompasses a wide variety of perspectives and experience.

Notable components of this CWPP include: identification and clarification of the Wildland Urban Interface (WUI), prioritized areas within the County, a detailed implementation plan and action table, and recommendations to reduce structural ignitability and wildfire risk.

These elements of the CWPP fulfill HFRA requirements and provide decision-makers and stakeholders with a useful and current tool to address the local risk of wildfire. This updated CWPP also facilitates access for eligible projects that reduce wildfire risk, increase wildfire response capacity, and provide public education regarding wildfires and associated risk.

The CWPP also summarizes the regulatory environment surrounding the development of a CWPP along with a characterization of the County including demographics, government structure, land use, and the fire environment.

The implementation plan developed for the CWPP consists of goals, objectives, strategies, and projects that align with federal, state, and local goals while also meeting the unique needs of the County. This implementation plan interfaces directly with a detailed action plan, consisting of individual projects collaboratively developed by the CWPP Core Team, the public, and stakeholders. The projects within the action plan are organized according to relative wildfire risk per fire district, which facilitates effective planning that aligns with resource allocation and current planning frameworks.

The Musselshell County CWPP is a comprehensive resource that characterizes current conditions and available resources, identifies and interprets wildfire risk, and provides next steps intended to mitigate that risk and provide the public with recommendations to reduce structural ignitability. The updated elements developed throughout this process also facilitate access to a variety of funding opportunities to implement the goals, objectives, and strategies outlined within the CWPP.

How to Use This Plan

The CWPP is meant to be read and utilized by both technical and general audiences and is organized to allow intuitive navigation to sections of particular interest while also maintaining logical flow throughout the document. The following overview provides a brief summary of the three sections of the CWPP.

Section 1: Introduction and Background

This section provides relevant information characterizing Musselshell County as it relates to topics addressed within Section 2 and Section 3 of the CWPP. Topics covered within this section relate to the purpose, need, and requirements of a CWPP document, the relationship of the CWPP to other active plans, policies, and regulations applicable to the County, and public engagement and collaboration.

Section 2: Wildland Urban Interface & Risk Assessment

Section 2 contains a summary of baseline information for Musselshell County, including government, land use, and demographics. The fire environment is also characterized, including descriptions of topography, hydrology, climate, vegetation, fuels, fire history, and risk to municipal watersheds. This section also reviews wildfire risk assessment data across the County and provides context for interpretation. At-risk and underserved communities are also characterized with respect to federal definitions as it relates to the CWPP process.

Section 3: Implementation

This section explains how the CWPP integrates with the National Cohesive Strategy, outlines various resources for homeowners to reduce structural ignitability, characterizes the County's current capacity for wildfire response efforts, and provides a detailed action plan outlining applicable goals, objectives, strategies, and projects identified through the CWPP update process. This section also includes priority areas for wildfire risk reduction throughout the County.

Virtual CWPP Resources

County Website: Disaster & Emergency Services (DES) - Musselshell County

CWPP Story Map: Musselshell County Community Wildfire Protection Plan

Section 1: Introduction and Background

1.1 Community Wildfire Protection Plans

Following decades of fire suppression, changing climate, and subsequently increasing frequency of catastrophic wildfire events, lawmakers identified the need to equip individual communities with tools and funding to address the growing risk of wildfire. In 2003, HFRA was enacted, outlining a basic process for at-risk communities to do this by creating a CWPP. A CWPP is a planning document that assists communities in preparing for, responding to, and recovering from wildfire. CWPPs can vary widely across communities based on unique local needs and priorities. HFRA further encourages hazardous fuel management and community participation to reduce the risk of large wildfires and directs federal land management agencies to prioritize authorized hazardous fuel reduction projects that provide for the protection of at-risk and/or underserved communities that implement CWPPs. Communities are encouraged to create CWPPs to plan for wildfire mitigation activities and tailor the plans to their unique environment.

Figure 1 Interagency Firefighters in Musselshell County

This document constitutes Musselshell County's updated CWPP document, which will guide current planners, fire departments, citizens, and other stakeholders in preventing, responding to, recovering from, and living with wildfire. The newly published CWPP is required for the County to be eligible for millions of dollars of federal funding to implement projects that mitigate wildfire risk.

CWPP Requirements

Though the content in CWPPs can vary based on the landscape, needs, and values of a given county, HFRA identifies four basic requirements for counties seeking federal funding. These requirements include:

- Collaboration
- Prioritized Fuel Reduction
- Recommendations to Reduce Structure Ignitability
- Agreement on final CWPP contents by the local government, local fire departments, and the state entity responsible for forest management, such as the Montana Department of Natural Resources and Conservation (MT DNRC)

Collaboration

CWPPs must be developed through a collaborative process involving local and state representatives, federal agencies, and other interested parties. Ideally, this collaboration will engage a broad diversity of stakeholders to ensure the CWPP reflects the best local knowledge, receives broad community buy-in, and accounts for ongoing and planned future projects. The 2025 CWPP was developed collaboratively by an interdisciplinary team of local county, city, and fire department representatives,

wildfire response personnel, subject matter specialists, state and federal agency representatives, key stakeholders, and private consultants, hereafter referred to as the "Core Team" (Table 1).

The Core Team

Table 1 Core Team Members

Name	Role
Musselshell County & Local Government	
Justin Russell	Musselshell County Deputy Director of Emergency Management
Darren Rook	Musselshell County Department of Emergency Services Coordinator
Tom Stockert	Musselshell County Road Department Supervisor
Denise Newman	Musselshell County Road Department
Robert Pancratz	Musselshell County Commissioner District 1
Sandra Jones	City of Roundup Mayor
Tim DeJaegher	Representative of the Town of Melstone
Wendy Jones	Lower Musselshell Conservation District – District Administrator
State	
Jeff Gates	MT Department of Emergency Services – District Field Officers Coordinator
Carmen Borchelt	MT Department of Natural Resources and Conservation – Fire Prevention Specialist
Jeffrey Brown	MT Department of Natural Resources and Conservation – Fire Management Officer
Mike Boettcher	MT Department of Natural Resources and Conservation – Area Assistant Fire Management Officer
Federal	
Isaac Wald	Bureau of Land Management – Mitigation and Education

Prioritized Fuel Reduction

CWPPs must include prioritization of fuel reduction projects by identifying priority areas and treatment methods to protect at-risk communities and essential infrastructure. Often, CWPPs will consider recent, ongoing, and planned future projects and will serve as an implementation plan for years to come. The 2025 CWPP provides spatial priority mapping across the County through the use of planning areas (see Appendix C). Recommended treatment methods are incorporated into the CWPP via the inclusion of strategies (Appendix A) and proposed projects within the Action Table (Appendix B).

Reduce Structural Ignitability

CWPPs must recommend measures to reduce structural ignitability. These measures can be implemented by private citizens to prevent loss and damage to their property in the event of wildfire. The 2025 CWPP provides an overview of the concepts and recommendations useful for reducing structural ignitability in the Fire Adapted Communities and Living with Fire sections.

Final Approval & Signatures

The CWPP must be approved and signed by the Musselshell County commissioners, chiefs of local fire departments, and a MT DNRC representative. To highlight the level and breadth of agreement for the 2025 CWPP, the updated Musselshell County CWPP is approved and signed by additional

signatories representing diverse stakeholders. Additional signatories can include representatives from local utilities and federal land management agencies.

Timeline of the Community Wildfire Protection Plan Update Process

The update process was initiated in July of 2024 and concluded in June of 2025. The final CWPP was signed into effect by all signatories on June 6, 2025 (Table 2).

Table 2 Community Wildfire Protection Plan Update Timeline

Milestone/Event	Date
CWPP Process Begins	July 1, 2024
CWPP Core Team Workshop	September 4, 2024
Open House Public Meeting (Roundup, MT)	November 7, 2024
Preliminary Draft CWPP	January 17, 2025
Draft CWPP for Public Review	March 31, 2025
Public Comment Period (30 days)	March 31, 2025 – April 30, 2025
Final Draft CWPP	May 9, 2025
Final CWPP Completed	June 6, 2025
CWPP Signed into Effect	June 6, 2025

1.2 Relationship to Other Plans, Policies, and Regulations

Conformance with relevant plans, policies, and regulations at federal, state, and local levels are important components of an effective CWPP. The 2025 CWPP conforms with the following plans, laws, and policies to maintain consistency and standardization.

National

National Fire Plan

Established in 2000, the National Fire Plan (NFP) addresses five key points: firefighting, rehabilitation, hazardous fuel reduction, community assistance, and accountability. To implement actions related to these five key points, the NFP seeks to ensure sufficient firefighting resources for the future; rehabilitate and restore fire damaged ecosystems; reduce the amount of flammable fuels in forests, and established the Wildland Fire Leadership Council (DOI and USDA 2023). The National Fire Plan also encourages the creation of a CWPP. The 2025 CWPP aligns with the key points and actions of the NFP by enabling Musselshell County to mitigate the risk of wildfire using resources available as a result of the NFP and in conformance with its key points.

Healthy Forests Restoration Act

The Healthy Forest Restoration Act of 2003 (P.L. 108-148) encourages hazardous fuel management and community participation to reduce the risk of large wildfires. HFRA directs federal land management agencies to prioritize authorized hazardous fuel reduction projects that provide the protection of at-risk communities that implement CWPPs and their watersheds. HFRA includes a definition for the WUI and provides standards or criteria for designating the WUI. It also provides flexibility for communities (and counties) to delineate the WUI based on their risk and needs. Communities are encouraged to create CWPPs to plan for wildfire mitigation activities and tailor the plans to their unique environment. HFRA requires CWPPs to meet three requirements: collaboration,

prioritized fuel reduction, and treatment of structural ignitability. Collaboratively developed CWPPs must also be approved by the local government, local fire department, and the state. The 2025 CWPP has been prepared in compliance with HFRA requirements and recommendations.

Federal Land Assistance, Management, and Enhancement Act and The National Cohesive Strategy

The Federal Land Assistance, Management, and Enhancement (FLAME) Act of 2009 (P.L. 111-88) establishes the need for hazardous fuel reduction funding and community wildfire risk assessments across the nation. The FLAME Act also created the National Cohesive Wildland Fire Management Strategy (National Cohesive Strategy) to manage wildland fire more effectively across the nation. The National Cohesive Strategy outlines three goals to restore and maintain landscapes, create fire adapted communities, and improve wildfire response (Wildland Fire Leadership Council 2023; US DOI and USDA 2014). The 2024 CWPP aligns with the three goals established by the National Cohesive Strategy (see Section 3: Implementation).

State

Montana Forest Action Plan

The Montana Forest Action Plan is a comprehensive plan for Montana's forests that is comprised of an assessment of forest conditions, priority areas for focused attention and goals and strategies for improving forests (Montana Forest Action Advisory Council 2020). The Montana Forest Action Plan prioritizes the revision of CWPPs through the "Foster Fire-Adapted Communities" strategy (Montana Forest Action Advisory Council 2020).

Local

Musselshell County, City of Roundup and Town of Melstone Emergency Management

This CWPP aligns and conforms with all emergency management plans developed by Musselshell County including the Multi-Hazard Mitigation Plan (2021 Update).

Musselshell County and City of Roundup Growth Policies

Musselshell County's Growth Policy (2017) and City of Roundup Growth Policy (2024 - Draft) detail goals which guide future development and construction. These goals include requirements that would improve wildfire response efforts and provide further opportunities for reducing wildfire risk through proactive planning.

1.3 Public Engagement and Collaboration

The CWPP update process began in July 2024 and continued for one year, consisting of public engagement efforts such as building a representative CWPP Core Team, developing publicly available informational resources, creating a central online location for CWPP information, soliciting stakeholder feedback, and providing CWPP information and opportunities for engagement through social media, press, and public meetings. Public engagement efforts provided multiple opportunities for public engagement, both virtually and in-person, to ensure inclusivity of all interested stakeholders. The draft CWPP was made available to the public during a 30-day public comment period. Substantive public comments were incorporated into the final CWPP.

1.4 Summary of Updates to the CWPP

Core features of the Musselshell County 2025 CWPP include an updated WUI boundary and delineation, consideration of new risk assessment data and current conditions throughout Musselshell County, and spatial prioritization mapping. Musselshell County looks very different today than it did 18 years ago during the previous update. In that time, a plethora of tools and resources related to identifying, interpreting, and mitigating wildfire risk have become available. The 2025 CWPP accounts for these changes and opens new doors to access grant funding and implement risk reduction projects that protect lives, property, critical infrastructure, and other high value resources not accounted for by the 2007 WUI.

When updating the WUI and CWPP, the interdisciplinary team used newly available science to inform the decision-making process and prioritize future projects. In 2020, DNRC released the Montana Wildfire Risk Assessment (MWRA) which uses the best available science to evaluate current wildfire risk across the entire state (DNRC 2020a). Importantly, it accounts for developments and changing conditions that occurred since the original CWPP was published in 2007, including increasing residential development within wildland fuels and changing forest conditions. The MWRA also provides information regarding potential wildfire risk for areas that may be developed in the future. The data products generated by the MWRA are an invaluable resource for identifying and interpreting wildfire risk, the susceptibility of resources to fire damage, and more. This tool was integral to the development of a modern and effective CWPP that protects local communities by accurately characterizing wildfire hazard and risk throughout Musselshell County.

The updated WUI and MWRA were used together to prioritize ongoing and proposed fuel reduction projects (see Prioritization Process). This prioritization framework helps unlock federal funding that is only available to counties with updated CWPPs and prioritized projects. By integrating the best available science, evaluating current conditions, and prioritizing projects, the 2025 CWPP is a user-friendly, informative, and effective planning document for local leaders and communities.

Section 2: Wildland Urban Interface & Risk Assessment

2.1. Wildland Fire and Musselshell County

County Overview

Located in south-central Montana, Musselshell County is bordered by Fergus and Petroleum Counties to the north, Golden Valley County to the west, Rosebud County to the east, and Yellowstone County to the south.

Totaling 1,869 square miles, Musselshell County is the 36th largest county in the state of Montana. The majority of Musselshell County is privately owned (84.2%), particularly in the foothills of the Bull Mountains and along the Musselshell River. The Bureau of Land Management (BLM) Billings Field Office oversees 8.4% of the land in the northwest portion of the county while USFWS manages 1% within the Lake Mason National Wildlife Refuge. The remaining 6.4% of land is administered by the State and scattered throughout the county in a checkerboard pattern (Headwaters Economics 2023).

Land Use

Much of Musselshell County is characterized by rural landscapes with small urban areas located primarily within and around Roundup. Key transportation routes throughout the county include U.S. Highway 12 (US-12), which travels east/west and U.S Highway 87 (US-87) which travels north/south. In Musselshell County, approximately 92% of the land is classified as farmland, with an average farm size of 3,189 acres, where hay is the top crop and cattle and sheep are the primary livestock (MSU Extension 2021). In addition to agricultural uses, the county supports Signal Peak Mine, a coal mining operation, and oil drilling in the Devil's Basin and Ragged Point areas (Musselshell County 2020). Recreation opportunities feature hiking, fishing, hunting on public lands and wildlife viewing at Lake Mason National Wildlife Refuge.

Critical Infrastructure

Within Musselshell County, critical infrastructure was identified through the Homeland Infrastructure Foundation-Level Database (HIFLD). Types of critical infrastructure within the County include:

- Highways
- Railroads
- Transmission lines
- Communications sites

Demographics

As of 2023, the estimated total population of Musselshell County was 5,308 (U.S Census Bureau 2023), making it the 34th most populous county in Montana (World Population Review 2024). Much of the population is concentrated in Roundup and small towns along US Highway 12. As shown in Table 3, Musselshell County has experienced steady growth from 2020 to 2023, attributable primarily to migration from outside the county (U.S Census Bureau 2023). The poverty rate of Musselshell County falls above the national average at 16% (Table 3).

Table 3 Summary of Selected Demographic Metrics for Musselshell County, MT

U.S. Census Bureau Metric	Value
Population	
Population estimates, July 1, 2023, (V2023)	5,308
Population estimates base, April 1, 2020, (V2023)	4,737
Population, percent change - April 1, 2020 (estimates base) to July 1, 2023, (V2023)	12.1%
Population, Census, April 1, 2020	4,730
Population, Census, April 1, 2010	4,538
Age and Sex	
Persons under 5 years, percent	4.7%
Persons under 18 years, percent	19.6%
Persons 65 years and over, percent	27.0%
Female persons, percent	48.9%
Race and Hispanic Origin	
White alone, percent	92.8%
White alone, not Hispanic or Latino, percent	89.1%
Hispanic or Latino, percent	4.5%
Asian alone, percent	1.3%
Two or More Races, percent	2.8%
Black or African American alone, percent	1.0%
American Indian and Alaska Native alone, percent	2.0%
Native Hawaiian and Other Pacific Islander alone, percent	0.1%
Housing	
Housing Units, July 1, 2023, (V2023)	2,642
Owner-occupied housing unit rate, 2018-2022	80.8%
Median value of owner-occupied housing units, 2018-2022	$222,200
Median selected monthly owner costs -with a mortgage, 2018-2022	$1,266
Median selected monthly owner costs -without a mortgage, 2018-2022	$511
Median gross rent, 2018-2022	$1,035
Building Permits, 2023	5
Families & Living Arrangements	
Households, 2018-2022	2,137
Persons per household, 2018-2022	2.28
Living in same house 1 year ago, percent of persons age 1 year+, 2018-2022	88.6%
Language other than English spoken at home, percent of persons age 5 years+, 2018-2022	2.2%
Computer and Internet Use	
Households with a computer, percent, 2018-2022	84.6%
Households with a broadband Internet subscription, percent, 2018-2022	80.2%
Health	
With a disability, under age 65 years, percent, 2018-2022	13.3%

U.S. Census Bureau Metric	Value
Persons without health insurance, under age 65 years, percent	11.7%
Income & Poverty	
Median household income (in 2022 dollars), 2018-2022	$54,875
Per capita income in past 12 months (in 2022 dollars), 2018-2022	$32,506
Persons in poverty, percent	16%

Fire Environment

Evaluating factors that influence fire behavior and activity is a critical component of an effective CWPP and serves to provide a characterization of the fire environment within Musselshell County. Fire behavior is influenced by physical characteristics that vary across the landscape such as topography, hydrology, climate, and vegetation. These characteristics, combined with ignition sources, constitute the fire environment.

Topography & Hydrology

Physical characteristics such as elevation, topography, and slope angle influence fire behavior on the landscape. A thorough understanding of these components informs effective and proactive fire management and fire suppression.

Musselshell County encompasses substantial portions of the Bull Mountains and the Devil's Basin, separated by the Musselshell River. Elevations range from approximately 3,000 feet in the basin bottom to 5,000 feet in the mountains. Dunn Mountain, on the border of Musselshell and Yellowstone counties, is the highest point in the region at 4,724 feet. The Bull Mountains are not particularly steep compared to other mountain ranges in the greater region, and the terrain is generally characterized by rolling hills and moderate slopes. However, steep areas within the range can significantly affect fire dynamics. Steep slopes facilitate rapid fire growth and spread, which can increase risk to firefighting personnel and reduce opportunities for fuels treatments due to difficulty accessing rugged terrain (NWCG 2021).

Musselshell County is characterized by a large single river drainage—the Musselshell River—which runs west to east towards neighboring Rosebud County. The Musselshell River is formed by the confluence of the North Fork and the South Fork near Martinsdale and flows approximately 340 miles to Fort Peck Reservoir. These forks are the largest tributaries of the river and flow from the Crazy, Castle and Little Belt Mountain ranges making the system highly snow melt dependent. Smaller tributaries located within Musselshell County include Horsethief, Fattig, Willow and Flatwillow Creeks. The majority of Musselshell County is a part of the Missouri-Musselshell watershed (Hydrologic Unit Code (HUC) 1004) with small portions of the southern end supplying the Lower Yellowstone watershed (HUC 1010) (USGS 2024) and the Upper Yellowstone watershed (HUC 1007). The county contributes to the Upper Musselshell (HUC 10040201), Middle Musselshell (HUC 10040202), Lower Yellowstone-Sunday (HUC 10100001), and Upper Yellowstone-Pompeys Pillar (HUC 10070007) sub-basins (USGS 2024).

Climate

Annual precipitation at the Roundup weather station averaged 18.63 inches over the past decade with December through March being the wettest months (AgACIS 2023). Weather systems and prevailing winds generally blow from the southwest through the west. Fire season in Musselshell County is typically from May to October, with most fire activity occurring in the summer months when fuels are driest. Late season fires are typically extinguished with fall precipitation.

Vegetation

In the context of fire management, vegetation is often referred to as fuels and is influential regarding fire behavior and resultant intensity, and severity. Vegetation in Musselshell County is described using the LANDFIRE Existing Vegetation Type (EVT) model, consisting of groups of existing vegetation communities based on field data, satellite imagery, and modelling (LANDFIRE 2022).

Musselshell County is represented by 59 EVT models, with three models representing the most land area (DOI and USDA 2020a, 2020b, 2022). Existing Vegetation Type models that cover less than 5% of land area, or represent non burnable areas such as rock, scree, and urban pavement are included as "other." The models detailed in Table 4 represent the majority of land cover and burnable fuels within Musselshell County. The 'Inter-mountain Basins Big Sagebrush Steppe,' 'Northwestern Great Plains Mixed grass Prairie,' and 'Northwestern Great Plains-Black Hills Ponderosa Pine Woodland and Savanna' EVTs are the most common in Musselshell County.

Table 4 Existing Vegetation Type in Musselshell County

LANDFIRE Existing Vegetation Type (EVT)	Area (acres)	Percentage of Musselshell County
Inter-mountain Basins Big Sagebrush Steppe	398,623	33.3
Northwestern Great Plains Mixed Grass Prairie	311,066	26.0
Northwestern Great Plains-Black Hills Ponderosa Pine Woodland and Savanna	205,004	17.1
Other[1]	236,842	23.6
Total	**1,196,489**	**100**

[1] Models representing less than 5% of land area or non-burnable fuels are classified as 'Other'.

Inter-Mountain Basins Big Sagebrush Steppe

Inter-Mountain Basins Big Sagebrush Steppe is the most common EVT present in Musselshell County, representing 33.3% of the total County area (Table 4). It is made up of mostly grasses, forbs, and shrubs. Big sagebrush (*Artemisia tridentata* spp.*)* and western wheatgrass (*Pascopyrum smithii)* are dominant species in this EVT (Kittel and Reid 2015). Thread-leaf sedge (*Carex filifolia)* and needleleaf sedge (*Carex duriuscula)* are also present (Kittel and Reid 2015). This EVT has historically had high severity, stand replacement fires with a fire return interval of 0-35 years (Kittel and Reid 2015). Fire frequency in this EVT is highly variable due to its wide range in topography, climate, and available fuel. The contemporary fire regime suggests that the overall frequency of fire is reduced, but the frequency of large, high severity fires has increased (Kittel and Reid 2015). Human activities such as grazing and land development, along with the prolific increase in invasive species such as cheatgrass (*Bromus tectorum)* have resulted in a shift from the historical fire regime. Woody encroachment is also a concern in sagebrush systems due to fire exclusion, as fire historically killed encroaching conifers (Kittel and Reid 2015). Woody encroachment increases the size, continuity, and abundance of surface fuels, contributing to larger wildfires.

Northwestern Great Plains Mixedgrass Prairie

Northwestern Great Plains Mixedgrass Prairie is the second largest EVT present in Musselshell County, representing 26.0% of the total County area (Table 4) where in which grasses and forbs dominate. Western wheatgrass (*Pascopyrum smithii*), green needlegrass (*Nassella viridula*), needle-and-thread (*Hesperostipa comata*), blue grama (*Bouteloua gracilis*), and fescue (*Festuca* ssp.) are

important species in this EVT (Menard and Kindscher 2015). This EVT has historically had low severity, patchy fires due to natural fire breaks in topography with a fire return interval of 8-12 years (Menard and Kindscher 2015). Fire, grazing, and drought are the primary drivers of dynamic processes in this system, however, human activities such as fire suppression and land development, along with the prolific increase in invasive species such as cheatgrass (*Bromus tectorum)* have resulted in a shift from the historical fire regime. Woody encroachment due to fire suppression, such as an increase in sagebrush (*Artemisia* sp.) or ponderosa pine (*Pinus ponderosa*), increases the size, continuity, and abundance of surface fuels, contributing to larger wildfires in this EVT (Menard and Kindscher 2015).

Northwestern Great Plains-Black Hills Ponderosa Pine Woodland and Savanna

Northwestern Great Plains-Black Hills Ponderosa Pine Woodland and Savanna is the third largest EVT present in Musselshell County, representing 17.1% of the total county area (Table 4). This system is dominated by ponderosa pine (*Pinus ponderosa*) and Douglas fir (*Pseudotsuga menziesii*) with an understory of bluebunch wheatgrass (*Pseudoroegneria spicata*) where little to no shrubs are present (Reid 2018). Historically, this EVT experienced frequent low-severity surface fires with a fire return interval ranging from 5 to 15 years, however, fire suppression has altered the fire regime and species composition of these systems. In the absence of fire, trees expand with younger cohorts dominating the understory of mature individuals. This increases the fuel loads of the system where fire is less frequent and often becomes intense crown fires, which can kill mature ponderosa pines (Reid 2018).

Fuels

In the context of fire, fuels are defined as any combustible vegetative material and are a primary driver of fire behavior. Fuel models are used to predict fire behavior based on specific fuelbed characteristics such as size, quantity, density, moisture content, and composition (Scott and Burgan 2005). The United States Department of Agriculture (USDA) Standard Fire Behavior Fuel Models are a comprehensive set of models used to define and quantify fuel types and their impacts on fire behavior (Scott and Burgan 2005). These fuel models correspond to predicted fire behavior and effects through variables such as spread rate or Rate of Spread (ROS) and flame length, which influence fire intensity.

Musselshell County is represented by 22 fuel models, with the GR2 and GS2 fuel models covering roughly 80% (79.8%) of the total acreage of Musselshell County (LANDFIRE 2023). GR2 fuels are described as “low load, dry climate grass” environments, consisting of moderately coarse, grassy fuels with moderate continuity. These fuels are highly influenced by precipitation and have a low moisture of extinction, which is the fuel moisture content at which combustion cannot be sustained independently (Scott and Burgan 2005). GR2 fuels are present in 46% of land area in Musselshell County (Table 5). The GS2 fuel model is a “moderate load, dry climate grass-shrub” system with a high rate of spread and moderate flame length (Scott and Burgan 2005). Within Musselshell County, 33.8% of the land area contains GS2 fuels (Table 5). NB3 fuels are described as “agricultural land maintained in a nonburnable condition,” however, if these fuels are allowed to cure before harvest such as with hay production, the fuels become burnable (Scott and Burgan 2005). NB3 fuels represent 7.6% of the land area in Musselshell County (Table 5). The TL8 model is defined by “moderate load long-needle pine litter” present on forest floors along with a small amount of herbaceous load. The ROS for the TL8 model is moderate, with low flame lengths (Scott and Burgan 2005).

Table 5 Fuel Model Acreage in Musselshell County

Fuel Model (Scott and Burgan 2005)	Area (acres)	Percentage of Musselshell County
GR2	550,056	46
GS2	404,579	33.8
NB3	90,443	7.6
TL8	19,534	3.0
Other[1]	115,872	9.6
Total	1,196,489	100

[1] Models representing less than 3% of land area or non-burnable fuels are classified as other.

Fire History

Understanding fire history is an important component to interpreting current fire activity and preparing for future wildfires. There have been 35 recorded major wildfires in Musselshell County history, burning a total of 292,490 acres (NIFC 2023a, 2023b). The Hawk Creek fire (1984) burned 106,370 acres, and the Delphia fire (2012) burned 40,352 acres, making them the two largest fires (NIFC 2023a, 2023b). The primary source of wildfire ignition in Musselshell County is lightning and/or unknown, but human ignitions have occurred in urban areas and the WUI (NIFC 2023a, 2023b). Of the 35 recorded major wildfires in Musselshell County, four have been confirmed human-caused ignitions (NIFC 2023a, 2023b). The largest fire in more recent history, the 2020 Bobcat fire, consumed 28,835 acres, claiming 10 primary residences and 13 outbuildings (NIFC 2023a). Changing climatic conditions and fire suppression policies have interrupted the natural fire regime across the western United States, leading to longer fire seasons, more intense fires and a build-up of fuels. These factors present new challenges for communities living with wildfire.

2.2. The Wildland Urban Interface

WUI Overview

The concept of the WUI has a variety of definitions ranging widely in detail and extent according to federal, state, and local sources. At its simplest, the WUI has been described as the area where wildland fuels meet human development, representing an area of increased risk to life, property, and infrastructure. However, the definition of the WUI has evolved in various ways to encompass local community characteristics and values. In recent years, the definition of the WUI has been at the forefront of various legal challenges as it relates to Federal agencies' use of the streamlined National Environmental Policy Act (NEPA) processes permitted through HFRA. The precedent set by such cases suggests that communities define the WUI according to HFRA requirements, with deviations from this definition clearly justified within the CWPP. These cases have also acknowledged the right of a community to extend the boundaries of the WUI beyond the HFRA WUI requirements in order to meet their needs, though such deviations must be clearly justified.

Defining and delineating the WUI serves to ensure that areas with increased risk to life, property, and infrastructure, are appropriately accounted for during decision-making processes. The delineation of the WUI also facilitates access to funding for projects intended to reduce that risk. Per HFRA recommendations, Musselshell County has updated the WUI to encompass the unique needs of the community and meet the definition of the WUI as defined by HFRA.

WUI Components

The updated Musselshell County WUI is comprised of the 'Functional WUI' data layer developed by MT DNRC and Pyrologix, LLC. as well as the additional components determined by the Core Team

during the CWPP update process (MT DNRC and Pyrologix 2022). Map 1 in Appendix C displays the extent of the updated Functional WUI.

MT DNRC Functional WUI

The MT DNRC Functional WUI is a 30-meter resolution raster dataset that maps the WUI where structures meet, or intermingle with, undeveloped wildland vegetation (i.e., burnable land cover greater than 200 meters from a building centroid). This data layer provides a starting point for WUI designation within a county. Per state statute MCA 76-13-145, the official WUI designation for each county is determined through the completion and/or update of a CWPP. This layer consists of data obtained from the "Structures & Addresses Framework" dataset from the Montana State Library Geographic Information System (GIS) Clearinghouse and fuels information from the calibrated LANDFIRE 2016 Remap (LF 2.0.0) FM40 layer. Land with structures within 200 meters of a building centroid was classified as Direct, Indirect, or Limited Exposure WUI.

- "**Direct Exposure**" WUI is burnable[1] wildland that contains or is near a structure located on or surrounded by burnable land cover. Directly exposed structures could benefit from both the hardening of the structure to resist ignition and the reduction of fuel in the home ignition zone to reduce the structure's exposure to heat and embers.

- "**Indirect**" Exposure WUI is nonburnable land that contains or is near a structure and is within 900 m of burnable land cover (Caggiano et al. 2020). Indirectly exposed structures could benefit from the hardening of the structure to resist ignition from embers and nearby structures.

- "**Limited Exposure**" WUI is nonburnable land that contains a structure but is greater than 900 m from burnable land cover.

- "**Critical Fireshed"** is the Burnable Land Area within about 1,500 m (1 mile) of a group of structures, dependent on structure density, but does not itself contain structures.

- "**Nonburnable Fireshed**" is the nonburnable land cover within 1,500 m (1 mile) of a group of structures but does not itself contain structures.

- "**Non-WUI**" is all land more than 1,500 m (1 mile) from a group of structures.

- "**Water**" is the portion of the landscape covered by open water.

The Functional WUI map (Figure 2) provides a broad overview of where structures are located, what their relative level of exposure is, and the burnable lands around those structures.

[1] Nonburnable land cover as defined for the MT DNRC Function WUI data layer is where the mapped fire-behavior fuel model is 91-99; burnable is all other fuel models.

Core Team Determined Additional Components

Additional community resources were identified by the Core Team that would be heavily impacted in the event of a wildfire and are included in the WUI boundary. A more detailed justification for these additions can be found in Table 7 (Appendix E). These resources and their buffers are listed below and shown in Figure 2:

- **Musselshell-Judith Rural Water System Line** including a ½ mile buffer (one mile total width)
- **Signal Peak Mine** including the air shafts not included in the above ground infrastructure or functional WUI
- **Melstone Pump Site** including the well, reservoir, and watershed area
- **South Repeater and South Repeater Road** including a one-mile buffer (repeater) and a ½ mile buffer (South Repeater Road) (Note:the repeater is located in adjacent Yellowstone County but is serviced by Musselshell County)
- **Additional Repeater Sites** including a one mile buffer around East, Turley, and West Repeaters

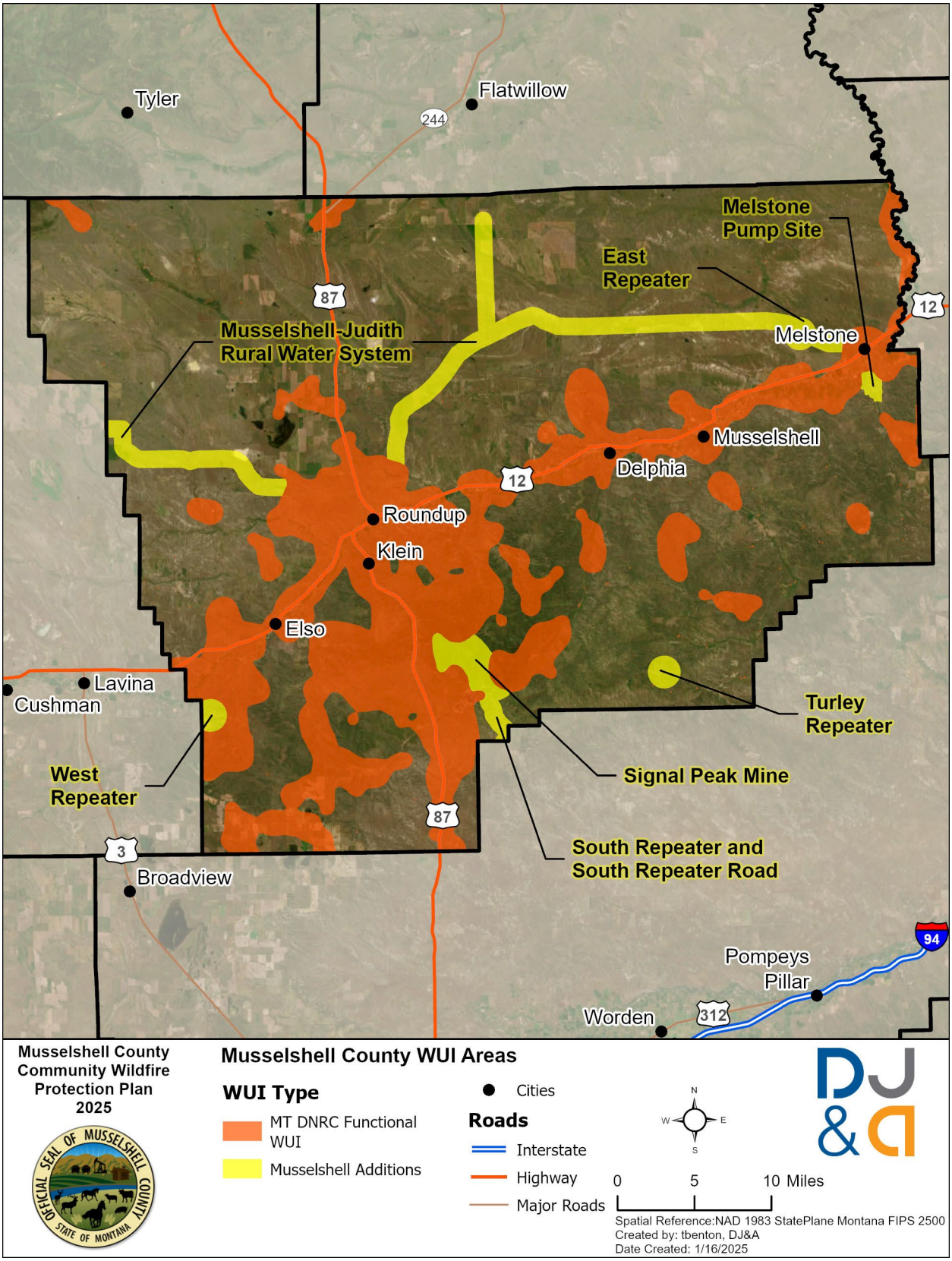

Figure 2 MT DNRC Functional WUI and Musselshell County Additions

At-Risk Communities

Low-income, minority, and rural communities have historically been excluded from wildfire planning processes and risk mitigation projects across the country and are often disproportionately affected by natural disaster events such as wildfire. Recognizing this, HFRA requires CWPPs to consider these communities in all essential aspects of the plan. Defined in the Act as "at-risk communities," these communities have the following characteristics:

- A group of homes and other structures with basic infrastructure and services;
- Located within or adjacent to federal lands with conditions conducive to large-scale wildfire;
- Wildfire poses a significant threat to human life or property (16 USC § 6511, Sec. 101(1)).

Per HFRA, all CWPPs must engage at-risk communities throughout the planning process, prioritize fuel projects around these communities, and recommend measures to reduce structure ignitability in these communities. The 2025 CWPP meets these requirements for the two at-risk communities identified in 65 FR 751, 'Urban Wildland Interface Communities Within the Vicinity of Federal Lands That Are at High Risk From Wildfire':

- Roundup
- Musselshell

The Musselshell County communities of Camp Three, Klien, and Farreltown have been acknowledged as "at-risk communities" by the Core Team. These communities meet the characteristics listed above and are included in the WUI boundary, though they are not currently acknowledged by HFRA as "at-risk."

Underserved Communities

Underserved communities are not explicitly defined within the HFRA, though federal and state guidance offers several metrics which can be implemented to determine if a community is underserved. The Community Wildfire Defense Grant (CWDG) Program highlights areas of "low income" or areas with a social vulnerability score of 0.75 or higher as being qualified for "underserved community" status (Wildfire Risk to Communities Project 2022), with the definition of "low income" in Montana being a household income that is 80% of the state median household income. At the time of analysis, the state median household income was $50,331 and the median household income for Musselshell County was $54,875 (Headwaters Economics 2023b). Though these communities were considered, they were not explicitly included as a separate WUI component as they were already included in other resource buffers. Future updates of the CWPP will continue to consider these communities and incorporate, if necessary.

2.3. Wildfire Risk

Wildfire risk is made up of several components that together characterize the total risk posed to a structure, community, or resource. According to MT DNRC, wildfire risk is "the combination of likelihood and intensity (together called "hazard") and exposure and susceptibility (together called "vulnerability")" (DNRC 2023b). The relationships of these interrelated concepts are illustrated by Figure 3 below.

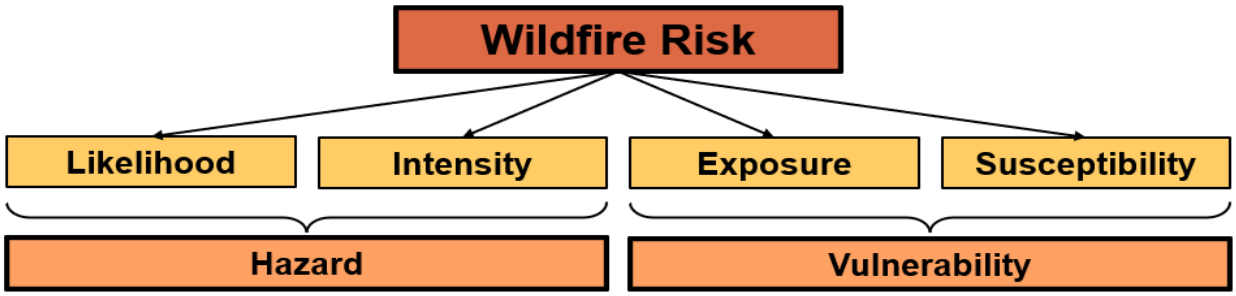

Figure 3 Components of Wildfire Risk

The concept of wildfire hazard is focused on wildlands themselves. Wildfire likelihood is driven by factors such as topography, weather conditions, and potential ignition sources. Wildfire intensity is a measure of the energy expected from a wildfire and is predicted based on total fuel types, fuel load, and topography. Together, likelihood and intensity represent wildfire hazard.

The concept of wildfire vulnerability, meanwhile, is focused on the communities and structures located within or adjacent to wildlands. Homes and structures located in areas where direct or indirect wildfire impacts may occur are considered to be exposed to wildfire. The characteristics and materials of the structures themselves, however, determine the likelihood of damage when exposed to wildfire, known as wildfire susceptibility. Together, wildfire exposure and susceptibility characterize the total vulnerability of communities and associated life and property when a wildfire does occur (DNRC 2023b).

As a composite of several discrete but interrelated concepts, wildfire risk provides a single key metric for understanding the real-world threat of wildfire to homes, communities, and resources. The Montana Wildfire Risk Assessment (DNRC 2020a) used recent LANDFIRE data, historical wildfire occurrence and weather patterns, and wildfire simulations to provide an updated picture of wildfire risk across the state (DNRC 2020a). Since its completion, this assessment has been instrumental for counties updating their CWPPs.

Risk Assessment & Community Base Map

Using the best available data and local knowledge and input, the CWPP Core Team developed a community base map including the boundaries of Musselshell County representing the total area to which the CWPP applies (Appendix E). Wildfire risk within the Community Base Map was evaluated using data and findings from the Montana Wildfire Risk Assessment (DNRC 2020a).

Risk Assessment

The Montana Wildfire Risk Assessment was completed in 2020 by Pyrologix for the MT DNRC (Gilbertson-Day et al. 2020). This detailed quantitative analysis of wildfire risk across the state of Montana serves as an integral resource for understanding and interpreting wildfire risk throughout Musselshell County. The MWRA considers various components that contribute to wildfire risk including: likelihood of a fire burning, the intensity of a fire if one should occur, exposure of assets and resources based on their locations, and the susceptibility of those assets and resources to wildfire. Data outputs related to the MWRA consist of spatially explicit maps and data layers including: risk to homes, wildfire threat, wildfire risk, wildfire potential impacts, and fire model inputs and fuelscape, along with numerous supporting data layers. For the purposes of the 2025 CWPP, the CWPP Core Team identified two data sources most relevant and appropriate for characterizing and interpreting wildfire risk within Musselshell County. These data sources include total wildfire risk (expected net

value change (eNVC)) and risk to potential structures (conditional net value change (cNVC)). These data layers serve to characterize wildfire risk of both current and potential assets and resources throughout Musselshell County. More information regarding the MWRA along with online maps and resources can be found at the MT DNRC website[2].

Wildfire Risk (eNVC)

Total wildfire risk within the MWRA was evaluated through an effects analysis that quantifies wildfire risk as the expected value of net response or eNVC. To evaluate wildfire risk, the MWRA characterized anticipated response of identified, mapped highly valued resources and assets (HVRAs) should they be exposed to wildfire. The anticipated response was then translated into a measure of total wildfire risk across Musselshell County as it relates to these identified HVRAs.

Risk to Potential Structures (cNVC)

Risk to potential structures is also referred to as 'Hazard in Context' within the MWRA and represents an integration of wildfire likelihood and intensity with generalized consequences or responses to a home everywhere on the landscape should a fire occur. This metric is useful as it can "predict" the risk of both future and current homes by evaluating the wildfire risk if a home were to occur at any point across the landscape. Response of these hypothetical homes to wildfire is assumed to be negative with the degree of damage correlated with increasing wildfire intensity.

[2] https://mwra-mtdnrc.hub.arcgis.com/

Section 3: Implementation

3.1. Integrating the National Cohesive Strategy

The Federal Land Assistance, Management, and Enhancement Act of 2009 (FLAME) aimed to provide improved resources and funding opportunities for wildfire suppression on federal lands (43 USC § 1748). As part of this effort, Congress required the development of a cohesive strategy to ensure nationwide consistency of wildfire management on federal, state, local, and tribal lands. Known simply as the National Strategy, it was developed cooperatively by a wide variety of governments and land management agencies, wildfire experts, and public stakeholders. The National Strategy guides wildfire planning efforts by establishing core guidelines to be used when developing CWPPs and emergency responses, prioritizing projects, and educating and equipping the public to protect their property from wildfire.

The National Cohesive Strategy focuses on three goals, listed below:

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

The interdisciplinary team incorporated each of these national priorities when preparing the CWPP, thereby ensuring consistency with the National Strategy. The result is a CWPP which prioritizes healthy and functional ecosystems through treatment activities, equips property owners with the knowledge and resources to protect their homes against wildfire, and identifies wildfire response capacity.

Restore and Maintain Resilient Landscapes

Though a natural and essential component of the ecosystem, the role of wildland fire has been altered through fire suppression, changing climatic conditions, declining forest health, increasing human activity, and human development and alteration of the landscape. These changes have resulted in conditions that reduce landscape resiliency, and increase the potential for increased wildfire activity and severity. Landscape restoration through proactive management reinstates resiliency and promotes natural fire activity across the landscape to maintain the beneficial ecological impacts of wildfire while mitigating risk. Once restored, ongoing maintenance through management is essential to perpetuate healthy, resilient landscapes.

Restoration and maintenance on the landscape can be achieved through various management actions related to vegetation and fuels, including: prescribed fire, managing wildfire for resource objectives, and mechanical, biological, and chemical fuels treatments. Mechanical, biological, and chemical fuels treatments include: thinning, commercial harvest, slash and underburning, slash and pile burning, herbicide application, reseeding, replanting, and more. Given the scale of fuels treatments needed to restore resilient landscapes, prioritization is critical to allocate resources effectively. These various treatment types can be implemented in priority areas where feasible and sustainable to reduce wildfire risk, improve ecological conditions, and achieve fire adapted and resilient landscapes.

Fire Adapted Communities

The National Wildfire Coordinating Group (NWCG) defines a fire adapted community as a community that “takes mitigation actions so they can live with wildfire without harm and without extensive wildfire

suppression efforts" (USFS 2023). Promoting fire adapted communities focuses on adaptation through fire mitigation strategies, public education, and applicable policies and regulations. Fire mitigation strategies may include using fuel treatments and individual homeowner action to help protect life and property during a wildfire event. Public education and outreach about wildfire preparedness can help the public understand their role in promoting fire adapted communities and protecting private property. Updating policies and regulations like building and subdivision codes can ensure fire resilience for future development.

Living with Fire

Building fire adapted communities is a constantly evolving process that includes taking actions to reduce the risk of wildfire, educating residents about becoming fire adapted, and designing tools that support the community. Fire is a natural part of the ecosystem, but communities at risk can take steps to reduce negative impacts when a wildfire does occur.

Steps that homeowners can take to become more fire adapted include reducing the ignition potential of their home and the 100-200 feet of area surrounding it, called the Home Ignition Zone (HIZ). This involves home hardening (using ignition resistant construction materials and techniques) and maintaining adequate defensible space within the HIZ through management of vegetation and other combustible materials on the property. An ignition resistant HIZ reduces the risk of loss by creating a home and property that is better able to defend itself from wildfire. The National Fire Protection Association's Firewise Program provides guidelines that help inform homeowners about specific actions for home hardening and HIZ treatments. The MT DNRC provides free wildfire risk home assessments to all Montana homeowners that include a wildfire risk rating as well as recommendations for specific actions homeowners can take to reduce their vulnerability to wildfire.

Recommendations to Reduce Structural Ignitibility

Resource managers reduce the risk of wildfire damage to private property through fuel reduction projects on state and federal lands, establishing fuel breaks and buffers, and wildfire suppression. However, property owners are responsible for helping create fire adapted communities by reducing the structural ignitability of their own property. In many cases, these efforts incorporate the same techniques used by local, state, and federal resource managers.

Measures to reduce structural ignitability vary from property to property depending on parcel size, the location of structures within the parcel, building age, construction, and materials, existing vegetation and fuel loads, access to water, and more. Despite property-level variation, the same basic concepts apply in all cases.

Fire propagation requires fuel. Reducing the ignition potential within the HIZ, with priority given to the home/structure and the first five feet surrounding it, is the most effective way for structures to withstand a wildfire. One of the most common ways that homes catch fire is by wind-driven embers which can travel up to a mile away from active wildfires and ignite buildings by landing on flammable exterior materials, or indirectly by igniting flammable vegetation or materials located close to the home, resulting in direct flame contact or radiant heat exposure to the home (Restiano et al. 2020). As such, property owners can reduce structural ignitibility by preventing flames and embers from accessing fuels within the building itself, a technique known as "hardening." Implementing hardening and creating ignition resistant homes and properties, collectively, saves homes and creates fire adapted communities. Common techniques for reducing structural ignitability include:

Building or retrofitting structures with ignition resistant materials and techniques (i.e., Class A roofing, ignition resistant siding, boxed eaves, covered gutters, metal gutters kept clear of debris, screened vents, etc.

Keeping the area 5-30 feet from the home clean and green by providing adequate spacing between trees, removing ladder fuels and ground litter, keeping vegetation healthy and hydrated, and using walkways, patios, or driveways to create fuel breaks.

Maintaining a non-combustible zone within five feet surrounding the home by removing all flammable materials and vegetation, using ignition resistant ground cover and sparsely placed fire adapted plants if vegetation is desired.

Clearing flammable materials away from propane tanks and firewood stacks and ensuring that both are located at least 30 feet away from the home.

Pruning trees 6-10 feet up from the base of the tree and keeping lawns well-watered and mowed.

Homeowner Resources

Because each property is unique, organizations such as Firewise/USA[3] and Ready, Set, Go![4], Keep Montana Green[5], and the Fire Adapted Learning Network[6] provide resources to help residents determine the best options for reducing structural ignitibility. These resources include further reading and recommendations, illustrations, step-by-step guides, evacuation checklists, and more that can be used when planning, completing projects, or discussing wildfire preparedness within a community.

Additionally, MT DNRC Community Preparedness Specialists are available to conduct free wildfire home risk assessments and site visits for property owners[7]. The MT DNRC also provides guidance for homeowners interested in mitigating wildfire risk within their communities including suggestions for home hardening, evacuation planning, and reducing ignition potential. More information can be found on MT DNRC webpages[8,9].

Grants and Funding

There are several opportunities for grants and funding available to communities and organizations to promote fire adapted communities. Although there is not currently a grant program available to assist individual homeowners with home hardening, local governments can utilize grant funds to support the development of programs that serve this purpose in addition to providing funding for projects that

[3] https://www.nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire/Firewise-USA
[4] https://www.wildlandfirersg.org/s/?language=en_US
[5] https://www.keepmontanagreen.com/
[6] https://fireadaptedmontana.org/
[7] https://dnrc.mt.gov/Forestry/Resources/request-a-site-visit
[8] https://dnrc.mt.gov/Forestry/Wildfire/fire-prevention-and-preparedness
[9] https://www.mtfireinfo.org/pages/prevention

mitigate wildfire risk in adjacent federal and state lands. Grant funding is available to private landowners for fuels reduction through the DNRC Hazardous Fuels Reduction Grant[10]. Additionally, there are several grants available through the MT DNRC to local governments to increase fire response capacity, such as the Cooperative Fire Protection Capacity grant and the Rural Fire Capacity Grant. Having an updated CWPP allows Musselshell County to access more funding sources, including the Community Wildfire Defense Grant, to increase wildfire preparedness and mitigate wildfire risk (DNRC 2023a).

Education and Outreach

Wildfire mitigation strategies are most effective when there is robust participation from all stakeholders. It is important to engage the community through education and outreach to mitigate the human hazards of wildfire. Public education campaigns such as Ready, Set, Go! and Firewise/USA bring communities together to prepare for wildfire. Becoming a Firewise/USA community gives residents access to resources, funding, and community support (Firewise USA 2022). There are currently no Firewise/USA communities in Musselshell County, but residents can take action to organize a Firewise community at any time (Firewise USA 2022). Many education and outreach efforts are already underway in the County.

Safe and Effective Wildfire Response

One of the most important roles of a CWPP is to identify wildfire response capacity and processes. The interdisciplinary team that developed the CWPP included members of the Musselshell County Office of Emergency Management, community preparedness and wildfire prevention specialists, and both federal and local fire department representatives. As a result, the CWPP has identified specific strategies to increase wildfire response capacity and improve communication across various resource groups.

Resources & Capacity

Local firefighting resources are skilled, trained, and equipped to respond to WUI wildfire incidents and often work closely with federal wildland firefighting resources supplied by the BLM and MT DNRC. Mutual aid agreements are also in place among local fire departments and federal agencies throughout the County as well as adjacent counties. Fire resources are currently insufficient to meet suppression needs, and increased capacity is essential to ensure that wildfire response can effectively respond to, confine, and manage wildfire incidents. The CWPP includes detailed strategies and projects that support increased fire response capacity.

[10] https://dnrc.mt.gov/Grants-and-Loans/

Figure 4 Roundup Fire Department Engine

Preparation & Prevention

In the County, wildfire preparation and prevention activities are a cooperative effort between city, county, state, and federal agencies. Fire preparedness actions may include: public education, home hardening, clearing of the home ignition zone, or planning for evacuation. Fire prevention actions include campaigns to educate the public about the dangers of human-caused fires and risk reduction measures, such as fire restrictions or burn bans. Although fire is a natural part of the ecosystem, some fires may pose a threat to human life or property. The CWPP facilitates the development of new programs to support wildfire preparedness and prevention throughout the County.

Mobilization

When a wildfire occurs in the County, a response crew is mobilized. Response crews are mobilized based on several factors, including the location of the fire and availability of resources. Local fire departments and volunteer fire departments are mobilized through the Musselshell County Dispatch.

Emergency Management

The Musselshell County Multi-Hazard Mitigation Plan (2021) provides a detailed overview of how the County has planned to respond to emergencies ranging from flood to wildfire. Within the Plan, an evacuation strategy is outlined which can include both sheltering in-place or evacuations from a defined area, such as would apply in the case of a wildfire event. Coordination of firefighting, emergency medical services, and technical rescue activities in the event of an emergency such as wildfire is also outlined within the Plan. The Disaster and Emergency Service's website also provides extensive resources to help individuals throughout the County learn more about available resources and proactively plan for emergency events.

Post-Fire

Recovering from a wildfire is a difficult task for the community. Homes, businesses and other community assets may have been lost or damaged during the fire. Residents returning to their homes may face significant property damage, even if the home did not burn. Soil in burned areas is unstable, often causing flash flooding and slides. Post-fire recovery planning helps mitigate safety hazards to the community and identifies resources to help residents recover from wildfire. Although the County does not currently have a post-fire recovery plan, the CWPP promotes the development of a plan, along with other public education and wildfire response strategies. To aid communities following a disaster, Montana Disaster and Emergency Services has compiled a list of resources to assist individuals dealing with the aftermath of a disaster event[11].

[11] https://des.mt.gov/Recovery/Recovery-Program

3.2. Implementation

Goals, Objectives, & Strategies

The CWPP implementation plan (Appendix A) and associated action table (Appendix B) were developed to clearly outline roles, responsibilities, and timelines for various projects that will facilitate the implementation and achievement of the goals, objectives, and strategies outlined within the CWPP. The CWPP defines goals, objectives, and strategies as follows:

Goal: A broad, long-term desired result.

> **Objective**: A measurable, specific action that serves to achieve a **Goal.**
>
> > **Strategy**: A method to achieve specific **Objectives.** Multiple **Projects** can be related to a given Strategy.

Action Plan

The action plan consists of various projects with assigned types, responsibilities, and timeframes. Using the National Strategy priorities (Restoring and Maintaining Landscapes, Fire-Adapted Communities, and Response to Wildfires) as overarching goals, the Core Team, with public input, developed each objective to further specify the goal. These objectives are then narrowed down further into a method that can be planned and implemented, called strategies. Each strategy involves at least one stakeholder but often requires the collaborative efforts of multiple interested stakeholders from the County, federal and state agencies, local fire departments, and other entities. Other stakeholder groups may be integrated into the action plan (Appendix B) as new strategies are developed in the coming years and roles are further defined. Wherever possible, timelines to complete each strategy are included within the action table to best capture the overarching timeline to facilitate achievement of larger goals and objectives defined for the CWPP.

Prioritization Process

This CWPP identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types of treatments that will protect one or more at-risk communities and essential infrastructure.

A GIS analysis was completed to determine a spatial representation using a combination of three risk layers (Risk to People, Property, and Critical Infrastructure (eNVC), and Risk to Potential Structures (cNVC)). These layers were intersected with WUI components to form a composite matrix that assigns “weight” or “points” to aid prioritization. The adjective rates of “Low” to “Very High” for each layer were reclassified to integers (1-7). Then using the formula: Risk to People and Property or Risk to Critical Infrastructure (whichever integer is higher) + (Risk to Potential Structures x 2). The results ranged from 0 to 21 and were grouped as follows:

- Low = 0 to 4
- Moderate = 5 to 10
- High = 11 to 15
- Very High = 16 to 21

Using these values, a spatial layer has been developed to show prioritization across the WUI. This spatial mapping of priorities will allow Musselshell County to interpret which areas should be prioritized and which management actions are appropriate. Priority levels are shown as low,

moderate, high, and very high based on the WUI and Risk Assessment intersections (see Map 6 in Appendix C).

3.3. Future Actions

The 2025 CWPP is designed to function as a living document with updates occurring as-needed. It is anticipated that additional goals, objectives, and strategies will be added as conditions and needs change for Musselshell County, and that the format of the action plan will facilitate easy integration of these elements.

Monitoring

To accurately and consistently monitor progress towards the goals, objectives, and strategies outlined within the CWPP, an annual review of the action plan will be conducted during which any completed strategies will be updated, and any pending additions or revisions to the CWPP document or the associated CWPP story map will be implemented. The annual review will also consider substantive changes to other plans, policies, and regulations identified in Section 1.2: Relationship to Other Plans, Policies, and Regulations (e.g., updates to the Montana Forest Action Plan) and/or substantive changes to data used to develop the WUI and risk assessment for this CWPP identified in Section 2: Wildland Urban Interface & Risk Assessment. Projects identified in the Action Plan will be reviewed annually to track progress and to provide further guidance in their implementation with use of the Project Monitoring Plan (Appendix B). In order to remain relevant and useful, CWPPs should be fully updated every five years; the next CWPP update should occur in 2030 (DNRC 2022).

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Appendices

Appendix A: Implementation – Goals, Objectives, and Strategies A-1
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Appendix A: Implementation – Goals, Objectives, and Strategies

Goal: A broad, long-term desired result.

Objective: A measurable, specific action that serves to achieve a **Goal.**

Strategy: A method to achieve specific **Objectives.** Multiple **Projects** can be related to a given **Strategy**.

Goal 1: Restore and Maintain Landscapes

Objective 1.1 Reduce fuel loading by supporting and implementing fuels treatments

Strategy 1.1.1 Implement the following fuels treatments to accomplish resource objectives: thinning, prescribed fire, commercial harvest, slashing, underburning, pile burning, chipping, thinning, and prescribed/targeted grazing on both publicly and privately owned land

Objective 1.2 Promote characteristic wildfire activity appropriate to natural fire regimes and resource objectives

Strategy 1.2.1 Identify strategic locations for new fuel breaks and buffers

Strategy 1.2.2 Improve and maintain existing fuel breaks and buffers

Strategy 1.2.3 Identify, improve, and maintain road buffers

Strategy 1.2.4 Facilitate and maintain cross-boundary collaboration to implement fuels reduction projects across multiple jurisdictions including privately-held lands

Strategy 1.2.5 Implement treatments that promote characteristic wildfire activity on the landscape

Objective 1.3 Implement post-fire recovery activities

Strategy 1.3.1 Support the implementation of recovery and restoration activities such as reseeding and replanting following wildfire events

Strategy 1.3.2 Support the development and implementation of a Musselshell County Post-Fire Recovery Plan that provides a framework for efficient and effective allocation of resources after a wildfire event

Strategy 1.3.3 Increase local capacity for post-fire response personnel and resources

Objective 1.4 Reduce insect and disease outbreaks and spread

Strategy 1.4.1 Support and implement projects that use approved methods to control insect and disease such as: micronutrients, pesticides, attractants, aggregants, anti-aggregants, and pheromones

Strategy 1.4.2 Fuels thinning to prevents spread of insects and disease outbreaks

Strategy 1.4.3 Monitor Aerial Surveys to detect trends in outbreaks

Objective 1.5 Use the best available science to inform CWPP goals, objectives, and strategies

Strategy 1.5.1 Facilitate the collection and/or analysis of updated data such as aerial imagery, surveys, etc. that would improve the implementation of projects associated with this CWPP

Goal 2: Fire Adapted Communities

Objective 2.1 Improve and maintain public education to reduce wildfire risk and structural ignitability

Strategy 2.1.1 Improve public access to existing educational resources

Strategy 2.1.2 Develop new educational opportunities/programs for residents

Strategy 2.1.3 Support and implement efforts to increase capacity for additional personnel, groups, or programs to implement and coordinate services that support fire adapted communities within the County

Strategy 2.1.4 Provide an updated platform for public access to CWPP resources that integrates with existing resources

Strategy 2.1.5 Establish a CWPP Monitoring Committee to ensure that the CWPP remains updated, relevant, and is communicated effectively among stakeholders

Objective 2.2 Support and implement mitigation treatments within priority areas within the County

Strategy 2.2.1 Continue to develop projects within the WUI and priority areas within the County

Objective 2.3 Reduce human-caused ignitions

Strategy 2.3.1 Work with utility companies to reduce ignition risk and identify opportunities for mitigation

Strategy 2.3.2 Improve and maintain public communication to reduce human-caused ignitions

Strategy 2.3.3 Provide training and resources for utilizing prescribed fire on private lands

Goal 3: Wildfire Response

Objective 3.1 Increase/improve water supply for fire suppression

Strategy 3.1.1 Identify alternate water resources

Strategy 3.1.2 Support the implementation of design alternatives that improve fire suppression and response capabilities within subdivision planning documents

Strategy 3.1.3 Construct additional water resources for fire suppression

Objective 3.2 Improve emergency notification and information communications

Strategy 3.2.1 Identify methods to increase communication efficacy and accessibility in the event of a wildfire

Strategy 3.2.2 Ensure communication and notification methods are inclusive of vulnerable populations

Strategy 3.2.3 Support the development of mitigation actions and planning related to wildfire smoke public health issues

Strategy 3.2.4 Consider wildfire smoke responses in future planning efforts

Strategy 3.2.5 Support the procurement and designation of funding to mitigate public health risks and issues related to wildfire smoke

Objective 3.3 Facilitate and maintain cross-boundary collaboration to improve wildfire response efforts.

Strategy 3.3.1 Coordinate with neighboring agencies and landowners to identify potential opportunities for collaboration

Strategy 3.3.2 Establish a Wildfire Response Working Group to improve communications and collaborative response efforts across groups and jurisdictions

Objective 3.4 Improve emergency response and mobilization efforts

Strategy 3.4.1 Develop an evacuation plan that identifies evacuation routes, reception/distribution areas, shelter locations, staging areas, and access control points

Objective 3.5 Increase response capacity

Strategy 3.5.1 Obtain funding for additional personnel, training, and equipment to improve wildfire response capacity and efficacy

Appendix B: Implementation – Action Table

Table 6 Musselshell County Community Wildfire Protection Plan Update Action Plan

Project Name	Project Type (Public Education/Fuels Reduction/Wildfire Response)	Responsible Entity	CWPP Strategy	Estimated Date of Completion	Notes
Ongoing Projects					
Ingress/Egress Road Condition Assessment and Improvement	Fuels Reduction / Wildfire Response	Musselshell County	1.2.3 and 3.5.1	5 Year Evaluation	Identify and assess critical ingress/egress routes in coordination with Musselshell County road and bridge department.
Continued support of Mutual Aid programs	Wildfire Response	Musselshell County and other agencies	3.5.1	Ongoing	These programs are continuous
Enhanced ability to support DNRC staff stations via increased volunteers, recruitment etc.	Wildfire Response	Musselshell County and DNRC	3.5.1	Ongoing	These DNRC staff stations are critical to Musselshell County and their ability to respond to wildfires. All recent wildfires that have had staff stations have remained small.
LMCD Annual Fuel Mitigation Meetings	Public Education	Lower Musselshell Conservation District	2.1.1	Ongoing	These programs are continuous
LMCD Bi-Annual Tour	Public Education	Lower Musselshell Conservation District	2.1.1	Ongoing	These programs are continuous
LMCD Home Defensible Space 50/50 Grant Cost Share Program	Fuels Reduction	Lower Musselshell Conservation District	1.1.1	Ongoing	These programs are continuous

Project Name	Project Type (Public Education/Fuels Reduction/Wildfire Response)	Responsible Entity	CWPP Strategy	Estimated Date of Completion	Notes
LMCD has current BLM Funding to do fuels reduction work on Musselshell County road easements in 2025 – 2027	Fuels Reduction	Lower Musselshell Conservation District	1.1.1	Fall 2027	
Proposed Projects					
Musselshell CWPP Online Story Map Maintenance	Public Education	Musselshell County	2.1.1 and 2.1.4	Summer 2025 - Ongoing	Maintaining and updating Story Map with CWPP updates and resources
Create Post-Fire Plan	Public Education / Wildfire Response	County (and other agencies)	1.3.2	2025 – Ongoing	Establish a Post Fire Recovery Team that will create and maintain a post fire resource and action plan
Vegetation Thinning and Clearing at the following locations: • Johnny Coal Road • #4 Road • State Land on Horsethief • County Road Right of Way • Juniper Subdivision	Fuels Reduction	TBD	1.1.1	Ongoing	Vegetation Thinning/Clearing

Project Name	Project Type (Public Education/Fuels Reduction/Wildfire Response)	Responsible Entity	CWPP Strategy	Estimated Date of Completion	Notes
Vegetation Thinning, Clearing, and Post Fire Recovery at the following locations: • Bobcat Fire Areas • Western Fire Area • Peterson Fire Area	Fuels Reduction	TBD	1.2.1	Fall 2028	Vegetation Thinning/Clearing/Post Fire Recovery
Purchase/lease of mobile BioChar facility	Fuels Reduction	TBD	1.2.1	Fall 2027	Post Fire Recovery
Coordination/ incentivization of community post-fire cleanup	Fuels Reduction	Musselshell County, Supporting Partners	1.2.4	Ongoing	Post Fire Recovery
Community education and implementation of controlled burns in post-fire recovery areas under right conditions	Fuels Reduction/Public Education	TBD	1.2.1 and 2.1.2	Ongoing	Post Fire Recovery
Develop training resources to provide to local realtors	Public Education	TBD	2.1.2	Fall 2026	

Project Name	Project Type (Public Education/Fuels Reduction/Wildfire Response)	Responsible Entity	CWPP Strategy	Estimated Date of Completion	Notes
Increased fuel mitigation funding	Fuels Reduction	Musselshell County and other agencies LMCD/DNRC	1.1.1 and 2.2.1	5-year duration/2026	LMCD is partnering with DNRC Forestry to apply for a CWDG Grant, or other relevant grant source, in 2026 to do fuels reduction work on DNRC State lands and the surrounding private lands. LMCD Has continued funding to continue the Home Defensible Space 50/50 grant cost share program for the next 3 to 5 years.
Education via example projects/photos as a video montage or mailer	Public Education	TBD	2.1.2	Ongoing, Annually	Motivate public engagement
Education via example projects as 'field days' or development of a 'self-driving tour , or pop-up information board where fuels mitigation is occurring	Public Education	TBD	2.1.2	Spring 2026	Motivate public engagement
Fire mitigation – training curriculum materials for teachers	Public Education	TBD	2.3.2	Current	These programs are continuous
Upgrading communication towers	Wildfire Response	911 Communications	3.2.1	Fall 2026	Dean Creek Tower identified as a priority

Project Name	Project Type (Public Education/Fuels Reduction/Wildfire Response)	Responsible Entity	CWPP Strategy	Estimated Date of Completion	Notes
Upgrading communication networks so that all response entities can communicate to each other and dispatch	Wildfire Response	911 Communications	3.2.1 and 3.5.1	Spring 2026	
Upgrading dispatch capabilities to rapid SOS and/or other technologies	Wildfire Response	Musselshell County Dispatch, 911 Communications	3.2.1 and 3.5.1	Fall 2025	
Streamline response vehicle fleet so vehicles are multipurpose (wildland/structure)	Wildfire Response	Musselshell County	3.5.1	2028	Pending fund options will determine the overall timeline
Dedicated wildfire response bulldozer	Wildfire Response	Musselshell County	3.5.1	2026	

Project Name	Project Type (Public Education/Fuels Reduction/Wildfire Response)	Responsible Entity	CWPP Strategy	Estimated Date of Completion	Notes
Address water for fire suppression availability for: • Dry water storage tanks • Additional cistern locations • Dry hydrants • Additional new hydrants in key locations • Install back-up power at County shop for reservoir pumping	Wildfire Response	Musselshell County	3.1.3	Fall 2025	
Install generators at city/county fire departments	Wildfire Response	Fire Council	3.5.1	2026	
Develop written mutual aid agreement with Parrot Creek	Wildfire Response	Musselshell County	3.3.1	2025	

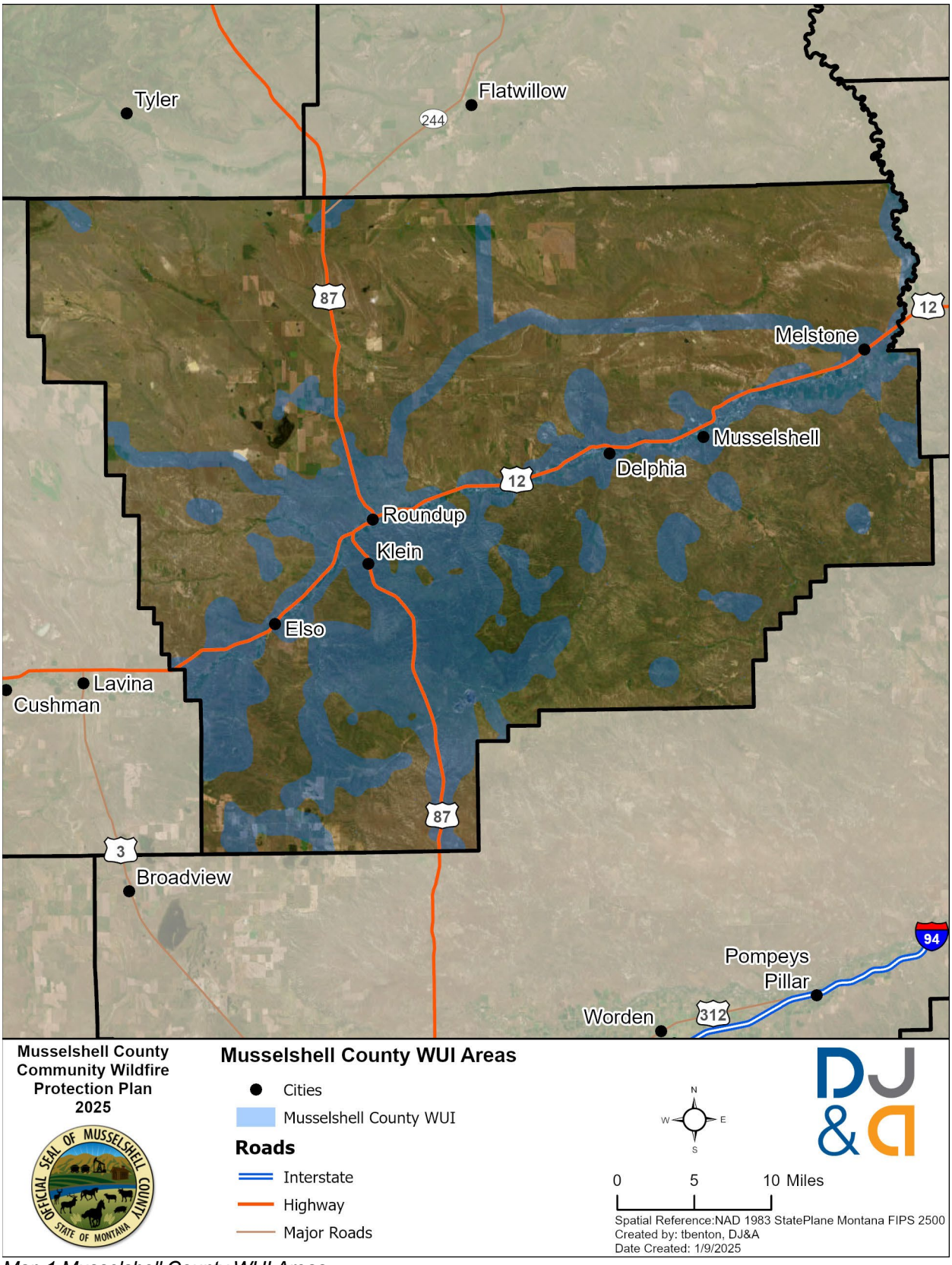
Project Name	Project Type (Public Education/Fuels Reduction/Wildfire Response)	Responsible Entity	CWPP Strategy	Estimated Date of Completion	Notes
Procure GIS contractor to develop advanced GIS layer to map locations of water sources and update other critical layers with accurate locations for dispatch system	Wildfire Response	Musselshell County	3.5.1	2025	
Road improvements in high priority areas	Wildfire Response	Musselshell County and other agencies	2.2.1	Ongoing	
Develop and update standard operations and policies	Wildfire Response	Musselshell County	3.4.1	2025	
Fire department preparedness for prescribed fire	Fuel Reduction	Musselshell County	1.1.1	2027	Training for fire departments to perform prescribed fire and purchase of trailer and equipment needed to safely perform prescribed fire

Table 7 Project Monitoring Plan

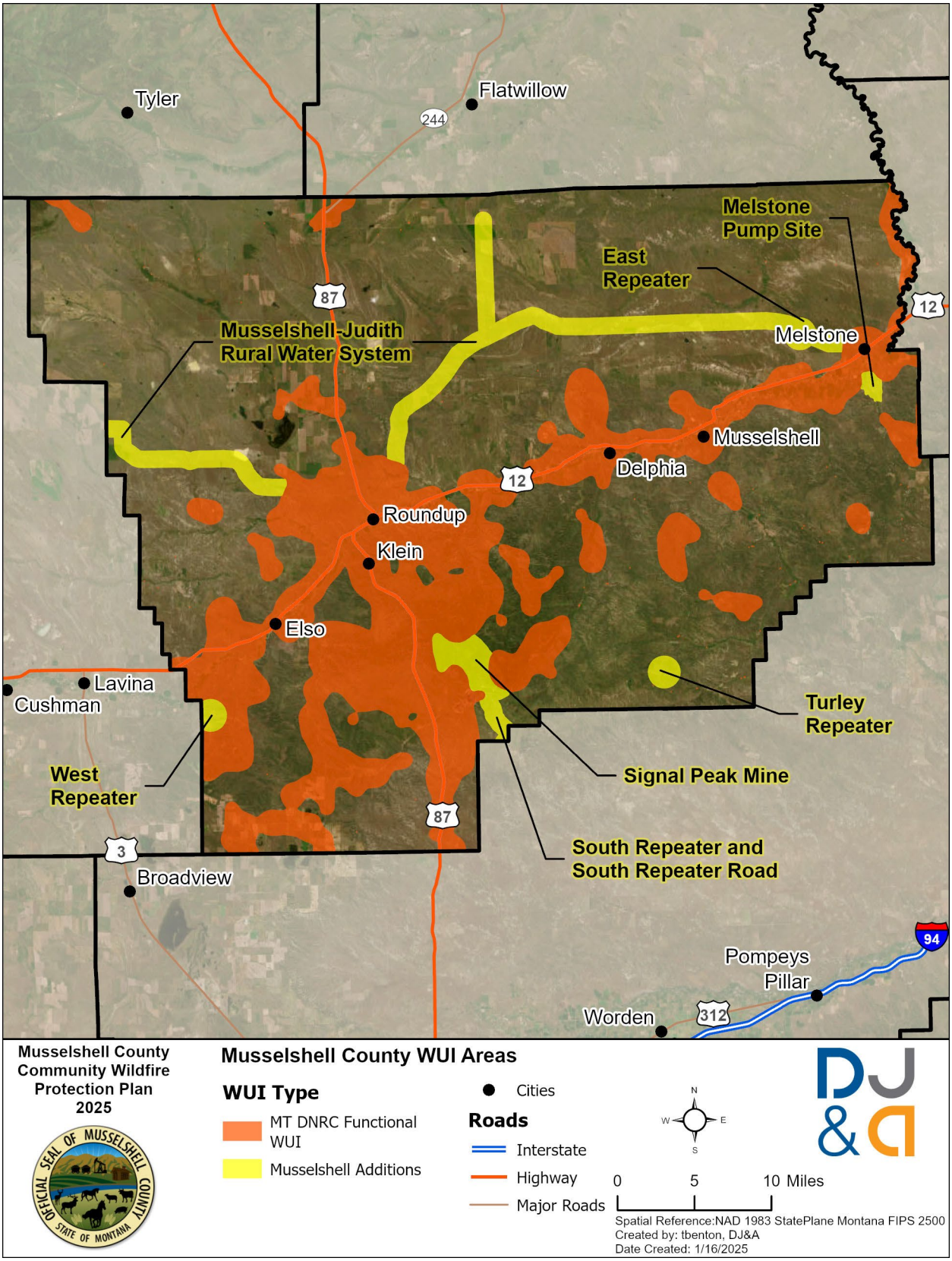
Project Monitoring Plan **Project Name:** **Project Reviewer/Date:** **Instructions:** Refer to the projects in the Musselshell County Community Wildfire Protection Plan Update Action Plan to complete this form. This form should be completed by the responsible entity for each block within the applicable phase of work. For blocks beyond the phase of work please enter N/A.	
Project Description / Identify Need: Was the work needed to be done clearly described?	
Plan: Was the work planned?	
Implementation: Was the project implemented according to the plan?	
Verification: Did project actions meet the goals, objectives, and expected outcomes?	
Adaptive Management: What changes to the project implementation plan, if any, need to be made to facilitate the execution of the next similar project?	

Appendix C: Maps

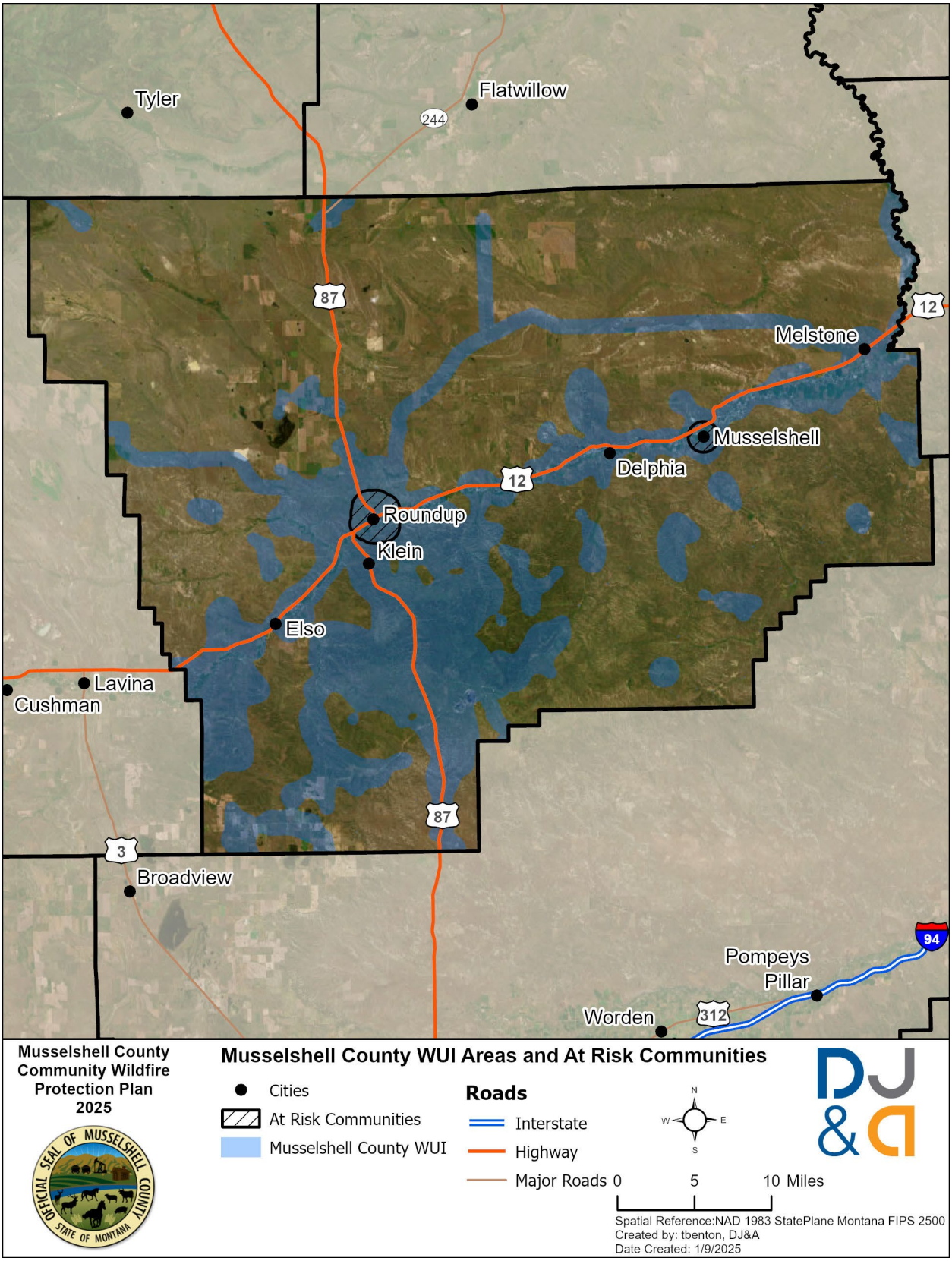
Map 1 Musselshell County WUI Areas C-2
Map 2 MT DNRC Functional WUI and Musselshell County Additions C-3
Map 3 Musselshell County WUI Areas and At Risk Communities C-4
Map 4 Risk to People, Property, and Infrastructure (eNVC) in Musselshell County C-5
Map 5 Risk to Potential Structures (cNVC) in Musselshell County C-6
Map 6 Community Base Map with Priority Areas and WUI in Musselshell County C-7
Map 7 Land Ownership and WUI in Musselshell County C-8
Map 8 WUI and Fire Districts in Musselshell County C-9



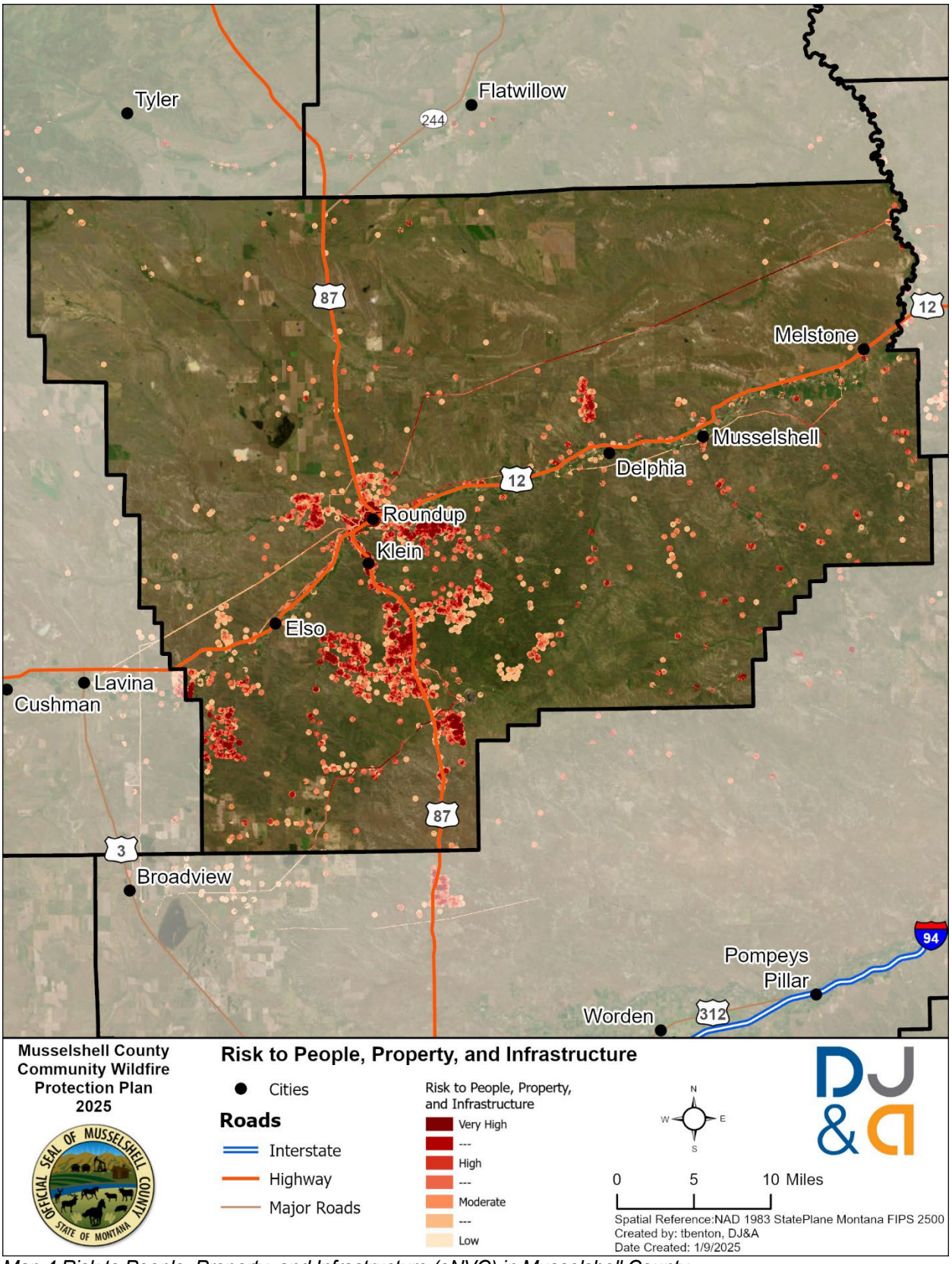
Map 1 Musselshell County WUI Areas



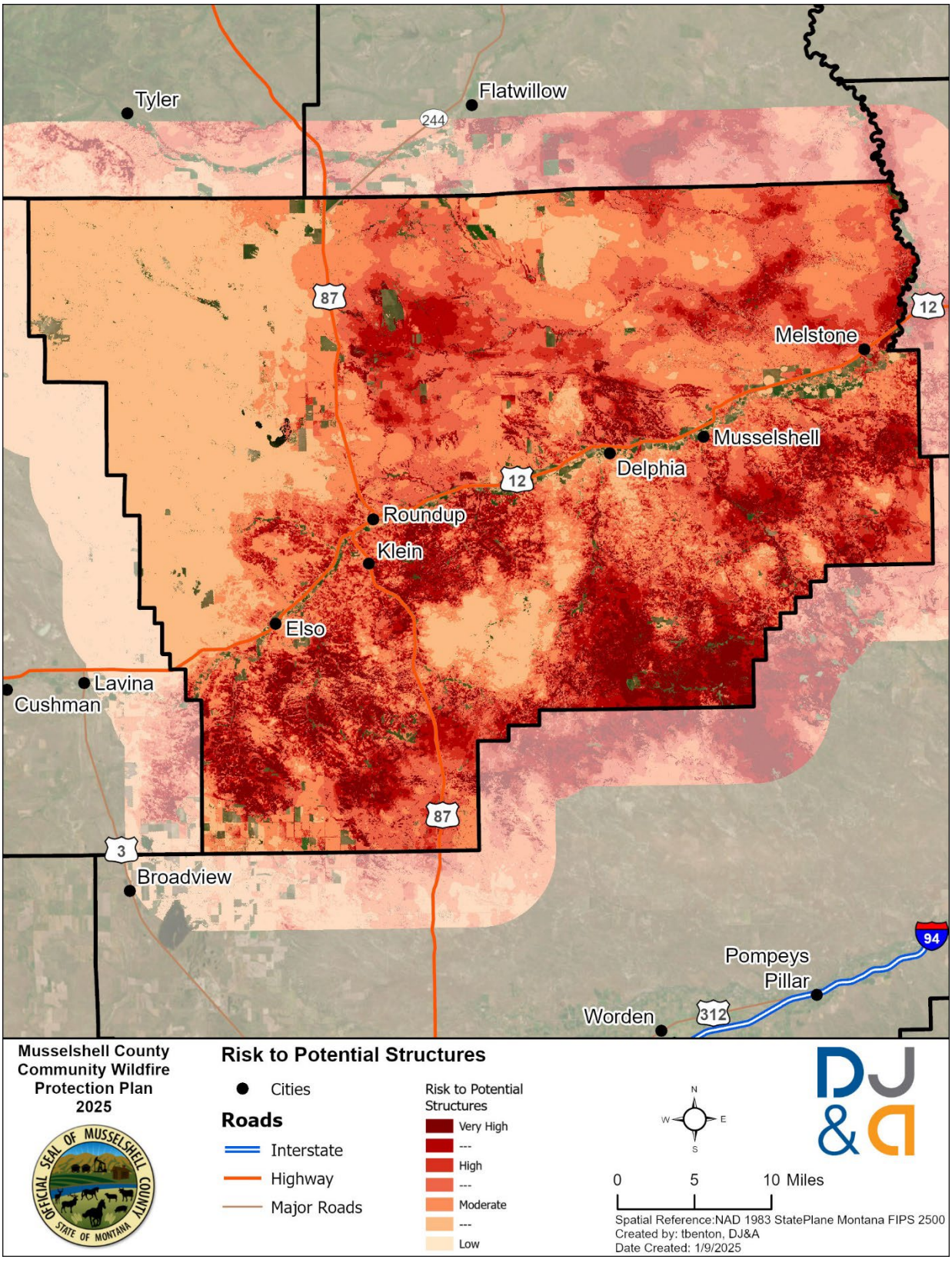
Map 2 MT DNRC Functional WUI and Musselshell County Additions



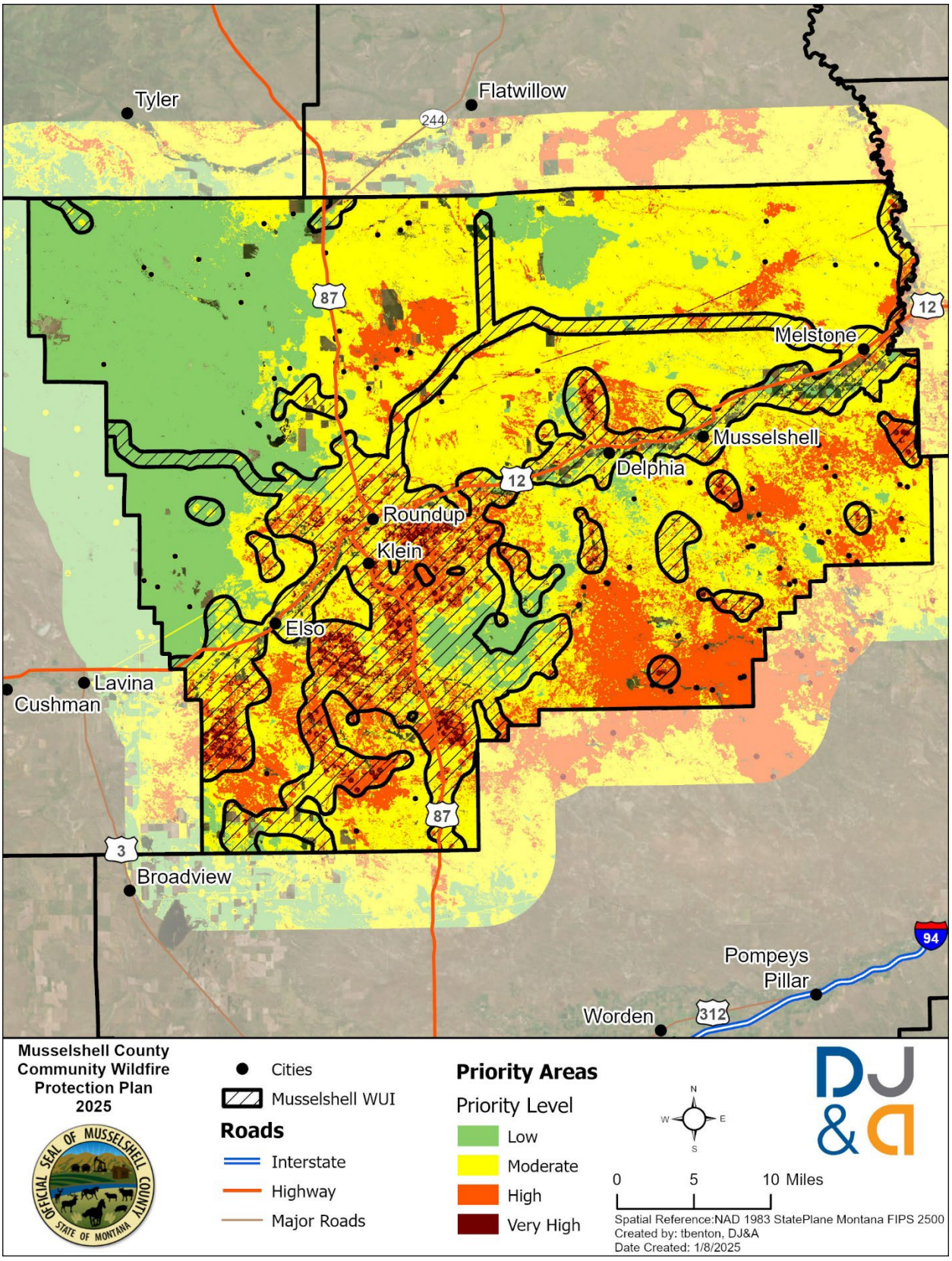
Map 3 Musselshell County WUI Areas and At Risk Communities



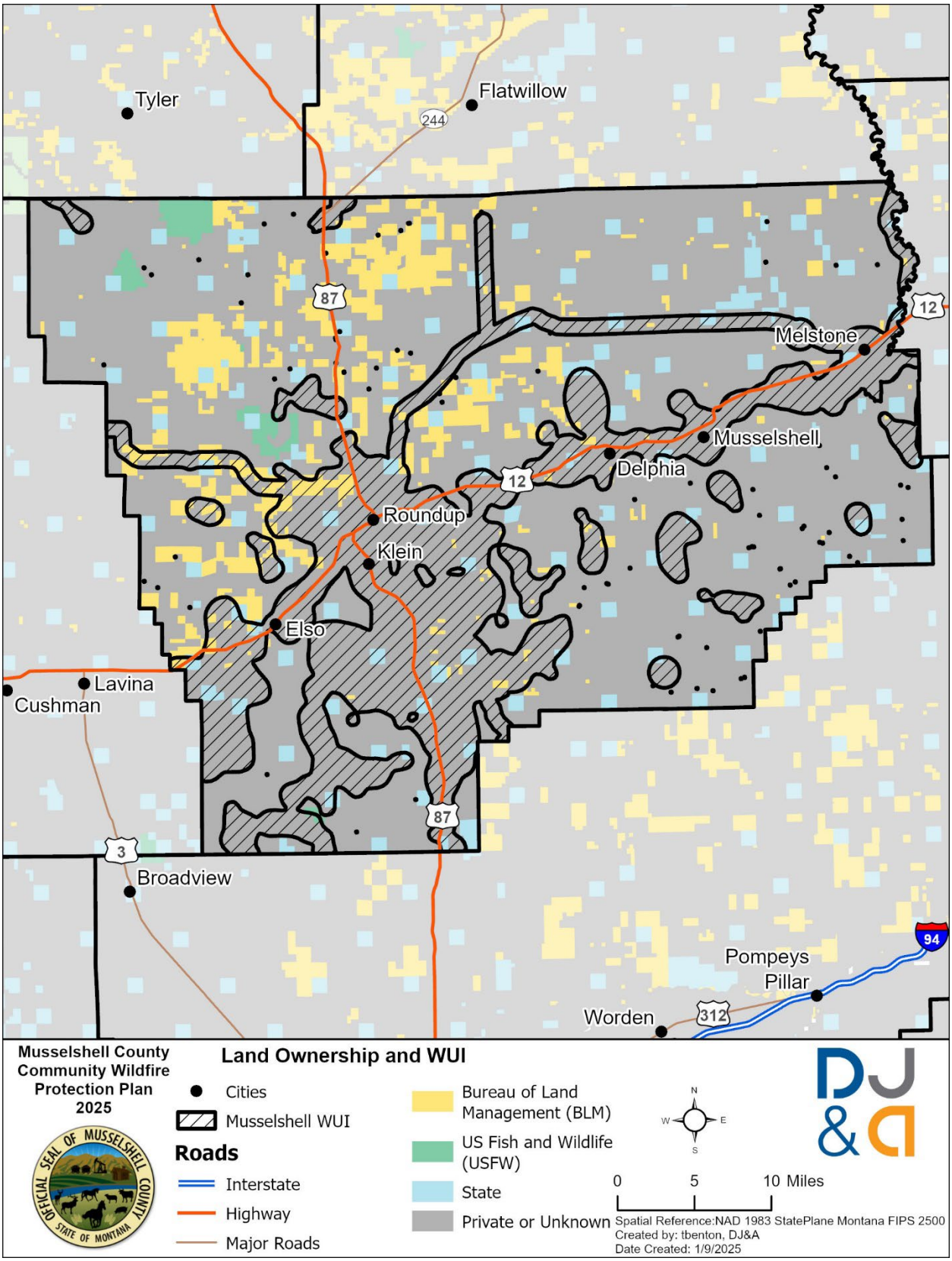
Map 4 Risk to People, Property, and Infrastructure (eNVC) in Musselshell County



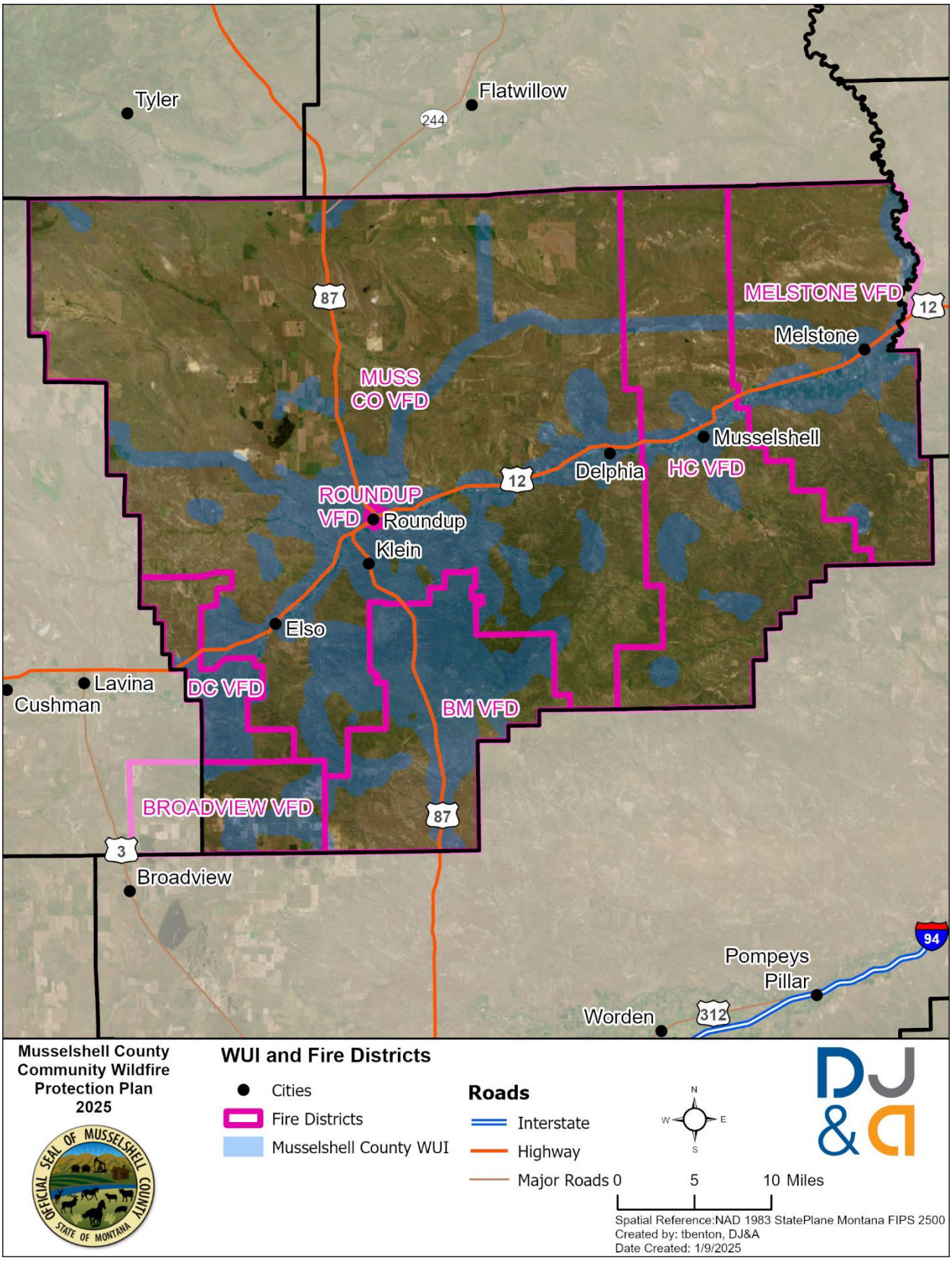
Map 5 Risk to Potential Structures (cNVC) in Musselshell County



Map 6 Community Base Map with Priority Areas and WUI in Musselshell County



Map 7 Land Ownership and WUI in Musselshell County



Map 8 WUI and Fire Districts in Musselshell County

Appendix D: Glossary of Terms

Term	Definition	Source
Asset (Wildfire)	Human-made features, such as commercial structures, critical facilities, housing, etc., that have a specific importance or value	(Gilbertson-Day et al. 2020)
At-risk community	The term "at-risk community" means an area— (A) that is comprised of— (i) an interface community as defined in the notice entitled "Wildland Urban Interface Communities Within the Vicinity of Federal Lands That Are at High Risk From Wildfire" issued by the Secretary of Agriculture and the Secretary of the Interior in accordance with title IV of the Department of the Interior and Related Agencies Appropriations Act, 2001 (114 Stat. 1009) (66 Fed. Reg. 753, January 4, 2001); or (ii) a group of homes and other structures with basic infrastructure and services (such as utilities and collectively maintained transportation routes) within or adjacent to Federal land; (B) in which conditions are conducive to a large-scale wildland fire disturbance event; and (C) for which a significant threat to human life or property exists as a result of a wildland fire disturbance event.	Healthy Forest Restoration Act of 2003 (P.L. 108-148)
Community Wildfire Protection Plan	(3) COMMUNITY WILDFIRE PROTECTION PLAN.—The term ''community wildfire protection plan'' means a plan for an at risk community that— (A) is developed within the context of the collaborative agreements and the guidance established by the Wildland Fire Leadership Council and agreed to by the applicable local government, local fire department, and State agency responsible for forest management, in consultation with interested parties and the Federal land management agencies managing land in the vicinity of the at-risk community; (B) identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment on Federal and non-Federal land that will protect 1 or more at-risk communities and essential infrastructure; and (C) recommends measures to reduce structural ignitability throughout the at-risk community.	Healthy Forest Restoration Act of 2003 (P.L. 108-148)
Condition Class (Vegetation)	Depiction of the degree of departure from historical fire regimes, possibly resulting in alterations of key ecosystem components. These classes categorize and describe vegetation composition and structure conditions that currently exist inside the Fire Regime Groups. Based on the coarse-scale national data, they serve as generalized wildfire rankings. The risk of loss of key ecosystem components from wildfires increases from Condition Class 1 (lowest risk) to Condition Class 3 (highest risk).	(NWCG 2023a)
Exposure (Wildfire)	The placement or coincidental location of an asset or resource within a hazardous environment	(Gilbertson-Day et al. 2020)

Term	Definition	Source
Fire Behavior	The manner in which a fire reacts to the influences of fuel, weather, and topography.	(NWCG 2023b)
Fire Intensity	A general term relating to the heat energy released in a fire.	(USDA 2023)
Fire Management	All activities related to the management of wildland fires, including fire prevention, fire suppression, and use of prescribed fire.	(NWCG 2023b)
Fire Regime	Fire regimes describe and categorize patterns of fire ignition, seasonality, frequency, type (crown, surface, or ground fire), severity, intensity, and spatial continuity (pattern and size) that occur in a particular area or ecosystem	(USDA 2023)
Fire Return Interval	Number of years between two successive fires in a specified area. Often used to designate an average of intervals (i.e., mean fire interval).	(USDA 2023)
Fire Severity	Degree to which a site has been altered or disrupted by fire; loosely, a product of fire intensity and residence time.	(NWCG 2021)
Flame Length	The length of flames in a fire front measure along the slant of a flame, from the midpoint of its base to its tip. Flame length is mathematically related to fireline intensity and tree crown scorch height.	(USDA 2023)
Fuel	Any combustible material, especially petroleum-based products and wildland fuels	(NWCG 2021)
Fuel Class	A set of fuels with similar traits. Fuels are categorized as herbaceous or woody and live or dead. Dead fuels are classed as 1-, 10-, 100-, or 1,000-hour timelag fuels, based on the time needed for fuel moisture to come into equilibrium with the environment: • 1-hour timelag fuels: Dead fuels comprised of herbaceous plants or woody plants less than about 0.25 inch (6.4 mm) in diameter and the surface layer of litter on the forest floor. • 10-hour timelag fuels: Dead fuels comprised of wood from 0.25 to 1 inch (0.6-2.5 cm) in diameter and the litter from just beneath the surface to around 0.75 inch (1.9 cm) below ground. • 100-hour timelag fuels: Dead fuels comprised of wood from 1 to 3 inches (2.5-7.6 cm) in diameter and litter from around 0.75 to about 4 inches (1.9-10 cm) below ground. 1,000-hour timelag fuels: Dead fuels comprised of wood from 3 to 8 inches (7.6-20.3) in diameter and the forest floor layer >4 inches (10 cm) below ground.	(USDA 2023)
Fuel Continuity	A qualitative description of the distribution of fuels both horizontally and vertically. Continuous fuels readily support fire spread. The larger the fuel discontinuity, the greater the fire intensity required for fire spread.	(USDA 2023)
Fuel Loading	The amount of fuel present expressed quantitatively in terms of weight of fuel per unit area. This may be available fuel (consumable fuel) or total fuel and is usually dry weight.	(NWCG 2021)
Fuel Model	Simulated fuel complex for which all fuel descriptors required for the solution of a mathematical rate of spread model have been specified.	(NWCG 2021)
Fuel Moisture	Expressed as a percent or fraction of oven-dry fuel weight. It is the most important fuel property controlling flammability. In living plants it is fluctuations vary considerably by species but are usually above 80% to 100%. 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.	(USDA 2023)

Term	Definition	Source
Fuel Reduction	Manipulation, including combustion, or removal of fuels to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control.	(NWCG 2021)
Prescribed Fire	Any fire intentionally ignited by management in accordance with applicable laws, policies, and regulations to meet specific objectives. Also called a controlled burn or prescribed burn.	(USDA 2023)
Probability (Wildfire)	Likelihood that a wildfire will burn a given point or area during a specified period of time	(MT DNRC 2023)
Rate of Spread (ROS)	The rate of spread is in chains per hour (ch/h) and is defined as the speed with which the fire is moving away from the site of origin. Wind, moisture, and slope drive the fire. The flaming zone, or fire head, moves away from the origin quickly with great intensity.	(NWCG 2023a)
Resource (Wildfire)	Resources are natural features, such as wildlife habitat, vegetation type, or water, with specific importance or value	(Gilbertson-Day et al. 2020)
Susceptibility (Wildfire)	Propensity of an asset or resource to be damaged if a wildfire occurs	(Gilbertson-Day et al. 2020)
Vulnerability (Wildfire)	A function of exposure and susceptibility	(Gilbertson-Day et al. 2020)
Wildfire Hazard	A physical situation with potential for causing damage to vulnerable resources or assets. Quantitatively, wildfire hazard is measured by two main factors: 1) burn probability (or likelihood of burning), and 2) fire intensity (measured as flame length, fireline intensity, or other similar measure).	(Gilbertson-Day et al. 2020)
Wildfire Risk	A function of wildfire hazard (probability and intensity) and vulnerability (exposure and susceptibility) of assets and resources	(MT DNRC 2023)

Appendix E: Wildland Urban Interface Summary Table

Table 8 Musselshell County WUI Components and Definitions

WUI Component	Definition
Functional WUI Areas	
Direct Exposure	Burnable wildland that contains or is near a structure located on or surrounded by burnable land cover. Directly exposed structures could benefit from both the hardening of the structure to resist ignition and the reduction of fuel in the home ignition zone to reduce the structure's exposure to heat and embers.
Indirect Exposure	Nonburnable land that contains or is near a structure and is within 900 m of burnable land cover. Indirectly exposed structures could benefit from hardening of the structure to resist ignition from embers and nearby structures.
Limited Exposure	Nonburnable land that contains a structure but is greater than 900 m from burnable land cover.
Critical Fireshed	Burnable land area within 1,500 m (1 mile) of a group of structures but does not itself contain structures.
Nonburnable Fireshed	Nonburnable land cover within 1,500 m (1 mile) of a group of structures but does not itself contain structures.
Additional WUI Areas: Community Resources and Infrastructure	
Musselshell-Judith Rural Water System Line	**Description:** Waterline including a ½ mile buffer (one mile total width).
	Justification: The risk to municipal water distribution infrastructure within the County is a high priority issue that requires protection from wildfire. This was included as a WUI component to ensure that Musselshell County maintains a consistent source of drinking water as well as a resource for fire suppression efforts.
	Data Source: Identified from a Proposed Project Phasing map in a Musselshell Judith Rural Water Project report. This map was converted to a .JPG, brought into ArcGIS, georeferenced using county corners, and the waterline was then hand digitized and a ½ mile buffer was applied.
Signal Peak Mine	**Description:** Includes air shafts that are not included in the above ground infrastructure or Functional WUI.
	Justification: As a critical part of the mine infrastructure, it was deemed by the CWPP Core Team that these above ground areas overlying the air shafts should be protected and included as a WUI component.
	Data Source: The additions in the vicinity of the Signal Peak Mine were digitized in GIS during a CWPP Core Team meeting.
Melstone Pump Site	**Description:** Includes the well, reservoir, and watershed area (between Poole Road and Melstone Custer Road).
	Justification: The risk to municipal water distribution infrastructure within the County is a high priority issue that requires protection from wildfire. This was included as a WUI component to ensure that Musselshell County maintains a consistent source of drinking water as well as a resource for fire suppression efforts.

WUI Component	Definition
	Data Source: The additional WUI polygon associated with the Melrose Water Pump Site was digitized in GIS during a CWPP Core Team meeting.
South Repeater and South Repeater Road	**Description:** This repeater is located in Yellowstone County but is serviced by Musselshell. A one mile buffer is included around the repeater and a ½ mile buffer is included around South Repeater Road.
	Justification: As this repeater is a critical communication tool used by the Musselshell County Department Emergency Services, it was determined that this repeater and its access road for maintenance should be protected and included as a WUI component.
	Data Source: The repeater and access road were identified and digitized in GIS during a CWPP Core Team meeting, and a one-mile buffer to the repeater was applied and a ½ mile buffer to the access road was applied.
Other Repeater Sites	**Description:** East, Turley, and West Repeaters are included with a one-mile buffer.
	Justification: These repeaters are a critical communication tool used by Musselshell County Department of Emergency Services, and it was determined by the CWPP Core Team that these should be protected and included as WUI components.
	Data Source: The repeaters were identified and digitized in GIS during a CWPP Core Team meeting, and a one-mile buffer was applied to each repeater.