Pre-Disaster Mitigation Plan

Cascade County, Montana

September 2011

PRE-DISASTER MITIGATION PLAN

FOR

CASCADE COUNTY MONTANA

AND

THE INCORPORATED CITY OF

GREAT FALLS

AND

THE INCORPORATED TOWNS OF

BELT, CASCADE AND NEIHART

***Prepared for*:**

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LIST OF ACRONYMNS

BID	Business Improvement District
BNSF	Burlington Northern-Santa Fe (Railroad)
BuRec	Bureau of Reclamation
CDBG	Community Development Block Grant
CDP	Census Designated Place
CPRI	Calculated Priority Risk Index
CRS	Community Rating System
CWPP	Community Wildfire Protection Plan
DES	Disaster and Emergency Services
DMA	Disaster Mitigation Act
DNRC	Montana Department of Natural Resources and Conservation
EAP	Emergency Action Plan
EOC	Emergency Operations Center
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right to Know Act
FD	Fire District
FEMA	Federal Emergency Management Agency
FSA	Fire Service Area
GIS	Geographic Information Systems
HAZUS-MH	Hazards of the United States – Multi-Hazard
HMGP	Hazard Mitigation Grants Program
ICBM	Inter-Continental Ballistic Missile
IFC	International Fire Code

LIST OF ACRONYMNS (continued)

LEPC	Local Emergency Planning Committee
MDOR	Montana Department of Revenue
NCDC	National Climatic Data Center
NFIP	National Flood Insurance Program
NFIRS	National Fire Incident Reporting System
NID	National Inventory of Dams
NOAA	National Oceanic and Atmospheric Administration
NRC	National Response Center
NRIS	Natural Resource Information System
NWS	National Weather Service
PDM	Pre-Disaster Mitigation
PDMC	Pre-Disaster Mitigation Competitive (grants program)
RFD	Rural Fire Department
SHELDUS	Spatial Hazard Events and Losses Database for the United States
SHMO	State Hazard Mitigation Officer
TRI	Toxic Release Inventory
USFS	United States Forest Service
WUI	Wildland Urban Interface

1.0 INTRODUCTION

The effects from several natural and man-made hazards may directly impact the safety and well being of residents of Cascade County. Historically, Cascade County residents have dealt with floods, high winds, severe summer storms with damaging thunderstorms, hail, harsh winter storms with extreme cold and blizzards, wildfires and hazardous material incidents. While most hazards cannot be eliminated, the effects from them can be mitigated.

Cascade County, working together with Tetra Tech Inc., prepared this Pre-Disaster Mitigation (PDM) Plan to help guide and focus hazard mitigation activities. The Cascade County PDM Plan profiles significant hazards to the community and identifies mitigation projects that can reduce those impacts. The purpose of the PDM Plan is to promote sound public policy designed to protect residents, critical facilities, infrastructure, private property, and the environment from natural and man-made hazards. The Cascade County PDM Plan includes resources and information to assist residents, organizations, local government, and others interested in participating in planning for natural and man-made hazards.

1.1 AUTHORITY

The Disaster Mitigation Act of 2000 (DMA 2000) (P.L. 106-390) provides an opportunity for states and local governments to take a new and revitalized approach to mitigation planning. DMA 2000 amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act (the Act) by repealing the previous Mitigation Planning Section (409) and replacing it with a new Mitigation Planning Section (322). This new section emphasizes the need for state and local entities to closely coordinate mitigation planning and implementation efforts. To implement the DMA 2000 planning requirements, FEMA published an Interim Final Rule in the Federal Register on February 26, 2002. This rule (44 CFR Part 201) established the mitigation planning requirements for states and local communities.

The Cascade County PDM Plan has been developed pursuant to the requirements in the Interim Final Rule for hazard mitigation planning and the guidance in the state and local plan interim criteria under DMA 2000. The Plan also meets guidance developed by the Federal Emergency Management Agency (FEMA) in June of 2008 for multi-jurisdictional mitigation planning.

The Cascade County Board of County Commissioners has adopted this PDM Plan. Also adopting the Plan are the incorporated communities of Great Falls, Belt, Cascade and Neihart. These governing bodies have the authority to promote sound public policy regarding natural and man-made hazards in their jurisdictions. Copies of the signed resolutions are included as **Appendix A** to this plan. The PDM Plan was adopted at the regularly scheduled County Commission and Town/City Council meetings, which were open to the public and advertised through the typical process the jurisdictions use for publicizing meetings.

Cascade County will be responsible for submitting the adopted PDM Plan to FEMA for review. Upon acceptance by FEMA, Cascade County and the incorporated communities of Belt, Cascade and Neihart, and the incorporated City of Great Falls will gain eligibility for mitigation project grants and post-disaster hazard mitigation grant projects.

1.2 ACKNOWLDGEMENTS

Many groups and individuals have contributed to development of the Cascade County PDM Plan. The Cascade County Disaster and Emergency Services (DES) Coordinator provided support for all aspects of plan development. The PDM Planning Team met on a regular basis to guide the project, prioritize mitigation projects and review draft deliverables. Cascade County and City of Great Falls Geographic Information System (GIS) Departments provided digital locations for the critical facilities and infrastructure used in the PDM analysis. The Local Emergency Planning Committee (LEPC) provided support during the project by identifying the hazards most threatening to the county and attending the public meetings. The local communities participated in the planning process by attending public meetings and contributed to plan development by reviewing and commenting on the draft plan.

1.3 SCOPE AND PLAN ORGANIZATION

The process followed to prepare the Cascade County PDM Plan included the following:

- Identify and prioritize hazard events that are most probable and destructive,
- Identify critical facilities,
- Identify areas within the county that are most vulnerable,
- Develop goals for reducing the effects of a disaster event,
- Develop specific projects to be implemented for each goal,
- Develop procedures for monitoring progress and updating the PDM Plan,
- Review the draft PDM Plan, and
- Adopt the PDM Plan.

The PDM Plan is organized into sections that describe the planning process (Section 2), community profile (Section 3), risk assessment and vulnerability analysis (Section 4), mitigation strategies (Section 5), a capability assessment (Section 6), and plan maintenance (Section 7). Appendices containing supporting information are included at the end of the plan.

2.0 PLANNING PROCESS

The Cascade County PDM Plan is the result of a collaborative effort between Cascade County, the incorporated communities of Great Falls, Belt, Cascade and Neihart, utilities, local agencies, non-profit organizations, businesses, and regional, state and federal agencies. The planning effort was facilitated by the contractor, Tetra Tech. Public participation played a key role in development of goals and mitigation projects, as outlined below. For the purposes of this planning effort, the public is defined as residents of Cascade County, local departments, state and federal agencies that support activities in the county, and neighboring communities and local partners.

2.1 PDM PLANNING TEAM

The Lewis and Clark County DES Coordinator requested that local leaders volunteer for the Planning Team to assist with update of the PDM Plan. These individuals are listed in **Appendix B**. The organization and affiliation of PDM Planning Team members are presented in **Table 2.1-1.**

TABLE 2.1-1
AGENCIES REPRESENTED ON THE PDM PLANNING TEAM

Cascade County Disaster and Emergency Services	Malmstrom Air Force Base
Cascade County Planning	Mayor of Belt
Cascade County Sheriffs Office/Fire Warden	Mayor of Cascade
City of Great Falls Emergency Preparedness Officer	Mayor of Neihart
City of Great Falls Planning	Montana Air National Guard
City of Great Falls Public Works	Montana State University-Great Falls
Dearborn Volunteer Fire Department	West Great Falls Flood Control & Drainage District

Responsibilities of the Planning Team included attending meetings and conference calls to discuss plan development, providing data for analysis in the risk assessment, attending public meetings, providing input and feedback on mitigation strategies, review of the draft plan document, and supporting the plan throughout the adoption process. The Planning Team will assist the Cascade County DES Coordinator in updating the plan in the future.

Conference calls were held with the Planning Team while the plan was being drafted. In advance of each meeting, an agenda and/or materials to be discussed (i.e. example mitigation strategies, examples of project eligible for FEMA funding, etc.) were sent to meeting participants. Conference call minutes are presented in **Appendix B**.

2.2 PROJECT STAKEHOLDERS

The planning process was initiated by preparing a stakeholders list of individuals whose input was needed to help prepare the PDM Plan. Planning partners on the stakeholders list received a variety of information during the planning process, including meeting notices, documents for review, and the draft mitigation strategy. **Appendix B** presents the stakeholders list for this project.

On the County level, project stakeholders included representatives from the following departments: County Commission, Risk/Safety Management, Planning, Law Enforcement, Disaster and Emergency Services, GIS, Health, Road and Bridge, Public Works, and 9-1-1 Dispatch. Individuals from these departments provided data for the plan, attended public meetings and/or reviewed the draft PDM Plan.

Stakeholders from the City of Great Falls included the Mayor, City Commission, and Floodplain Administrator, as well as representatives from the following departments: Planning, Police, Emergency Services, GIS, Health, Fire/Rescue, and Public Works. Individuals from these departments provided data for the plan, attended public meetings and/or reviewed the draft PDM Plan.

Stakeholders from the incorporated communities included: Mayors and town clerks. These individuals provided data for the plan, attended public meetings and/or reviewed the draft PDM Plan.

Stakeholders from federal agencies included representatives from: the National Weather Service (NWS), and Malmstrom Air Force Base. Representatives from these agencies attended one or more of the public meetings and/or offered guidance and support specific to their areas of expertise for development of the PDM Plan.

Stakeholders from state agencies included representatives from: Dept. of Transportation, Highway Patrol, and Air National Guard. Representatives from these agencies attended one or more of the public meetings and reviewed the draft PDM Plan.

Other entities invited to participate in the planning process included the West Great Falls Flood Control and Drainage District, several volunteer fire departments, and the public school and university system. Individuals from these entities attended the public meetings and reviewed the draft PDM Plan.

Non-governmental stakeholders including non-profits and other businesses in the community included: Montana Refining Company, Conoco-Phillips/Yellowstone Pipe Line Company, Great Falls Amateur Radio Club, Salvation Army, Community Emergency Response Team representatives, and the American Red Cross. Most non-governmental stakeholders did not offer input on development of the PDM Plan.

Planning partners from adjoining towns and counties included: Teton, Judith Basin, Meagher, Chouteau and Lewis and Clark County DES Coordinators and the DES District 2 Representative. These planning partners did not offer input on development of the Cascade County PDM Plan.

2.3 REVIEW OF EXISTING PLANS AND STUDIES

At the initiation of the PDM Plan project, planning documents and studies completed for the project area were provided to the contractor to review in order to determine how mitigation could be integrated into this planning process and future local planning mechanisms and programs. Contributing Plans/Ordinances reviewed by the contractor included:

DAMS

- Emergency Action Plan, Black Eagle Dam (Cascade County)
- Emergency Action Plan, Rainbow Dam (Cascade County)
- Emergency Action Plan, Ryan Dam (Cascade County)
- Emergency Action Plan, Cochrane Dam (Cascade County)
- Emergency Action Plan, Morony Dam (Cascade County)
- Emergency Action Plan. Holter Dam (Lewis & Clark County)
- Emergency Action Plan, Hauser Dam (Lewis & Clark County)
- Emergency Action Plan, Canyon Ferry Dam (Lewis & Clark County)
- Emergency Action Plan, Gibson Dam (Lewis & Clark County)
- Emergency Action Plan, Pishkun Dikes (Teton County)
- Emergency Action Plan, Willow Creek Dam (Lewis & Clark County)

EMERGENCY OPERATIONS

- Emergency Operations Plan (draft), 2011
    - Hazard Identification Annex: Earthquake
    - Hazard Identification Annex: Hazardous Material Incidents
    - Hazard Identification Annex: Landslide
    - Hazard Identification Annex: Transportation
    - Hazard Identification Annex: Weather Emergencies

LAND USE

- Cascade County Floodplain Ordinance, 2002
- Cascade County Growth Policy, 2006
- City of Great Falls Growth Policy, 2005
- Missouri River Urban Corridor Plan, 2004
- City of Great Falls Land Development Code
- Cascade County Subdivision Regulations, 2007
- Cascade County Zoning Ordinance, 2009
- City of Great Falls Zoning Ordinance

MITIGATION

- Teton County All-Hazard Mitigation Plan (2005)
- Lewis and Clark Pre-Disaster Mitigation Plan (2005)
- Cascade County Community Wildfire Protection Plan, 2008

TRANSPORTATION

- Great Falls Urban Area Transportation Plan, 2000-2020

Data obtained from the plans and regulation review was incorporated into various sections of the PDM Plan. *Section 4.0* contains reference to the plans and ordinances affecting management of the hazard. *Section 7.3* includes a discussion on how mitigation can be implemented through existing programs.

2.4 PROJECT WEBSITE

A website was setup at the start of the project to provide information to project stakeholders and to facilitate the planning effort by hosting figures and documents for review. The project website can be viewed at: www.cascadepdm.com. The website remained active during the course of the project through adoption of the plan.

The website contained a home page and pages for project contacts, planning team, meetings, plan documents, reference materials, and project stakeholders. The Home page contained a letter inviting participation in development of the plan. The Contacts page contained information on Tetra Tech personnel involved in management of the project. The Planning Team page contained maps for the planning team to review prior to conference calls. The Meetings page contained the public meeting schedule, notes from the public meetings and presentations, and the planning team conference call schedule, agendas and meeting notes. The Plan page contained sections from the draft plan for stakeholder review. The Reference Material page contained FEMA guidance on preparing multi-jurisdictional hazard mitigation plans, the FEMA Region 8 Crosswalk, and links to the State of Montana Hazard Mitigation Plan and Statewide Hazard Assessment, Montana DES and FEMA websites. The Stakeholders page contained contact information for the planning team and a list of the project stakeholders. Each page of the website had a comment field where viewers could log in their comments or questions.

2.5 PROJECT MEETINGS

Two public meetings were conducted during plan development: a project kick-off meeting where hazards were identified and a meeting to present the draft results of the risk assessment. Sign-in sheets, presentation materials and meeting notes are contained in **Appendix B** and posted on the project website.

A project kick-off meeting was held on January 6, 2010 in Great Falls at the Cascade County DES office. The meeting was advertised in the Great Falls Tribune on January 5th and 6th, 2010 and on the project website. A meeting notice was also sent via e-mail to all project stakeholders. Tetra Tech made a presentation at the meeting outlining the background and rationale for completing a PDM Plan, the process and methodology for plan development, and the project schedule. Meeting participants reviewed an extensive list of hazards and the *Calculated Priority Risk Index* to determine which hazards

should be profiled in the plan (see *Section 4.1* for additional details). The PDM Planning Team was established from a group of department and agency representatives and/or mayors of the incorporated communities who were present at the meeting. Approximately 40 individuals participated in the meeting.

Public meetings were held to review the draft plan on June 22 and 23, 2011. Three meetings were held; an evening meeting at the Belt School on June 22nd, a morning meeting in Great Falls on June 23, and an afternoon meeting in Fort Shaw on June 23rd. Notice of the meeting was sent to the project stakeholders list, advertised in the June 21, 2011 edition of the Great Falls Tribune and listed on the project website. Tetra Tech presented preliminary results of the risk assessment at the meeting as well as the draft mitigation strategy. The draft risk assessment and mitigation strategy were reviewed at the meeting and additional mitigation measures were identified that could reduce property loss and human suffering. Approximately 40 individuals attended the public meeting including representatives from a variety of county and city/town departments, the school system, local businesses, non-profit agencies, and the general public. Agencies in attendance included the National Weather Service, Montana Department of Transportation, and the Montana Air National Guard. Also in attendance were representatives from the U.S. Senators Baucus and Tester offices. Most attendees networked before and after the meeting, listened to the presentation and some asked questions.

2.6 PLAN REVIEW

The planning process for the PDM Plan began on December 14, 2010 and lasted approximately nine months. The public was provided at least two opportunities for comment prior to adoption of the plan. The first opportunity was during the drafting process. An advertisement was run in the local newspaper on August 5, 2011 notifying the public of the availability of the draft PDM Plan and that review copies were available in hard copy, electronically on compact disk (CD) upon request, or accessible via the project website. A hard copy of the PDM Plan was available for review at the County Commissioner's office in Great Falls. An e-mail announcement was sent to the project stakeholders list on announcing the availability of the draft PDM Plan for review with instructions on how to comment. CDs of the draft Plan were provided upon request.

The draft document was produced with line numbers to aid in the review process. Reviewers were asked to submit their comments on the draft plan to the DES office or via the project website after a 30-day review period. The DES Coordinator reviewed the comments and in consultation with the Planning Team submitted a consolidated list of comments to the contractor. Comments were incorporated into a final draft document and the PDM Plan was submitted to the State Hazard Mitigation Officer (SHMO) and FEMA for compliance with the Region 8 Crosswalk.

Comments received from the SHMO and FEMA were addressed and the final plan was produced and posted to the project website. At this point a second opportunity was provided to the public to

comment on the PDM Plan. The final plan was posted on the project website and stakeholders were notified of its availability via an e-mail message and press release in the local newspaper. Final comments were addressed in a second plan revision and the final plan was posted on the project website and provided to the Cascade County Commissioners and the incorporated communities of Great Falls, Belt, Cascade and Neihart for adoption. After adoption, final copies of the plan were submitted to the SHMO and FEMA.

Future comments on the PDM Plan should be addressed to:

Cascade County Disaster and Emergency Services
521 1st Ave NW
Great Falls, Montana 59404
406-454-6900

3.0 COMMUNITY PROFILE

This section of the PDM Plan presents an overview of Cascade County, the City of Great Falls, and the towns of Belt, Cascade and Neihart. It provides baseline information on the characteristics of the county, the towns, their citizens, economy and land use patterns, and presents the backdrop for this mitigation planning process.

3.1 PHYSICAL SETTING

Cascade County is located in north-central Montana, east of the continental divide, in the transitional area between the Great Plains and Rocky Mountains and covers 2,698 square miles (**Figure 1A**). The county has five distinct watersheds: the Missouri River, the Smith River, the Sun River, the Dearborn River, and Belt Creek. Great Falls is largely situated in a valley at the confluence of the Sun and Missouri Rivers upstream of the waterfalls that gave the city its name. The majority of the terrain is relatively flat and elevations range from 8,621 feet in the Highwood Mountains to 2,700 where the Missouri River exits the County. The County is bordered on the west by the Rocky Mountains, to the southeast by the Little Belt and the Highwood Mountains, and by the Hi-line area to the north. Most lands in the county are used for agriculture.

Landownership in Cascade County is 81.7 percent private, 12.4 percent federal, and 5.2 percent state. Federally owned land is administered by the U.S. Forest Service (178,412 acres), Bureau of Land Management (24,627 acres), U.S. Fish and Wildlife Service (7,148 acres) and Bureau of Reclamation (1,361 acres). Population density in Cascade County is 30.1 persons per square mile. Great Falls, the third largest city in Montana has a population density of 2,909 persons per square mile. **Figure 1B** presents landownership and population density in Cascade County.

3.2 CLIMATE

Cascade County has a moderate, seasonal climate. The average daily high temperature is between 75 and 85 degrees in the summer and between 20 and 40 degrees in the winter. The average daily low temperature in Cascade County is between 40 and 55 in the summer season and between 10 and 25 in the winter. Cascade County averages between 10 to 16 inches of rain per year with the vast majority of the precipitation occurring from April to September. The highest rainfall occurs in the Highwood Mountains and averages 29 inches a year. Cascade County is considered to have a semi-arid climate.

Winters in Cascade County are typically not as cold as might be expected given the area's northern latitude. This is largely due to its location on the leeward side of the Rocky Mountains and the warm Chinook winds that frequently occur. Periods of below-zero temperatures are common each winter but they seldom last for more than a few days. January tends to be the coldest month with an average low

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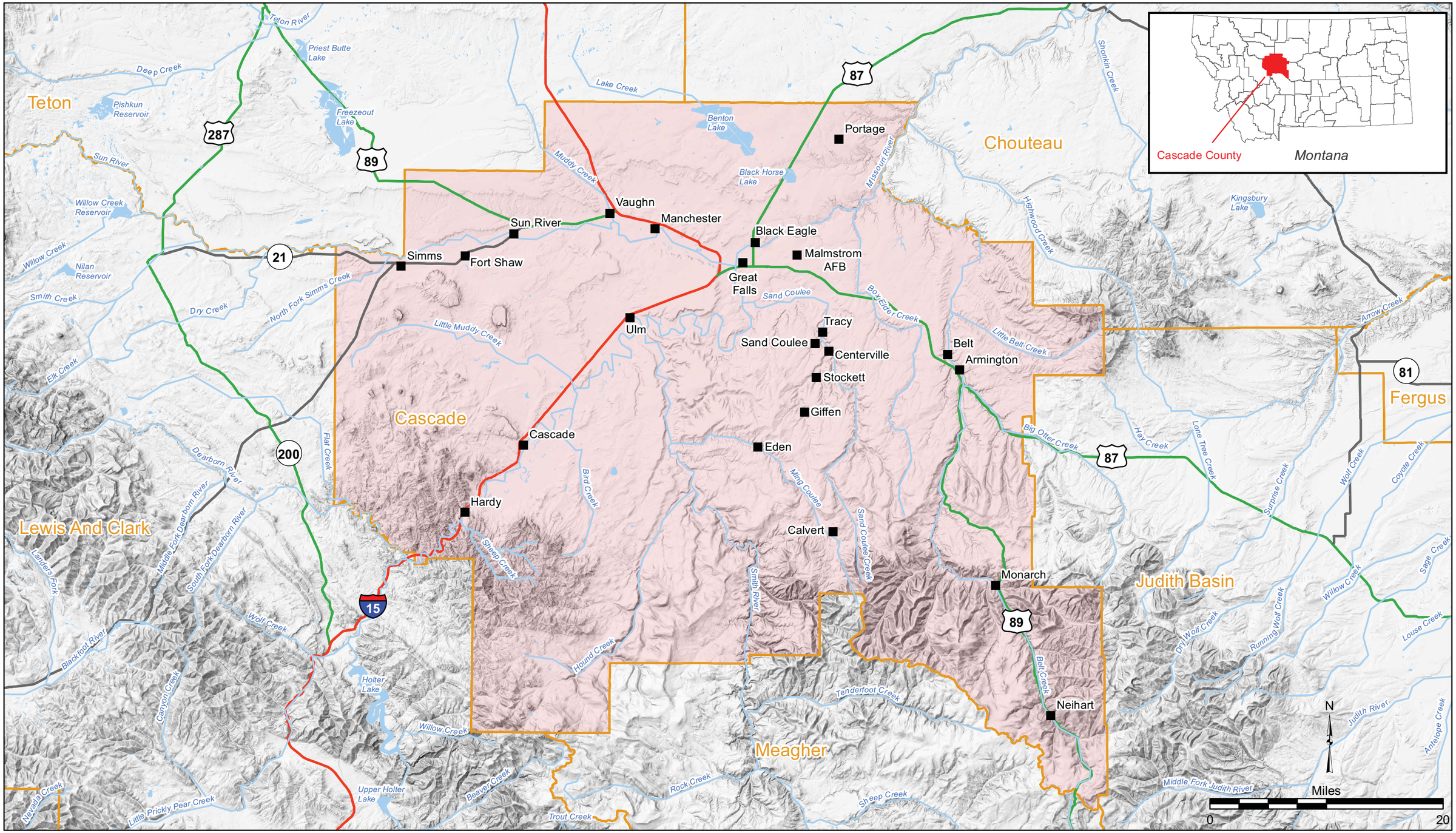

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Figure 1A

Location Map

Cascade County, Montana

Pre-Disaster Mitigation Plan

■ Place Names

River/Stream

Lake/Reservoir

County Boundary

Interstate

U.S. Highway

Montana Highway

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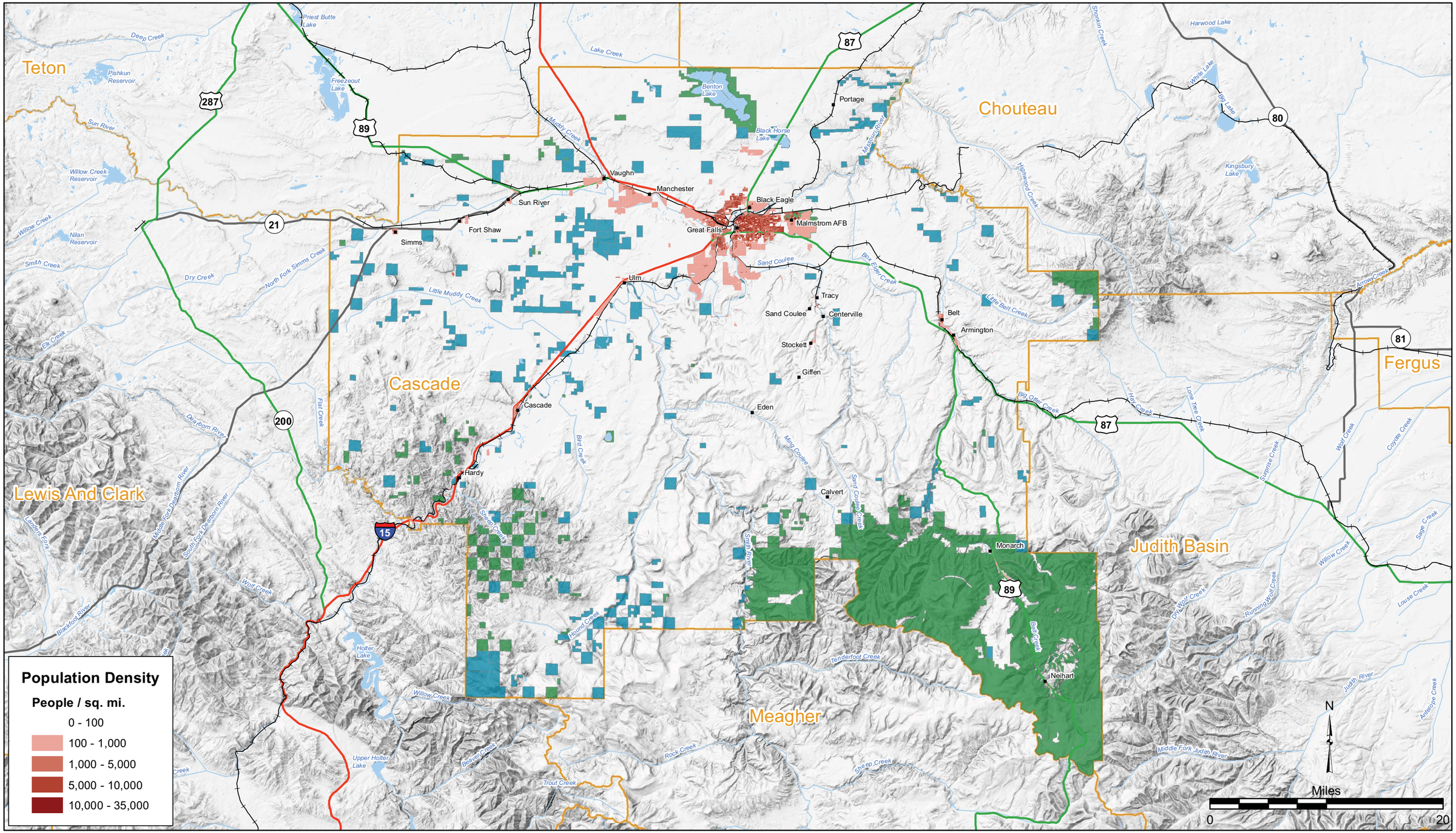


Land Use
- State
- Federal
- Private

- Place Names
- County Boundary
- River/Stream
- Lake/Reservoir
- Interstate
- U.S. Highway
- Montana Highway
- Rail

May 2011

Figure 1B

Land Use & Population Density

Cascade County, Montana

Pre-Disaster Mitigation Plan

temperature of 12.5 degrees F. Snowfall averages about 63 inches per year in the region with the Showdown Ski Resort receiving approximately 200 inches of snow a year.

An important element of the climate in Cascade County is the wind. Cascade County lies within the Chinook zone, which is associated with 160 mph wind speeds. Chinook winds during the winter and early spring can lead to significant snow melt and flooding of small streams and rivers. Average wind speeds range from 10 to 15 mph depending on the exposure of the location. The average and peak sustained winds tend to be stronger over higher, more exposed terrain and areas below steep canyons. The high wind gusts often occur with thunderstorms during the summer, with gusts over 60 mph occurring every year. The highest sustained winds tend to occur in the spring and fall, when long-lasting Chinook events are most likely to occur.

3.3 CRITICAL FACILITITES AND INFRASTRUCTURE

Critical facilities are of particular concern because they provide essential products and services that are necessary to preserve the welfare and quality of life and fulfill important public safety, emergency response, and/or disaster recovery functions. Critical facilities include: 911 emergency call centers, emergency operations centers, police and fire stations, public works facilities, sewer and water facilities, hospitals and shelters; and facilities that, if damaged, could cause serious secondary impacts (i.e., hazardous material facilities). Critical facilities also include those facilities that are vital to the continued delivery of community services or have large vulnerable populations. These facilities may include buildings such as the jail, law enforcement center, public services buildings, senior centers, community corrections center, the courthouse, and juvenile services building and other public facilities such as hospitals, nursing homes and schools.

Critical facilities in Cascade County are identified in **Appendix C.** The size and replacement value were collected where readily available; however, time and resource constraints prohibited the collection of values for all structures. A GIS layer of the critical facilities was used in the hazard risk assessment. This GIS layer should be updated on a regular basis for use in future analysis. Further details on Cascade County's critical facilities and infrastructure are presented below.

Water and Wastewater Services

Municipal water systems serve the City of Great Falls, Belt, Neihart, Cascade and Ulm. The Missouri River is Great Falls' source of potable water. The municipal water system consists of the water plant, about 268 miles of distribution mains, seven pump stations, and seven storage tanks. The City of Great Falls provides water in some areas even though the properties are not within the city limits. The largest of these areas are Malmstrom Air Force Base and the Black Eagle Water District. Most of the residents and businesses in unincorporated Cascade County rely on groundwater for their needs because they are not connected to any central system.

The City of Great Falls operates a sanitary sewer system that serves most of the residents and businesses in the city limits and consists of 211 miles of collector and transmission mains, 2,600 manholes, 24 lift stations, and the wastewater treatment plant located on the Missouri River (Great Falls Growth Policy). Other than the City of Great Falls, there are only six community sewer systems in Cascade County. These are in the communities of Simms, Belt, Cascade, Sun Prairie, Vaughn and Stockett. All other communities use separate systems which discharge effluent directly into the ground.

The Great Falls Public Works Department operates a storm drain utility and maintains about 100 miles of public storm drains, over 3,700 manholes or inlets, and seven detention basins. The natural and man-made drainage facilities in the area have been designed to accommodate most storm conditions (Great Falls Growth Policy).

Utilities

A series of five hydroelectric dams have been constructed on the falls of the Missouri River within Cascade County providing electricity to the power grid. NorthWestern Energy and the Sun River Electric Cooperative provide electrical power to the county. In the Great Falls area, Energy West provides natural gas services. Propane tanks are located throughout Cascade County at ranch and home sites.

Emergency Services

Emergency services within Cascade County include fire protection, emergency medical services including ambulance transportation, law enforcement, and emergency preparedness.

There is a mixture of fire protection organizations providing fire services to Cascade County. These include Great Falls Fire/Rescue, Belt City Fire District (FD), and Neihart FD; Belt Rural Fire District (RFD); Fort Shaw Fire Service Area (FSA), Vaughn FSA, Black Eagle FSA, Cascade FSA, Gore Hill FSA, Monarch FSA, Sand Coulee FSA, Stockett FSA, Sun River FSA, Ulm FSA, Simms FSA, Dearborn FSA, Cascade Farmer/Rancher FSA; Montana Department of Natural Resources and Conservation (DNRC); Lewis and Clark National Forest; and Bureau of Land Management. The Montana Air National Guard has a fire department located at the Great Falls International Airport and the Malmstrom Air Force Base has a fire department located at the Air Force Base in Great Falls.

The Cascade County Sheriff's Department provides law enforcement and evacuation services in the County. The City of Great Falls Police Department and the City of Belt Police department provide those services in their jurisdictional areas. Great Falls Emergency Services and Belt Ambulance provide ambulance service to the entire county.

County emergency preparedness comes under the office of the Cascade County Disaster and Emergency Services. Cascade County Disaster Emergency Services has mutual aid agreements with surrounding counties and these have recently been updated.

3.4 POPULATION TRENDS

As of the 2010 census, Cascade County is Montana's fifth most populous county, with 81,327 residents. Great Falls, the county seat, is the state's third largest city, with a population of 60,091 individuals. Great Falls accounts for 73.9 percent of Cascade County's total population.

Cascade County has experienced moderate growth rate in recent years. The percentage of the population classified as "rural" is decreasing, as is the actual number of residents. Some areas of the county, specifically the area south of the City of Great Falls, south of the town of Cascade and U.S. 89 from Manchester to Simms, are feeling development pressures, as people are moving out of Great Falls (Cascade Growth Policy). **Table 3.4-1** illustrates the change in population Cascade County compared to the United States and State of Montana.

TABLE 3.4-1
COUNTY, STATE AND NATIONAL POPULATION TRENDS

Year	Cascade County Population	% change from previous census	State of Montana Population	% change from previous census	United States Population	% change from previous census
2010	81,327	1.2%	989,415	9.12%	308,745,538	9%
2000	80,357	3.4%	902,190	11%	281,424,602	12%
1990	77,691	−3.7%	799,065	2%	248,709,873	9%
1980	80,696	−1.4%	786,690	12%	226,542,199	10%
1970	81,804	11.4%	694,409	3%	203,302,031	12%

Source: Montana Census and Economic Information Center, 2010

The Cascade County Growth Policy reports the following population trends:

- Rural farm populations will continue to decrease. This will be due mostly to a continuing consolidation of farms.
- Rural non-farm population will increase due partially to the availability of rural residential lots. The population and influence of the City of Great Falls will result in even greater development pressures on the rural portions of the County.
- The Montana State Department of Commerce estimates Cascade County's population to increase to 82,239 by 2025.
- The population has gotten older. The median age in 2000 is 36.7 years, up from 32.7 years in 1990.
- The largest age category is 40 to 44 years old (6,450 people or 8.0% of the total).
- The age group that has grown the fastest, as a share of total, is 45 to 49 years, up 1,468 people. Their share of the total rose by 1.6%.

When comparing growth in Great Falls and Montana between the 1900s and 1970s, the City grew faster than the rest of the state. Industries and the development of Malmstrom Air Force Base attracted people to Great Falls while other areas grew more slowly. Since 1970, however, this trend has reversed.

The closing of the ARCO Refinery in 1980 and resulting reductions in other activities lead to population losses in the 1980s that have not yet been offset by the growth that occurred during the 1990s and 2000s. While some of the larger cities in Montana have had rapid population increases during the past decade, Great Falls has seen more stable growth of between 0.5 and 1.0 percent per year (City of Great Falls Growth Policy).

Table 3.4-2 presents population statistics for the City of Great Falls and the other incorporated communities in Cascade County as well as the Census Designated Places (CDP).

TABLE 3.4-2
CASCADE COUNTY POPULATION TRENDS – CITIES, TOWNS AND CENSUS DESIGNATED PLACES

City/Town or CDP	1970	1980	% Change Since Last Census	1990	% Change Since Last Census	2000	% Change Since Last Census	2010	% Change Since Last Census
Belt	656	825	20.5%	571	-44.5%	633	9.8%	597	-6.0%
Black Eagle CDP	--	--	--	--	--	914	--	904	-1.1%
Cascade	714	773	7.6%	729	-6.0%	819	11%	685	-19.6%
Fort Shaw CDP	--	--	--	--	--	274	--	280	2.1%
Gibson Flats CDP	--	--	--	--	--	--	--	199	--
Great Falls	60,091	56,884	-5.6%	55,125	-3.2%	56,690	2.7%	58,505	3.1%
Malmstrom AFB CDP	--	--	--	5,938	--	4,544	-30.7%	3,472	-30.9%
Neihart	109	91	-19.8%	53	-71.7%	91	41.8%	51	-78.4%
Sand Coulee CDP	--	--	--	--	--	--	--	212	--
Simms CDP	--	--	--	--	--	373	--	354	-5.4%
Stockett CDP	--	--	--	--	--	--	--	169	--
Sun Prairie CDP	--	--	--	1,424	--	1,772	19.6%	1,630	-8.7%
Sun River CDP	--	--	--	--	--	131	--	124	-5.6%
Ulm CDP	--	--	--	--	--	750	--	738	-1.6%
Vaughn CDP	--	--	--	--	--	701	--	658	-6.5%

Notes: CDP = Census Designated Place; AFB = Air Force Base; -- = data not available; Changes in Place population between years may be due to population growth or decline, due to significant boundary changes, or a combination of factors.
Source: U.S. Census Bureau, 2011

3.5 HOUSING STOCK

Housing data from the 2010 census was not available at the time of this writing. The U.S. Census estimates that in 2000, Cascade County had 36,526 housing units. The median value of the occupied housing units was $92,500. Additionally, there were 2,577 private, non-farm establishments and 6,732 non-employer establishments (2007 data). A further breakdown of the housing units from the 2000 census is presented in **Table 3.5-1.** This housing table will be updated when data from the 2010 census is available.

TABLE 3.5-1 2000 U.S. CENSUS HOUSING DATA; CASCADE COUNTY					
Topic	Cascade County	City of Great Falls	Town of Belt	Town of Cascade	Town of Neihart
Number of Occupied Housing Units	36,526	23,834	273	323	44
Median Value of Housing Units	$92,500	$92,000	$60,500	$84,400	$106,300
Year Structure Built					
1999 to March 2000	609	309	-	3	1
1995 to 1998	1,653	989	3	8	11
1990 to 1994	1,152	572	5	14	-
1980 to 1989	2,897	1,661	26	28	10
1970 to 1979	6,600	4,187	65	69	15
1960 to 1969	6,443	4,984	42	50	33
1940 to 1959	9,280	7,501	43	84	45
1939 or earlier	6,591	5,050	115	106	31
Census Estimated Value	$3,378,655,000	$2,192,728,000	$16,516,500	$27,261,200	$4,677,200

The housing stock in Great Falls and Cascade County, including all occupied or vacant but habitable housing units, has experienced some sizable changes in recent decades. From 1970 to 1990, the number of units in the city increased by 16.4 percent while the county's housing stock grew by 21.7 percent during this same period. Included in the county's housing stock numbers are 1,406 units located at Malmstrom Air Force Base. Coupled with the lack of population growth, this change shows a trend in the way people have chosen to live, as fewer people are now living in each housing unit.

3.6 ECONOMY AND SOCIOECONOMICS

The economy of Great Falls and Cascade County is tied closely to two primary economic sectors: military spending and agricultural production. By their very nature, these two sectors produce a kind of "up and down" economy. The local economy relies heavily on agricultural production and serves a large agricultural trade area for retailing and wholesaling, as well as providing trade, health, and financial services. The other facet, military spending, has fluctuated widely in recent years with the modernization of the missile site facilities by Boeing Inc. (Cascade County Growth Policy).

It is estimated that Malmstrom Air Force Base provided 52 percent of the governmental jobs in Cascade County in 2008 by employing 3,686 military personnel and 2,014 civilians, including contractors in 2008 (MT Dept Labor, 2010). **Table 3.6.1** presents the top private employers in Cascade County in 2009 as well as other economic indicators.

TABLE 3.6-1 ECONOMIC & SOCIOECONOMIC DATA; CASCADE COUNTY		
Indicator	**Cascade County**	**State of Montana**
Median household income (2008 data)	$42,528	$43,948
Persons below poverty level (2008 data)	13.6%	14.1%
Total number of companies/firms (2002 data)	6,732	100,402
Top private employers in Cascade County (excluding railroad and government) (2009 data)	Benefis Hospital, Great Falls Clinic, National Electronics Warranty, Wal-Mart, Easter Seals-Goodwill, Albertsons, Benefis Healthcare, Centene Corp., Center for Mental Health, DA Davidson Co., Great Falls Tribune, Heritage Inn, Meadow Gold Dairy, Missouri River Manor, North Central Independent Living, Park Place Health Care Center, Quality Life Concepts, Sam's Club, Sletten Construction, University of Great Falls	

The Montana Department of Labor and Industry estimates that unemployment in Cascade County was 4.9 percent in 2008 while the per capita income was $36,403. The U.S. Census Bureau estimates that 13.6 percent of the County population was living below the poverty level in 2008.

3.7 LAND USE AND FUTURE DEVELOPMENT

The majority of land use in Cascade County is agricultural. Industrial, commercial and residential land use is managed with zoning ordinances and subdivision regulations, in accordance with guidelines set forth in the Cascade County and City of Great Falls growth policies.

Growth Policies

Cascade County and the City of Great Falls use growth policies to guide decisions about land use. These documents analyze and summarize community-wide issues and trends in order to recommend broad goals, objectives, and policies to manage long-range growth. One goal in the Cascade County Growth Policy is to "*protect and maintain the county's rural character and encourage efficient use of land*". It is recommended that this be achieved through the use of the subdivision review process and development of setbacks from perennial streams. The City of Great Falls' Growth Policy recommends that development standards be implemented for the "*protection of citizens from natural and man-made environmental hazards*". The only action item resembling mitigation to achieve this goal is for a "*system of drainage ways to be built and maintained to effectively manage stormwater*".

At their next revision, the County and City growth policies should be updated to provide guidance and assess regulation of new development in areas that are vulnerable to hazards or ensure that development occurs in a manner so that risk is minimized and that mitigation options are considered in future land use decisions. *Section 5.0* of this plan presents the mitigation strategy adopted by Cascade County, City of Great Falls, and incorporated towns of Belt, Cascade and Neihart which should be integrated into the next revision of these growth policies.

Subdivision Regulations

Cascade County and the City of Great Falls control development through the use of subdivision regulations. The county's subdivision regulations state that all subdivisions must be designed so that potentially significant adverse impacts to public health and safety have been avoided or reasonably minimized. Among other things, public health and safety is defined as: flooding, fire or wildfire hazards, rock falls or landslides, unstable soils, steep slopes, and other natural hazards; and air or vehicular traffic safety hazards.

Zoning Ordinances

Zoning ordinances can be a useful tool to regulate land use. According to the City of Great Falls' Growth Policy, zoning ordinances for the City are outdated. They represent a rigid, broad-brush approach to development (i.e. heights and setbacks, parking requirements, permitted uses), and lack the sensitivity and flexibility to consistently protect the scale and character of distinctly different parts of the community. A future revision of the City's zoning ordinance should consider development guidelines that take into account natural and man-made hazards.

Building Codes

Building codes are also a tool to control future development. The main purpose of building codes are to protect public health, safety and general welfare as they relate to the construction and occupancy of buildings and structures. They comprise s a set of rules that specify the minimum acceptable level of safety for buildings and often contain requirements for snow and wind loads and seismic risk. Building codes are generally intended to be applied by architects and engineers, but are also used by building inspectors. Building codes are in effect in the City of Great Falls

Future Development

According the Cascade County Growth Policy, most of the new housing built in the county during the next 20 years will require the subdivision of previously vacant or agricultural land. Most of this land is near but not incorporated into the City of Great Falls. The City of Great Falls has the potential to expand on several fronts. Residential growth is occurring in the southwest corner of the City (south and west of Grande Vista Park). This area has the land and infrastructure capacity to provide approximately 200 additional lots as development proceeds southward over time to 45th Avenue Southwest. Residential growth is also occurring in southeast Great Falls with the Berkner Heights and Whispering Ridge filings. To the north, growth is taking place with additional filings of Skyline Heights and Skyline Park Addition. Great Falls' current pace has been 80 to 100 single-family homes per year. (City of Great Falls Growth Policy)

Land for continued industrial growth is generally available in the northeast corner of the urban area in and near North Park Addition and east of Source Giant Springs. Additional industrial development is also occurring near the Malt Plant north of the city. Vacant land south of MSU-Great Falls is considered a logical and productive site for an upscale business/research park. (City of Great Falls Growth Policy)

4.0 RISK ASSESSMENT AND VULNERABILITY ANALYSIS

Cascade County is exposed to many hazards both natural and man-made. A risk assessment and vulnerability analysis was completed to help identify where mitigation measures could reduce loss of life or damage to property in the county.

This section includes a description of the risk assessment methodology and a hazard profile for eight (8) hazards organized from high to low by county priority: wildfire, structure fire, severe summer weather, hazardous material incidents, transportation accidents, severe winter weather, flooding and levee failure, and dam failure. The section is concluded with a risk assessment summary and discussion on the location of future development projects. Supporting documentation is presented in **Appendix C**.

4.1 RISK ASSESSMENT METHODOLOGY

A risk assessment was conducted to address requirements of the DMA 2000 for evaluating the risk to Cascade County from natural hazards. DMA 2000 requires measuring potential losses to critical facilities and property by assessing the vulnerability of these facilities to natural hazards. In addition to the requirements of DMA 2000, the risk assessment approach taken in this study evaluated risks to vulnerable populations and also examined the risk presented by several man-made hazards. The goal of the risk assessment process is to determine which hazards present the greatest risk and what areas are the most vulnerable to hazards.

The risk assessment approach used for this PDM Plan entailed using GIS software and data to develop vulnerability models for people, structures, critical facilities, and evaluating those vulnerabilities in relation to hazard profiles that model where hazards exist. This type of approach to risk assessment is dependent on the detail and accuracy of the data used during the analysis. Additionally, some types of hazards are extremely difficult to model. Data limitations are described in *Section 4.1.7*.

4.1.1 Critical Facilities and Building Stock

Critical facilities were mapped using data provided by Cascade County and City of Great Falls GIS Departments. Mapping of these facilities allowed for the comparison of their location to the hazard areas where such hazards are spatially recognized. Construction type of critical facilities (e.g. steel, wood, masonry, etc.) has not been compiled and was therefore, not considered in the analysis. This data should be collected for future updates of this Plan.

Infrastructure, including water, wastewater, and communication facilities had digital mapping available and were therefore included in the analysis. Replacement values of critical facilities, as available from the jurisdiction's insurance companies, were used in the risk assessment (**Appendix C**). The location of inter-continental ballistic (ICB) missile sites and bridges around Cascade County were included on the

maps but not factored into the analysis due to a lack of replacement values. Bridge data for Cascade County, obtained from the Montana Natural Resource Information System (NRIS), is presented in **Figures 2A and 2B**.

Building stock data was obtained from the Montana Department of Revenue's (MDOR) cadastral mapping program. This system spatially recognizes land parcels within the county with a distinction between residential and other properties. Appraised building values are available on the parcel level and were used to determine exposure. The "other" building type includes all properties not designated as residential and in this study and consists of commercial, agricultural and industrial properties. Data used for this analysis was from 2010.

Building exposure in the risk assessment is presented in accordance with distinct census reporting areas. Cascade County is located within seven census divisions (Belt, Cascade, Eden/Stockett, Great Falls, Great Falls North, Monarch/Neihart, and Sun River Valley). The County also has 11 census designated places (CDPs) (see **Table 3.5-2**) in addition to the four incorporated towns. A census-designated place is a concentration of population identified by the U.S. Census Bureau for statistical purposes. CDPs are populated areas that lack separate municipal government, but which otherwise physically resemble incorporated places. **Figure 3** presents the census reporting areas used in the risk assessment.

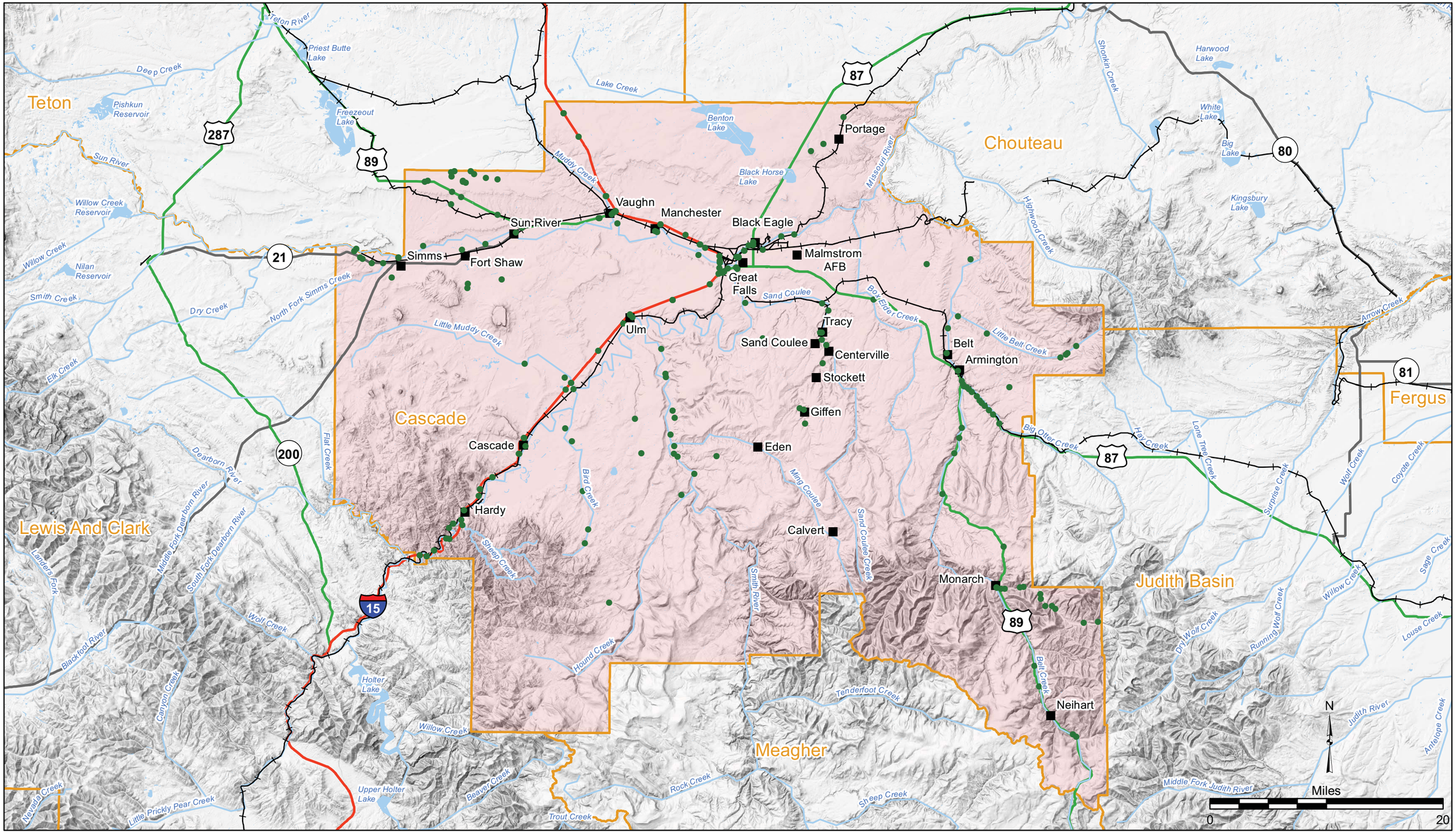
4.1.2 Vulnerable Population

Data from the 2010 census was used in the analysis to determine vulnerable populations at risk in the hazard areas, as available. Census data was downloaded from the U. S. Census Bureau's website. Downloaded data included total population (by census block) and number of individuals under the age of 18 for the incorporated communities, the county, CDPs, and census divisions. Data for populations over the age of 65 and individuals living below the poverty level were not yet available for Census 2010; therefore, this information should be included in the 2016 PDM Plan update.

4.1.3 Hazard Identification

Hazards were identified through several different means. A history of past events was gathered and possible future events were recognized through internet research, available GIS data, public meetings, subject matter experts, past disaster declarations, and examination of both the incomplete 2006 Cascade County PDM Plan and State of Montana Multi-Hazard Mitigation and Statewide Hazard Assessment. Hazards were reviewed with the project Planning Team to determine whether they constituted a threat to the county and should be profiled in the PDM Plan. Hazards identified as relevant for the PDM Plan included: wildfire, structure fire, severe summer weather, hazardous material incidents, transportation accidents, severe winter weather, flooding and levee failure, and dam failure.

G:\PDM\CascadeCo_Update2011\ArcMap\CascadeCo_Bridges_Fig2A.mxd



- Bridges
- Place Names
- River/Stream
- Lake/Reservoir
- County Boundary
- Interstate
- U.S. Highway
- Montana Highway
- Rail

May 2011

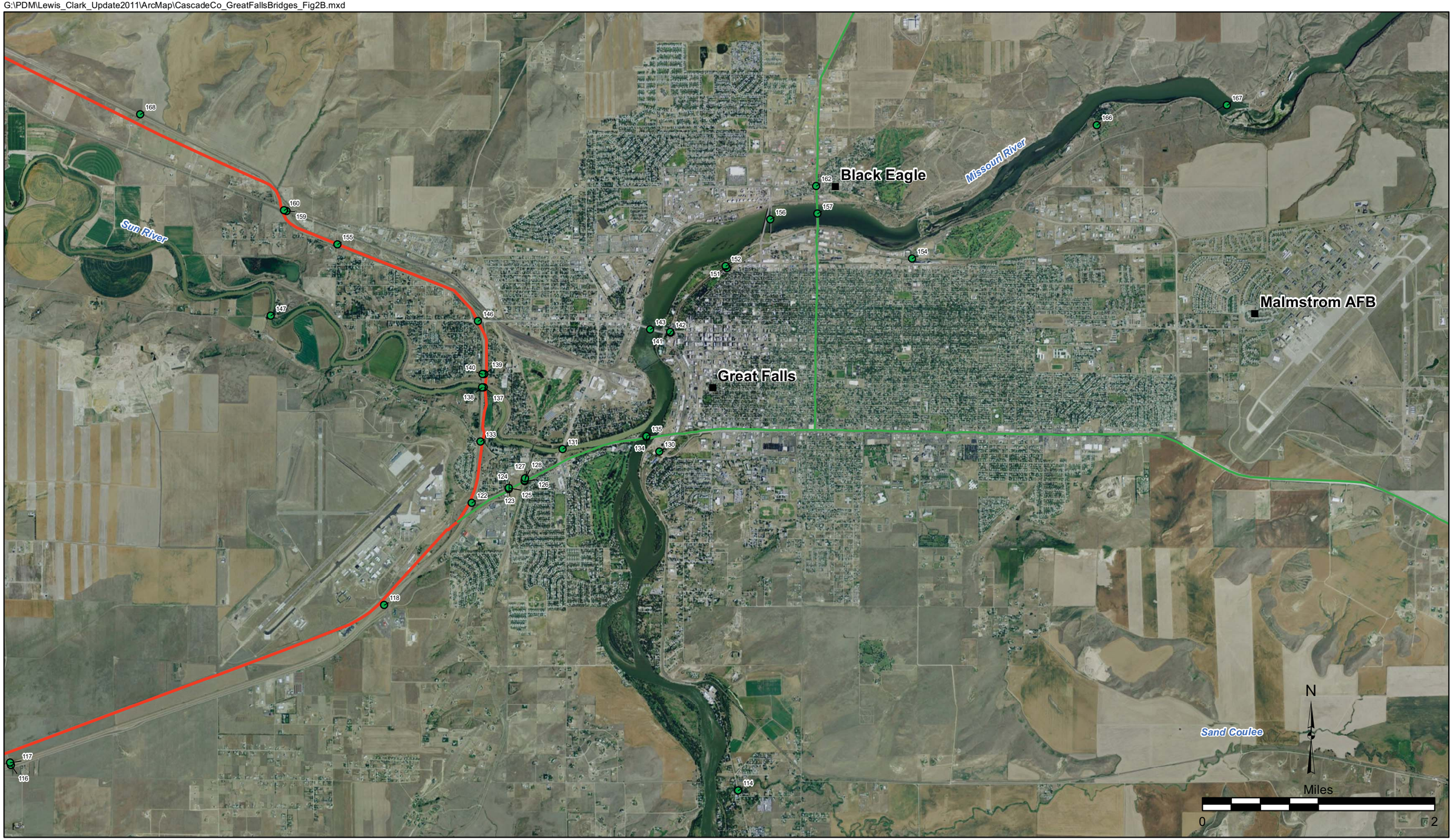
Figure 2A

Bridge Inventory

Cascade County, Montana

Pre-Disaster Mitigation Plan

G:\PDM\Lewis_Clark_Update2011\ArcMap\CascadeCo_GreatFallsBridges_Fig2B.mxd

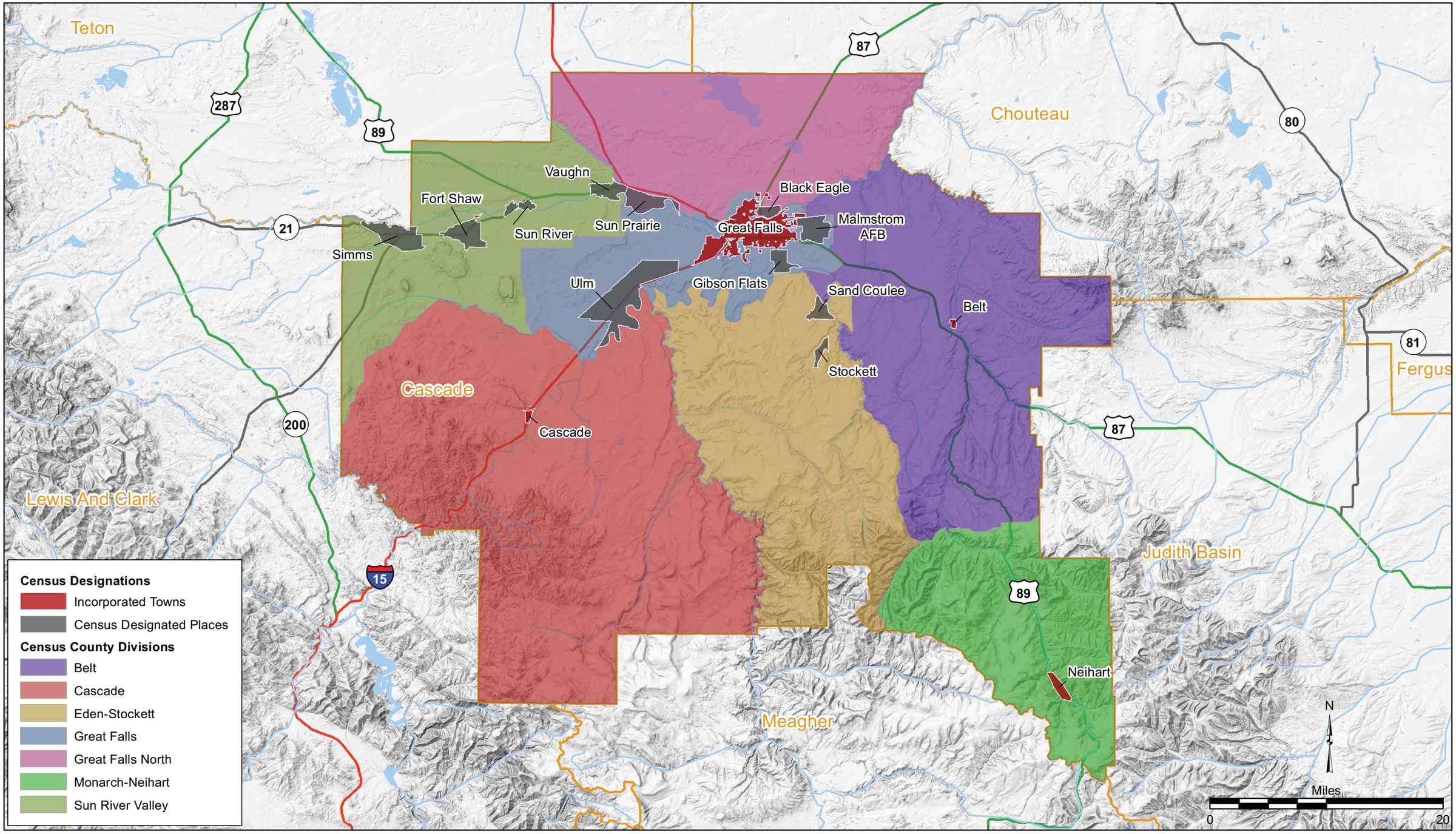


Bridges
City/Town
County Boundary
Interstate
U.S. Highway
Montana Highway

May 2011

Figure 2B
Great Falls Bridges
Cascade County, Montana
Pre-Disaster Mitigation Plan

G:\PDM\CascadeCo_Update2011\ArcMap\CascadeCo_Census_Fig3.mxd



River/Stream
Lake/Reservoir
County Boundary
Interstate
U.S. Highway
Montana Highway

May 2011

Figure 3
Census Divisions
Cascade County, Montana
Pre-Disaster Mitigation Plan

The hazards were ranked using the Calculated Priority Ranking Index (CPRI) presented in Table 4.1.1 (see *Section 4.1.5*).

4.1.4 Hazard Profiles

Hazard profiles were prepared for each of the identified hazards and are presented within this section according to their prioritized rank. The level of detail for each hazard is generally limited by the amount of data available.

Each hazard profile contains a description of the hazard and the history of occurrence, the vulnerability and area of impact, the probability and magnitude of future events, and an evaluation of how future development is being managed to reduce risk. The methodology used to analyze each of these topics is further described below.

Description and History

A number of databases were used to describe and compile the history of hazard events profiled in this plan. This data was supplemented by input from the public, local officials, newspaper accounts, and internet research. The two primary databases used included the National Climatic Data Center (NCDC) Storm Events Database and Spatial Hazard Events and Losses Database for the United States (SHELDUS).

The NCDC Storm Events database receives Storm Data from the National Weather Service (NWS). The NWS service receives their information from a variety of sources, including county, state and federal emergency management officials, local law enforcement officials, skywarn spotters, NWS damage surveys, newspaper clipping services, the insurance industry and the general public. Storm Data is an official publication of the National Oceanic and Atmospheric Administration (NOAA) which documents the occurrence of storms and other significant weather phenomena having sufficient intensity to cause loss of life, injuries, significant property damage, and/or disruption to commerce. The Great Falls office of the NWS was involved in the planning process for the PDM Plan and provided input to assist the Planning Team in hazard ranking.

SHELDUS is a county-level hazard data set for the United States for 18 different natural hazard events types. For each event the database includes the date, location, property losses, crop losses, injuries, and fatalities that affected each county. The database includes every loss causing and/or deadly event between 1960 through 1975 and from 1995 onward. Between 1976 and 1995, SHELDUS reflects only events that caused at least one fatality or more than $50,000 in property or crop damages.

Vulnerability and Area of Impact

Vulnerabilities are described in terms of exposure to critical facilities, structures, population, and socioeconomic values from the hazard. Hazard impact areas describe the geographic extent a hazard can impact a jurisdiction and are uniquely defined on a hazard-by-hazard basis. Mapping of the hazards, where spatial differences exist, allows for hazard analysis by geographic location. Some hazards can have varying levels of risk based on location. Other hazards cover larger geographic areas and affect the area uniformly.

Probability and Magnitude

Probability of future hazard events was assessed based on hazard frequency over a 100 year period. Hazard frequency was based on the number of times the hazard event occurred divided by the period of record. If the hazard lacked a definitive historical record, the probability was assessed qualitatively based on regional history and other contributing factors. Probability is described as follows:

- Highly Likely – greater than 1 event per year (frequency greater than 1).
- Likely – less than 1 event per year but greater than 1 event every 10 years (frequency greater than 0.1 but less than 1).
- Possible – less than 1 event every 10 years but greater than 1 event every 100 years (frequency greater than 0. 01 but less than 0.1).
- Unlikely – less than 1 event every 100 years (frequency less than 0.01)

Magnitude or severity of potential hazards was evaluated for each hazard. Magnitude is a measure of the strength of a hazard event and is usually determined using technical measures specific to the hazard. Magnitude was calculated for each hazard where property damage data was available. Magnitude is:

- (Property Damage / Number of Incidents) / $ of Building Stock Exposure = Magnitude expressed as a percentage.

Future Development

The impact to future development was assessed based on potential opportunities to limit or regulate development in hazardous areas such as building codes, zoning and subdivision regulations. The impacts were assessed through a narrative on how future development could be impacted by the hazard. Plans, ordinances and/or codes currently in place were identified that could be revised to better protect future development in the county from damage caused by natural and man-made hazards.

4.1.5 Hazard Ranking and Priorities

In ranking the hazards, the Planning Team completed a Calculated Priority Risk Index (CPRI) worksheet for each hazard. The CPRI examines four criteria for each hazard (probability, magnitude/severity, warning time, and duration), the risk index for each according to four levels, then applies a weighting factor (**Table 4.1-1**). The result is a score that has been used to rank the hazards. Each hazard profile presents its CPRI score with a cumulative score sheet included in **Appendix C**. **Table 4.1-2** presents the results of the CPRI scoring for all hazards.

TABLE 4.1-1
CALCULATED PRIORITY RISK INDEX

CPRI Category	Degree of Risk			Assigned Weighting Factor
	Level ID	Description	Index Value	
Probability	Unlikely	▪ Rare with no documented history of occurrences or events. ▪ Annual probability of less than 0.01.	1	45%
	Possibly	▪ Infrequent occurrences with at least one documented or anecdotal historic event. ▪ Annual probability that is between 0.1 and 0.01.	2	
	Likely	▪ Frequent occurrences with at least two or more documented historic events. ▪ Annual probability that is between 1 and 0.1.	3	
	Highly Likely	▪ Common events with a well documented history of occurrence. ▪ Annual probability that is greater than 1.	4	
Magnitude/ Severity	Negligible	▪ Negligible property damages (less than 5% of critical and non-critical facilities and infrastructure). ▪ Injuries or illnesses are treatable with first aid and there are no deaths. ▪ Negligible quality of life lost. ▪ Shut down of critical facilities for less than 24 hours.	1	30%
	Limited	▪ Slight property damages (greater than 5% and less than 25% of critical and non-critical facilities and infrastructure). ▪ Injuries or illnesses do not result in permanent disability and there are no deaths. ▪ Moderate quality of life lost. ▪ Shut down of critical facilities for more than 1 day and less than 1 week.	2	
	Critical	▪ Moderate property damages (greater than 25% and less than 50% of critical and non-critical facilities and infrastructure). ▪ Injuries or illnesses result in permanent disability and at least one death. ▪ Shut down of critical facilities for more than 1 week and less than 1 month.	3	
	Catastrophic	▪ Severe property damages (greater than 50% of critical and non-critical facilities and infrastructure). ▪ Injuries or illnesses result in permanent disability and multiple deaths. ▪ Shut down of critical facilities for more than 1 month.	4	
Warning Time	Less than 6 hours	Self explanatory.	4	15%
	6 to 12 hours	Self explanatory.	3	
	12 to 24 hours	Self explanatory.	2	
	More than 24 hours	Self explanatory.	1	
Duration	Less than 6 hours	Self explanatory.	1	10%
	Less than 24 hours	Self explanatory.	2	
	Less than one week	Self explanatory.	3	
	More than one week	Self explanatory.	4	

TABLE 4.1-2 CALCULATED PRIORITY RANKING INDEX SUMMARY					
Hazard	**Probability**	**Magnitude and/or Severity**	**Warning Time**	**Duration**	**CPRI Score**
Communicable Disease/Pandemic	Highly likely	Catastrophic	12-24 hours	> 1 week	3.70
Wildfires	Highly likely	Critical	< 6 hours	< 1 week	3.60
Structure Fire	Highly likely	Critical	< 6 hours	< 6 hours	3.40
Severe Summer Weather (Thunderstorms, Wind, Hail, Tornadoes, Microbursts)	Highly likely	Limited	< 6 hours	< 6 hours	3.10
Hazardous Material Incidents	Likely	Critical	< 6 hours	< 24 hours	3.05
Transportation Accidents (air, land, rail)	Likely	Critical	< 6 hours	< 6 hours	2.95
Severe Winter Weather	Highly likely	Limited	> 24 hours	< 1 week	2.85
Flooding/Flash Flooding/ Levee Failure	Likely	Limited	> 24 hours	> 1 week	2.80
Drought	Likely	Limited	> 24 hours	> 1 week	2.80
Volcanic Ash	Possible	Catastrophic	12-24 hours	> 1 week	2.80
Dam Failure	Possible	Catastrophic	> 24 hours	< 1 week	2.55
Landslides/Mudslides	Possible	Limited	< 6 hours	< 6 hours	2.20
Terrorism/Violence	Possible	Limited	< 6 hours	< 6 hours	2.20
Earthquake	Possible	Negligible	< 6 hours	< 24 hours	2.00

The Calculated Priority Risk Index scoring method has a range from 0 to 4. "0" being the least hazardous and "4" being the most hazardous situation.

The Planning Team determined that four hazards scored using the CPRI should be de-emphasized in the County's PDM Plan for the reasons cited below:

- Communicable Disease/Pandemic – Hazard is addressed by other programs at the county, state and federal level.
- Drought – Hazard is addressed by programs at the state and federal level.
- Terrorism/Violence – Hazard is addressed by programs on the state and federal level.
- Volcanic Ash – Hazard not likely to impact the planning area.

With the exception of communicable disease, these hazards will not be further addressed in this Plan. A hazard profile for the communicable disease hazard is included in **Appendix C.** This hazard profile will be more fully developed in the 2016 PDM Plan Update.

The Planning Team concurred that the CPRI scoring accurately reflected the county's priorities; the prioritized list of hazards for Cascade County is shown below.

1 – Wildfire
2 – Structure Fire
3 – Severe Summer Weather
4 – Hazardous Material Incidents

5 – Transportation Accidents
6 – Severe Winter Weather
7 – Flooding/Levee Failure
8 – Dam Failure
9 – Landslides/Mudslides
10 – Earthquakes

The landslide and earthquake hazards were considered lower priority. Hazard profiles for these hazards are included in **Appendix C**, rather than in the body of the PDM Plan.

4.1.6 Assessing Vulnerability – Estimating Potential Losses

The methodology used in the vulnerability analysis presents a quantitative assessment of the building stock, population, and critical facility exposure to the individual hazards. Building stock data, available from the Montana Department of Revenue's (MDOR) cadastral mapping program was used in the analysis. This data spatially recognizes land parcels along with the appraised value of building stock. Using GIS, hazard risk areas were intersected with the building stock data to identify the number of structures and exposure due to each hazard. Using GIS, hazard risk areas were also intersected with critical facility data to determine the number and exposure of critical facilities to each hazard. Various infrastructure (e.g. water systems, wastewater systems) were analyzed as part of the critical facility vulnerability analysis.

Population exposure was computed using data from the 2010 census and the percentage of the census blocks located in each hazard area. Population exposure is reported according to total population living in the hazard area and a subset of this data, individuals under the age of 18 years. Using GIS, total population for the census blocks was intersected with the hazard maps to determine the population at risk. It should be noted that there are some inherent inaccuracies using this approach. Using a percentage of census block population to compute the number of individuals living in the hazard area may include more persons than actually reside in the hazard area where census blocks are large.

For hazards that are uniform across the jurisdiction (i.e. severe summer weather, structure fires, highway accidents, and severe winter weather) the methodology presented below was used to determine annualized property loss.

- Exposure x Frequency x Magnitude

Where:

- Exposure = building stock, vulnerable population, or critical facilities at risk

- Frequency = annual number of events determined by calculating the number of hazard events / period of record
- Magnitude = percent of damage expected calculated by: (property damage/# incidents)/ building stock or critical facility exposure

For hazards that are not uniform across the jurisdiction and instead occur in specific areas (e.g. flooding, wildfire, hazardous material incidents, dam failure, etc.) the hazard area factored into the loss estimation calculations.

For hazards without property damage magnitude could not be calculated and therefore, only the exposure of the building stock or population was computed. Annualized loss estimates cannot be calculated without property damage using this approach.

4.1.7 Data Limitations

Risk assessment results are only a general representation of potential vulnerabilities and there are many inherent inaccuracies with the risk assessment methodology used. Output is only as good as the data sources used and Cascade County may wish to consider alternate data for future PDM Plan updates.

The remainder of this section presents hazard profiles organized by county priority followed by a risk assessment summary. Loss estimates, where applicable, are summarized at the end of this section.

4.2 WILDFIRE

CPRI SCORE = 3.6

Description and History

A wildfire is an unplanned fire, a term which includes grass fires, forest fires and scrub fires, both man-caused or natural in origin. Severe wildfire conditions have historically represented a threat of potential destruction within the region. Negative impacts of wildfire include loss of life, property and resource damage or destruction, severe emotional crisis, widespread economic impact, disrupted and fiscally impacted government services, and environmental degradation.

Wildland and rangeland fires occur every year in Cascade County; they are part of the normal vegetative cycle for forest and grasslands in the state. The frequency at which they occur depends on the forest and vegetation type and the prevailing weather conditions. Historically, vegetation types influenced the fire recurrence intervals, but fire regimes have been altered through fire suppression and changes in the landscape. Fire suppression has increased the amount of fuels available to burn and decreased the separation of fuels, resulting in greater undergrowth and denser vegetation. These changes have increased fire severity and frequency, compared to the fire regime prior to the 20th century. An added factor in fire recurrence is the weather and drought, including extended periods of low precipitation, insect infestation, and heat that increase the potential severity of a fire season. When these conditions mix with high winds, low humidity, high temperatures, and/or dry lightning storms, the fires can be devastating. In Cascade County, bark beetle damage has become much more noticeable since 2000. The number of stands infested by mountain pine beetle has increased each year as beetles have moved up the drainages. In central Montana, many of the agricultural fields are in Conservation Reserve Program which also increase fuels for rangeland fires.

By all historical records, the Great Idaho fire of 1910 in northern Idaho and western Montana was the largest forest fire in American history. The fire burned 3 million acres, killed 86 people, destroyed numerous towns in northern Idaho and western Montana, and by some accounts, most of the destruction occurred in 6 hours. The hurricane winds of August 20 and 21, 1910 turned numerous fires scattered throughout the region into a blow-torch. The fire occurred when the U.S. Forest Service was a fledgling agency that lacked the personnel, equipment, and communications to effectively address wildfire. Even with today's technology and resources devoted to wildland fire fighting, that magnitude of fire could occur again, given similar conditions.

The National Fire Incident Reporting System (NFIRS) database indicates that Cascade County has had 653 wildfires in the past 10 years. The State Fire Marshal indicated that this number may be low because the Volunteer Fire Departments don't always report. The Montana DNRC provided wildfire data for Cascade County from the past 30 years. **Table 4.2-1** shows the fires over one acre by year.

TABLE 4.2-1
WILDFIRE LISTINGS OVER 1 ACRE IN CASCADE COUNTY; 1981 to 2010

Date	Name	Acres	Date	Name	Acres
8/17/1981	Stickney	7	9/7/1992	Harris Mtn.	6.01
8/25/1981	Dearborn / Colburn	6.5	3/22/1994	Gondeiro Ranch	400
7/8/1983	Paul Creek	3	8/9/1994	Baldy	8
8/9/1984	Dearborn	35	8/12/1994	Alabama Wilson	1.5
8/25/1984	Finnegan	3	9/9/1994	Bootlegger #1	100
4/15/1985	Sun River	200	8/5/1995	Andy Creek	10
7/10/1985	Prewitt Creek	31	6/18/1996	Middle Stickney	1
7/1/1986	Castle Rock	1	8/18/1996	Sheep Creek #1	700
8/14/1986	Paul Creek	1	10/10/1996	Cascade Butte	1,100
5/26/1988	Sugarloaf	4	4/30/1997	Box Lane	10
7/9/1988	Hardy Creek	7	7/16/1997	Upper Sawmill	5
7/10/1989	Flat Creek Complex	1	7/28/1997	Sawmill Springs	4
8/14/1989	Sheep Creek #2	1	8/30/1997	Telegraph Mountain	2.8
6/26/1990	Paul Creek Co Assist	5	3/13/1999	Patterson	4
7/16/1990	Seibold Tracks	50	3/25/1999	Ming Coulee	50
7/30/1990	Sheep Creek 2	7	5/6/1999	Paul Creek	50
8/2/1990	Sawmill	4.5	12/16/1999	Sheep Creek	9
8/18/1990	Whitetail	1	10/1/2001	Sunny Valley	10
8/30/1990	North Sheep Creek 2	7	7/5/2003	Andy Creek	4
9/14/1990	Sawmill 3	80	7/8/2003	Hardy Creek	7
5/20/1991	Coburn Mtn.	1.5	7/9/2003	Sugar Loaf	2.8
8/7/1991	North Fork Sawmill	1.01	7/15/2003	Box Canyon	160
8/7/1991	Footbridge	1.5	8/7/2003	Finegan Mountain	30
8/10/1991	Harris Mtn #2	2	8/9/2003	Sawmill North	2
8/11/1991	Harris Mt #1	1.5	8/9/2003	Sullivan Creek	6
10/16/1991	Dearborn	170	8/13/2003	Rocky Point	1
6/10/1992	N.Fk Sawmill	1	8/17/2003	Bull Run	6
6/12/1992	Pruett Ck.	1.5	9/5/2003	Dearborn	20
8/1/1992	Dearborn	5	7/26/2005	Sieben #11	7.8
8/16/1992	Hardy Cr.	2	7/24/2006	Sugarloaf	8
8/19/1992	Sugarloaf #2	260	8/8/2008	Yank Creek Fire	5.1

Source: Montana DNRC, 2011

A Presidential Disaster Declaration due to wildfire was granted in 2000 and included Cascade County. State-wide wildfire disasters have been declared in 1979, 1988, 1991, 1992, 1996, 1998, 1999, 2000 and 2003 (DMA, 2010).

Vulnerability and Area of Impact

Problems with wildfire occur when combined with the human environment. People and structures near wildfires are threatened unless adequately protected through evacuation or mitigation. Most structures are flammable, and therefore, are threatened when wildfire approaches. In addition, a significant loss of life could occur to residents, firefighters, and others who are in the wildfire area and do not evacuate. Infrastructure such as electric transmission lines, fuel tanks, and radio transmission towers are not often equipped to withstand the heat from a wildfire. Timber resources, animal habitats, and waterways can

all be damaged leading to negative economic and environmental impacts. The area where human development meets undeveloped, vegetative lands is called the wildland urban interface (WUI).

In 2008, Cascade County completed a Community Wildfire Protection Plan (CWPP) which is included in **Appendix E**. This document identifies the following WUI areas in Cascade County: the Dearborn Area, including Cooper Ranch and Stickney Creek; Hardy - Missouri River Corridor; Logging Creek Area; the southwest side of the Highwood Mountains adjacent to the National Forest; and, the Missouri, Sun and Smith River corridors. Mitigation projects identified in the CWPP are incorporated herein by reference.

According to the Cascade County CWPP, five primary issues make the county particularly vulnerable to wildfire. These include: 1) the semi-arid landscape and poor moisture regime that due to the lack of moisture during any of the four seasons can place the county into a fire season throughout a large share of the year; 2) the wind generated from the Rocky Mountain Front Range can turn an ignition into a large wildland fire in a very short period of time; 3) the size and scale of the county, scattered numbers of outlying fire stations, significant reduction in number of people willing to volunteer as fire fighters in the county, and ageing population in Neihart; 4) lands in the Conservation Reserve Program which can be easily ignited and could result in extreme fire behavior, especially under windy conditions, and provide for challenging wildland fire suppression efforts; and, 5) a very high risk subdivision (i.e. Coopers Ranch) with the high potential for suffering loss of life, property and resources from a wildland fire. In addition, Cascade County communities listed in the Federal Register as "Communities at Risk" from wildland fire include Monarch and Neihart (Firelogistics, 2008).

Probability and Magnitude

Property damage is difficult to obtain for wildfires since it is typically only the forest resource that is lost. DNRC has collected data on structure loss from wildfires since 2003. This data indicates one incidence of structure loss in Cascade County. The Box Canyon Fire in 2003, which burned 160 acres, resulted in one structure being lost and 25 homes and 10 outbuildings saved.

Table 4.2-2 presents the wildfire events in Cascade County with reported damages since 1960 according to the SHELDUS database and Presidential Disaster Declaration information.

TABLE 4.2-2
CASCADE COUNTY WILDFIRE EVENTS WITH DAMAGES

Date	Injuries	Fatalities	Property Damage	Crop Damage	Remarks
10/28/1990	0	0	$82,540	$825	Grass Fire
8/1/1994	0	0	$12,671	$0	Wildfire
9/1/1994	0	0	$12,671	$1,267	Forest Fires
2000	-	-	Aprox. $214,426	-	Presidential Disaster for 54 Counties w/ $11,579,00 in Individual Assistance
TOTAL	**0**	**0**	$322,307	$2,092	

Source: SHELDUS, 2010 (adjusted to 2009 dollars); DES, 2011

Wildfire does not present a uniform risk across Cascade County. **Figure 4** presents a wildfire risk map that shows the WUI and the Cascade County critical facilities. The WUI layer used for this analysis consists of two input layers: WUI zones computed using GIS and U.S. Forest Service (USFS) Region One Healthy Forest Restoration Act WUI. Wildland interface zones up to four miles from interface communities (areas where population density >= 250 people per square mile), were identified as important areas for reducing fuel hazards. A wildland urban interface zone mapping procedure was created based on buffering interface communities by four miles. Each one mile buffer zone in the four mile area was assigned a WUI risk class of: 4 (very high) for the nearest, 3 (high) for the next, 2 (moderate) for the next, and 1 (low) for the farthest. Additional WUI areas were added from the USFS Healthy Forest Restoration Act WUI layer which was created using communities at risk, population density, and topography modeling.

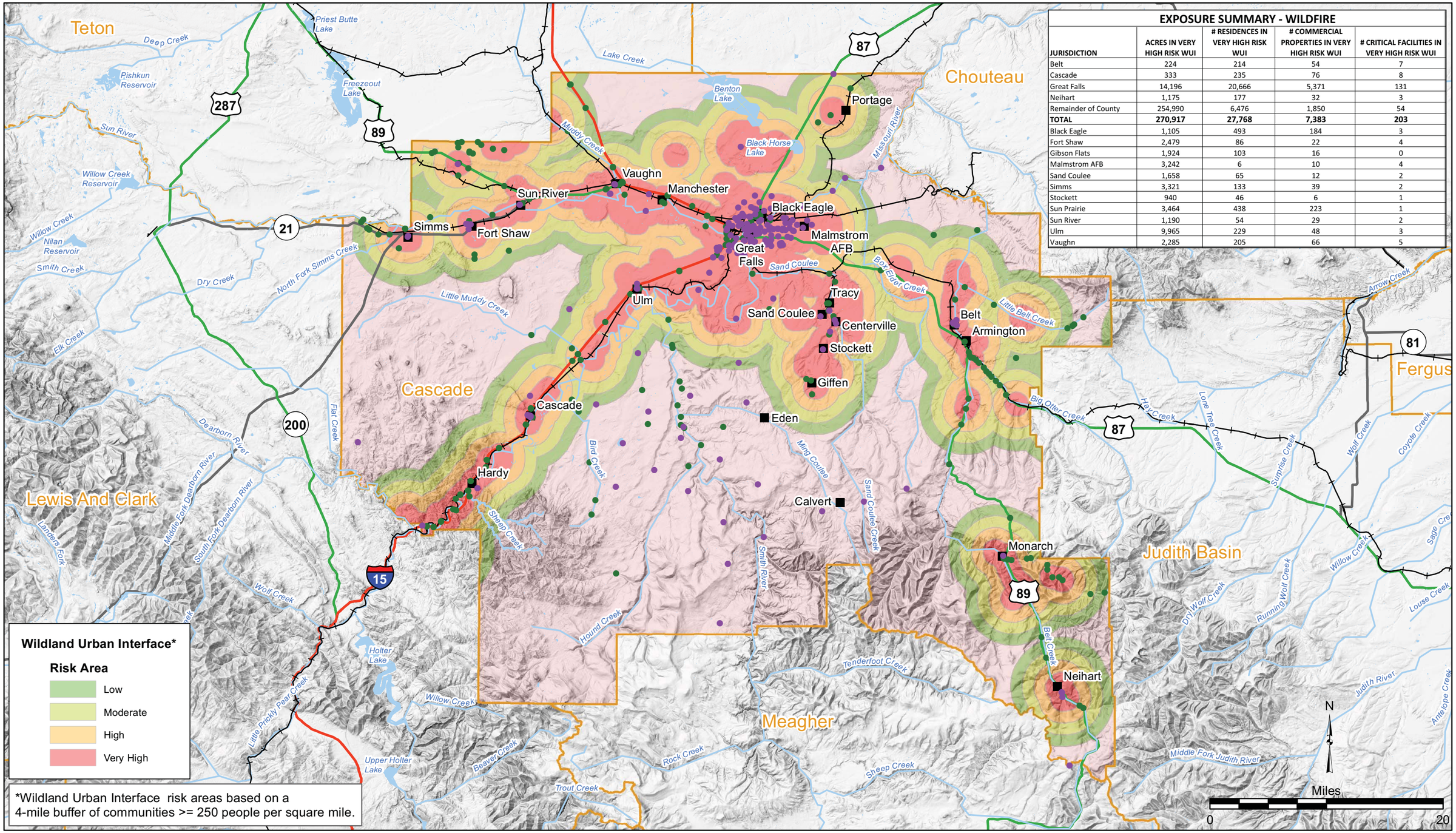
To complete the vulnerability analysis for this project, GIS was used to intersect the resulting WUI layer with both the critical facility and MDOR cadastral parcel datasets. Estimates of vulnerable population were calculated by determining the percent exposure in each census block for the hazard area. Exposure values are presented in **Table 4.2-3**. Annualized loss estimates were calculated by applying frequency and magnitude to building stock exposure, and are presented on the Risk Assessment Summary tables in *Section 4.10* (**Tables 4.10-1 through 4.10-5**). Building exposure reflects only the monetary structure value and does not account for improvements or personal effects that may be lost to wildfire. The *Wildfire Section* in **Appendix C** presents supporting documentation from the risk assessment including a list of critical facilities in the very high, high, moderate, and low WUI risk zones.

GIS analysis of the wildfire risk to Cascade County indicates that over 270,917 acres are within the very high-risk WUI. According to the vulnerability analysis, 27,768 residences, 7,383 commercial, industrial and agricultural buildings, and 203 critical facilities are located in very high-risk WUI. Digital data on construction type for the facilities is not available but will be considered in future PDM updates.

The history of wildfires, the terrain, and recent insect infestations has prompted Cascade County to identify wildfire as a significant hazard. Smoke from fires both within and outside of the county can create poor air quality. Sensitive groups, such as the elderly and asthmatics, can be affected. Wildfires can also have a significant impact on the regional economy with the loss of timber, natural resources, recreational opportunities, or tourism. Although the primary concern is to structures and the interface residents, most of the costs associated with fires, come from firefighting efforts. As past events have also shown, infrastructure such as power transmission lines can also be threatened.

Wildfires generally occur more than once per year in Cascade County and therefore, the probability of future events is rated as “highly likely”.

G:\PDM\CascadeCo_Update2011\ArcMap\CascadeCo_Wildfire_Fig4.mxd



EXPOSURE SUMMARY - WILDFIRE

JURISDICTION	ACRES IN VERY HIGH RISK WUI	# RESIDENCES IN VERY HIGH RISK WUI	# COMMERCIAL PROPERTIES IN VERY HIGH RISK WUI	# CRITICAL FACILITIES IN VERY HIGH RISK WUI
Belt	224	214	54	7
Cascade	333	235	76	8
Great Falls	14,196	20,666	5,371	131
Neihart	1,175	177	32	3
Remainder of County	254,990	6,476	1,850	54
TOTAL	**270,917**	**27,768**	**7,383**	**203**
Black Eagle	1,105	493	184	3
Fort Shaw	2,479	86	22	4
Gibson Flats	1,924	103	16	0
Malmstrom AFB	3,242	6	10	4
Sand Coulee	1,658	65	12	2
Simms	3,321	133	39	2
Stockett	940	46	6	1
Sun Prairie	3,464	438	223	1
Sun River	1,190	54	29	2
Ulm	9,965	229	48	3
Vaughn	2,285	205	66	5

- Critical Facilities
- Bridges
- Place Names
- River/Stream
- Lake/Reservoir
- County Boundary
- Interstate
- U.S. Highway
- Montana Highway
- Rail

May 2011

Figure 4

Wildfire Risk

Cascade County, Montana

Pre-Disaster Mitigation Plan

TABLE 4.2-3
CASCADE COUNTY VULNERABILITY ANALYSIS - WILDFIRE

JURISDICTION	RESIDENTIAL VERY HIGH RISK EXPOSURE $	# RESIDENCES VERY HIGH RISK WUI	COMMERCIAL, INDUSTRIAL & AGRICULTURAL VERY HIGH RISK BUILDING EXPOSURE $	# COMMERCIAL, INDUSTRIAL & AGRIDULTURAL BUILDINGS IN VERY HIGH RISK WUI	CRITICAL FACILITY VERY HIGH RISK EXPOSURE $	# CRITICAL FACILITIES AT VERY HIGH RISK WUI	POPULATION AT RISK IN VERY HIGH RISK WUI	PERSONS UNDER 18 IN VERY HIGH RISK WUI
Incorporated Communities & County								
Belt	$16,138,830	214	$5,425,834	54	$4,394,466	7	597	142
Cascade	$22,517,751	235	$10,051,395	76	$5,082,755	8	685	151
Great Falls	$2,555,386,799	20,666	$3,670,964,476	5,371	$351,087,457	131	58,505	13,161
Neihart	$14,994,082	177	$1,380,923	32	$1,617,000	3	51	1
Remainder of County	$949,977,937	6,476	$164,230,650	1850	$56,283,963	54	19,968	4,775
CENSUS Designated Places								
Black Eagle	$40,893,821	493	$34,930,709	184	$845,000	3	904	179
Fort Shaw	$10,108,637	86	$1,660,036	22	$1,367,352	4	276	85
Gibson Flats	$15,720,511	103	$2,896,073	16	$0	0	199	53
Malmstrom AFB	$454,348	6	$4,208,774	10	$5,675,000	4	3,472	1,125
Sand Coulee	$6,851,839	65	$523,802	12	$148,993	2	212	48
Simms	$12,430,303	133	$1,834,978	39	$2,001,713	2	354	70
Stockett	$3,911,615	46	$292,255	6	$70,000	1	169	45
Sun Prairie	$54,127,036	438	$9,819,074	223	$0	1	1,630	383
Sun River	$3,975,992	54	$915,992	29	$1,146,913	2	124	27
Ulm	$30,745,484	229	$3,493,052	48	$1,059,414	3	639	147
Vaughn	$25,062,986	205	$3,680,192	66	$1,066,145	5	658	149
CENSUS County Divisions								
Belt	$52,660,553	449	$7,767,035	105	$4,544,466	9	1,489	343
Cascade	$91,679,500	700	$13,282,676	132	$5,172,755	11	1,459	271
Eden-Stockett	$57,088,939	393	$9,313,472	66	$3,827,883	9	1,302	313
Great Falls	$3,099,349,388	23,836	$3,705,966,833	6,071	$389,922,841	149	69,127	15,852
Great Falls North	$137,052,456	1,301	$102,592,228	727	$7,708,574	7	3,608	831
Monarch-Neihart	$39,043,916	384	$2,413,706	55	$1,687,000	4	225	28
Sun River Valley	$82,140,647	705	$10,717,328	227	$5,602,122	14	2,596	592

Future Development

Land use regulations can reduce the incidence of wildland fire by addressing defensible space and access for emergency vehicles. Cascade County addresses wildfire in their Growth Policy and Subdivision regulations, as discussed below.

The Cascade County Growth Policy includes a section on Wildfire and Fire Protection. The single goal states: *Minimize risk of fire by management and planning, and to permit the effective and efficient suppression of fires in order to protect persons, property and forested areas*. Objectives for achieving this goal are as follows:

- Encourage fire protection measures throughout the county, giving special emphasis to the extreme fire hazards at the wildland/urban interface.
- Subdivisions should be planned, designed, constructed and maintained so as to minimize the risk of fire. Developers should submit a defensible space plan for each subdivision to the appropriate fire district for its review.
- Encourage fire resistant construction and the use of sprinkler systems.
- Promote cooperation with local fire districts and state and federal agencies to develop and provide a wildfire educational program.
- Promote fire services for all subdivisions.
- Promote adequate water supply systems.
- Support adequate ingresses and egresses in all subdivision planning.
- Promote vegetation policies that reduce fire hazards.

The Cascade County Subdivision regulations have a section on Fire Protection requiring all subdivisions to be planned, designed, constructed, and maintained to minimize the risk of fire and to permit effective and efficient response in order to protect persons, property, and natural resource areas. Design elements of the subdivision include the placement of structures in such a manner so as to minimize the potential for flame spread and to permit efficient access for fire fighting equipment.

A Fire Protection Plan must accompany the submission of any application for a major subdivision (6 lots or greater), prior to the subdivision application being considered complete. This plan must include an analysis of the wildland fire hazards on the site, as influenced by existing vegetation and topography. The analysis must: identify and document the wildland fire risk and hazard areas; establish priorities relative to mitigating the dangers from wildland fire; and, determine mitigation measures for vegetation, other combustibles and construction criteria. The plan must address: access, ingress, egress, and evacuation; fuel modification; water supply; construction, location, and design of structures; ignition potential of structures; asset protection zones (defensible space); adequate fire protection facilities for the project; adequate signage for location by fire personnel; and, response agency and approximate response time. The Fire Protection Plan must be implemented before the county will

approve the final plat and is considered part of the subdivider's obligations for land development. Provisions for the maintenance of the Fire Protection Plan must be included in the covenants, conditions, and restrictions for the development. A property owners' association must be formed and designated to enforce the covenants, conditions, and restrictions. County subdivision regulations also detail requirements for water supply for the purpose of fire fighting, and access for emergency responders and evacuation of residents.

Stricter standards apply for subdivisions proposed in areas classified as high or extreme hazard areas (see CWPP, **Appendix E**) including: additional water supply capacity and storage for fire fighting; road rights-of-way cleared of construction slash; bridges and cattle guards constructed of noncombustible materials; subdivisions designed to allow emergency vehicle access to wildland areas behind structures by providing a perimeter roadway along the entire wildland side of a development or by providing a fuel break accessible to fire apparatus.

The subdivision regulations also dictate building density in areas of steep slopes and/or dense forest growth. Buildings are prohibited on slopes greater than 25 percent and at the apex of "fire chimneys" (topographic features, usually drainage way or swales, which tend to funnel or otherwise concentrate fire toward the top of steep slopes). Fuel breaks and greenbelts should separate communities, groups of structures, or residences and other buildings from densely forested areas.

There is no required mitigation for existing structures or the construction of individual homes in wildfire-prone areas.

Completed Mitigation Projects

According to Planning Team members, wildfire mitigation projects have been completed in the Dearborn and Monarch areas of Cascade County. However, additional fuel treatments are needed in these areas.

4.3 STRUCTURE FIRE

CPRI SCORE = 3.4

Description and History

Although structure fires are usually individual disasters and not community-wide, the potential exists for widespread structure fires that displace several businesses or families. Urban blocks, commercial structures, and apartment buildings are especially vulnerable. Statistics from structure fires in Cascade County over the past 10 years are presented in **Table 4.3-1.**

TABLE 4.3-1
CASCADE COUNTY STRUCTURE FIRE STATISTICS; 1/2001-12/2010

Property Type	Fires	Fire Fighter Deaths	Fire Fighter Injuries	Civilian Deaths	Civilian Injuries	Property Loss
Residential	662	0	11	3	34	$10,276,893
Commercial	94	0	1	0	2	$6,758,679
Industrial	113	0	4	0	0	$5,646,598
TOTAL	869	0	16	3	36	$22,682,170

Sources: State Fire Marshal, 2011

A description of a typical structure fire is presented below.

February 13, 2011 - Six people are safe after a Sunday morning fire in Great Falls. Strong winds made it more difficult for Great Falls Fire Rescue to put out the structure fire at 1316 3rd Avenue NW. A mother and her three children were trapped on the second story of the apartment house after the fire burned up the stairwell. Because the home had no other fire escape but the stairs, crews had to rescue the family of four using a ladder through a top floor window. Fire Battalion Chief Steve Gonser said, "Normally most houses have more than one way to exit the home, but this apartment house has only one stairwell going up. The mother did a very good job of notifying us that they were trapped upstairs and unable to get out. So when the crew got here they immediately went into rescue mode, that was their number one priority was to rescue the people on the upper floor." The two people on the main floor safely exited the home through the front door. Gonser estimates the damage to be around $10,000. Fire Rescue says the cause is still unknown, but it appears to have been started by smoking materials. (*No Injuries in Sunday Morning Structure Fire*, http://www.krtv.com/news/no-injuries-in-sunday-morning-structure-fire/)

Vulnerability and Area of Impact

Based on review of historic structure fire data and consultation with the State Fire Marshal, the entire project area has been classified with a uniform risk for structure fire since vulnerable structures are not restricted to a specific area within populated portions of the county. Structure fires have resulted in well over $22 million dollars in property damage over the past 10 years. Annualized loss estimates are presented in the Risk Assessment Summary Tables in *Section 4.10* (**Table 4.10-1 through Table 4.10-5**). The *Structure Fire Section* in **Appendix C** presents additional information from the risk assessment.

Probability and Hazard Magnitude

History has shown that structure fires are a serious concern for Cascade County. The losses, primarily covered by insurance, have not resulted in a Presidential Disaster Declaration, but have resulted in other negative impacts such as economic losses for the area.

With 869 structure fires in the 10 period of record, the probability of this hazard occurring in the future is rated as “highly likely”.

Future Development

The City of Great Falls has adopted the International Fire Code (IFC) and Cascade County is considering adopting this code. The IFC is a comprehensive code which includes regulations governing the safeguarding of life and property from all types of fire and explosions hazards. Topics include general precautions against fire, emergency planning and preparedness, fire department access, fire hydrants, automatic sprinkler systems, fire alarm systems, hazardous materials storage and use, and fire safety requirements for new and existing buildings and premises.

4.4 SEVERE SUMMER WEATHER

CPRI SCORE = 3.1

Severe summer weather includes thunderstorms, wind, hail, lightning, tornadoes, and microbursts that typically occur between May and October of each year.

Description and History

A severe thunderstorm is defined by the National Weather Service as a thunderstorm that produces wind gusts at or greater than 58 mph (50 knots), hail 1-inch or larger, and/or tornadoes. Although not considered "severe", lightning and heavy rain can also accompany thunderstorms. Thunderstorms can produce intense downburst and microburst wind. In addition, high winds, defined below, can occur outside of thunderstorms when the overall weather conditions are favorable.

Tornadoes are the most concentrated and violent storms produced by the earth's atmosphere. They are created by a vortex of rotating wind and strong vertical motion, which possess remarkable strength and can cause widespread damage. The most violent tornadoes are capable of tremendous destruction with wind speeds of 300 mph or more. Maximum wind speeds in tornadoes are confined to small areas and vary over short distances. Tornadoes are most common in the Great Plains, and are more infrequent and generally small west of the Rockies. Thunderstorms can produce deadly and damaging tornadoes.

A microburst is a very localized column of sinking air, producing damaging divergent and straight-line winds at the surface that are similar to, but distinguishable from, tornadoes. The scale and suddenness of a microburst makes it a great danger to aircraft due to the low-level wind shear caused by its gust front, with several fatal crashes having been attributed to the phenomenon over the past several decades. Microbursts in forested regions have flattened acres of standing timber.

Cascade County experiences strong winds associated with the east side of the Rocky Mountains. Winds are generally westerly to southwesterly and frequently cause property damage.

The NWS provides short-term forecasts and warnings of severe summer weather to the public by producing regularly-scheduled severe weather outlooks and updates on various forms of hazardous weather, as listed below.

- *Severe Thunderstorm Warning*: Any thunderstorm wind gust equal to or greater than 58 mph; any hail size 1-inch or larger.
- *High Wind*: Sustained winds of 40 mph for an hour or any gust to 58 mph (non-convective winds).
- *Tornado Warning:* A violently, rotating column of air extending from the base of a thunderstorm to the ground.

Table 4.4-1 presents severe summer weather events (May through October) from the NCDC database indicating the magnitude of these events.

TABLE 4.4-1
CASCADE COUNTY SEVERE SUMMER WEATHER REPORTS (~MAY-OCTOBER)

Date	Location	Magnitude	Date	Location	Magnitude	Date	Location	Magnitude
6/14/1955	Hail	0.75 in.	8/8/1985	Hail	0.75 in.	6/27/2001	Tstm Wind	62 kts.
7/18/1955	Tstm Wind	60 kts.	8/27/1985	Hail	1.00 in.	7/12/2001	Tstm Wind	61 kts.
7/1/1957	Hail	1.00 in.	7/24/1987	Hail	1.00 in.	7/16/2001	Tstm Wind	52 kts.
7/14/1957	Tstm Wind	70 kts.	5/16/1988	Tstm Wind	52 kts.	7/17/2001	Hail	0.88 in.
6/6/1958	Hail	0.75 in.	5/24/1988	Hail	0.75 in.	7/28/2001	Tstm Wind	69 kts.
6/27/1958	Tstm Wind	65 kts.	6/17/1988	Tstm Wind	63 kts.	8/4/2001	Hail	0.75 in.
7/18/1958	Hail	0.75 in.	7/3/1988	Tstm Wind	64 kts.	10/12/2001	High Wind	64 kts.
6/19/1960	Hail	1.75 in.	7/5/1988	Hail	0.75 in.	10/23/2001	High Wind	61 kts.
6/29/1961	Tstm Wind	62 kts.	5/10/1989	Tstm Wind	50 kts.	10/31/2001	High Wind	54 kts.
7/6/1961	Hail	1.00 in.	7/15/1989	Tstm Wind	50 kts.	6/21/2002	Hail	0.75 in.
6/28/1963	Hail	1.50 in.	7/20/1989	Tstm Wind	54 kts.	6/21/2002	Tstm Wind	52 kts.
7/24/1963	Hail	0.75 in.	7/26/1989	Tstm Wind	0 kts.	6/27/2002	Tstm Wind	61 kts.
2/27/1965	Tstm Wind	53 kts.	7/30/1989	Tstm Wind	50 kts.	7/6/2002	Tstm Wind	61 kts.
6/24/1965	Hail	0.75 in.	6/28/1990	Hail	0.75 in.	7/8/2002	Tstm Wind	87 kts.
7/10/1965	Hail	2.75 in.	7/2/1990	Tstm Wind	75 kts.	7/14/2002	Tstm Wind	57 kts.
7/3/1967	Hail	0.75 in.	7/5/1990	Tstm Wind	59 kts.	7/17/2002	Tstm Wind	52 kts.
7/31/1967	Tstm Wind	54 kts.	8/20/1990	Hail	1.50 in.	7/23/2002	Tstm Wind	61 kts.
6/19/1968	Tstm Wind	55 kts.	6/25/1991	Hail	1.00 in.	8/5/2002	Hail	1.75 in.
8/4/1968	Tstm Wind	0 kts.	7/14/1991	Hail	1.75 in.	8/16/2002	High Wind	63 kts.
8/11/1968	Tstm Wind	54 kts.	6/10/1992	Tstm Wind	50 kts.	10/5/2002	High Wind	62 kts.
8/14/1969	Tstm Wind	55 kts.	8/2/1992	Hail	1.25 in.	5/16/2003	High Wind	56 kts.
8/18/1969	Tstm Wind	50 kts.	8/23/1992	Hail	1.25 in.	6/10/2003	Hail	1.75 in.
6/27/1970	Hail	1.75 in.	8/20/1993	Hail	0.75 in.	6/10/2003	Tstm Wind	52 kts.
6/27/1970	Tstm Wind	73 kts.	5/15/1994	Tstm Wind	0 kts.	6/15/2003	Hail	0.75 in.
6/29/1970	Hail	0.88 in.	5/27/1994	Tstm Wind	70 kts.	6/19/2003	Tstm Wind	61 kts.
8/20/1971	Tstm Wind	50 kts.	8/22/1994	High Winds	60 kts.	6/20/2003	Hail	0.75 in.
8/31/1971	Tstm Wind	50 kts.	6/11/1995	Hail	1.00 in.	7/16/2003	Tstm Wind	55 kts.
7/24/1972	Tstm Wind	56 kts.	6/12/1995	Hail	1.00 in.	8/8/2003	Hail	0.75 in.
6/22/1973	Tstm Wind	53 kts.	6/15/1995	Hail	1.75 in.	10/29/2003	High Wind	69 kts.
8/13/1973	Tstm Wind	62 kts.	6/16/1995	Hail	1.00 in.	5/8/2004	Tstm Wind	57 kts.
6/20/1974	Hail	1.75 in.	8/7/1995	Hail	0.75 in.	6/5/2004	Tstm Wind	52 kts.
6/30/1975	Hail	1.75 in.	5/14/1996	Tstm Wind	68 kts.	6/6/2004	Hail	1.75 in.
7/15/1975	Tstm Wind	50 kts.	6/15/1996	Hail	1.00 in.	6/6/2004	Tstm Wind	56 kts.
6/3/1976	Hail	0.75 in.	5/8/2001	Tstm Wind	50 kts.	6/23/2004	Hail	0.75 in.
6/3/1976	Tstm Wind	54 kts.	5/16/2001	High Wind	50 kts.	6/23/2004	Tstm Wind	52 kts.
6/6/1976	Tstm Wind	52 kts.	6/27/2001	Tstm Wind	62 kts.	6/29/2004	Lightning	N/A
6/10/1976	Hail	0.75 in.	7/12/2001	Tstm Wind	61 kts.	8/4/2004	Hail	1.50 in.
7/11/1976	Tstm Wind	54 kts.	7/16/2001	Tstm Wind	52 kts.	8/5/2004	Hail	1.00 in.
6/28/1978	Hail	2.00 in.	7/17/2001	Hail	0.88 in.	8/5/2004	Tstm Wind	57 kts.
6/29/1978	Hail	1.50 in.	7/28/2001	Tstm Wind	69 kts.	6/16/2005	Tstm Wind	56 kts.
6/29/1978	Tstm Wind	50 kts.	8/4/2001	Hail	0.75 in.	6/22/2005	Hail	0.75 in.
8/22/1978	Hail	1.00 in.	10/12/2001	High Wind	64 kts.	6/25/2005	Hail	1.75 in.
8/22/1978	Tstm Wind	64 kts.	10/23/2001	High Wind	61 kts.	8/1/2005	Lightning	N/A
6/30/1979	Hail	1.00 in.	10/31/2001	High Wind	54 kts.	5/22/2006	Tstm Wind	52 kts.
7/6/1979	Tstm Wind	64 kts.	6/21/2002	Hail	0.75 in.	6/4/2006	Tstm Wind	52 kts.
6/9/1980	Tstm Wind	52 kts.	6/21/2002	Tstm Wind	52 kts.	7/23/2006	Tstm Wind	57 kts.
6/10/1980	Hail	1.00 in.	6/27/2002	Tstm Wind	61 kts.	8/29/2006	Lightning	N/A
6/25/1980	Tstm Wind	65 kts.	7/6/2002	Tstm Wind	61 kts.	5/10/2007	Hail	1.00 in.

TABLE 4.4-1
CASCADE COUNTY SEVERE SUMMER WEATHER REPORTS (~MAY-OCTOBER)

Date	Location	Magnitude	Date	Location	Magnitude	Date	Location	Magnitude
8/4/1981	Hail	1.50 in.	7/8/2002	Tstm Wind	87 kts.	5/10/2007	Tstm Wind	57 kts.
8/19/1981	Tstm Wind	67 kts.	7/14/2002	Tstm Wind	57 kts.	6/16/2007	Hail	1.75 in.
8/20/1981	Tstm Wind	50 kts.	7/17/2002	Tstm Wind	52 kts.	6/24/2007	Hail	2.00 in.
8/27/1981	Tstm Wind	52 kts.	7/23/2002	Tstm Wind	61 kts.	7/7/2007	Hail	0.75 in.
6/28/1982	Hail	2.00 in.	8/5/2002	Hail	1.75 in.	7/9/2007	High Wind	50 kts.
8/10/1982	Tstm Wind	54 kts.	8/16/2002	High Wind	63 kts.	8/19/2007	Tstm Wind	54 kts.
8/11/1982	Hail	2.50 in.	10/5/2002	High Wind	62 kts.	4/29/2008	Tstm Wind	80 kts.
7/6/1983	Hail	0.75 in.	5/16/2003	High Wind	56 kts.	5/28/2008	Tstm Wind	52 kts.
7/25/1983	Tstm Wind	50 kts.	6/10/2003	Hail	1.75 in.	6/1/2008	Tstm Wind	52 kts.
8/3/1983	Tstm Wind	50 kts.	6/10/2003	Tstm Wind	52 kts.	7/4/2008	Hail	1.25 in.
8/10/1983	Tstm Wind	60 kts.	6/15/2003	Hail	0.75 in.	7/4/2008	Tstm Wind	52 kts.
5/14/1984	Tstm Wind	61 kts.	6/19/2003	Tstm Wind	61 kts.	8/8/2008	Tstm Wind	56 kts.
5/15/1984	Hail	1.00 in.	6/20/2003	Hail	0.75 in.	8/9/2008	Tstm Wind	52 kts.
5/15/1984	Tstm Wind	52 kts.	7/16/2003	Tstm Wind	55 kts.	5/4/2010	High Wind	51 kts.
8/24/1984	Tstm Wind	60 kts.	8/8/2003	Hail	0.75 in.	6/29/2010	High Wind	51 kts.
5/25/1985	Hail	1.50 in.	10/29/2003	High Wind	69 kts.	6/29/2010	Tstm Wind	54 kts.
5/28/1985	Hail	1.00 in.	5/8/2001	Tstm Wind	50 kts.	8/6/2010	Tstm Wind	60 kts.
6/20/1985	Tstm Wind	71 kts.	5/16/2001	High Wind	50 kts.			

Source: National Weather Service (NCDC, 2010)
Notes: Tstm = Thunderstorm; kts. = knots; in. = inches

The State of Montana's Multi-Hazard Mitigation Plan and Statewide Hazard Assessment (2010) reports that Cascade County ranks 6th among counties with the highest frequency of tornado, wind, and hail events. In addition, Cascade County ranks 9th in incidents of thunderstorm winds in excess of 75 mph. There have been no Presidential Disaster Declarations or State Disasters issued for the severe summer weather in Cascade County. Several noteworthy storms are listed below.

June 15, 1924 - Tornado injured seven people and destroyed three homes at a farming community northwest of Great Falls.

July 8, 2002 - A significant severe weather day for Central Montana. Extensive damage from tornados, strong wind gusts, and large hail associated with supercell thunderstorms. Severe thunderstorms were observed in five counties in Central Montana. The most impressive damage was from a microburst wind gust at Neihart, where a 1/4-mile swath of trees was sheared off. Confirmed tornados caused damage in parts of Fergus and Southern Blaine counties. Large hail up to 2.5 inches in diameter was reported in Judith Basin and Fergus counties. Several funnel clouds were also sighted in these areas.

Microburst near Neihart, July 2, 2002

Table 4.4-2 presents severe summer weather events in Cascade County with reported damages, injuries, or fatalities since 1960.

TABLE 4.4-2
CASCADE COUNTY SEVERE SUMMER STORM EVENTS WITH DAMAGES (~MAY-OCTOBER)

Date	Injuries	Fatalities	Property Damage	Crop Damage	Remarks
6/19/1960	0	0	$50	$0	Thunder And Hailstorm
5/10/1961	0	0	$208	$0	High Winds And Thunderstorms
5/30/1961	0	0	$106	$1,064	Thunder, Heavy Rain, Hail Storms
6/29/1961	0	0	$3,000	$1,064	High Wind, Hail, Heavy Rain, Tornado
6/29/1961	0	0	$500	$0	Tornado
7/6/1961	0	0	$0	$5,000	Thunderstorm, Heavy Rain, Hail
9/14/1963	2	0	$0	$0	High Wind
6/6/1964	0	1.2	$0	$0	Heavy Rain
7/2/1964	0	0	$0	$208	Hail, Thunderstorms
8/18/1964	0	0	$0	$208	Lightning
7/4/1964	2	0	$0	$0	Lightning
6/24/1965	0	0	$5,000	$0	Thunderstorm and Hail
7/29/1965	0	0	$0	$5,000	Hail And Wind
7/2/1966	0	0	$1,667	$166,667	Thunderstorms and Hail
7/3/1967	0	0	$50	$500	Hail and Rain
7/17/1968	0	0	$50	$50,000	Hail, Rain
7/19/1968	0	0	$172	$0	High Wind, Thunderstorms
8/4/1968	0	1	$0	$0	Wind
6/27/1970	0	0	$10,638	$10,638	Strong Winds, Hail
9/19/1971	0	0	$294	$0	Wind
10/11/1971	0	0	$556	$0	Wind
6/30/1973	0	0	$15	$152	Hail and Strong Winds
6/19/1974	0	0	$6,250	$6,250	Hailstorm
7/26/1974	0	0	$167	$0	High Winds
7/1/1975	0	0	$4,167	$4,167	Wind, Hail
7/15/1975	0	0	$5,000	$0	Wind
8/7/1975	0	0	$104	$1,042	Hail and Wind
6/3/1976	0	0	$5,000	$5,000	Hail, Wind
6/6/1976	0	0	$2,500	$250,000	Hail
6/10/1976	0	0	$25,000	$25,000	Hail
6/1/1977	0	0	$250,000	$0	Tornado
6/16/1977	0	0	$42	$4,167	Hail
7/3/1978	2	0	$250,000	$50,000	Tornado
8/22/1978	0	0	$12,500	$125,000	Hail, Wind
6/25/1980	0	0	$50,000	$0	Wind
5/21/1981	0	0	$333,333	$0	Heavy Rains
7/11/1981	0	0	$0	$166,667	Hail, Winds
8/19/1981	0	0	$50,000	$0	Wind
6/28/1982	0	0	$50,000	$500,000	Hail/Rain
5/25/1985	0	0	$500	$50,000	Hail
6/20/1985	0.02	0	$1,163	$1,163	Hail/Wind
5/12/1987	0.2	0.2	$10	$10	High Wind
7/5/1988	0	0	$250,000	$0	Tornado
7/2/1990	0	0	$5,000	$50,000	Thunderstorm Winds
7/2/1990	1	0	$5,000,000	$500,000	Hail, Thunderstorm Winds
10/16/1991	0	0	$102,041	$0	Wind
8/2/1992	0	0	$500	$50,000	Hail
5/15/1994	0	0	$500,000	$0	Thunderstorm Winds
5/27/1994	0	0	$500,000	$0	Thunderstorm Winds

TABLE 4.4-2
CASCADE COUNTY SEVERE SUMMER STORM EVENTS WITH DAMAGES (~MAY-OCTOBER)

Date	Injuries	Fatalities	Property Damage	Crop Damage	Remarks
6/26/1994	0	0	$4,167	$0	High Winds
6/15/1996	0	0	$2,000	$0	Hail
7/3/1998	0	0	$28,000	$0	Tornado
7/10/1998	0	0	$5,000	$0	Thunderstorm Wind/Hail
9/19/1998	0	0	$1,000	$0	Thunderstorm Wind
10/31/1999	0	0	$200,000	$0	High Wind
4/27/2003	0	0	$20,000	$0	Strong Wind
6/15/2003	0	0	$0	$1,000	Hail
6/19/2003	0	0	$60,000	$0	Severe Thunder Storm - Wind
8/8/2003	0	0	$5,000	$0	Severe Thunder Storm - Wind
6/6/2004	0	0	$2,000	$0	Hail
6/29/2004	1	0	$10,000	$0	Lightning
8/4/2004	1	0	$0	$0	Hail
4/29/2008	0	0	$3,000	$0	Thunderstorm Wind
TOTAL	**9.22**	**2.4**	**$10,762,750**	**$2,029,965**	

Source: SHELDUS, 2010 (adjusted to 2009 dollars); National Weather Service (NCDC, 2010)

Note: Often casualties and damage information are listed without sufficient spatial reference. In order to assign the damage amount to a specific county, the fatalities, injuries and dollar losses were divided by the number of counties affected from this event.

Vulnerability and Area of Impact

According to FEMA's wind zone classifications (http://www.fema.gov/plan/prevent/saferoom/tsfs02_wind_zones.shtm), the entire county is in Zone II (160 mph Design Wind Speeds) with a "special wind region" designated to include the City of Great Falls and areas to the north. Based on review of historic weather data, the entire project area has been classified with a uniform risk for severe summer weather events and the entire building stock and population of Cascade County is at risk. Structures, utilities, and vehicles are most at risk from the wind component of these storms, with crops and livestock being additionally threatened by hail. Mostly likely, though, only isolated areas would be affected by these types of storms rather than encompassing the entire county. Annualized loss estimates are presented in the Risk Assessment Summary Tables in *Section 4.10* (**Table 4.10-1 through Table 4.10-5**). The *Severe Summer Weather Section* in **Appendix C** presents additional information from the risk assessment.

Probability and Hazard Magnitude

Windstorms and microbursts affect areas with significant tree stands, as well as areas with exposed property, major infrastructure, and aboveground utility lines. Severe hailstorms can also cause considerable damage to buildings and automobiles, but rarely result in loss of life. Nationally, hailstorms cause nearly $1 billion in property and crop damage annually, as peak activity coincides with peak agricultural seasons.

As of February 1, 2007, the NWS began using the Enhanced Fujita Scale for Tornado damage. The Enhanced F-scale is a set of wind estimates based on damage. It uses three-second gusts estimated at the point of damage based on a judgment of eight levels of damage to 28 indicators that vary with height and exposure. Generally tornadoes in north-central Montana do not exceed EF2 ratings.

The history of thunderstorm, wind, hail, microburst and/or tornado events in Cascade County indicate that they occur more than once per year. Therefore, the probability of this hazard occurring in the future is rated as "highly likely".

Future Development

The State of Montana has adopted the 2009 International Building Code which stipulates that buildings throughout the state must be constructed to withstand a constant velocity of 75 mph and three second gusts of 90 mph. The City of Great Falls requires permits and inspections to ensure the codes are followed. Cascade County has no building department and has therefore, not adopted a building code or other regulations stipulating construction that would lessen the impact of severe summer weather beyond the State of Montana codes.

4.5 HAZARDOUS MATERIAL INCIDENTS

CPRI SCORE = 3.05

Description and History

A hazardous material release is the contamination of the environment (i.e. air, water, soil) by any material that because of its quantity, concentration, or physical or chemical characteristics threatens human health, the environment, or property. Hazardous materials, including petroleum products and agricultural chemicals, are commonly stored and used in Cascade County and are regularly transported via the regions roadways, railroads, and pipelines. A release of hazardous materials from both fixed and transportation incidents pose possible threats to the county. Hazards range from small spills on roadways to major transportation releases on railways. Illegal methamphetamine operations have also become a concern.

Records of hazardous material events, available from the National Response Center (NRC) database are summarized in **Table 4.5-1.**

TABLE 4.5-1
CASCADE COUNTY HAZARDOUS MATERIAL INCIDENTS

Incident Date	Type Of Incident	Incident Cause	Location	Nearest City	Suspected Responsible Company	Medium Affected	Material Name
10/31/1990	Fixed	Unknown	Vaughn Radio Site	Vaughn	US West	Subsurface	Oil: Diesel
2/27/1991	Mobile	Equipment Failure	Building 245 1st Ave.	Malmstrom AFB	U.S. Air Force	Land	Jet Fuel: Jp-4
5/1/1991	Mobile	Equipment Failure	Malmstrom AFB	Malmstrom AFB	U.S. Air Force	Land	Hydraulic Oil
7/8/1991	Fixed	Operator Error	Bldg 145	Malmstrom AFB	U.S. Air Force	Air	Halon
8/16/1991	Mobile	Transport Accident	Commercial Gate	Malmstrom AFB	Consol. Freightways	Unknown	Oil: Diesel
8/27/1991	Fixed	Unknown	Ryan Dam	Great Falls	Montana Power Co	Water	Oil: Diesel
12/5/1991	Aircraft	Equipment Failure	352 Degrees	Malmstrom AFB	U.S. Air Force	Air	Jet Fuel: Jp-4
1/22/1993	Pipeline	Unknown	1209 6th Ave South	Great Falls	Great Falls Gas Co	Air	Natural Gas
7/28/1993	Fixed	Equipment Failure	43rd St & 10th Ave S.	Great Falls	Montana Power Co	Land	PCBs
2/20/1994	Pipeline	Operator Error	1700 11th Ave South	Great Falls	Great Falls Gas Co.	Air	Natural Gas
4/10/1994	Fixed	Dumping	Gibson Flats Road	Great Falls	NW Equipment	Water	Diesel; Batteries; Waste Oil/Lubricants
5/5/1994	Fixed	Unknown	1900 10th St	Great Falls	MT Refining Co	Land	Hydrochloric Acid
6/2/1994	Fixed	Equipment Failure	166 Ryan Loop	Great Falls	MT Power Co	Water	Hydraulic Oil
7/21/1994	Fixed	Unknown	9th No./ Smelter Ave.	Great Falls	Montana Refinery	Air	Unknown Material
7/26/1994	Fixed	Operator Error	36 Rainbow Dam Rd	Great Falls	MT Power Co	Water	Hydraulic Oil
7/29/1994	Fixed	Unknown	Smelter Ave	Great Falls	Montana Refining	Air	Unknown Material
8/18/1994	Fixed	Equipment Failure	Ryan Power House	Great Falls	MT Power Co	Water	Oil, Misc: Lubricating
2/8/1995	Fixed	Equipment Failure	Malmstrom AFB Bldg	Malmstrom AFB	U.S. Air Force	Unknown	--
2/28/1995	Fixed	Unknown	312 3rd Ave South	Great Falls	Meadow Gold Dairy	Water	--
4/4/1995	Unknown Sheen	Unknown	10th St Bridge	Great Falls		Water	Unknown Oil
5/10/1995	Fixed	Other	2929 10th Ave South	Great Falls	Pro Lube	Land	Dextron; Motor Oil
5/31/1995	Unknown Sheen	Equipment Failure	Malmstrom AFB	Malmstrom AFB	U.S. Air Force	Land	Jet Fuel: JP-4
7/17/1995	Fixed	Dumping	1707 5.5 Ave South	Great Falls	--	Land	Sulfadiazine; Benzalkonium Chloride; Aspirin
9/8/1995	Unknown Sheen	Other	1900 10th St NE	--	--	Land	Ethylene Glycol
12/14/1995	Mobile	Operator Error	Malmstrom AFB	Malmstrom AFB	U.S. Air Force	Land	Oil: Diesel
4/5/1996	Unknown Sheen	Dumping	Bay Drive on Missouri	Great Falls	Cenex	Water	Unknown Material
5/17/1996	Fixed	Operator Error	1900 10th St	Great Falls	Montana Refining	Water	Sulfuric Acid

TABLE 4.5-1
CASCADE COUNTY HAZARDOUS MATERIAL INCIDENTS

Incident Date	Type Of Incident	Incident Cause	Location	Nearest City	Suspected Responsible Company	Medium Affected	Material Name
6/12/1996	Mobile	Unknown	GF Intl Airport	Great Falls	Northwest Airlines	Land	Jet Fuel: JP-4
7/8/1996	Fixed	Other	166 Ryan Loop	Great Falls	MT Power Co	Water	Hydraulic oil; gasoline
11/29/1996	Fixed	Equipment Failure	336 Rainbow Dam Rd	Great Falls	MT Power Co	Water	Governor Oil
1/29/1997	Railroad	Other	MM 154.3	Cascade	BNSF Railroad	Land	Oil, Fuel: No. 2-D
8/22/1997	Fixed	Equipment Failure	6200 3rd Ave South	Great Falls	FAA	Land	Oil: Diesel
9/17/1997	Fixed	Unknown	336 Rainbow Dam Rd	Great Falls	MT Power Co	Water	Oil, Misc: Lubricating
4/9/1998	Fixed	Unknown	152 Doc Russell Rd	Fort Shaw	Independent Farmer	Air	Ammonia, Anhydrous
6/6/1998	Unknown Sheen	Dumping	I-15, MM 279	Great Falls	--	Land	Mystery Barrel
8/31/1998	Mobile	Operator Error	I-15 Near MM:282	Great Falls	Watkins Sheppard	Land	Oil: Diesel
4/8/1999	Fixed	Unknown	312 3rd Ave South	Great Falls	Meadow Gold Dairy	Air	Ammonia, Anhydrous
11/19/1999	Fixed	Unknown	1900 10th St NE	Great Falls	Montana Refining	Air	Gasoline; Diesel Oil
2/6/2000	Fixed	Operator Error	I-15, Exit 277	Great Falls	Pop In Conoco	Soil	Oil: Diesel
3/10/2000	Fixed	Operator Error	Cenex Bulk Plant	Power	Cenex Transportation	Other	Oil: Diesel
8/2/2000	Pipeline	Unknown	Milepost 30.5	Great Falls	Conoco	Land	Gasoline
8/24/2000	Fixed	Unknown	44 Bald Eagle Drive	Cascade	--	Other	--
5/12/2001	Fixed	Unknown	East Of 10 St Bridge	Great Falls	--	Water	Unknown Material
1/6/2002	Fixed	Other	1300 River Drive No.	Great Falls	MT Power Co	Water	Non PCB Dielectric Oil
6/17/2002	Storage Tank	Equipment Failure	North of Vaughn	Vaughn	Red Sky Co.	Water	Oil: Diesel
6/18/2002	Storage Tank	Equipment Failure	Sun River Backwaters	Vaughn	--	Water	Oil: Diesel
5/5/2003	Mobile	Equipment Failure	5001 49th St. SW	Great Falls	IRS	Land	Pavement Oil
6/2/2003	Storage Tank	Other	1900 10th St. NE	Great Falls	Montana Refining	Water	Slop Oil
8/31/2003	Storage Tank	Unknown	1700 52nd St N	Great Falls	Mtn View Fertilizer	Air	Propane
9/25/2003	Fixed	Equipment Failure	1900 10th St. NE	Great Falls	Montana Refining	Air	NO; NO_2
10/28/2003	Storage Tank	Equipment Failure	1301 20th St. So.	Great Falls	MSU-GF	Air	Chlorine
2/26/2004	Mobile	Operator Error	341 CES/DEV	Malmstrom AFB	Talcott Const.	Land	Transformer OIl
5/31/2004	Fixed	Equipment Failure	1900 10th St. NE	Great Falls	Montana Refining	Air	NO; NO_2
4/6/2005	Aircraft	Equipment Failure	Malmstrom AFB	Great Falls	US Air Force	Land	Hydrazine
5/9/2005	Pipeline	Equipment Failure	Section 11	Great Falls	Conoco Phillips	Water	Hyrdo Test Water; Crude Oil
8/21/2005	Fixed	Equipment Failure	1600 6th Street NE	Great Falls	Veolia Water NA	Land	PCBs; Other Oil
9/16/2006	Mobile	Equipment Failure	76th St/Goddard Dr	Malmstrom AFB	U.S. Air Force	Water	Gasoline
10/21/2006	Storage Tank	Operator Error	1900 10th St. NE	Great Balls	Montana Refining	Other	Caustic
12/7/2006	Fixed	Operator Error	Missouri River	Great Falls	PPL Montana	Water	Hydraulic Oil
12/9/2006	Fixed	Equipment Failure	Cochrane Hydro Plant	Great Falls	PPL Montana	Water	Hydraulic Oil
5/10/2007	Aircraft	Equipment Failure	2800 Airport Ave B	Great Falls	Air National Guard	Other	Jet Fuel: JP-8
5/18/2007	Aircraft	Explosion	341st CES/DEV 39 78th St North	Malmstrom AFB	U.S. Air Force	Land	Jet A Fuel; Hydraulic Oil; Diesel Oil
10/6/2007	Fixed	Dumping	8 25th Street South	Great Falls	Superior Autobody	Other	Sanding/Sump Water
12/21/2007	Fixed	Unknown	Cochrane Dam	Great Falls	Spooner Const.	Water	Vegetable Oil
12/26/2007	Mobile	Transport Accident	6 Miles N. GF, Hwy 87	Great Falls	Dixon Brothers Inc	Land	Oil, Fuel: No. 2-D
1/19/2009	Storage Tank	Equipment Failure	1900 10th St. NE	Great Falls	Montana Refining	Other	Gas Oil / Asphalt
1/20/2009	Railroad	Operator Error	1900 10th St. NE	Great Falls	Montana Refining	Soil	Asphalt
11/24/2009	Fixed	Equipment Failure	Rainbow Dam Road	Great Falls	Walsh Construction	Water	Gasoline
2/16/2010	Storage Tank	Other	Rainbow Dam	Great Falls	Walsh Construction	Water	Diesel; Waste Water
6/28/2010	Fixed	Equipment Failure	6720 Rainbow Dam Rd	Great Falls	Walsh Construction	Water	Hydraulic Oil
7/12/2010	Fixed	Equipment Failure	6720 Rainbow Dam Rd	Great Falls	Walsh Construction	Water	Hydraulic Oil

Source: National Response Center, 2010

The Montana Department of Justice maintains a list of clandestine methamphetamine drug laboratory sites. Drug lab sites in Cascade County are listed in **Table 4.5-2**. Methamphetamine labs typically require a hazardous material response.

TABLE 4.5-2 METHAMPHETAMINE LABORATORY SITES IN CASCADE COUNTY					
Date	**City**	**Address**	**Date**	**City**	**Address**
11/21/1999	Great Falls	818 3rd Ave N	7/17/2002	Great Falls	10 29th St NW
12/6/2000	Great Falls	2521 7th Ave N	11/25/2002	Great Falls	46 Fields Rd
2/15/2001	Stockett	11 Burrell Ave	1/22/2003	Great Falls	38 White Ln
3/20/2001	Great Falls	2319 14th Ave S # 10	1/23/2003	Great Falls	1401 4th Ave NW
3/20/2001	Great Falls	2325 14th Ave S #48	3/4/2003	Great Falls	5405 Lower River Rd #111
4/23/2001	Great Falls	25 Golden Valley Lp	3/31/2003	Black Eagle	1717 Smelter Ave NE
5/8/2001	Cascade	170 Upper Sawmill Creek Rd	4/23/2003	Great Falls	612 11th St N
5/27/2001	Great Falls	418 5th Ave N Apt #9	8/20/2003	Great Falls	1600 20th Ave S
11/4/2001	Great Falls	908 5th Ave S	7/22/2004	Great Falls	614 12th St N
11/6/2001	Great Falls	10 19th St S	8/18/2004	Great Falls	520 2nd Ave S # 46
11/9/2001	Great Falls	4727 2nd Ave N #5	11/10/2004	Great Falls	1008 7th Ave S
11/11/2001	Ulm	33 Ulm Vaughn Rd	3/23/2007	Great Falls	1302 24th St S Apt #2
12/21/2001	Great Falls	417 5th Ave N	5/30/2007	Belt	166 Castner St
2/14/2002	Great Falls	2226 Central Ave W #26	8/3/2007	Great Falls	2611 Upper River Rd #13
2/20/2002	Great Falls	911 3rd Ave NW	7/23/2010	Fort Shaw	150 Hale St
4/1/2002	Great Falls	4400 10th Ave S			

Source: Montana Dept. Justice (http://svc.mt.gov/deq/methquery/)

The U.S. Environmental Protection Agency (EPA) maintains the Toxics Release Inventory (TRI) of facilities that have released contaminants to the environment. TRI listings for Cascade County are presented in **Table 4.5-3**.

TABLE 4.5-3 TOXICS RELEASE INVENTORY FOR 2010				
Facility Name and City/Town	**Total On-site Disposal (pounds)**	**Total Off-site Disposal (pounds)**	**Total On- & Off-site Disposal (pounds)**	**Chemicals/ Compounds Released**
U.S. Air Force Malmstrom AFB	4,658	52	4,710	lead compounds
Montana Refining Co Inc., Great Falls	195,913	128	196,041	ammonia, benzene, glycol ethers, cumene, cyclohexane, ethylbenzene, ethyene, hydrogen fluoride, lead, mercury, n-hexane, naphthalene, polycyclic aromatic compounds, propylene, toluene, xylene

Source: Envirofacts (http://www.epa.gov/enviro/html/tris/tris_query.html)

According to the Montana State Hazard Mitigation Plan (2010), Cascade County had the 4th and 5th largest hazardous material spills from a fixed facility between 1997 and 2006. These involved a diesel spill in 2002 and a fuel oil spill in 1999. The City of Great Falls had the 12th largest haz-mat spill during this period which involved a crude oil spill in 2002.

In addition to the TRI facilities listed in **Table 4.5-3**, commercial storage of chemical/petroleum products in Cascade County includes: Agri-Basics, Wilbur Ellis, and the Conoco-Phillips Terminal. These facilities were included in the PDM analysis for hazardous material incidents.

Vulnerability and Area of Impact

The volume and type of hazardous materials that flow into, are stored, and flow through communities will determine exposure to a potential release of hazardous materials. An accidental or intentional release of materials could produce a health hazard to those in the immediate area, downwind, and/or downstream.

The Emergency Planning and Community Right-to-Know Act (EPCRA) was enacted in 1986 to inform communities and citizens of chemical hazards in their areas. Sections 311 and 312 of EPCRA require businesses to report the locations and quantities of chemicals stored on-site to state and local governments in order to help communities prepare to respond to chemical spills and similar emergencies. EPCRA Section 313 requires the U.S. EPA and the States to annually collect data on releases and transfers of certain toxic chemicals from industrial facilities, and make the data available to the public in the Toxics Release Inventory. In 1990 Congress passed the Pollution Prevention Act which required that additional data on waste management and source reduction activities be reported under TRI. The goal of TRI is to empower citizens, through information, to hold companies and local governments accountable in terms of how toxic chemicals are managed. Two facilities in Cascade County are listed in the TRI Inventory; Malmstrom Air Force Base and Montana Refining Company (**Table 4.5-3**).

To model the spatial distribution of hazardous material incident risk a GIS data layer of transportation arteries was used, which included highways, major roadways, railroads, and pipelines. Facilities where large quantities of hazardous materials or petroleum products are stored in the county were added to this layer and it was then buffered by 0.25 miles. **Figures 5a and 5b** present the hazardous material buffer in the county and for the City of Great Falls, respectively. The hazardous material buffer was intersected with the critical facility and MDOR parcel datasets to determine exposure. Population exposure was calculated by the percent of the hazardous material buffer in each census block. **Table 4.5-4** presents the results of the hazardous material vulnerability analysis.

The GIS analysis indicates that there are over 153,443 acres of the county in the hazardous material buffer including 13,317 residences, 4,931 commercial, industrial and agricultural buildings, and 138 critical facilities. The *Hazardous Material Incident Section* in **Appendix C** presents the critical facilities in the hazardous material buffer and other supporting documentation from the vulnerability analysis.

Probability and Magnitude

Hazardous materials incidents can cause death, serious injury, long-lasting health effects, and damage to buildings, homes, and other property. The magnitude of the hazard is often expressed as a percentage of property damage caused by the incident. Little data is available documenting property loss from hazardous material incidents in Cascade County.

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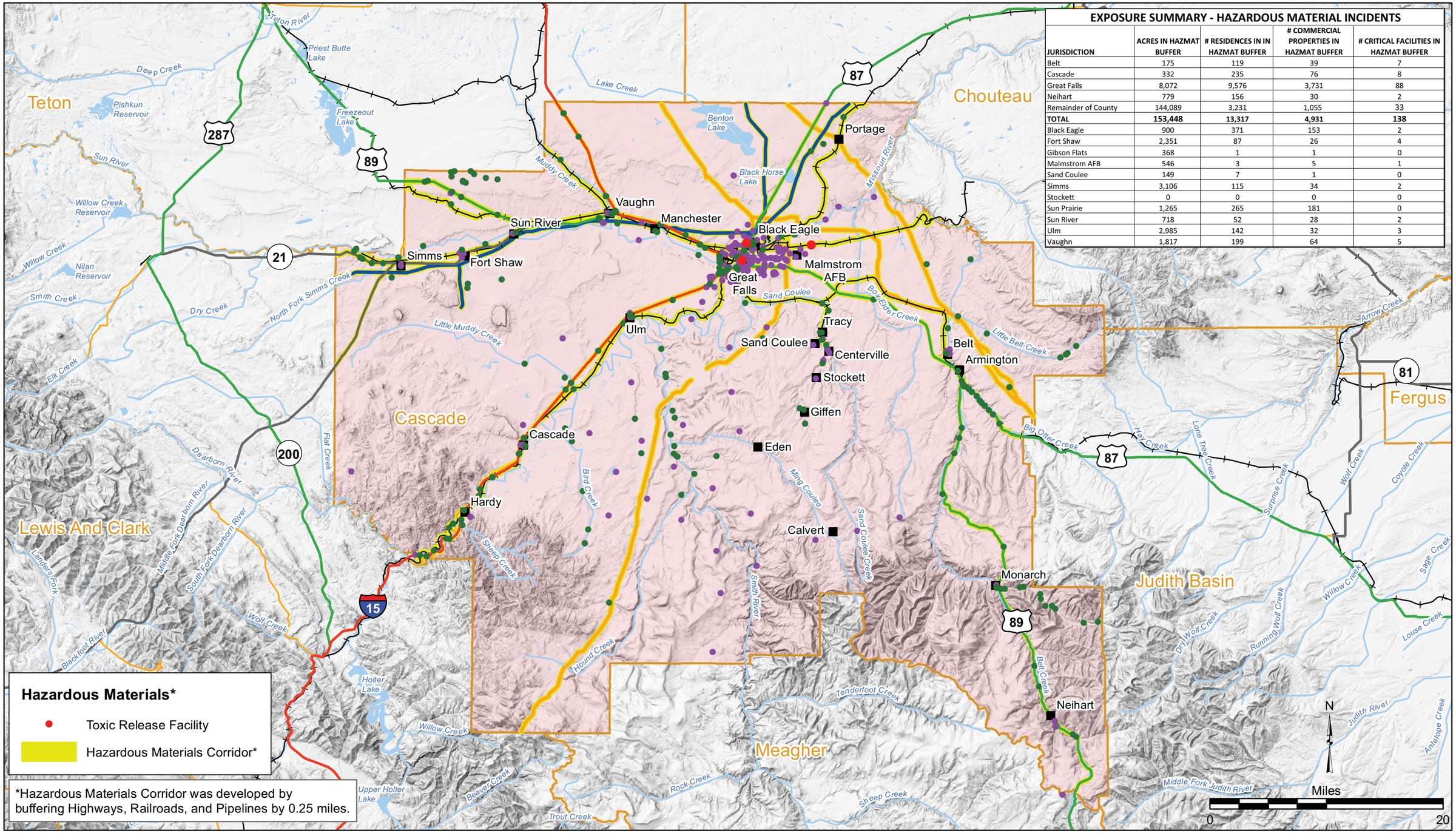

EXPOSURE SUMMARY - HAZARDOUS MATERIAL INCIDENTS

JURISDICTION	ACRES IN HAZMAT BUFFER	# RESIDENCES IN IN HAZMAT BUFFER	# COMMERCIAL PROPERTIES IN HAZMAT BUFFER	# CRITICAL FACILITIES IN HAZMAT BUFFER
Belt	175	119	39	7
Cascade	332	235	76	8
Great Falls	8,072	9,576	3,731	88
Neihart	779	156	30	2
Remainder of County	144,089	3,231	1,055	33
TOTAL	**153,448**	**13,317**	**4,931**	**138**
Black Eagle	900	371	153	2
Fort Shaw	2,351	87	26	4
Gibson Flats	368	1	1	0
Malmstrom AFB	546	3	5	1
Sand Coulee	149	7	1	0
Simms	3,106	115	34	2
Stockett	0	0	0	0
Sun Prairie	1,265	265	181	0
Sun River	718	52	28	2
Ulm	2,985	142	32	3
Vaughn	1,817	199	64	5

- Critical Facilities
- Bridges
- Place Names
- River/Stream
- Lake/Reservoir
- County Boundary
- Interstate
- U.S. Highway
- Montana Highway
- Rail
- Gas Transmission Pipeline
- Hazardous Liquid Pipeline

May 2011

Figure 5A

Hazardous Materials Buffer

Cascade County, Montana

Pre-Disaster Mitigation Plan

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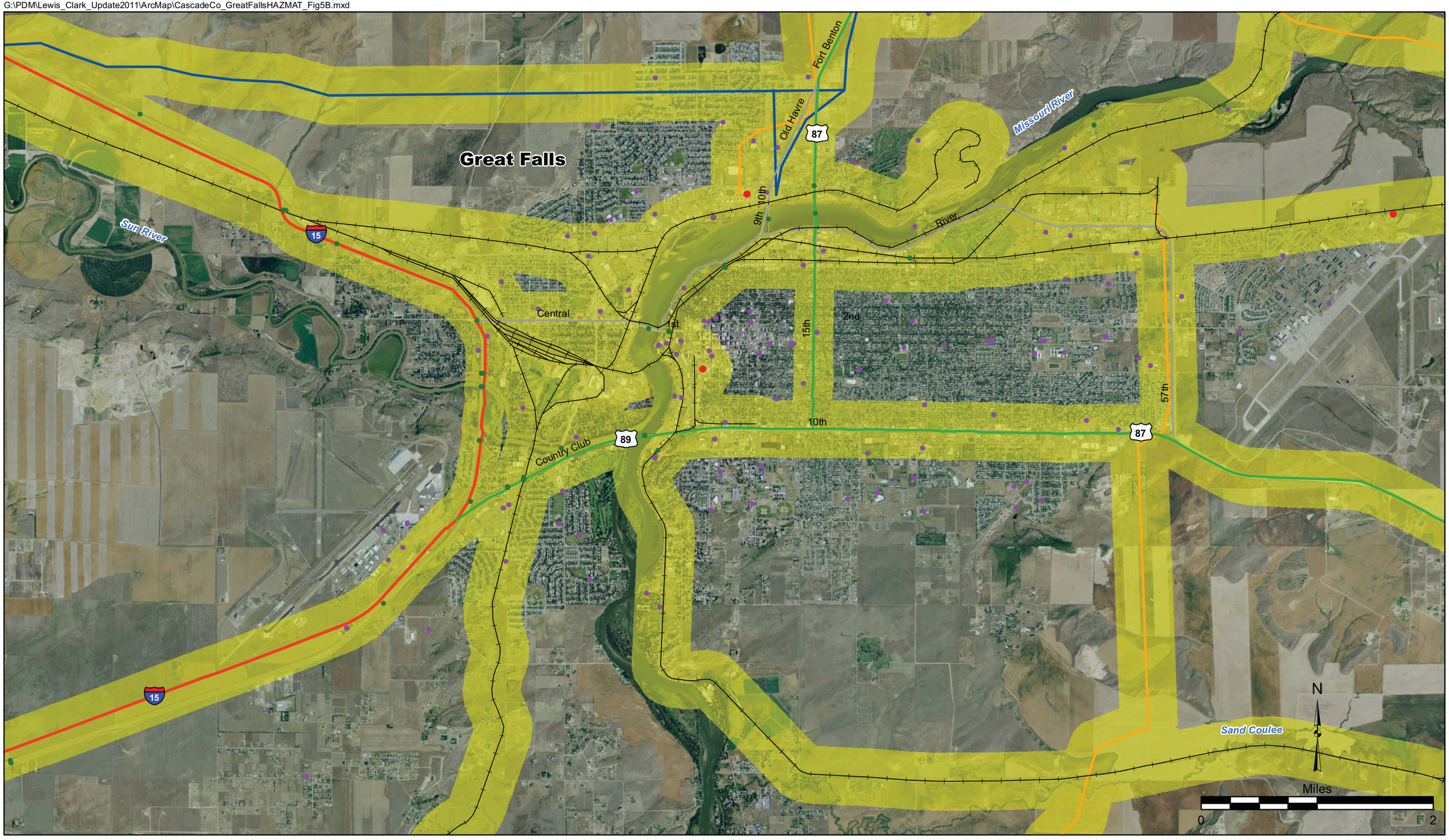

Critical Facilities
Bridges
Toxic Release Facility
Hazardous Materials Corridor
Rail
Interstate
U.S. Highway
Montana Highway
Other Highway
Gas Transmission Pipeline
Hazardous Liquid Pipeline

May 2011

Figure 5B

Great Falls Hazardous Materials Buffer

Cascade County, Montana

Pre-Disaster Mitigation Plan

TABLE 4.5-4
CASCADE COUNTY VULNERABILITY ANALYSIS - HAZARDOUS MATERIAL INCIDENTS

JURISDICTION	RESIDENTIAL PROPERTY HAZMAT EXPOSURE $	# RESIDENCES AT RISK	COMMERCIAL , INDUSTRIAL & AGRICULTURAL BUILDING HAZMAT EXPOSURE $	# COMMERCIAL, INDUSTRIAL & AGRICULTURAL BUILDINGS AT RISK	CRITICAL FACILITIES EXPOSURE RISK $	# CRITICAL FACILITIES AT RISK	POPULATION AT RISK	PERSONS UNDER 18 AT RISK
Incorporated Communities & County								
Belt	$9,695,700	119	$4,249,098	39	$4,394,466	7	515	127
Cascade	$22,517,751	235	$10,051,395	76	$5,082,755	8	685	151
Great Falls	$1,152,783,373	9,576	$2,640,876,194	3,731	$175,718,086	88	35,602	8,093
Neihart	$12,270,437	156	$1,380,023	30	$827,000	2	51	1
Remainder of County	$420,082,605	$3,231	$122,729,395	1,055	$53,058,830	33	14,176	3,343
CENSUS Designated Places								
Black Eagle	$27,838,188	371	$33,272,642	153	$775,000	2	851	161
Fort Shaw	$9,391,638	87	$1,716,542	26	$1,367,352	4	280	86
Gibson Flats	$56,951	1	$3,987	1	$0	0	102	26
Malmstrom AFB	$228,040	3	$2,808,898	5	$5,675,000	1	1,848	689
Sand Coulee	$1,485,091	7	$1,208	1	$0	0	132	29
Simms	$11,107,273	115	$1,795,051	34	$2,001,713	2	330	65
Stockett	$0	0	$0	0	$0	0	0	0
Sun Prairie	$27,236,835	265	$7,786,530	181	$0	0	1,365	317
Sun River	$3,874,897	52	$902,151	28	$1,146,913	2	121	27
Ulm	$17,843,779	142	$2,847,683	32	$1,059,414	3	586	131
Vaughn	$23,925,052	199	$3,400,494	64	$1,066,145	5	658	149
CENSUS County Divisions								
Belt	$54,675,693	376	$6,618,398	90	$4,394,466	7	1,556	347
Cascade	$80,582,695	590	$13,240,730	124	$5,152,755	9	1,421	260
Eden-Stockett	$16,374,488	143	$454,287	18	$2,102,224	3	703	159
Great Falls	$1,281,525,084	10,369	$2,641,203,254	3,928	$213,246,689	96	41,620	9,677
Great Falls North	$76,847,349	835	$101,938,937	521	$7,685,881	6	3,036	675
Monarch-Neihart	$34,948,482	358	$2,412,521	52	$897,000	3	223	28
Sun River Valley	$72,396,075	646	$13,417,978	198	$5,602,122	14	2,470	569

The history of hazardous material events in Cascade County over the past 20 years indicates 70 incidents have occurred. Therefore, the probability of future events is rated as "highly likely".

Future Development

The U.S. Department of Transportation regulates the ways in which non-radioactive hazardous materials can be transported. Currently, there are no designated HAZMAT routes in central Montana. So, these materials can be transported through Great Falls and Cascade County with few restrictions. (City of Great Falls Growth Policy)

There are no land use regulations that restrict building around industrial facilities, along transportation routes, or in the vicinity of facilities which store large quantities of hazardous materials/petroleum products.

4.6 TRANSPORTATION ACCIDENTS (HIGHWAY, RAILROAD, AIR)

CPRI SCORE = 2.95

Description and History

HIGHWAY ACCIDENTS

According to the Cascade County Growth Policy, approximately 104,000 passenger automobiles and trucks are registered in the county. These travel on approximately 1,700 miles of county-maintained roads, which are the secondary highways and light-duty roads, and approximately 375 miles of state-maintained highways, which are primary highways including Interstate 15 and its frontage roads. Approximately 30 interstate carriers serve Great Falls providing a wide spectrum of service to and from everywhere in the United States and Canada.

The source and location of transportation accidents vary but the response is typically the same. Response is focused on determining the presence of hazardous materials and then assisting the injured. Statistics on highway accidents in Cascade County over the past 10 years were provided by the Montana Highway Patrol, and are presented in **Table 4.6-1**. Information is not available on whether these incidents involved a hazardous material response.

TABLE 4.6-1
CASCADE COUNTY HIGHWAY ACCIDENT STATISTICS; 3/2001-3/2011

Number of Accidents	Fatalities	Injuries	# Involving Property Damage	Total Property Damage (Aprox)
22,809	135	14,758	2,377	$1,342,850

Sources: Montana Highway Patrol, 2011

RAILROAD ACCIDENTS

The Burlington Northern-Santa Fe Railroad (BNSF) provides freight service to Cascade County. BNSF's rails extend northwest from Laurel to Shelby. BNSF also maintains trackage from Great Falls to Choteau. Rail service accounts for the second-highest volume of freight movement behind trucks. Agricultural products and supplies account for most of the freight shipped from the area. A large percentage of the large, bulk incoming manufactured products and lumber are moved by rail as well.

There are about a dozen at-grade railroad crossings in the area. Most of the principal and minor arterials have bridges to cross over or under the rail lines so there are few safety hazards, delays, or other conflicts between the trains and motor vehicles. The frequency and length of trains using the at-grade crossings have not historically caused significant delays, hazards or other problems for drivers. **Table 4.6-2** presents statistics on accidents at railroad crossings in Cascade County. **Table 4.6-3** presents statistics from the Federal Railroad Administration on railroad collisions and derailments.

TABLE 4.6-2
ACCIDENTS AT RAILROAD CROSSINGS IN CASCADE COUNTY

Date	Road Name	Fatalities	Injuries	Date	Road Name	Fatalities	Injuries
2-Mar 1976	County Road, GF	0	0	31-Aug 1988	Sun Prairie Rd	0	0
22-Mar 1976	14th Street Crossing, GF	0	0	5-Jan 1989	FAS 5205, GF	0	0
13-Apr 1976	Armington	0	0	21-Apr 1990	Fisher	0	0
14-May 1976	Private Farm Crossing	0	0	10-May 1992	Pelican Point	0	1
24-May 1976	Private	0	0	9-Jan 1993	Mill Line, GF	0	0
31-Oct 1976	6th St NW, GF	0	0	6-Aug 1993	Private-Lumber Yard	0	0
30-Jan 1977	18th Ave SW, GF	1	2	24-Nov 1993	Bay Drive, GF	0	0
25-Apr 1977	Central Ave, GF	0	0	7-Jan 1995	11th Street, GF	0	0
10-Jan 1978	Ayrshire, GF Yard	0	0	23-May 1995	1st Avenue SW, GF	0	0
19-Jan 1978	Private	0	0	4-Feb 1996	14th St North, GF	0	0
24-Jan 1978	Private	0	0	22-Jun 1996	Sand Coulee St, GF	0	1
11-Aug 1978	Private Anaconda	0	0	11-Jan 1997	13th St. North, GF	0	0
19-Oct 1978	Private - Fields	0	3	11-Jun 1998	11th Street	0	0
30-Apr 1979	Central Avenue, GF	0	0	15-Nov 1998	FAS 227	2	0
10-May 1979	3rd St & Central Ave W	0	0	9-Jul 1999	74 - 105, GF	0	0
26-Dec 1979	Private Carpet Barn	0	0	14-Feb 2002	GF Wastewater Plant	0	0
3-Jan 1980	10th St, GF	0	0	7-Nov 2003	Wagon Lane	1	0
21-Dec 1980	Gerber	0	2	9-Dec 2003	Bat Drive	0	1
23-Dec 1980	Private-Carpet Barn	0	0	3-Feb 2004	9th Avenue, GF	0	0
23-Dec 1981	15th St, GF	0	0	18-Oct 2005	9th Street N, GF	0	0
14-Jun 1981	6th St, GF	0	0	27-Dec 2005	Gibson Flats Rd	0	1
19-Apr 1982	Ayrshire Rd	0	0	24-Aug 2008	Private Xing	0	0
4-Feb 1983	Circle K	2	0	4-Nov 2009	Armington	0	0
17-Jan 1984	BN Drive, GF	0	0	9-Dec 2003	Bat Drive	0	1
10-Sep 1984	Private-21st Street	0	0	3-Feb 2004	9th Avenue, GF	0	0
27-Sep 1984	Armington Road	0	0	18-Oct 2005	9th Street N, GF	0	0
25-Jan 1985	Private	0	0	27-Dec 2005	Gibson Flats Rd	0	1
13-Sep 1986	15th Street N., GF	0	0	24-Aug 2008	Private Xing	0	0
8-Feb 1988	15th Street, GF	0	0	4-Nov 2009	Armington	0	0
12-Mar 1988	Hwy 330	0	0	**TOTAL**		**6**	**13**

Source: Federal Railroad Administration, 2011; http://safetydata.fra.dot.gov/OfficeofSafety/publicsite/Query/gxrabbr.aspx

TABLE 4.6-3
RAILROAD ACCIDENTS IN CASCADE COUNTY

Date	RR	Type	Accident	Cars	F	I	Date	RR	Type	Accident	Cars	F	I
11/8/1975	CP	Freight Train	Derailment	7	0	0	10/10/1992	BNSF	Freight Train	Derailment	8	0	0
5/20/1976	CP	Yard/Switching	Collision	0	0	0	1/31/1993	BNSF	Light Loco(S)	Other	0	0	0
8/29/1976	CP	Freight Train	Derailment	5	0	0	4/23/1993	BNSF	Freight Train	Derailment	6	0	0
9/1/1976	CP	Freight Train	Derailment	7	0	0	10/16/1993	BNSF	Freight Train	Derailment	5	0	0
11/26/1976	BNSF	Freight Train	Derailment	24	2	10	11/121993	BNSF	Freight Train	Derailment	12	0	0
1/4/1977	BNSF	Freight Train	Derailment	0	0	0	6/12/1994	BNSF	Yard/Switching	Derailment	1	0	0
12/21/1977	CP	Yard/Switching	Derailment	2	0	0	9/13/1994	BNSF	Freight Train	Derailment	5	0	0
1/30/1978	BNSF	Freight Train	Other	0	0	0	10/6/1995	BNSF	Freight Train	Derailment	2	0	0
3/17/1978	BNSF	Single Car	Collision	0	0	0	2/8/1996	BNSF	Yard/Switching	Derailment	9	0	0
6/27/1978	BNSF	Cut of Cars	Other	2	0	0	4/3/1996	BNSF	Yard/Switching	Derailment	8	0	0
9/6/1978	CP	Yard/Switching	Derailment	4	0	0	4/18/1996	BNSF	Freight Train	Derailment	3	0	0
11/18/1978	BNSF	Freight Train	Derailment	5	0	0	5/23/1996	BNSF	Freight Train	Derailment	5	0	0
12/21/1978	BNSF	Yard/Switching	Collision	0	0	0	5/27/1996	BNSF	Freight Train	Derailment	3	0	0
1/25/1979	BNSF	Freight Train	Derailment	1	0	0	11/10/1996	BNSF	Yard/Switching	Derailment	24	0	0
1/29/1979	BNSF	Freight Train	Derailment	3	0	0	8/20/1997	BNSF	Freight Train	Derailment	4	0	0
7/6/1979	BNSF	Freight Train	Derailment	1	0	0	9/24/1997	BNSF	Freight Train	Derailment	3	0	0
8/13/1979	CP	Freight Train	Derailment	2	0	0	1/4/1998	BNSF	Freight Train	Other	0	0	0
3/9/1980	BNSF	Freight Train	Derailment	11	0	0	8/4/1998	BNSF	Freight Train	Derailment	10	0	0
3/28/1980	BNSF	Yard/Switching	Collision	4	0	0	11/27/2000	BNSF	Freight Train	Derailment	2	0	0
7/8/1980	BNSF	Freight Train	Derailment	10	0	0	3/3/2001	BNSF	Yard/Switching	Derailment	8	0	0

TABLE 4.6-3
RAILROAD ACCIDENTS IN CASCADE COUNTY

Date	RR	Type	Accident	Cars	F	I	Date	RR	Type	Accident	Cars	F	I
8/11/1980	BNSF	Freight Train	Derailment	1	0	0	4/12/2003	BNSF	Freight Train	Derailment	9	0	0
9/9/1980	BNSF	Yard/Switching	Collision	0	0	0	12/28/2003	BNSF	Yard/Switching	Derailment	3	0	0
5/31/1981	BNSF	Freight Train	Derailment	4	0	0	8/3/2004	BNSF	Yard/Switching	Other	0	0	0
6/1/1981	BNSF	Freight Train	Derailment	4	0	0	5/1/2005	BNSF	Yard/Switching	Other	6	0	0
10/4/1982	BNSF	Freight Train	Derailment	8	0	0	3/2/2006	BNSF	Freight Train	Derailment	1	0	0
4/12/1984	BNSF	Freight Train	Derailment	8	0	0	10/20/2006	BNSF	Yard/Switching	Other	3	0	0
7/10/1984	BNSF	Single Car	Other	0	0	0	11/10/2006	BNSF	Freight Train	Derailment	2	0	0
7/17/1984	BNSF	Yard/Switching	Derailment	4	0	0	1/23/2007	BNSF	Yard/Switching	Derailment	6	0	0
8/5/1984	GFMZ	Yard/Switching	Derailment	8	0	0	10/15/2007	BNSF	Yard/Switching	Other	0	0	0
2/9/1987	BNSF	Freight Train	Collision	2	0	0	1/25/2008	BNSF	Yard/Switching	Collision	0	0	0
6/25/1987	BNSF	Single Car	Other	0	0	0	4/22/2008	BNSF	Light Loco(S)	Other	0	0	0
3/25/1988	BNSF	Yard/Switching	Derailment	4	0	0	9/16/2008	BNSF	Freight Train	Derailment	9	0	0
9/12/1990	BNSF	Yard/Switching	Other	2	0	0	3/28/2010	BNSF	Freight Train	Derailment	2	0	0
11/28/1990	BNSF	Yard/Switching	Derailment	2	0	0	6/22/2010	BNSF	Freight Train	Derailment	1	0	0
8/18/1991	BNSF	Freight Train	Derailment	4	0	0	10/14/2010	BNSF	Yard/Switching	Derailment	14	0	0
3/17/1992	BNSF	Freight Train	Other	15	0	0	**TOTAL**					**2**	**10**

Source: Federal Railroad Administration, 2011; http://safetydata.fra.dot.gov/OfficeofSafety/publicsite/Query/incabbr.aspx
Notes: RR = Railroad; F = Fatalities; I = Injuries

On November 26, 1976, a Burlington Northern freight train derailed in the town of Belt. The 121 car BN freight train was approaching the Farmers Union fuel storage area when one of four railroad tankers containing propane derailed and then exploded as it struck the railroad viaduct over the road leading into Belt. A total of 24 cars in the middle of the train jumped the tracks and several careened into one of four 30,000 gallon liquid propane storage tanks at the Farms Union storage area. The derailment was followed by two major explosions. The initial blast hurled one railroad car 300 feet off the tracks and ignited several businesses and houses on one side of the viaduct and a lumber yard on the other side. Two hours later, another propane tanker exploded, rocking the entire community.

About half of the residents of Belt were evacuated by authorities as railroad tankers and storage tanks exploded sending huge fireballs into the sky and hurling burning debris onto houses on the far side of the community. At least six business buildings and six homes were destroyed by the fire which spread over more then four city blocks near the railroad tracks. About one-half of the town's houses had window damage and metal debris from exploding tanks damaged homes more than a mile away. The overpass was destroyed in the explosions. Two persons were killed.
Source: Great Falls Tribune, November 27 and 28, 1976.

AIRCRAFT ACCIDENTS

The area's public airport is the Great Falls International Airport. Privately owned aviation-related industries are also located on Airport property, as is the headquarters of the 120th Fighter Interceptor Group of the Montana Air National Guard. Express airmail services are provided by Federal Express, United Parcel Service, and the U. S. Postal Service with most local freight handled at the Great Falls International Airport. Northwest Airlines, Delta Airlines, Big Sky Airlines, and Horizon Airlines provide regularly scheduled commercial passenger services. Although the runways and aviation facilities located

at Malmstrom Air Force Base are just beyond the city limits, these facilities are not available for public use. Heliports in Great Falls are located at the two hospital facilities and are reserved for emergency flights. (Cascade County Growth Policy, 2006)

Aviation accidents can occur for a multitude of reasons from mechanical failure to poor weather conditions to pilot error. The National Transportation Safety Board (NTSB) maintains a database of aircraft accidents since 1962. Listings for Cascade County are presented in **Table 4.6-4**.

TABLE 4.6-4
AIRCRAFT ACCIDENTS IN CASCADE COUNTY

Date	Location	Make/Model	Severity	**Probable Cause**
8/14/1963	Great Falls	CURTISS-WRT C-46F	Fatal(1)	Engine failure or malfunction
3/6/1964	Great Falls	PIPER PA24	Nonfatal	Pilot in command misjudged clearance
4/29/1964	Belt	PIPER PA18A	Fatal(1)	Pilot in command misjudged clearance
5/24/1964	Belt	CALLAIR A9	Nonfatal	Pilot in command - improper compensation for wind conditions
10/1/1964	Great Falls	CESSNA 175	Nonfatal	Pilot in command exercised poor judgment
11/14/1964	Belt	CESSNA 182	Nonfatal	Pilot in command misjudged altitude
11/16/1964	Great Falls	PIPER PA28	Nonfatal	Pilot in command - improper operation of brakes and/or flight controls
12/26/1964	Great Falls	PIPER PA28	Nonfatal	Pilot in command - improper operation of brakes and/or flight controls
2/17/1965	Great Falls	PIPER PA-22	Nonfatal	Pilot in command exercised poor judgment
3/21/1965	Great Falls	CESSNA 140	Nonfatal	Engine failure or malfunction
5/11/1965	Great Falls	PIPER PA-18A	Fatal(1)	Pilot in command failed to obtain/maintain flying speed
3/28/1966	Great Falls	PIPER PA-28	Nonfatal	Pilot in command misjudged distance and altitude
7/25/1966	Neihart	PIPER PA-18	Nonfatal	Pilot in command - improper level off
9/15/1966	Great Falls	CESSNA 140	Nonfatal	Pilot in command - improper operation of brakes and/or flight controls
9/15/1966	Great Falls	CESSNA 185	Nonfatal	Collided with parked aircraft
12/25/1966	Great Falls	CHAMPION 7GCB	Nonfatal	Pilot in command - improper operation of brakes and/or flight controls
5/9/1967	Great Falls	CESSNA 180H	Nonfatal	Pilot in command - improper operation of brakes and/or flight controls
10/3/1967	Great Falls	PIPER PA-22	Nonfatal	Pilot in command taxied/parked without proper assistance
11/1/1967	Great Falls	CONVAIR 340T	Nonfatal	Pilot in command misjudged distance and altitude
4/6/1968	Great Falls	PIPER PA-18	Nonfatal	Pilot in command misjudged distance and speed
4/26/1968	Cascade	CESSNA 175	Fatal(3)	Pilot in command continued VFR flight into adverse weather conditions
5/5/1968	Great Falls	BEECH P35	Nonfatal	Pilot in command inadvertently retracted gear
1/5/1969	Great Falls	PIPER PA-24	Fatal(4)	Pilot in command continued VFR flight into adverse weather conditions
2/14/1969	Great Falls	PIPER PA-23	Nonfatal	Miscellaneous acts, conditions - improper alignment/adjustment
6/4/1969	Great Falls	CALLAIR A-9	Nonfatal	Pilot in command misjudged clearance
6/25/1969	Great Falls	CESSNA 182C	Fatal(4)	Pilot in command - spatial disorientation
9/24/1969	Neihart	CESSNA 182J	Nonfatal	Pilot in command - improper compensation for wind conditions
12/9/1969	Great Falls	MAULE M-4	Nonfatal	Pilot in command failed to maintain directional control
5/22/1970	Great Falls	MOONEY M20D	Nonfatal	Pilot in command failed to follow approved procedures,directives, etc.
5/23/1970	Great Falls	ALON A-2	Nonfatal	Pilot in command attempted operation beyond experience/ability level
6/3/1970	Cascade	PIPER PA-18	Nonfatal	Pilot in command failed to see and avoid objects or obstructions
1/19/1971	Great Falls	BEECH 65-80	Nonfatal	Airframe - landing gear: normal retraction/extension assembly
3/9/1971	Great Falls	CESSNA 177	Nonfatal	Pilot in command - improper recovery from bounced landing
10/3/1971	Great Falls	MOONEY M20C	Nonfatal	Miscellaneous acts, conditions - material failure
2/6/1972	Great Falls	MOONEY M20E	Nonfatal	Pilot in command misjudged distance and altitude
3/17/1972	Great Falls	CESSNA 310G	Nonfatal	Airframe - landing gear: normal retraction/extension assembly
8/7/1972	Great Falls	PIPER PA-20	Nonfatal	Pilot in command failed to maintain directional control
11/30/1972	Great Falls	CESSNA 175B	Nonfatal	Pilot in command exercised poor judgment
6/10/1975	Great Falls	BELL 47G-3	Nonfatal	Power plant failed for undetermined reasons
9/6/1978	Great Falls	AERO COMDR 500B	Fatal(1)	Pilot in command - improper IFR operation
10/22/1978	Great Falls	CESSNA T210L	Nonfatal	Pilot in command - inadequate preflight preparation and/or planning
8/24/1979	Neihart	BEECH B23	Fatal(4)	Pilot in command continued VFR flight into adverse weather conditions
6/22/1980	Great Falls	PIPER PA-30	Nonfatal	Pilot in command failed to assure the gear was down and locked
1/27/1981	Cascade	PIPER PA-18	Nonfatal	Pilot in command failed to maintain directional control
7/12/1981	Great Falls	CESSNA 182	Nonfatal	Dual student - improper operation of flight controls

TABLE 4.6-4
AIRCRAFT ACCIDENTS IN CASCADE COUNTY

Date	Location	Make/Model	Severity	**Probable Cause**
9/2/1981	Great Falls	AERO COMDR 681	Nonfatal	Miscellaneous acts, conditions - material failure
1/6/1983	Great Falls	BELL 47G-3B-2	Nonfatal	Maintenance inadequate
12/27/1983	Great Falls	LAKE LA-4-200	Nonfatal	Lubricating system, oil seal, leak
5/14/1986	Great Falls	CESSNA 172H	Nonfatal	Compensation for wind conditions, improper pilot in command
12/2/1986	Great Falls	CESSNA 152A	Nonfatal	Control tower service, inadequate
12/6/1987	Great Falls	CESSNA 177RG	Nonfatal	Preflight planning/preparation improper
4/26/1988	Great Falls	CESSNA 182P	Nonfatal	Flare improper
8/7/1988	Cascade	CESSNA 180	Nonfatal	In-flight planning/decision improper
3/25/1989	Great Falls	PIPER PA-18-150	Nonfatal	Failure of the pilot in compensate adequately for wind conditions
9/18/1989	Neihart	MOONEY M20C	Nonfatal	Failure to maintain sufficient altitude.
11/14/1991	Belt	PIPER PA-24-250	Nonfatal	Blocked fuel vent & inadequate inspection resulted in fuel starvation
5/19/1994	Great Falls	SPITFIRE MARK 18	Fatal(1)	Pilot's failure to maintain aircraft control
11/8/1994	Great Falls	BEECH 58P	Fatal(4)	Pilot's failure to maintain airspeed
5/16/1997	Great Falls	Learjet 35A	Nonfatal	Pilot's inadequate preflight planning/preparation
5/19/1998	Great Falls	Piper PA-31T1	Fatal(2)	The flight crew's failure to maintain aircraft control
7/13/1998	Great Falls	Piper PA-32-300	Nonfatal	Improper remedial action and overload of the landing nose gear
11/17/1999	Neihart	Bell 206L-1	Nonfatal	Clearance from object not maintained. Gusting wind conditions factor.
11/12/2000	Great Falls	Piper PA-20	Nonfatal	Improper decision to land on snow covered terrain
7/21/2001	Great Falls	Pilatus PC-6/B2-H4	Nonfatal	Pilot's failure to maintain directional control of the aircraft while landing
1/9/2002	Great Falls	Cessna 210L	Nonfatal	Failure to maintain clearance from terrain
8/17/2004	Neihart	BEECH BE-99	Fatal(2)	Pilot's failure to maintain adequate terrain clearance.
3/24/2005	Cascade	Abbott Glasair	Nonfatal	Accumulation of wet snow on engine while on approach for landing.
6/18/2006	Great Falls	Cessna 180	Nonfatal	Pilot's failure to adequately compensate for wind conditions
7/3/2006	Great Falls	Cessna 195	Nonfatal	Loss of control during takeoff roll and subsequent ground loop
5/3/2008	Great Falls	EA300/L	Nonfatal	Pilot's misjudged landing flare
12/21/2008	Great Falls	CESSNA 180C	Nonfatal	Pilot's failure to maintain directional control during the landing roll
9/28/2010	Great Falls	CESSNA 310R	Nonfatal	Collapse of right main landing gear while turning off active runway

Source: http://www.ntsb.gov/ntsb/query.asp

Vulnerability and Area of Impact

HIGHWAY ACCIDENTS

Privately-owned vehicles provide transportation for individuals in Cascade County using the federal and state highway system as well as county and private roads. Trucks and trailers carry interstate and intrastate cargo. Interstate accidents caused by severe weather and high speeds occur frequently.

RAILROAD ACCIDENTS

The major rail carrier in Cascade County is BNSF. The greatest risk associated with freight trains is a spill of hazardous materials. There is no passenger railroad service so a mass casualty incident is not a concern.

There are numerous rail crossings in Cascade County. These gated and ungated crossings include private, public, grade separated and at-grade crossings. According to the NTSB, more than 80 percent of public railroad crossings do not have lights and gates, and 60 percent of all railroad accidents occur at these unprotected crossings.

The Cascade County Emergency Operations Center (EOC) is located immediately adjacent to an active rail line. Derailments at this location have occurred on several occasions as there is a curve in the tracks here. Not only is the EOC located in this building but it is the only operational 911 center for the County as well as the City of Great Falls' Police Department.

AIRCRAFT ACCIDENTS

A major airline crash would create a mass casualty incident with hundreds of injuries or deaths. Hazardous materials incidents are created with fuel spills and dangerous cargo, such as chemicals in a crop duster or an airplane carrying fire retardant. The crash of a military aircraft with munitions or classified material would require the support of explosive ordinance disposal or military security. An airplane crash in a remote area of the County would create a search and rescue situation.

Aviation accidents in Cascade County typically involve private, small aircraft which do not involve mass casualties. These accidents typically occurred at remote locations and are often the result of severe weather. No accidents involving aircraft associated with Malmstrom Air Force Base or the Montana Air National Guard were reported in the data reviewed.

Probability and Magnitude

Cascade County is vulnerable to all types of transportation emergencies. The two major effects of transportation accidents are human injury and hazardous materials releases. Mass casualty incidents can be difficult because of location. Remote locations have limited resources, making response time slow, and delay treatment of the injured. There have been no Presidential Disaster Declarations or State emergency declarations associated with the Transportation Accident hazard in Cascade County and the likelihood of a significant event resulting in a disaster declamation is considered low.

Highway accidents have resulted in well over $1.3 million dollars in property damage over the past 10 years. Annual loss estimates are presented in the Risk Assessment Summary Tables in *Section 4.10* (**Tables 4.10-1 through 4.10-5**). For the sake of the PDM analysis, the Highway Accident hazard is considered to affect all of Cascade County uniformly. The *Highway Accident Section* in **Appendix C** presents additional information from the risk assessment.

The history of aircraft accidents in Cascade County indicates approximately 73 incidents have occurred in 46 years resulting in 25 fatalities. Seventy-two (72) railroad accidents have occurred at crossings over the past 35 years resulting in 6 fatalities and 13 injuries. During this same period, derailments and railroad collisions have caused another 2 fatalities and 10 injuries. In the past 10 years, motor vehicle accidents have resulted in 135 fatalities and over 14,000 injuries. Since transportation accidents occur more than once per year, the probability of future events is rated as "highly likely".

Future Development

Cascade County does not have any ordinances or regulations requiring special considerations to mitigate the affects of transportation accidents.

4.7 SEVERE WINTER WEATHER

CPRI SCORE = 2.85

The winter weather hazard profiled below includes several weather conditions that occur from late fall through early spring in Cascade County (November through April). Snow, blizzards, extended cold and high winds frequently occur together but also occur independent of one another during these months.

Description and History

Winter storms and blizzards follow a seasonal pattern that begins in late fall and lasts until early spring. These storms have the potential to destroy property, and kill livestock and people. Winter storms may be categorized as sleet, ice storms or freezing rain, heavy snowfall or blizzards, and low temperatures. Blizzards are most commonly connected with blowing snow and low visibility. Winter also brings sustained straight line winds that can be well over 50 mph.

A severe winter storm is generally a prolonged event involving snow or ice and extreme cold. The characteristics of severe winter storms are determined by the amount and extent of snow or ice, air temperature, wind speed, and event duration. Severe winter storms create conditions that disrupt essential regional systems such as public utilities, telecommunications, and transportation routes.

A combination of temperatures to 30 below zero and high winds can close roads, threaten disruption of utilities, limit access to rural homes, impede emergency services delivery and close businesses. Such storms also create hazardous travel conditions, which can lead to increased vehicular accidents and threaten air traffic. Additionally, motorists stranded due to closed roads and highways may present a shelter problem.

An important element of winter weather is the wind. Cascade County lies within the Chinook zone, which is associated with 160 mph wind speeds. Chinook winds during the winter and early spring can lead to significant snow melt and flooding of small streams and rivers. Average wind speeds range from 10 to 15 mph depending on the exposure of the location. Average and peak sustained winds tend to be much stronger and have been responsible for significant property damage in the past.

The National Weather Service provides short-term forecasts of hazardous weather to the public by producing regularly-scheduled severe weather outlooks and updates on various forms of hazardous weather including blizzards and wind chill. Warning and Advisory Criteria for winter weather are presented in **Table 4.7-1**.

TABLE 4.7-1
WARNING AND ADVISORY CRITERIA FOR WINTER WEATHER

Winter Weather	Weather Advisory/Watch	Weather Warning
Snow	2-5 inches of snow in 12 hours	6 inches or more in 12 hours, or 8 inches in 24 hours
Blizzard	(see blowing snow)	Sustained winds or frequent gusts to 35 mph with visibility below a ¼ mile for three hours or more
Blowing Snow	Visibility at or less than a ½ mile.	Visibility at or less than a ½ mile in combination with snowfall at or greater than 6 inches and/or freezing precipitation
High Wind	Conditions are favorable for high winds in and close to the watch area in the next 12 to 48 hours.	Sustained winds ≥ 40 mph for at least 2 hours or any gust ≥ 58 mph
Ice/Sleet	(see freezing rain/drizzle)	Accumulations of ¼ inch or more of ice.
Freezing Rain/ Drizzle	Light precipitation and ice forming on exposed surfaces.	None
Wind Chill	Wind chills of -20 to -39 degrees with a 10 mph wind in combination with precipitation	Wind chills -40 degrees or colder with a 10 mph wind in combination with precipitation.

Source: National Weather Service (NWS, 2010)

Snow storms and cold temperatures are common occurrences in Cascade County and generally do not cause any problems as residents are used to winter weather and are prepared for it. Sometimes, however, blizzards can occur and overwhelm the ability to keep roads passable. Heavy snow and ice events also have the potential to bring down power lines and trees. Extreme wind chill temperatures may harm residents if unprotected outdoors or if heating mechanisms are disrupted. **Table 4.7-2** presents winter weather events, including high wind, from the NCDC database indicating the magnitude of the events.

TABLE 4.7-2
CASCADE COUNTY SEVERE WINTER WEATHER REPORTS (~NOVEMBER-APRIL)

Date	Event	Date	Event	Date	Event
3/1/1973	High Wind (56 kts.)	12/17/2000	High Wind (50 kts.)	11/26/2005	Heavy Snow
4/24/1983	High Wind	3/13/2001	High Wind (56 kts.)	12/5/2005	Winter Storm
4/21/1989	High Wind	3/14/2001	Heavy Snow	12/13/2005	Heavy Snow
2/23/1994	Winter Storm	3/19/2001	High Wind (54 kts.)	1/10/2006	High Wind (58 kts.)
4/21/1994	High Wind (53 kts.)	4/11/2001	Heavy Snow	2/1/2006	High Wind (66 kts.)
4/9/1996	High Wind (55 kts.)	5/20/2001	Heavy Snow	3/19/2006	Heavy Snow
11/7/1996	High Wind (51 kts.)	6/3/2001	Heavy Snow	4/2/2006	Heavy Snow
11/18/1996	Winter Storm	12/16/2001	High Wind (55 kts.)	9/16/2006	Heavy Snow
11/27/1996	High Wind (73 kts.)	1/8/2002	High Wind (67 kts.)	11/7/2006	High Wind (56 kts.)
12/10/1996	High Wind (58 kts.)	1/12/2002	High Wind (60 kts.)	11/13/2006	High Wind (67 kts.)
12/15/1996	High Wind (62 kts.)	1/20/2002	High Wind (70 kts.)	11/16/2006	High Wind (54 kts.)
12/15/1996	Heavy Snow	1/23/2002	High Wind (64 kts.)	11/25/2006	Heavy Snow
12/18/1996	Heavy Snow	1/25/2002	Winter Storm	12/13/2006	High Wind (54 kts.)
12/21/1996	Heavy Snow	1/26/2002	Heavy Snow	12/15/2006	High Wind (57 kts.)
12/24/1996	Winter Storm	2/10/2002	High Wind (68 kts.)	12/28/2006	Heavy Snow
12/27/1996	Heavy Snow	2/21/2002	High Wind (100 kts.)	1/2/2007	High Wind (55 kts.)
12/29/1996	Winter Storm	2/23/2002	Winter Storm	1/6/2007	High Wind (52 kts.)
1/8/1997	Winter Storm	2/28/2002	Winter Storm	1/7/2007	High Wind (66 kts.)
1/10/1997	Heavy Snow	3/19/2002	Winter Storm	2/15/2007	High Wind (61 kts.)
1/15/1997	Heavy Snow	4/1/2002	Winter Storm	3/12/2007	High Wind (52 kts.)

TABLE 4.7-2
CASCADE COUNTY SEVERE WINTER WEATHER REPORTS (~NOVEMBER-APRIL)

Date	Event	Date	Event	Date	Event
3/1/1973	High Wind (56 kts.)	12/17/2000	High Wind (50 kts.)	11/26/2005	Heavy Snow
4/24/1983	High Wind	3/13/2001	High Wind (56 kts.)	12/5/2005	Winter Storm
4/21/1989	High Wind	3/14/2001	Heavy Snow	12/13/2005	Heavy Snow
1/25/1997	Heavy Snow	4/17/2002	Winter Storm	4/1/2007	Heavy Snow
1/30/1997	High Wind (116 kts.)	4/13/2002	High Wind (65 kts.)	5/22/2007	Heavy Snow
2/22/1997	Heavy Snow	4/22/2002	High Wind (58 kts.)	11/3/2007	High Wind (52 kts.)
2/27/1997	Heavy Snow	5/7/2002	Winter Storm	11/12/2007	High Wind (55 kts.)
3/11/1997	Heavy Snow	5/22/2002	Winter Storm	11/18/2007	Heavy Snow
3/26/1997	Heavy Snow	6/10/2002	Winter Storm	1/4/2008	High Wind (50 kts.)
3/28/1997	High Wind (68 kts.)	11/16/2002	High Wind (63 kts.)	1/17/2008	Heavy Snow
4/1/1997	Heavy Snow	11/18/2002	High Wind (74 kts.)	1/19/2008	Heavy Snow
4/4/1997	Winter Storm	1/14/2003	Winter Storm	1/28/2008	Winter Storm
12/27/1997	High Wind (57 kts.)	2/5/2003	Winter Storm	3/4/2008	Heavy Snow
3/4/1998	Heavy Snow	3/3/2003	Winter Storm	3/11/2008	High Wind (50 kts.)
11/13/1998	High Wind (58 kts.)	4/9/2003	High Wind (58 kts.)	3/24/2008	High Wind (50 kts.)
11/21/1998	High Wind (57 kts.)	4/15/2003	Winter Storm	3/29/2008	Winter Storm
11/24/1998	High Wind (61 kts.)	4/18/2003	Winter Storm	4/5/2008	Heavy Snow
11/25/1998	High Wind (51 kts.)	4/27/2003	Strong Wind (48 kts.)	4/19/2008	Heavy Snow
12/17/1998	High Wind (66 kts.)	5/18/2003	Winter Storm	6/10/2008	Heavy Snow
12/26/1998	High Wind (56 kts.)	10/29/2003	Winter Storm	6/11/2008	Heavy Snow
1/11/1999	High Wind (58 kts.)	11/18/2003	High Wind (68 kts.)	11/12/2008	High Wind (51 kts.)
1/14/1999	High Wind (53 kts.)	11/28/2003	High Wind (70 kts.)	1/28/2009	High Wind (94 kts.)
2/1/1999	High Wind (59 kts.)	12/26/2003	Winter Storm	1/31/2009	High Wind (61 kts.)
2/6/1999	High Wind (53 kts.)	1/1/2004	Winter Storm	3/28/2009	Winter Storm
2/9/1999	Winter Storm	3/7/2004	High Wind (72 kts.)	3/29/2010	High Wind (50 kts.)
3/30/1999	Heavy Snow	3/18/2004	High Wind (67 kts.)	4/3/2010	High Wind (52 kts.)
4/29/1999	Heavy Snow	5/22/2004	Winter Storm	4/8/2010	High Wind (59 kts.)
12/15/1999	High Wind (57 kts.)	11/2/2004	High Wind (84 kts.)	4/14/2009	Winter Storm
12/16/1999	High Wind (54 kts.)	11/24/2004	Winter Storm	4/27/2009	Winter Storm
1/9/2000	High Wind (55 kts.)	12/10/2004	High Wind (61 kts.)	10/27/2009	Heavy Snow
1/16/2000	High Wind (57 kts.)	12/19/2004	High Wind (73 kts.)	12/4/2009	Winter Storm
2/14/2000	Heavy Snow	12/29/2004	Winter Storm	12/21/2009	Ice Storm
3/14/2000	High Wind (35 kts.)	1/17/2005	High Wind (59 kts.)	1/22/2010	Winter Storm
4/1/2000	Winter Storm	3/14/2005	Heavy Snow	3/30/2010	Winter Storm
4/4/2000	High Wind (50 kts.)	3/17/2005	Winter Storm	4/13/2010	Winter Storm
5/11/2000	Heavy Snow	3/23/2005	Winter Storm	4/29/2010	Winter Storm
11/16/2000	Heavy Snow	4/18/2005	Winter Storm		

Source: National Weather Service (NCDC, 2010)

Table 4.7-3 presents winter weather events with reported damages from the SHELDUS and NCDC databases. The dataset used to populate SHELDUS typically includes every loss causing and/or deadly event between 1960 through 1975 and from 1995 onward. Between 1976 and 1995, SHELDUS reflects only events that caused at least one fatality or more than $50,000 in property or crop damages. The NCDC data contains sporadic damage figures which were added to the dataset when they represented a unique damaging event.

TABLE 4.7-3
CASCADE COUNTY SEVERE WINTER WEATHER EVENTS WITH DAMAGES (~NOVEMBER-APRIL)

Date	Inj	Ftl	PD	CD	Remarks	Date	Inj	Ftl	PD	CD	Remarks
2/25/1961	0	0	$106	$106	High Wind	10/11/1981	0.16	0	$2,632	$0	Wet Heavy Snow
3/1/1961	0.04	0	$208	$0	High Wind	11/15/1986	0.2	0.2	$10	$0	High Wind
12/21/1961	0.07	0	$12	$0	High Wind	9/17/1988	0	0	$25,000	$0	Severe Snow
1/22/1962	0	0	$217	$0	High Wind	1/30/1989	0	0	$100,000	$1,000	Wind
2/22/1962	0	0	$10	$0	Cold, High Wind	1/31/1989	0	0	$15,152	$152	Blizzard
11/19/1962	0.07	0	$877	$0	High Winds	2/1/1989	0	1	$87,719	$88	Severe Cold
2/1/1963	0.04	0	$19	$0	Freezing Rain, Wind, Snow	5/28/1989	0	0	$2,000	$0	Winter Storm
11/27/1963	1	0	$0	$0	Wind	1/25/1990	0	0	$10,000	$10,000	High Wind
4/5/1964	0	0	$4	$0	Drifting Snow	1/29/1990	0	0	$5,556	$0	Snow
5/3/1964	0	0.04	$1,852	$0	Snow, High Wind	2/11/1990	0	0	$1,000	$10,000	High Wind
12/15/1964	0	0	$8,772	$0	High Wind, Severe Cold	4/27/1990	0	0	$1,613	$0	Winter Storm
1/15/1967	0	0	$877	$0	High Wind	11/22/1990	0	0	$13,514	$0	High Winds
1/19/1967	0	0	$278	$0	High Wind	11/23/1990	0	0	$3,333	$3,333	High Winds
12/15/1967	0	0	$13	$0	Blowing Snow	11/28/1990	0	0	$100,000	$0	Blizzard
1/1/1969	0	0	$88	$0	Cold and Snow	4/11/1991	0	0	$2,941	$0	Winter Storm
1/26/1969	0	0	$1	$0	Lightning	4/27/1991	0	0	$3,125	$0	Winter Storm
3/3/1971	0	0	$167	$0	Wind, Snow	1/15/1992	0	0	$10,000	$0	Wind
11/25/1971	0.37	0	$185	$0	Hoarfrost, Ice	2/28/1991	0	1	$3,125	$0	Blizzard, Wind
1/16/1972	0	0	$1,667	$0	Strong Winds	8/22/1992	0	0	$217	$21,739	Winter Storm
1/9/1972	0	0	$877	$0	Strong Winds	8/25/1992	0	0	$0	$877	Frost/Freeze
2/16/1972	0	0	$172	$0	High Wind	12/23/1992	0	0	$4,545	$0	High Winds
3/5/1972	0	0	$167	$0	High Winds	2/23/1994	0	0	$5,000,000	$0	Winter Storm
3/23/1973	0	0	$24	$0	Blizzard	12/17/1998	0	0	$5,000	$0	High Wind
4/18/1973	0	0	$10,417	$0	Blizzard	12/15/1999	0	0	$40,000	$0	High Wind
11/16/1973	0	0	$5,000	$0	Wind	12/16/1999	0	0	$8,000	$0	High Wind
1/29/1974	0	0	$893	$0	Wind	1/16/2000	0	0	$30,000	$0	High Wind
12/26/1974	0	0	$172	$0	High Winds	1/12/2002	4	2	$0	$0	Wind
4/7/1975	0	0	$10,417	$0	Severe Blizzard	4/27/2003	0	0	$20,000	$0	Wind
11/4/1978	0	0	$0	$0	Strong Winds	11/13/2006	0	0	$3,000	$0	High Wind
12/29/1978	0	1	$0	$0	Cold, Snow	11/15/2006	0	0	$7,143	$0	High Wind
12/4/1979	0	0	$5,556	$0	Wind	1/1/2007	0	0	$43,750	$0	High Wind
12/13/1979	0	0	$5,556	$0	Wind	**TOTAL**	**5.95**	**5.24**	**$5,602,979**	**$47,295**	

Notes: Inj = Injuries; Ftl = Fatalities; PD = Property Damage; CD = Crop Damage

Source: SHELDUS, 2010 (adjusted to 2009 dollars).

Note: Often casualties and damage information are listed without sufficient spatial reference. In order to assign the damage amount to a specific county, the fatalities, injuries and dollar losses were divided by the number of counties affected from this event.

The tables above indicate that winter storms, high winds, and extended cold have affected Cascade County. No Presidential Disaster Declarations have been granted for winter storms in Cascade County; however, in 1985 the Town of Neihart received a State Disaster Declaration for a winter freeze. Further details on this event were not available.

Vulnerability and Area of Impact

Cascade County is equally exposed to effects of extended cold, winter storms and high wind during the winter months. Seasonally, winter storm events may affect the higher regions with more snowfall, but since the population is generally concentrated in the lower elevations, the hazard risk area for severe winter weather is considered uniform for the entire county. Annualized loss estimates are presented in the Risk Assessment Summary Tables in *Section 4.10* (**Table 4.10-1 through Table 4.10-5**). The Severe *Winter Weather Section* in **Appendix C** presents supporting documentation from the risk assessment.

Probability and Magnitude

Severe winter storms, extended periods of extreme cold, and high winds occur in Cascade County multiple times each year. Therefore, the probability of a severe winter storm event occurring in the future is rated as "highly likely".

Snow generally does not cause the communities to shut down or disrupt activities. Occasionally, though, extreme winter weather conditions can cause problems. The most common incident in these conditions are motor vehicle accidents due to poor road conditions. Such incidents normally involve passenger vehicles; however, an incident involving a commercial vehicle transporting hazardous materials or a vulnerable population such as a school bus is also possible.

Since winter storms and cold spells typically do not cause major structural damage, the greatest threat to the population is the potential for utility failure from a high wind event during a cold spell. Although cold temperatures and snow are normal in the county, handling the extremes can go beyond the capabilities of the community. Should the temperatures drop below -15 for over 30 days or several feet of snow fall in a short period of time, the magnitude of frozen water pipes and sewer lines or impassable streets could result in disastrous conditions for many people. If power lines were to fail due to snow/ice load, winds, or any other complicating factor, the situation would be compounded. In the event power or other utilities were disrupted, many homes could be without heat. With temperatures frequently dropping below zero in a typical winter, an event where heating systems failed could send many residents to shelters for protection. Other residents may try to heat their homes through alternative measures and increase the chance for structure fires or carbon monoxide poisoning.

Sheltering of community members could present significant logistical problems when maintained over a period of more than a day. Transportation, communication, energy (electric, natural gas, and vehicle fuels), shelter supplies, medical care, food availability and preparation, and sanitation issues all become exceedingly difficult to manage in extreme weather conditions. Local government resources could be quickly overwhelmed. Mutual aid and state aid might be hard to receive due to the regional impact of this kind of event.

Future Development

Cascade County does not have any ordinances or regulations requiring special considerations to mitigate the affects of severe winter weather or high winds.

The State of Montana has adopted the 2009 International Building Codes (IBC) and these codes are recognized by Cascade County and the incorporated communities as the standards for construction. The IBC includes a provision that buildings must be constructed to withstand a wind load of 75 mph constant velocity and three second gusts of 90 mph. Buildings must be designed to withstand a snow load of 30 pounds per square foot minimum. The City of Great Falls requires permits and inspections to ensure the 2009 IBC are followed. There is no building permit/inspection requirement in the rest of Cascade County for compliance with the IBC.

4.8 FLOODING/FLASH FLOODS/LEVEE FAILURE

CPRI SCORE = 2.80

Description and History

A flood is a natural event for rivers and streams. Excess water from snowmelt and rainfall accumulates and overflows onto the banks and adjacent floodplains. Floodplains are lowlands, adjacent to rivers and lakes that are subject to recurring floods. A flash flood generally results from a torrential (short duration) rain or cloudburst on a relatively small drainage area. Ice jam flooding occurs when pieces of floating ice carried by the streams current accumulate at an obstruction to the stream. The water held back can cause flooding upstream, and if the obstruction suddenly breaks, flash flooding can then occur downstream as well.

Hundreds of floods occur each year, making it one of the most common hazards in all 50 states. Floods kill an average of 150 people a year nationwide. Most injuries and deaths occur when people are swept away by flood currents and most property damage results from inundation by sediment-laden water. Faster moving floodwater can wash buildings off their foundations and sweep vehicles downstream. Pipelines, bridges, and other infrastructure can be damaged when high water combines with flood debris. Basement flooding can cause extensive damage to the structure and systems of a building.

Chinook winds, warm dry winds that can gust to 100 mph and that are typical to the area in March and April, often lead to the rapid melting of snow and cause flooding while the ground is still frozen. Major flooding occurs when rainstorms are combined with the heavier snowmelt in May and June. Flooding is also caused by high-intensity rainstorms later in the summer. Ice effects can also create flood problems in Great Falls. The Missouri River in the area from Craig to Hardy is also prone to flooding from ice jams.

The National Weather Service provides short-term forecasts and warnings of hazardous weather to the public by producing regularly-scheduled severe weather outlooks and updates on various forms of hazardous weather including heavy rain and flooding. A “watch” is issued when conditions are favorable for severe weather in or near the watch area. A “warning” is issued when the severe weather event is imminent or occurring in the warned area. Warning and Advisory Criteria for flooding is presented below.

- *Flash Flood Warning:* Flooding is imminent, water levels rise rapidly with inundation occurring in less than 6 hours.
- *Flood Warning:* Flooding is expected to occur more than 6 hours after the causative event.

Widespread flooding occurred in Cascade County in 1894, 1899, 1908, 1916, 1927, 1936, 1948, 1953, 1958, 1964, 1965, 1966, 1969, 1975 and 2011. Cascade County received Presidential Disaster Declarations for flooding in 1964, 1975 and 1981 and was part of a State-wide declaration in 2011. A description of the 1964 and 1975 flood events is presented below along with descriptions of several

more recent flood events. The magnitude of the 2011 floods will be described in the 2016 PDM Plan update.

1964 Presidential Flood Disaster - In the second week of June 1964, the worst natural disaster in Montana's recorded history descended on the state in the form of heavy rains that quickly turned once picturesque creeks into raging, mile-wide rivers. Dams, roads, and railroads washed out, homes and ranches were swept away, and 30 people died. The area affected by the flooding amounted to nearly 30,000 square miles, or roughly 20 percent of the state. By Thursday, June 11, President Lyndon Johnson had declared nine counties in northwest and north-central Montana a federal disaster area. When mop-up operations ended, damages stood at an estimated at $62 million in 1964 currency. (Montana Magazine of Western History, 2004)

Many areas were hard hit, but among the worst were a band from roughly Kalispell to Great Falls. Between June 7 and 8, Browning received more than eight inches of rain, 10 inches in Glacier National Park, 13 inches southwest of Augusta, and 11 inches at Heart Butte. In effect, nearly an average year's worth of precipitation fell in a 24-hour period. What was worse was that heavy snow pack also melted and greatly added to runoff.

The drainages of Birch Creek, the Sun, Dearborn, Teton, Marias and Two Medicine rivers east of the Continental Divide, and the Flathead system on the west side of the Divide saw the greatest damage. The Blackfeet Indian Reservation suffered monumental losses of lives and property. Raging rivers and streams on the reservation destroyed 265 homes, 20,000 acres of hayland, two large dams, irrigation equipment for 37,000 acres, and what was worse, all 30 of the people who lost their lives in the terrible storm lived on the reservation.

Flooding in the western part of Great Falls resulted from overflow of both the Sun and Missouri Rivers. Flood damage at Great Falls from both streams was estimated at $4,360,000 ($31,631,941 in 2011 dollars); residential damage was estimated to be more then $3,160,000, commercial damage nearly $200,000, and damage to streets and utilities exceeded $1,000,000. Approximately 3,000 persons were evacuated from the flooded areas and boarded in shelters. Varying degrees of damage were sustained by 681 homes and 24 businesses. A local survey later indicated that 518 families suffered 50 percent or more loss of personal possessions and of this number, 350 families lost 100 percent of their personal belongings. Damage to the Great Falls sewer system was great and the return of many evacuees to their homes was postponed for several days until sewer repairs could be made. Total damages in the Sun River basin were estimated at near $9 million ($65,295,290 in 2011 dollars) (COE, 1973; COE, 1979).

1975 Presidential Flood Disaster - During the period from June16-20, 1975, rainfall averaging from 3 to 10 inches fell over all of the Sun River basin and most of the Missouri River basin. This rainfall, coupled with snowmelt and super-saturated ground conditions resulted in the Sun River peaking at Great Falls on the morning of June 21st. Over 4,000 persons were evacuated from the floodplain in Great Falls.

Flooding in the western part of Great Falls resulted from high stages on the Sun River and from backwater effects on the Missouri River caused by high inflows from the Sun River. Flood depths as great as 12 feet occurred in low-lying areas. Urban damages in Great Falls were estimated to be $9,459,000 ($39,542,488 in 2011 dollars) including residential damage estimated to be more than $8,700,000. Damage surveys conducted by the Corps of Engineers reported than 552 residences were flooded. Commercial damage amounted to $100,000, and damages to streets and utilities were in excess of $650,000 (COE, 1979).

June 19, 2003 - A severe thunderstorm moved northeast across central Cascade County during the evening hours of the 19th. One to two inches of rain fell in 30 minutes as the storm moved through. Flash flooding occurred in the towns of Sand Coulee and Tracy. Water flooded 25 homes and left roadways filled with mud and debris.

May 10, 2005 - Heavy mountain rain and a rapidly melting snow pack combined to cause the Dearborn River to overflow its banks during the week of May 10th. The Dearborn, which flows along the southern Lewis and Clark and western Cascade county border, peaked at 7.5 feet, some 2.5 feet above flood stage and the highest level in more than a decade. Flooding occurred in pastureland and hayfields. The water breached some roadways causing minimal damage.

June 3, 2005 - Heavy rains fell over portions of Cascade and Chouteau counties the weekend of June 3rd through the 5th. Some areas received an estimated 6 to 12 inches of rain. Seven bridges were washed out in the Highwood area of Chouteau County which resulted in many people being stranded and over 30 property owners warned about the rising waters. Additionally, several campers were stranded at camp sites that became flooded. In Cascade County, over 200 feet of the Willow Creek Road was washed out. Power poles were knocked down in both counties resulting in 9-1-1 emergency communications being out in Chouteau County.

December 20, 2010 - Ice jamming on the Missouri River in Great Falls caused minor flooding of Lower River Road. A portion of the road was closed for several days.

June 2011 - Flooding of Belt Creek and the Sun River caused extensive property damage in these communities. A Presidential Disaster Declaration was received for the State of Montana listing Cascade County as one of the impacted counties. As of this writing, damages are still being assessed. The 2016 update of the Cascade County PDM Plan will further describe this incident.

Sun River flood of June 2011

Vulnerability and Area of Impact

Figures 6a and 6b show flood-prone areas within Cascade County and Great Falls, respectively. These maps were developed using Q3 flood data available from FEMA to support floodplain management and planning activities.

Floodplain Insurance Studies for Cascade County (2002), the town of Belt (1985), the City of Great Falls (2002) report the following areas with flood vulnerabilities.

Missouri River - Most of the City of Great Falls, including the main business district, lies east of the confluence of the Sun and Missouri Rivers and is safe from flooding because flow is controlled by dams. Much of the portion of Great Falls lying west of the Missouri River is in the Sun River floodplain.

Sun River - The Sun River basin drains approximately 2,020 square miles between the river headwaters at the Continental Divide and Great Falls, where the Sun River joins the Missouri River. Two levees have been built along the Sun River for flood protection; the Vaughn levee which protects about 250 households (**Figure 6c**), and the West Great Falls levee which protects over 700 homes (**Figure 6d**). These levees protect property worth millions of dollars. Re-certification issues with the levees are currently an issue in Cascade County, as described below.

Beginning in the 1950s, local officials and residents in West Great Falls sought help from the U.S. Army Corps of Engineers to address serious flooding problems near the junction of the Sun and Missouri Rivers. After years of debate and litigation, the property owners in this area formed the West Great Falls Flood Control and Drainage District in 1976 to finance and maintain a system of flood control levees. In the early 1980s, levees were finally built in response to floods that had repeatedly caused significant damage to properties in the Sun River watershed, particularly major floods in 1964 and 1975.

The West Great Falls flood control project involves two elements; a local flood protection levee and 16 interior drainage structures including one for the Watson-Coulee drainage basin. The flood protection levee consists of approximately 31,800 linear feet of levee which is set back from the existing channel approximately 50 feet. The levee provides protection against the 500-year flood event for a large portion of West Great Falls. In 1979, it was estimated that the levee would prevent $1,199,000 in average annual damages. Had the authorized flood protection project for Great Falls been constructed prior to the 1975 Presidential Flood Disaster, the city would not have experienced any flooding (COE, 1976; COE, 1979).

The West Great Falls Flood Control District's levee along the Sun River protects over 850 residences.

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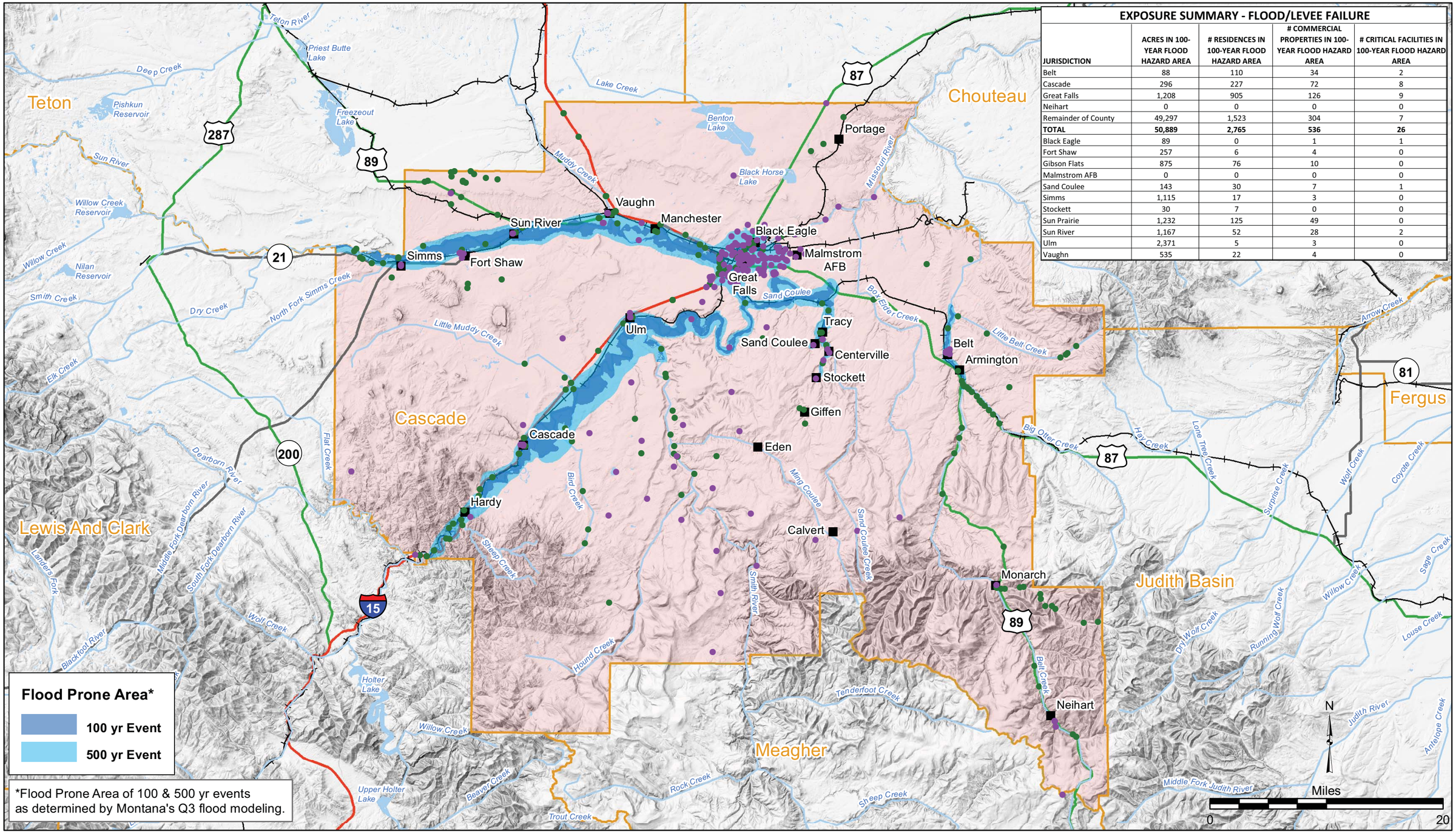

EXPOSURE SUMMARY - FLOOD/LEVEE FAILURE

JURISDICTION	ACRES IN 100-YEAR FLOOD HAZARD AREA	# RESIDENCES IN 100-YEAR FLOOD HAZARD AREA	# COMMERCIAL PROPERTIES IN 100-YEAR FLOOD HAZARD AREA	# CRITICAL FACILITIES IN 100-YEAR FLOOD HAZARD AREA
Belt	88	110	34	2
Cascade	296	227	72	8
Great Falls	1,208	905	126	9
Neihart	0	0	0	0
Remainder of County	49,297	1,523	304	7
TOTAL	**50,889**	**2,765**	**536**	**26**
Black Eagle	89	0	1	1
Fort Shaw	257	6	4	0
Gibson Flats	875	76	10	0
Malmstrom AFB	0	0	0	0
Sand Coulee	143	30	7	1
Simms	1,115	17	3	0
Stockett	30	7	0	0
Sun Prairie	1,232	125	49	0
Sun River	1,167	52	28	2
Ulm	2,371	5	3	0
Vaughn	535	22	4	0

Critical Facilities
Bridges
Place Names
River/Stream
Lake/Reservoir
County Boundary
Interstate
U.S. Highway
Montana Highway
Rail

May 2011

Figure 6A

Flood Prone Area

Cascade County, Montana

Pre-Disaster Mitigation Plan

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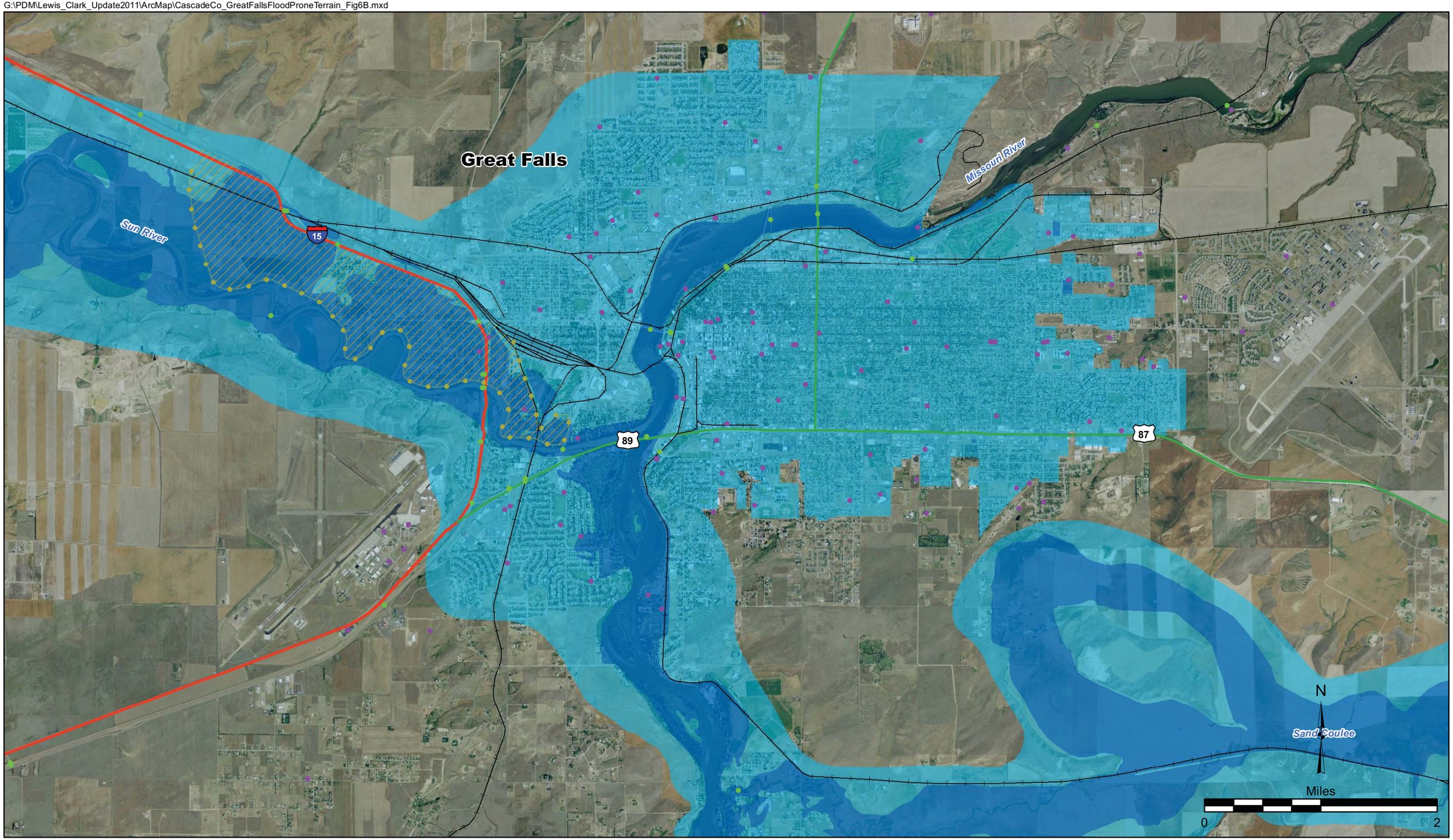

Critical Facilities
Bridges
West Great Falls Levee
Protected Levee Area
100 yr Event
500 yr Event
Interstate
U.S. Highway
Montana Highway
Rail

May 2011

Figure 6B

Great Falls Flood Prone Area

Cascade County, Montana

Pre-Disaster Mitigation Plan

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Critical Facilities
Vaughn Levee
Protected Levee Area

May 2011

Figure 6C
Vaughn Levee
Cascade County, Montana
Pre-Disaster Mitigation Plan

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May 2011

Figure 6D

West Great Falls Levee

Cascade County, Montana

Pre-Disaster Mitigation Plan

Critical Facilities

West Great Falls Levee

Protected Levee Area

FEMA is in the process of producing new digital flood insurance rate maps as part of a national map modernization program. The Vaughn and West Great Falls flood districts must demonstrate they can meet federal regulations by having the levees certified by a registered professional engineer or federal agency with responsibility for levee design. Without a new certification, FEMA's maps would show that no levee exists, requiring homeowners to purchase costly flood insurance through the National Flood Insurance Program and property values would drop. The U.S. Army Corps of Engineers, which built the levees, is no longer doing certification, which is why the flood districts have been slow to move. Flood commissioners say the districts can't afford the certification. They're hoping the Corps will resume doing the certifications. Cascade County and the flood districts signed a Provisional Accredited Levee agreement with FEMA giving them until May 13, 2013 to certify the levees. Estimates put the cost of certification of the levees between $325,000 and $1 million dollars. A congressional earmark may be necessary to complete the levee re-certification. (Great Falls Tribune, *Vaughn Levee Gets Two-Year Extension for Certification*, May 3, 2011; KFBB.com, *City Commission Discusses West Great Falls Flood Levee*, May 24, 2011).

Belt Creek - Belt Creek flows north through the length of Belt. Although the channel is fairly deeply entrenched and most of the reach has embankments along the stream, the main channel in places is not sufficient to contain the 100-year flood. Businesses and residential structures were built adjacent to the main channel on ground having elevations lower than the top of the embankments; thus, the structures were subject to flooding from the 100-year flood. Considerable channeling and diking work has been done on Belt Creek through the corporate limits and for a short distance downstream. The Town of Belt has been adding to the height of the dikes through unscheduled additions of riprap whenever materials and equipment are available. Existing dikes give protection from floods of less than the 10-year event (FEMA, 1985).

Gibson Flats- Gibson Flats is located in a depression on the floodplain and has a history of flooding problems. The contributing drainage area for Gibson Flats is 5,120 acres, of which 200 acres are urban development within the City of Great Falls. Floodwater comes from three sources: local runoff, overflow from Sand Coulee Creek near the junction of Lyman Cutoff Road and Gibson Flats Road, and backup water from Sand Coulee Creek. The lack of an adequate outlet in Gibson Flats has caused floodwater to remain ponded for several weeks in the past. A combination of all three sources of flooding during a 100-year storm would cause water to reach depths of 6 feet in the Gibson Flats community.

Floodplain and Floodway Management Activities

The National Flood Insurance Program (NFIP) encourages local governments to adopt "sound" floodplain management programs to reduce private and public property losses due to floods. Cascade County, the City of Great Falls, and the towns of Belt and Neihart are all are enrolled in the NFIP. **Table 4.8-1** presents statistics on NFIP flood insurance policies and losses.

TABLE 4.8-1 NATIONAL FLOOD INSURANCE PROGRAM STATISTICS				
Jurisdictions	**Policies in Force**	**Insurance in Force**	**Total Losses**	**Total Payments**
Cascade County	366	$66,371,300	104	$114,339
Great Falls	218	$46,919	67	$115,684
Belt	44	$6.637,100	16	$97,729
Neihart	1	$30,000	0	$0

Source: FEMA, 9/30/2010

There are three repetitive loss properties in Cascade County with a total of seven losses. Locations of these properties are on file with the Cascade County Planning Department. A Repetitive Loss property is any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling ten-year period, since 1978.

There are no severe repetitive loss properties in Cascade County. Severe repetitive loss properties are defined as those that have had at least four NFIP claim payments over $5,000 each and the cumulative amount exceeding $20,000; or, where at least two separate claim payments have been made with the cumulative amount exceeding the market value of the building. At least two of the referenced claims must have occurred within any ten-year period and must be greater than 10 days apart.

The NFIP's Community Rating System (CRS) recognizes community efforts (beyond minimum standards) by reducing flood insurance premiums for the community's property owners. CRS discounts on flood insurance premiums range from 5% up to 45%. Those discounts provide an incentive for new flood protection activities that can help save lives and property in the event of a flood. To participate in the CRS, a community can choose to undertake some of the 18 public information and floodplain management activities. Based on the total number of points a community earns, the CRS assigns you to one of ten classes. Your discount on flood insurance premiums is based on your class. Cascade County, the City of Great Falls, and the Town of Belt currently participate in the Community Rating System, all with ratings of 8.

Probability and Magnitude

Flood listings, with associated property and crop damage, adjusted to 2010 values are presented below in **Table 4.8-2.**

TABLE 4.8-2 CASCADE COUNTY FLOOD EVENTS WITH DAMAGES					
Date	**Injuries**	**Fatalities**	**Property Damage**	**Crop Damage**	**Remarks**
1964 Flood	-	-	$31,631,941	Unknown	Presidential Disaster
3/17/1969	0	0	$877	$0	Flooding
1975 Flood	-	-	$39,542,488	Unknown	Presidential Disaster
7/3/1978	0	0	$0	$41,667	Flash Flood, Hail, Rain
1981 Flood	-	-	$1,000,000*	Unknown	Presidential Disaster

TABLE 4.8-2
CASCADE COUNTY FLOOD EVENTS WITH DAMAGES

Date	Injuries	Fatalities	Property Damage	Crop Damage	Remarks
6/19/1991	0	0	$10,000	$10	Flood
8/21/1993	0	0	$5,000	$0	Urban Flood
6/19/2003	0	0	$250,000	$0	Flooding
6/3/2005	0	0	$230,000	$0	Flood, Sand Coulee
TOTAL	**0**	**0**	**$72,670,306**	**$41,677**	

Notes: *Threshold amount of damage for Presidential Disaster Declaration
Source: SHELDUS, 2010 (adjusted to 2009 dollars); National Weather Service (NCDC, 2010); Corps of Engineers, 1973, 1976, 1979; DES, 2011.

To determine exposure to property and population from the 100- and 500-year flood events, FEMA's Q3 data was intersected with the critical facility and MDOR parcel datasets using GIS (**Figures 6a and 6b**) Vulnerable populations were calculated based on the percentage of flood risk area in each census track. **Table 4.8-3** presents the vulnerability analysis for flooding in Cascade County. Annualized loss estimates are presented in the Risk Assessment Summary Tables in *Section 4.10* (**Table 4.10-1 through Table 4.10-5**). The *Flooding Section* in **Appendix C** presents supporting documentation from the risk assessment.

The GIS analysis indicates that 50,889 acres in Cascade County are located in the 100-year flood hazard area including 2,765 residences, 536 commercial, industrial and agricultural buildings, and 26 critical facilities. These estimates do not recognize the flood protection offered by the Vaughn and West Great Falls levee systems.

Based on the frequency of past events, the probability of flooding in Cascade County is rated as "likely"; an event that may occur more than once per decade but not every year.

Future Development

Prohibitive development areas were established as part of the Cascade County Growth Policy. The locations and boundaries of these areas are set forth on a map, kept on file in the Cascade County Planning Board Office and include those areas adjoining a watercourse or drain way, which would be covered by the floodwater of a 100-year flood as delineated on the FEMA Floodway Boundary Maps. The Flood Hazard Evaluation Areas are intended to contain those potential floodplains where it is necessary and desirable, to regulate and prohibit any nonagricultural or non-open space uses, structures or activities. The Cascade County Subdivision Regulations restrict subdivision of a parcel of land which is determined to have any portion located in a regulated floodplain of a perennial stream.

Floodplain management regulations are presently in effect for those parts of the Sun River, the Missouri River, and Sand Coulee Creek within Cascade County and the City of Great Falls. These regulations are administered by the Montana DNRC and basically preclude new structural development within areas

TABLE 4.8-3
CASCADE COUNTY VULNERABILITY ANALYSIS - FLOODING

JURISDICTION	$ RESIDENTIAL PROPERTY 100 YR FLOOD EXPOSURE	RESIDENCES AT RISK #	$ COMMERCIAL , INDUSTRIAL & AGRICULTURAL BUILDING 100 YR FLOOD EXPOSURE	COMMERCIAL, INDUSTRIAL & AGRICULTURAL BUILDINGS AT RISK #	$ CRITICAL FACILITIES 100 YR FLOOD EXPOSURE	CRITICAL FACILITIES AT RISK #	Population At Risk	PERSONS UNDER 18 AT RISK
Incorporated Communities & County								
Belt	$8,865,776	110	$4,708,606	34	$2,270,491	2	400	96
Cascade	$20,597,413	227	$9,012,735	72	$5,082,755	8	685	151
Great Falls	$123,710,664	905	$111,234,635	126	$12,144,809	9	3,327	667
Neihart	$0	0	$0	0	$0	0	0	0
Remainder of County	$270,556,020	1,523	$23,169,688	304			6,953	1,490
CENSUS Designated Places								
Black Eagle	$0	0	$410,000	1	$0	1	110	18
Fort Shaw	$1,331,137	6	$1,043,078	4	$0	0	81	20
Gibson Flats	$9,108,400	76	$1,047,731	10	$0	0	171	44
Malmstrom AFB	$0	0	$0	0	$0	0	0	0
Sand Coulee	$2,832,130	30	$176,658	7	$159,712	1	212	48
Simms	$2,371,252	17	$47,940	3	$0	0	51	6
Stockett	$537,441	7	$0	0	$0	0	96	29
Sun Prairie	$18,255,942	125	$2,027,362	49	$0	0	896	203
Sun River	$3,712,662	52	$852,692	28	$1,146,913	2	124	27
Ulm	$1,288,631	5	$90,010	3	$0	0	111	23
Vaughn	$4,922,447	22	$263,285	4	$0	0	136	31
CENSUS County Divisions								
Belt	$21,812,739	195	$5,557,568	46	$2,270,491	2	995	259
Cascade	$54,688,970	432	$9,818,297	95	$5,082,755	8	1,231	217
Eden-Stockett	$28,520,076	179	$4,427,767	31	$2,261,936	4	825	186
Great Falls	$272,198,584	1,624	$122,744,847	239	$12,144,809	9	6,361	1,338
Great Falls North	$19,231,323	132	$2,474,806	53	$0	1	1,048	225
Monarch-Neihart	$0	0	$0	0	$0	0	0	0
Sun River Valley	$27,278,181	203	$3,102,379	72	$1,146,913	2	905	179

classified as designated floodways under state law. The City of Great Falls has floodplain zoning. Construction is prohibited within the confines of the floodway but is allowed in the floodway fringe if built above or flood-proofed to an elevation equal to or greater than one foot above the 100-year flood elevation. Permits are required before any filling or construction is done in designated flood hazard areas. These rules are intended to promote the wise use of floodplains and minimize the risk that residents and property owners face by being located in a flood hazard area.

The Growth Policy for the City of Great Falls recommends that a coordinated stormwater management plan be developed and a Capital Improvement Program be adopted to fund drainage improvements. The City's Growth Policy also recommends that sound stormwater management principles be incorporated into new land development regulations and the site plan review process. These regulations should allow and encourage creative ways to reduce runoff from parking lots and other impervious surfaces.

It is the City's policy to require drainage plans for new subdivisions, Planned Unit Developments, and any residential, commercial, or industrial development that involves impervious surfaces greater than 15,000 square feet. Generally, the City requires on-site detention of storm water runoff equal to the difference in the volume generated by a 5-year rain falling in a 2-hour period and a 100-year storm falling in a two-hour period.

4.9 DAM FAILURE

CPRI SCORE = 2.55

Description and History

Dams have been placed around Montana for many reasons including recreation, flood control, irrigation, water supply, hydroelectricity, and mining. Dams are built and owned by a variety of entities such as private individuals, utilities, and the government. Dams come in all shapes and sizes from small earthen dams to large concrete structures. The structural integrity of a dam depends on its design, maintenance, and weather/drainage situation. Problems arise when a dam fails and people and/or property lie in its inundation area. Dams can fail for a variety of reasons including seismic activity, poor maintenance, overwhelming weather and flow conditions, or by an intentional act. Dam failure can be compared to riverine or flash flooding in the area downstream from the dam, and sometimes for long distances from the dam, depending on the amount of water retained and the drainage area. Others may be located in areas that result in little if any damages during a failure.

The U.S. Army Corps of Engineers, National Inventory of Dams (NID) website keeps a record of dams across the country. Montana DES also keeps an extensive library of Emergency Action Plans (EAPs) for the state's high hazard dams. Hazard ratings are also given to those dams for emergency management planning purposes. These ratings, high, significant, and low, are based on the potential for loss of life and property damage from the failure of the dam, not the condition or probability of the dam failing, as described below.

Low Hazard Potential: Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

Significant Hazard Potential: Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

High Hazard Potential: Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

Cascade County has five high hazard dams and several significant or low hazard dams. **Figures 9A and 9B** show dam inundation areas in Cascade County and the City of Great Falls, respectively. In addition, there are six high hazard dams in adjoining Teton and Lewis and Clark counties that have the potential to impact Cascade County. These dams are described in **Table 4.9-1**.

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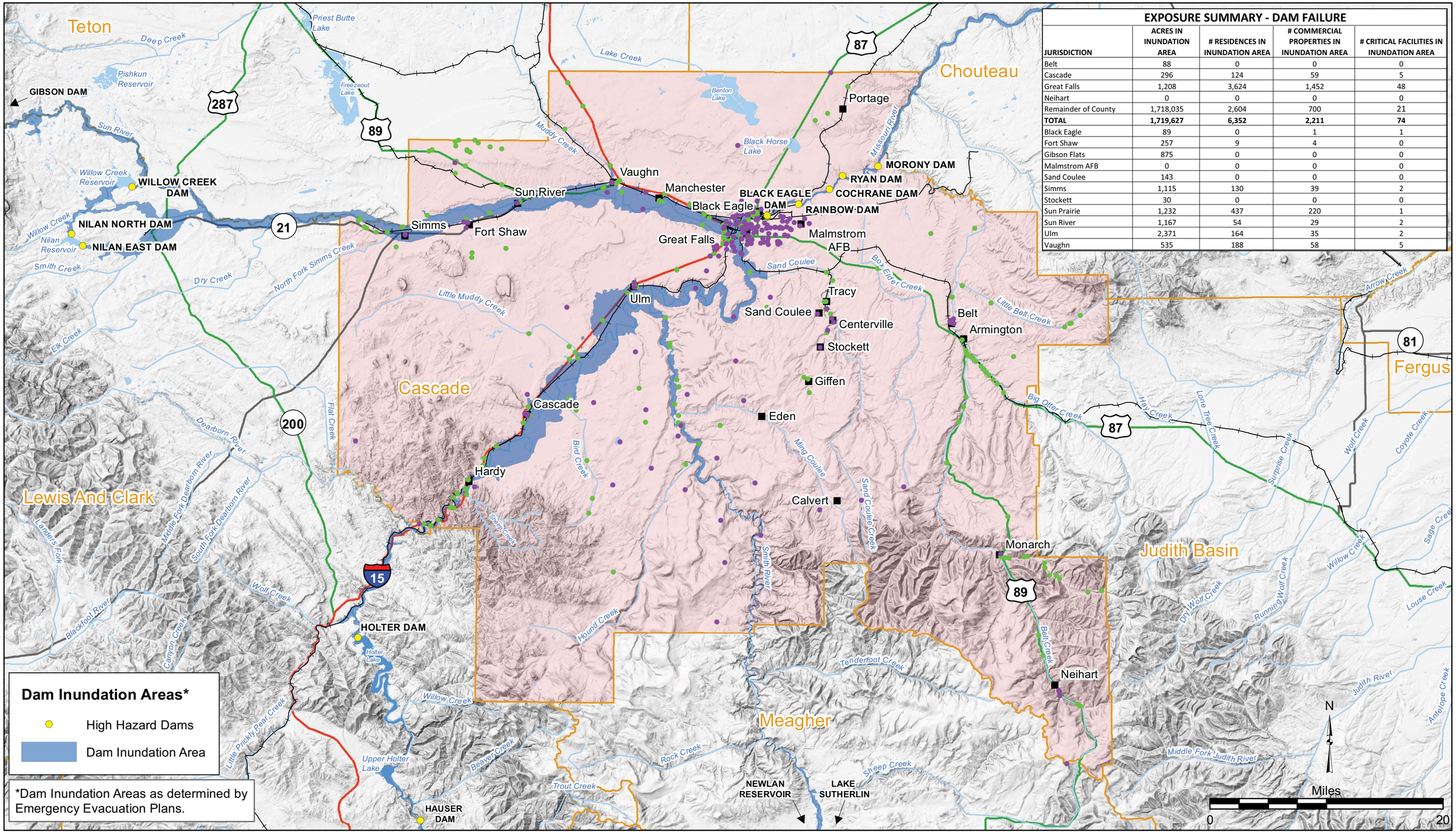


EXPOSURE SUMMARY - DAM FAILURE

JURISDICTION	ACRES IN INUNDATION AREA	# RESIDENCES IN INUNDATION AREA	# COMMERCIAL PROPERTIES IN INUNDATION AREA	# CRITICAL FACILITIES IN INUNDATION AREA
Belt	88	0	0	0
Cascade	296	124	59	5
Great Falls	1,208	3,624	1,452	48
Neihart	0	0	0	0
Remainder of County	1,718,035	2,604	700	21
TOTAL	**1,719,627**	**6,352**	**2,211**	**74**
Black Eagle	89	0	1	1
Fort Shaw	257	9	4	0
Gibson Flats	875	0	0	0
Malmstrom AFB	0	0	0	0
Sand Coulee	143	0	0	0
Simms	1,115	130	39	2
Stockett	30	0	0	0
Sun Prairie	1,232	437	220	1
Sun River	1,167	54	29	2
Ulm	2,371	164	35	2
Vaughn	535	188	58	5

- Critical Facilities
- Bridges
- Place Names
- River/Stream
- Lake/Reservoir
- County Boundary
- Interstate
- U.S. Highway
- Montana Highway
- Rail

May 2011

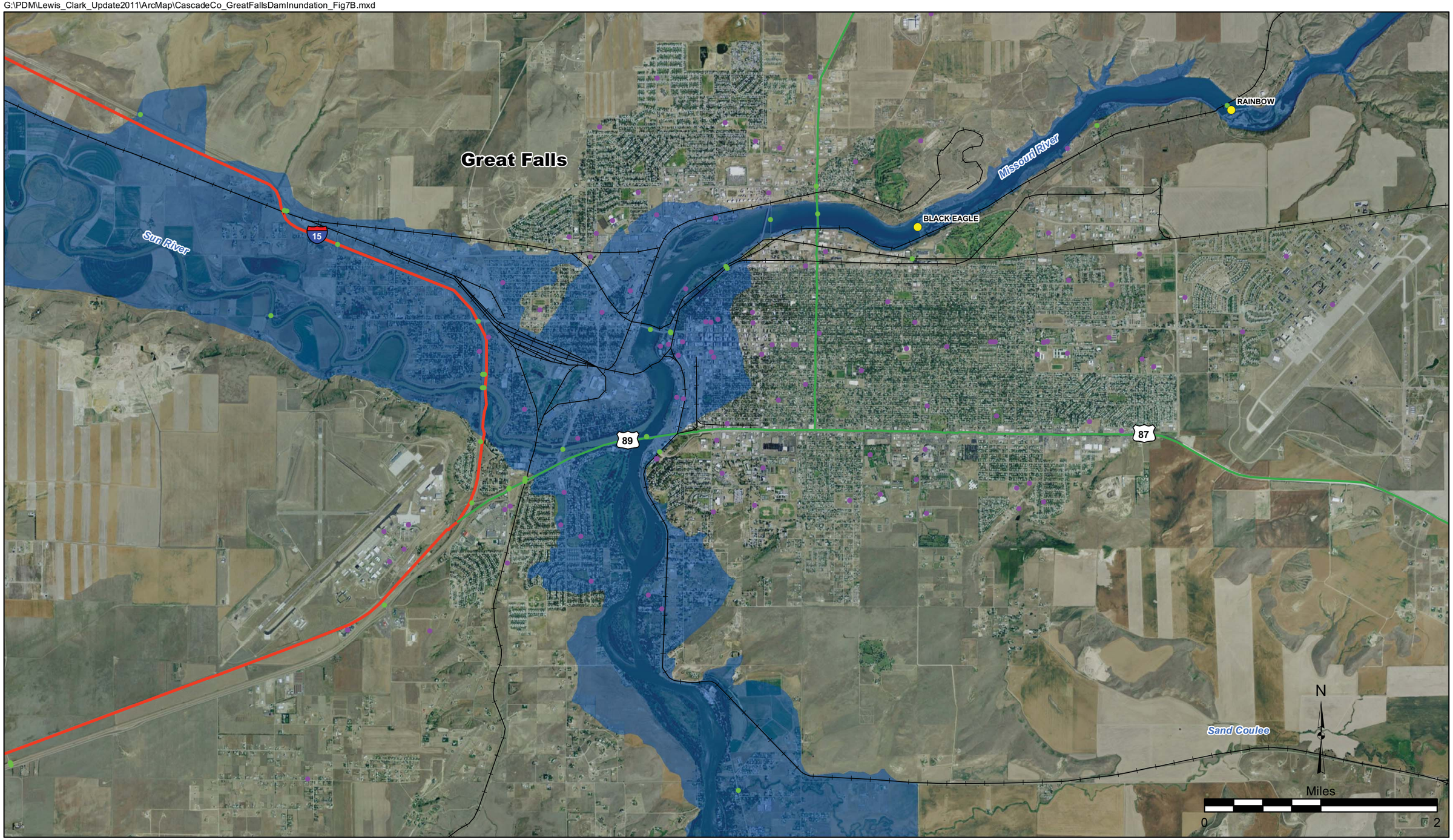
Figure 7A

Dam Inundation Areas

Cascade County, Montana

Pre-Disaster Mitigation Plan

G:\PDM\Lewis_Clark_Update2011\ArcMap\CascadeCo_GreatFallsDamInundation_Fig7B.mxd



Critical Facilities
Bridges
High Hazard Dams
Dam Inundation Area
Interstate
U.S. Highway
Montana Highway
Rail

May 2011

Figure 7B

Great Falls Dam Inundation Areas

Cascade County, Montana

Pre-Disaster Mitigation Plan

TABLE 4.9-1
HIGH HAZARD DAMS IN OR WITH POTENTIAL TO AFFECT CASCADE COUNTY

Dam Name	County	Drainage	Height (feet)	Storage (acre-ft)	Purpose	Owner
Black Eagle Dam	Cascade	Missouri River	13	1,710	PG	PPL Montana
Cochrane Dam	Cascade	Missouri River	59	2,700	PG	PPL Montana
Morony Dam	Cascade	Missouri River	59	2,700	PG	PPL Montana
Rainbow Dam	Cascade	Missouri River	29	1,050	PG	PPL Montana
Ryan Dam	Cascade	Missouri River	61	5,000	PG	PPL Montana
Canyon Ferry Dam	Lewis & Clark	Missouri River	225	2,051,000	PG, Rec	BuRec
Gibson Dam	Teton/Lewis & Clark	Sun River	199	99,100	IR, FC, Rec	BuRec
Hauser Dam	Lewis & Clark	Missouri River	111	64,253	PG, Rec	PPL Montana
Holter Dam	Lewis & Clark	Missouri River	124	240,000	PG, Rec	PPL Montana
Nilan Dams (2)	Lewis & Clark	Sun River	51	15,600	IR, Rec	BuRec
Willow Creek Dam	Lewis & Clark	Sun River	93	39,800	IR, Rec	BuRec
Pishkun Dikes (8)	Teton	Sun River	12-50	46,700	IR, Rec	BuRec

Note: BuRec = U.S. Bureau of Reclamation; IR = Irrigation; FC = Flood Control; Rec = Recreation; PG = Power Generation
Source: BuRec, 2011 (http://www.usbr.gov/projects/); PPL Montana, 2011 (http://www.pplmontana.com)

There have been two disasters involving dams which have impacted Cascade County; one occurred on the Missouri River in 1908, and the other was associated with the Gibson Dam in 1964. These events are described below.

Hauser Dam - On April 14, 1908, at about 2:30 PM, Hauser Dam (in Lewis and Clark County) failed after water pressure undermined the masonry footings (the steel dam itself being structurally sound). The first sign of trouble was when silt-heavy water began gushing from the base of the dam near the powerhouse. A power company employee, spotting the problem, ran into the powerhouse and told everyone to flee for their lives. About 15 minutes later, the masonry footings gave way, causing the upstream section of the dam to settle and a 30-foot wide breach to open in the dam. The water pouring through the breach further undermined the dam's footing, and six minutes later a 300-foot wide section of the dam tore loose. The powerhouse was only slightly damaged. A surge of water 25 to 30 feet high swept downstream. The remaining sections of the dam, anchored to bedrock, helped hold back some of the water for a time, reducing the destructiveness of the flood. A Great Northern Railway locomotive was dispatched to the City of Great Falls, 70 miles downstream, warning stations along the way about the dam break.

Looking downstream at the west end Hauser Dam after its catastrophic failure on April 14, 1908.

The warnings and the geology of the Missouri River below Hauser Dam helped save numerous lives. The construction camp at Holter Dam (then being built) was swept away. The flood reached the small town of Craig around 7:00 PM, but the narrow canyons of the Missouri River above the town helped hold back part of the floodwaters and dissipated much of their energy. The residents of the town had received plenty of warning, and were evacuated. At first, the press reported that the town had been swept away, but this proved inaccurate as only a few shacks and the railroad station had been uprooted. The Craig Bridge (normally 25 feet above water) had more than 2 feet of water over its deck and was feared doomed, but it held. The Great Northern Railway tracks from Craig to Ulm were under water. Workers at the Great Falls smelter improvised a wing dam to deflect the floodwaters away from the smelter site and dynamited a portion of Black Eagle Dam to allow the floodwaters to go downstream. Their efforts were not needed, as the Missouri River only rose 7 feet by the time it reached Great Falls. Nonetheless, damages were estimated at more than $1 million.
(http://www.metnet.mt.gov/special/quarries%20from%20the%20gulch/htm/hauser.shtml)

Gibson Dam - In June 1964, a combination of heavy rains along the Continental Divide and rapid snowmelt caused widespread flooding of many watersheds which resulted in a Presidential Disaster Declaration. Fourteen (14) inches of rain fell during a 37 hour period. The water level in Gibson Reservoir rose three feet over the top of the dam spilling 60,000 cubic feet per second (cfs) of floodwater into the Sun River drainage. Damages were estimated at $62 million in 1964 currency from the flood event that included overtopping of the Gibson Dam.

Vulnerability and Area of Impact

Dams that could have the greatest impact to life and property in Cascade County, demonstrated by their NID hazard rating, are the high hazard dams on the Missouri River up- and downstream of Great Falls and those on the Sun River system. Those areas directly downstream from these high hazard dams would be the areas most at risk for loss of life and structural damage. Emergency Action Plans or these dams are available at the Cascade County DES office.

To model the exposure from a breach of the high hazard dams in Cascade County, a GIS data layer was created for this project and figures created showing the dam failure hazard (**Figures 7a and 7b**). Inundation areas were digitized from the EAPs and intersected with critical facility and MDOR parcel datasets to determine building exposures. Vulnerable populations were calculated based on the percent census block in the inundation areas. Exposure values are presented in **Table 4.9-22**.

GIS analysis of the dam failure risk to Cascade County indicates that over 1.7 million acres are within the inundation areas of the high hazard dams, including 6,352 residences, 2,211 commercial, industrial and agricultural buildings, and 74 critical facilities. The *Dam Failure Section* in **Appendix C** presents supporting documentation from the risk assessment including a list of critical facilities in the inundation areas.

TABLE 4.9-2
CASCADE COUNTY VULNERABILITY ANALYSIS - DAM FAILURE

JURISDICTION	RESIDENTIAL INUNDATION AREA EXPOSURE $	RESIDENCES AT RISK #	COMMERCIAL, INDUSTRIAL & AGRICULTURAL BUILDING EXPOSURE $	# COMMERCIAL , INDUSTRIAL & AGRICULTURAL PROPERTIES AT RISK	CRITICAL FACILITY INUNDATION EXPOSURE $	CRITICAL FACILITIES # AT RISK	POPULATION AT RISK	PERSONS UNDER 18 AT RISK
Incorporated Communities & County								
Belt	$0	0	$0	0	$0	0	0	0
Cascade	$11,876,609	124	$3,979,380	59	$1,072	5	462	100
Great Falls	$429,570,429	3,624	$991,632,500	1,452	$102,552,667	48	12,786	2,883
Neihart	$0	0	$0	0	$0	0	0	0
Remainder of County	$421,269,022	2,604	$48,043,905	$700	$10,636,764	21	8,679	1,842
CENSUS Designated Places								
Black Eagle	$0	0	$410,000	1	$0	1	206	33
Fort Shaw	$1,895,688	9	$1,043,078	4	$0	0	109	32
Gibson Flats	$0	0	$0	0	$0	0	0	0
Malmstrom AFB	$0	0	$0	0	$0	0	0	0
Sand Coulee	$0	0	$0	0	$0	0	0	0
Simms	$12,665,339	130	$1,830,147	39	$2,001,713	2	339	67
Stockett	$0	0	$0	0	$0	0	0	0
Sun Prairie	$53,965,736	437	$8,789,764	220	$0	1	1,630	383
Sun River	$3,975,992	54	$915,992	29	$1,146,913	2	124	27
Ulm	$23,429,467	164	$2,424,078	35	$352,690	2	501	113
Vaughn	$23,912,599	188	$3,496,861	58	$1,066,145	5	641	145
CENSUS County Divisions								
Belt	$0	0	$0	0	$0	0	18	0
Cascade	$74,885,234	519	$7,312,991	116	$23,508	6	1,310	232
Eden-Stockett	$23,267,448	79	$2,152,274	12	$0	1	270	57
Great Falls	$646,024,786	4,768	$1,004,996,161	1,620	$102,905,357	51	16,578	3,721
Great Falls North	$58,754,070	480	$20,972,362	294	$6,046,869	7	1,966	439
Monarch-Neihart	$0	0	$0	0	$0	0	0	0
Sun River Valley	$59,784,522	506	$8,221,997	169	$4,214,770	9	1,785	376

Probability and Magnitude

A dam failure event may allow for some advanced warning to the public, and therefore, the potential impact to the population is considered moderate. The probability of a significant dam breach affecting Cascade County was ranked as "possible" by the Planning Team.

A high magnitude dam failure can represent more than one threat of damage. The most obvious threat is the floodwater generated by sudden breaching of the dam which can result in direct damage due to submergence, hydraulic damage, and loss of life or property damage. A less obvious threat is sedimentation which can threaten the integrity of a downstream structure.

Future Development

Cascade County does not have zoning or subdivision regulations to prevent new construction in dam inundation areas.

4.10 RISK ASSESSMENT SUMMARY

This section summarizes the results of the individual risk assessments presented under the hazard profiles. There have been no repetitive loss properties in the identified hazard areas in Cascade County, or the communities of Great Falls, Cascade, and Neihart. Annual loss estimates are presented for each hazard where damage data is available. Future development projects in Cascade County are discussed as they relate to the hazard areas.

Vulnerability Analysis - Loss Estimation Summary

Estimating potential losses and calculating risk requires evaluating where hazard areas and vulnerabilities to them coincide, how frequently the hazards occur, and then estimating the magnitude of damage resulting from a hazard event. Annualized loss was computed for the hazards where damage data was available. *Section 4.1* presents the methodology for loss estimation calculations. **Tables 4.10-1 through 4.10-5** present annual loss for the various hazards for residential, commercial (including industrial and agricultural buildings), and critical facilities in the county and incorporated communities. **Appendix C** contains supporting information.

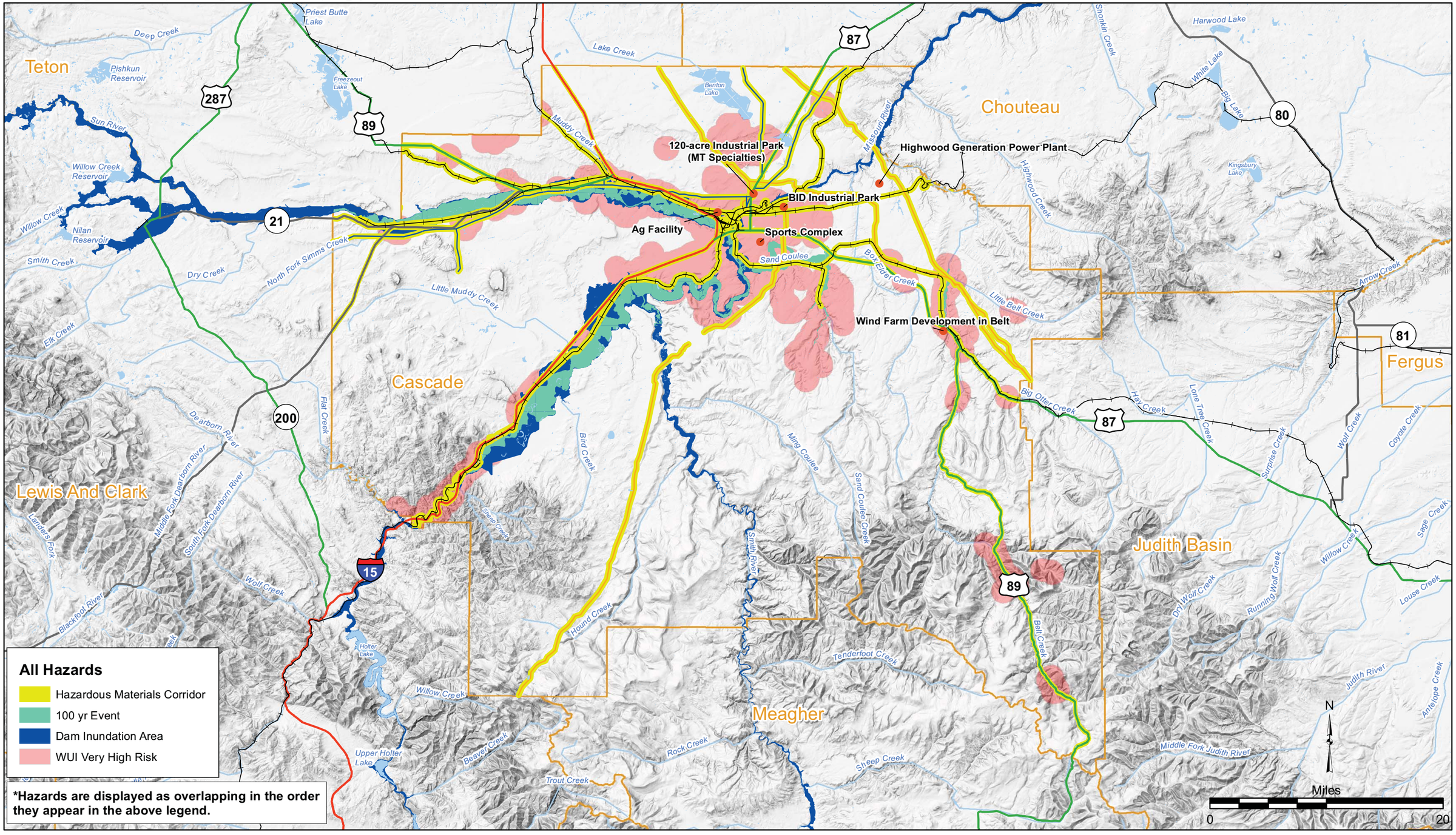
Future Development

Future development projects identified within the next 10 years in Cascade County include:

- 120 acre industrial park northeast of the Malt Plant
- Business Improvement District (BID) Industrial Park at 52nd St & 18th Ave. N.
- Ag facility on Stuckey Road
- Sports Complex at 24th Ave S. & 26th St. (old driving range)
- Wind farm development in Belt
- Highwood Generation Power Plant
- Residential development within 1 mile of existing Great Falls city limits

Figure 8 presents the composite of hazard prone areas with the identified future development projects in the county. **Table 4.10-6** presents a matrix of each future development project, showing which hazards they will be exposed to. Data on proposed construction method and estimated cost were not available.

G:\PDM\CascadeCo_Update2011\ArcMap\CascadeCo_AllHazardsFutureDevelopment_Fig8A.mxd



Future_Development
County Boundary
River/Stream
Lake/Reservoir
Interstate
U.S. Highway
Montana Highway
Rail
Gas Transmission Pipeline
Hazardous Liquid Pipeline

May 2011

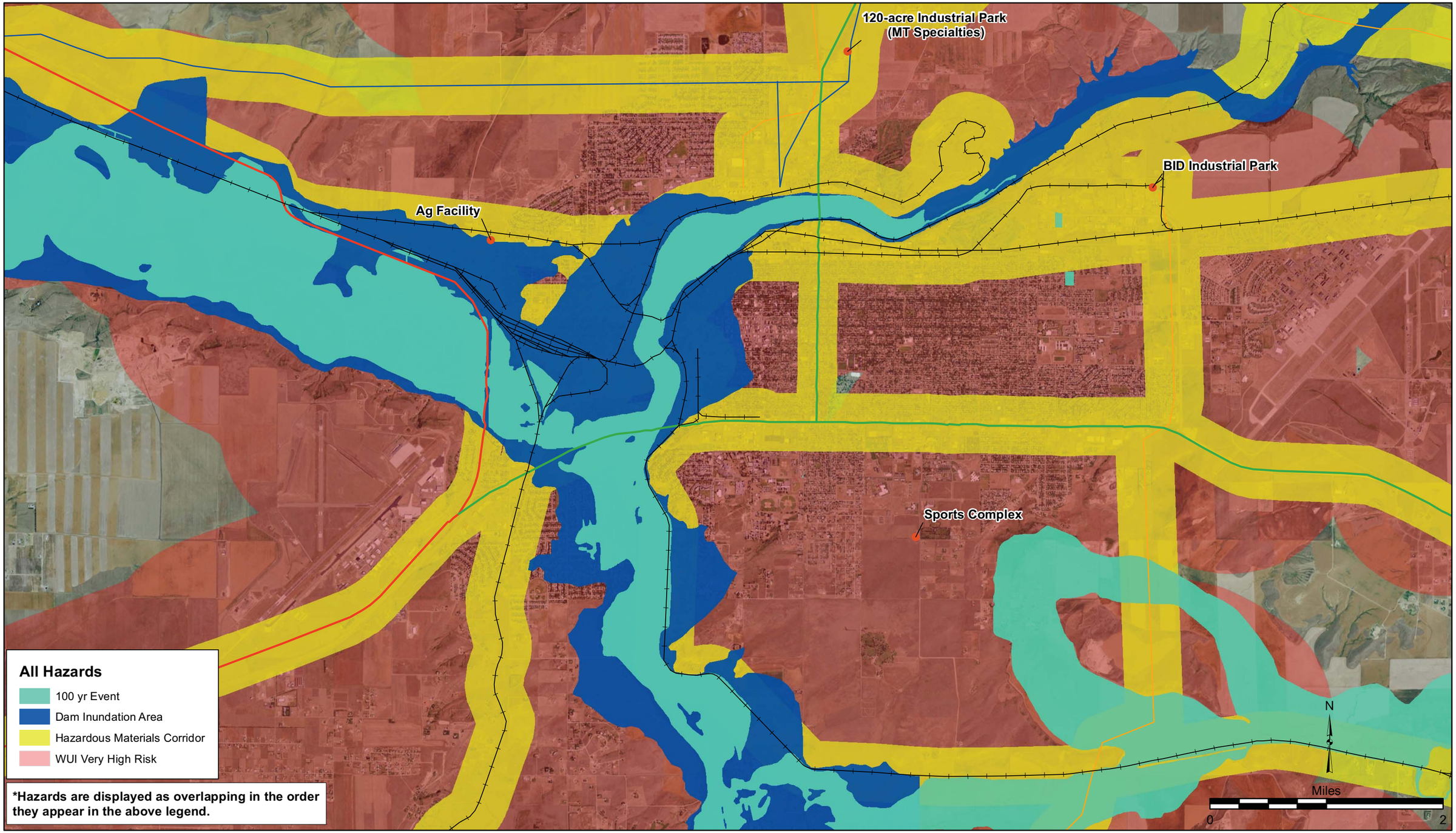
Figure 8A

All Hazards / Future Development

Cascade County, Montana

Pre-Disaster Mitigation Plan

G:\PDM\CascadeCo_Update2011\ArcMap\CascadeCo_GreatFallsAllHazardsFutureDev_Fig8B.mxd



Future Development
Interstate
U.S. Highway
Montana Highway
Rail
Gas Transmission Pipeline
Hazardous Liquid Pipeline

May 2011

Figure 8B

Great Falls - All Hazards / Future Development

Cascade County, Montana

Pre-Disaster Mitigation Plan

TABLE 4.10-1
HAZARD VULNERABILITY SUMMARY; CASCADE COUNTY

Hazard	Residential Building Stock $ Exposure in Hazard Area	# Residential Structures in Hazard Area	Residential Building Stock $ Annual Loss	Commercial, Industrial & Agricultural Building Stock $ Exposure in Hazard Area	# Commercial, Industrial & Agricultural Structures in Hazard Area	Commercial, Industrial & Agricultural Building Stock $ Annual Loss	Critical Facility $ Exposure in Hazard Area	# Critical Facilities Exposure in Hazard Area	Critical Facilities $ Annualized Loss	Population in Hazard Area	Under 18 in Hazard Area
Wildfire	$949,977,937	6,476	$1,354	$164,230,650	1,850	$234	56,283,963	54	81	19,968	4,775
Structure Fire	$1,134,301,276	7,751	$339,118	$188,537,784	2,179	$56,366	$56,646,845	84	$16,935	21,670	5,215
Severe Summer Weather	$1,134,301,276	7,751	$38,252	$188,537,784	2,179	$6,358	$56,646,845	84	$1,910	21,670	5,215
Hazardous Material Incidents	$420,082,605	3,231	NA	$122,729,395	1,055	NA	$53,058,830	33	NA	14,176	3,343
Severe Winter Weather	$1,134,301,276	7,751	$16,895	$188,537,784	2,179	$2,808	$56,646,845	84	$844	21,670	5,215
Highway Accidents	$1,134,301,276	7,751	$20,077	$188,537,784	2,179	$3,337	$56,646,845	84	$1,003	21,670	5,215
Flooding/Levee Failure	$270,556,020	1,523	$55,138	$23,169,688	304	$4,722	$3,408,849	7	$11,544	6,953	1,490
Dam Failure	$421,269,022	2,604	NA	$48,043,905	700	NA	$10,636,764	21	NA	8,679	1,842

NA = Not Available. Annual loss can not be computed due to the absence of historic property damage figures that are required to calculate magnitude. See Section 4.1 on page 4-1 which describes risk assessment methodology for additional information.
Wildfire exposure is presented for "Very High" hazard area.
Flooding exposure is presented for the 100-year event assuming no levee protection.
It should be noted that there are some inherent inaccuracies using a percentage of census block population to compute the number of individuals living in the hazard area . More persons than actually reside in the hazard area where census blocks are large.

TABLE 4.10-2
HAZARD VULNERABILITY SUMMARY; CITY OF GREAT FALLS

Hazard	Residential Building Stock $ Exposure in Hazard Area	# Residential Structures in Hazard Area	Residential Building Stock $ Annual Loss	Commercial, Industrial & Agricultural Building Stock $ Exposure in Hazard Area	# Commercial, Industrial & Agricultural Structures in Hazard Area	Commercial, Industrial & Agricultural Building Stock $ Annual Loss	Critical Facility $ Exposure in Hazard Area	# Critical Facilities Exposure in Hazard Area	Critical Facilities $ Annualized Loss	Population in Hazard Area	Under 18 in Hazard Area
Wildfire	$2,555,386,799	20,666	$3,642	$3,670,964,476	5,371	$5,232	$351,087,457	131	$500	58,505	13,161
Structure Fire	$2,557,237,526	20,690	$764,527	$3,671,092,076	5,372	$1,097,532	$351,087,457	131	$104,963	58,505	13,161
Severe Summer Weather	$2,557,237,526	20,690	$86,238	$3,671,092,076	5,372	$123,801	$351,087,457	131	$11,840	58,505	13,161
Hazardous Material Incidents	$1,152,783,373	9,576	NA	$2,640,876,194	3,731	NA	$175,718,086	88	NA	35,602	8,093
Severe Winter Weather	$2,557,237,526	20,690	$38,090	$3,671,092,076	5,372	$54,680	$351,087,457	131	$5,229	58,505	13,161
Highway Accidents	$2,557,237,526	20,690	$45,262	$3,671,092,076	5,372	$64,977	$351,087,457	131	$6,214	58,505	13,161
Flooding/Levee Failure	$123,710,664	905	$25,212	$111,234,635	126	$22,669	$12,144,809	9	$71,550	3,327	667
Dam Failure	$429,570,429	3,624	NA	$991,632,500	1,452	NA	$102,552,667	48	NA	12,786	2,883

NA = Not Available. Annual loss can not be computed due to the absence of historic property damage figures that are required to calculate magnitude. See Section 4.1 on page 4-1 which describes risk assessment methodology for additional information.
Wildfire exposure is presented for "Very High" hazard area.
Flooding exposure is presented for the 100-year event assuming no levee protection.
It should be noted that there are some inherent inaccuracies using a percentage of census block population to compute the number of individuals living in the hazard area . More persons than actually reside in the hazard area where census blocks are large.

TABLE 4.10-3
HAZARD VULNERABILITY SUMMARY; TOWN OF BELT

Hazard	Residential Building Stock $ Exposure in Hazard Area	# Residential Structures in Hazard Area	Residential Building Stock $ Annual Loss	Commercial, Industrial & Agricultural Building Stock $ Exposure in Hazard Area	# Commercial, Industrial & Agricultural Structures in Hazard Area	Commercial, Industrial & Agricultural Building Stock $ Annual Loss	Critical Facility $ Exposure in Hazard Area	# Critical Facilities Exposure in Hazard Area	Critical Facilities $ Annualized Loss	Population in Hazard Area	Under 18 in Hazard Area
Wildfire	$16,138,830	214	$23	$5,425,834	54	$8	$4,394,466	7	$6	597	142
Structure Fire	$16,138,830	214	$4,825	$5,425,834	54	$1,622	$4,394,466	7	$1,314	597	142
Severe Summer Weather	$16,138,830	214	$544	$5,425,834	54	$183	$4,394,466	7	$148	597	142
Hazardous Material Incidents	$9,695,700	119	NA	$4,249,098	39	NA	$4,394,466	7	NA	515	127
Severe Winter Weather	$16,138,830	214	$240	$5,425,834	54	$81	$4,394,466	7	$65	597	142
Highway Accidents	$16,138,830	214	$286	$5,425,834	54	$96	$4,394,466	7	$78	597	142
Flooding/Levee Failure	$8,865,776	110	$1,807	$4,708,606	34	$960	$2,270,491	2	$896	400	96
Dam Failure	$0	0	NA	$0	0	NA	$0	0	NA	0	0

NA = Not Available. Annual loss can not be computed due to the absence of historic property damage figures that are required to calculate magnitude. See Section 4.1 on page 4-1 which describes risk assessment methodology for additional information.
Wildfire exposure is presented for "Very High" hazard area.
Flooding exposure is presented for the 100-year event assuming no levee protection.
It should be noted that there are some inherent inaccuracies using a percentage of census block population to compute the number of individuals living in the hazard area . More persons than actually reside in the hazard area where census blocks are large.

TABLE 4.10-4
HAZARD VULNERABILITY SUMMARY; TOWN OF CASCADE

Hazard	Residential Building Stock $ Exposure in Hazard Area	# Residential Structures in Hazard Area	Residential Building Stock $ Annual Loss	Commercial, Industrial & Agricultural Building Stock $ Exposure in Hazard Area	# Commercial, Industrial & Agricultural Structures in Hazard Area	Commercial, Industrial & Agricultural Building Stock $ Annual Loss	Critical Facility $ Exposure in Hazard Area	# Critical Facilities Exposure in Hazard Area	Critical Facilities $ Annualized Loss	Population in Hazard Area	Under 18 in Hazard Area
Wildfire	$22,517,751	235	$32	$10,051,395	76	$14	$5,082,755	8	$7	685	151
Structure Fire	$22,517,751	235	$6,732	$10,051,395	76	$3,005	$5,082,755	8	$1,520	685	151
Severe Summer Weather	$22,517,751	235	$759	$10,051,395	76	$339	$5,082,755	8	$171	685	151
Hazardous Material Incidents	$22,517,751	235	NA	$10,051,395	76	NA	$5,082,755	8	NA	685	151
Severe Winter Weather	$22,517,751	235	$335	$10,051,395	76	$150	$5,082,755	8	$76	685	151
Highway Accidents	$22,517,751	235	$399	$10,051,395	76	$178	$5,082,755	8	$90	685	151
Flooding/Levee Failure	$20,597,413	227	$4,198	$9,012,735	72	$1,837	$5,082,755	8	$1,036	685	151
Dam Failure	$11,876,609	124	NA	$3,979,380	59	NA	$1,072	5	NA	462	100

NA = Not Available. Annual loss can not be computed due to the absence of historic property damage figures that are required to calculate magnitude. See Section 4.1 on page 4-1 which describes risk assessment methodology for additional information.
Wildfire exposure is presented for "Very High" hazard area.
Flooding exposure is presented for the 100-year event assuming no levee protection.
It should be noted that there are some inherent inaccuracies using a percentage of census block population to compute the number of individuals living in the hazard area . More persons than actually reside in the hazard area where census blocks are large.

TABLE 4.10-5
HAZARD VULNERABILITY SUMMARY; TOWN OF NEIHART

Hazard	Residential Building Stock $ Exposure in Hazard Area	# Residential Structures in Hazard Area	Residential Building Stock $ Annual Loss	Commercial, Industrial & Agricultural Building Stock $ Exposure in Hazard Area	# Commercial, Industrial & Agricultural Structures in Hazard Area	Commercial, Industrial & Agricultural Building Stock $ Annual Loss	Critical Facility $ Exposure in Hazard Area	# Critical Facilities in Hazard Area	Critical Facilities $ Annualized Loss	Population in Hazard Area	Under 18 in Hazard Area
Wildfire	$14,994,082	177	$21	$1,380,923	32	$2	$1,617,000	3	$2	51	1
Structure Fire	$15,055,088	178	$4,501	$1,380,923	32	$413	$1,617,000	3	$483	51	1
Severe Summer Weather	$15,055,088	178	$508	$1,380,923	32	$47	$1,617,000	3	$55	51	1
Hazardous Material Incidents	$12,270,437	156	NA	$1,380,023	30	NA	$827,000	2	NA	51	1
Severe Winter Weather	$15,055,088	178	$224	$1,380,923	32	$21	$15,055,088	3	$24	51	1
Highway Accidents	$15,055,088	178	$266	$1,380,923	32	$24	$1,617,000	3	$29	51	1
Flooding/Levee Failure	$0	0	$0	$0	0	$0	$0	0	$0	0	0
Dam Failure	$0	0	NA	$0	0	NA	$0	0	NA	0	0

NA = Not Available. Annual loss can not be computed due to the absence of historic property damage figures that are required to calculate magnitude. See Section 4.1 on page 4-1 which describes risk assessment methodology for additional information.
Wildfire exposure is presented for "Very High" hazard area.
Flooding exposure is presented for the 100-year event assuming no levee protection.
It should be noted that there are some inherent inaccuracies using a percentage of census block population to compute the number of individuals living in the hazard area . More persons than actually reside in the hazard area where census blocks are large.

TABLE 4.10-6
FUTURE DEVELOPMENT SUMMARY

Proposed Project	Hazard Areas							
	Wildfire	Structure Fire	Severe Summer Weather	Hazardous Material Incidents	Severe Winter Weather	Highway Accidents	Flooding/ Levee Failure	Dam Failure
NE of Malt Plant – 120 acre industrial park (MT Specialties)	Yes	Yes	Yes	Yes	Yes	Yes	No	No
52nd St & 18th Ave. N – BID industrial park	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Stuckey Road – Ag facility proposed	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Sports Complex – 24th Ave S. & 26th St. (old driving range)	Yes	Yes	Yes	No	Yes	Yes	No	No
Wind farm development in Belt	Yes	Yes	Yes	No	Yes	Yes	No	No
Highwood Generation Power Plant	No	Yes	Yes	No	Yes	Yes	No	No

5.0 MITIGATION STRATEGY

Hazard mitigation, as defined by the Disaster Mitigation Act of 2000, is any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards. The development of a mitigation strategy allows the community to create a vision for preventing future disasters, establish a common set of mitigation goals, prioritize actions, and evaluate the success of such actions.

Specific mitigation goals and projects were developed for Cascade County by the Planning Team and reviewed and enhanced at the public meetings. A matrix developed for project ranking emphasizing cost-benefit and input from local officials was used to determine project prioritization. Project implementation is discussed at the conclusion of this section. **Appendix D** contains supporting documentation for the mitigation strategy including: example mitigation projects and the mitigation action plan with individual project worksheets.

5.1 HAZARD MITIGATION GOALS

The PDM Plan goals describe the overall direction that Cascade County can take to work toward mitigating risk from natural and man-made hazards and avoid long-term vulnerabilities to these hazards. Mitigation goals for this plan are listed below.

- Reduce the Impacts from Wildfire
- Reduce the Impacts from Structure Fires
- Reduce Impacts from Severe Summer Weather
- Reduce Impacts from Hazardous Material Incidents
- Reduce Impacts from Severe Winter Weather
- Reduce Impacts from Transportation Accidents
- Reduce Impacts from Flooding and Levee Failure
- Reduce Impacts from Dam Failure
- Reduce Impacts from All Hazards

5.2 HAZARD MITIGATION OBJECTIVES & PROJECTS

The Planning Team reviewed a wide range of mitigation projects prior to determining what actions to include in the Cascade County PDM Plan (**Appendix D**). Particular attention was given to new and existing buildings and infrastructure and developing appropriate mitigation strategies for these facilities. Prior to analyzing and prioritizing the mitigation actions, projects were grouped under the following objectives.

- Prevention
- Property Protection
- Public Education and Awareness
- Natural Resource Protection
- Structural Projects
- Emergency Services

The Cascade County mitigation projects are listed in **Table 5.4-1**.

5.3 MITIGATION PROJECT RANKING AND PRIORITIZATION

Each of the proposed projects has value; however, time and financial constraints do not permit all projects to be implemented immediately. By prioritizing the actions, the most critical, cost effective projects can be achieved in the short term.

A cost-benefit matrix was developed to rank the mitigation projects using the following criteria. Each project was assigned a "high", "medium", or "low" rank for *Population Impacted, Property Impacted*, *Project Feasibility* and *Cost*, as described below:

- For the *Population Protected* category, a "high" rank represents greater than 50 percent of county residents would be protected by implementation of the mitigation strategy; a "medium" rank represents 20 to 50 percent of county residents would be protected; and, a "low" rank represents less than 20 percent of county residents would be protected.

- For the *Property Protected* category, a "high" represents that greater than $500,000 worth of property would be protected through implementation of the mitigation strategy; "medium" represents that $100,000 to $500,000 worth of property would be protected; and, "low" would be less than $100,000 would be protected.

- For the *Project Feasibility* category a "high" rank represent that technology is available and implementation is likely; a "medium" rank indicates technology may be available but implementation could be difficult; and, a "low" rank represents that no technology is available or implementation would be unlikely.

- For the *Project Cost* category, a "high" represents that the mitigation project would cost more than $500,000; a "medium" rank represents the project cost would be between $100,000 and $500,000; and, "low" represents the project would cost less than $100,000.

The overall cost-benefit was then calculated by summing the total score for each project. **Table 5.3-1** presents the cost-benefit scoring matrix. **Table 5.4-1** and the mitigation action plans in **Appendix D** present the scoring of each project.

TABLE 5.3-1
COST-BENEFIT SCORING MATRIX

	Population Protected	Property Protected	Project Feasibility	Cost
High	3	3	3	1
Medium	2	2	2	2
Low	1	1	1	3

After considering all mitigation projects, the Planning Team prioritized the projects as high, medium, or low based on which projects were most needed to protect life and property. Prioritization of the projects serves as a guide for choosing and funding projects. **Table 5.4-1** and the mitigation action plans in **Appendix D** present the county priority for each project.

5.4 PROJECT IMPLEMENTATION

The Planning Team reviewed the projects and assigned a corresponding county/city department responsible for its implementation. Cooperating organizations for implementation may also include local, federal or regional agencies that are capable of implementing activities and programs. The Planning Team identified a schedule for implementation and potential funding sources. The schedule for implementation included several categories including: "on-going" for projects that are part of the county's DES program; "short-term" for projects to be completed within 1-2 years; "mid-term" for projects to be completed within 3-4 years; "long-term" for projects to be completed in 5 or more years; and "Year 1-5" for projects which will span the entire planning period. Implementation details are shown in **Table 5.4-1** and in the mitigation action plans in **Appendix D.** Potential funding sources are discussed in *Section 6.3*. The Cascade County DES Coordinator will be responsible for mitigation project administration.

TABLE 5.4-1
CASCADE COUNTY MITIGATION STRATEGY

Goal	Objective	Project	Ranking / Score County Priority	Responsible Agency / Department	Schedule	Potential Funding Source
Goal 1 - Reduce the Impacts from **Wildfire**	Objective 1.1 - Enhance Opportunities to Protect Property from Wildfire	1.1.1 - Perform fuel treatments along evacuation routes	High / 10 points High Priority	DES, Fire Service Areas, County Fire Council	Year 1-5	FEMA, DNRC, USFS, BLM, County
		1.1.2 - Continue grants programs for landowners to create defensible space.	High / 11 points High Priority	DES, Fire Service Areas, County Fire Council	Ongoing	FEMA, DNRC, County, USFS, BLM
		1.1.3 - Study creation of fire breaks in appropriate locations in Conservation Reserve Program lands and areas of future development.	Medium / 9 points Medium Priority	DES, Fire Service Areas, Farm Service Agency	Ongoing	County, Farm Service Agency
	Objective 1.2 - Provide Public Education and Awareness on Wildfire	1.2.1 - Continue education programs to raise consciousness of landowners on wildfire	High / 12 points High Priority	Fire Service Areas, FireSafe Montana	Ongoing	County, USFS, BLM
	Objective 1.3 - Enhance Emergency Service Capabilities to fight Wildfire	1.3.1 - Recruit and train volunteer fire fighters	High / 11 points High Priority	County Fire Council, Fire Service Areas	Ongoing	FEMA, County, DNRC
		1.3.2 - Obtain more 4-WD tenders	Medium / 8 points High Priority	County Fire Council, Fire Service Areas	Ongoing	GSA, FEMA, DNRC
		1.3.3 - Install culverts on initial attack roads	High / 10 points High Priority	County Fire Council, Commissioners, Public Works; Private Landowners, Fire Service Areas	Ongoing	FEMA, County, USFS, BLM, DNRC
		1.3.4 - Install booster antennas to enhance cell service in fire districts where it would be beneficial.	Medium / 9 points Medium Priority	County Fire Council	Mid-Range	FEMA, County
		1.3.5 - Improve training and qualifications of personnel to more effectively interface with incoming Incident Management Teams deployed in the county.	High / 10 points Medium Priority	DNRC, USFS, FEMA, Emergency Management, County Fire Council	Mid-Range	FEMA, DNRA, County
		1.3.6 - Obtain additional repeaters or relocate existing repeaters to enhance radio communications in Sun River/Simms area, Neihart, and Sand Coulee.	Medium/ 9 points High Priority	DES, County Communications	Short-Range	County, FEMA

TABLE 5.4-1
CASCADE COUNTY MITIGATION STRATEGY

Goal	Objective	Project	Ranking / Score County Priority	Responsible Agency / Department	Schedule	Potential Funding Source
Goal 1 - Reduce the Impacts from **Wildfire**	Objective 1.3 - Enhance Emergency Service Capabilities to fight Wildfire	1.3.7 - Increase availability of water resources for wildland firefighting by strategic placement of water tanks and ponds.	Medium / 9 points Low Priority	County Fire Council, DNRC	Long-Range	County, FEMA, DNRC
		1.3.8 - Create a database of water sources for firefighting and make database available to rural fire districts.	High / 11 points Medium Priority	County, City of Great Falls	Ongoing	County, City of Great Falls
		1.3.9 - Consider increasing air support in Cascade County for wildfire suppression	Medium / 9 points Medium-Low Priority	DNRC, FEMA	Long-Range	DNRC, FEMA
	Objective 1.4 - Implement Actions to Prevent Impacts from Wildfires	1.4.1 - Review subdivision regulation to reexamine water supply requirements.	Medium / 7 points High Priority	County Planning	Short-Range	County
		1.4.2 - Complete a study of impact fees for rural residents to fund more reliable water supplies and fire safety.	Medium / 9 points Medium Priority	County Planning	Short-Range	County
Goal 2 - Reduce the Impacts from **Structure Fire**	Objective 2.1 - Enhance Emergency Service Capabilities to fight structure fires	2.1 - Recruit and train volunteer fire fighters	High / 11 points High Priority	Fire Service Areas	Ongoing	FEMA, Fire Services Training School
		2.2 - Increase availability of water resources for structure fire suppression by creating reliable water supplies in rural areas.	Medium / 9 points High Priority	Fire Service Areas	Ongoing	County, FEMA
		2.3 - Update equipment needed for suppressing structure fires	High / 10 points High Priority	Fire Service Areas	Ongoing	County, GSA, FEMA, DNRC
Goal 3 - Reduce the Impacts from **Severe Summer Weather**	Objective 3.1 - Enhance Opportunities to Protect Property from Severe Summer Weather	3.1.1 - Install 3-mil window film on windows of existing and future schools and critical facilities to prevent shattering.	High / 10 points Low Priority	DES, School District	Long-Range	FEMA, County, Schools
	Objective 3.2 - Provide Public Education and Awareness on Severe Summer Weather	3.2.1 - Promote the National Weather Service's Severe Weather Awareness Week.	High / 10 points High Priority	Emergency Management, NWS	Ongoing	NWS, County
		3.2.2 - Work towards Cascade County becoming a National Weather Service Storm Ready Community.	High / 10 points Medium Priority	Emergency Management, NWS	Mid-Range	NWS, County
		3.2.3 - Promote National Weather Service's severe weather spotter training program	High / 10 points High Priority	Emergency Management, NWS	Ongoing	NWS
Goal 4 - Reduce the Impacts from **Hazardous Material Incidents**	Objective 4.1 - Enhance Opportunities to Protect Property from Hazardous Material Incidents	4.1.1 - Explore the possibility of an alternate route around Great Falls for truck traffic carrying hazardous material loads and/or a signed hazardous material route to avoid population center.	High / 10 points Medium Priority	County & City Planning, MDT	Mid-Range	County, City of Great Falls, MDT

TABLE 5.4-1
CASCADE COUNTY MITIGATION STRATEGY

Goal	Objective	Project	Ranking / Score County Priority	Responsible Agency / Department	Schedule	Potential Funding Source
Goal 4 - Reduce the Impacts from **Hazardous Material Incidents**	Objective 4.2 - Enhance Emergency Service Capabilities	4.2.1 - Ensure local emergency responders have adequate training to respond to haz-mat events consistent with local capabilities.	Medium / 9 points High Priority	Emergency Management, Fire Service Areas	Ongoing	Fire Services Training School
		4.2.2 - Obtain regional containment equipment trailers and supplies to strategically position for response in the county	High / 10 points Medium Priority	DES, Fire Services Areas	Mid-Range	County
		4.2.3 - Update resource list of emergency response supplies/vendors.	Medium / 8 points High Priority	Emergency Management	Ongoing	County, City of Great Falls
		4.2.4 - Explore creating a safe haven for haz-mat loads that may be in trouble.	High / 10 points Low Priority	Emergency Management, MDT	Long-Range	County, City of Great Falls, MDT
Goal 5 - Reduce the Impacts from **Severe Winter Weather**	Objective 5.1 - Enhance Emergency Service Capabilities	5.1.1 - Update list of emergency shelter locations in each community	High / 10 points Medium Priority	Emergency Management, Red Cross, VOAD, City & County GIS	Ongoing	County, City of Great Falls
		5.1.2 - Obtain generators for emergency shelters.	Medium / 7 points Low Priority	Emergency Management	Long-Range	GSA, Facility Owners
		5.1.3 - Continue to aggressively address rural locations within the county so people's residences can be found for rescue purposes.	Medium / 8 points High Priority	DES, GIS	Ongoing	County
		5.1.4 - Coordinate with DPHHS on emergency access requirements at licensed private facilities.	Medium / 8 points Medium Priority	LEPC Special Needs & Health Emergency Subcommittees	Mid-Range	County
		5.1.5 - Consider enhanced snow removal services to support public safety and infrastructure protection	Medium / 9 points High Priority	Fire Service Areas, County Public Works	Short-Range	County
		5.1.6 - Survey boundary description of current access routes (Dearborn) and establish a legal easement for emergency response purposes.	Medium / 9 points Medium Priority	County Attorney	Mid-Range	County
	Objective 5.2 - Provide Public Education and Awareness on Severe Winter Weather	5.2.1 - Perform public outreach/education of location of emergency shelters.	High / 10 points Medium Priority	Emergency Management	Mid-Range	County, City of Great Falls
		5.2.2 - Conduct public outreach campaign where special needs residents would provide information on where they live and what they need. Develop a database with this information.	Medium / 7 points Medium Priority	Emergency Management, LEPC Subcommittees	Ongoing	County, City of Great Falls
		5.2.3 - Promote the National Weather Service's Winter Weather Awareness Week	High / 10 points High Priority	Emergency Management, NWS	Ongoing	County, City of Great Falls
	Objective 5.3 - Implement Activities to Prevent the Impacts from Severe Winter Weather	5.3.1 - Work with utility companies to bury power lines where interruption of service is frequent.	Medium / 8 points Medium Priority	Emergency Management, Public Works, Utility Companies	Long-Range	County, Utility Companies

TABLE 5.4-1
CASCADE COUNTY MITIGATION STRATEGY

Goal	Objective	Project	Ranking / Score County Priority	Responsible Agency / Department	Schedule	Potential Funding Source
Goal 6 - Reduce the Impacts from **Transportation Accidents**	Objective 6.1 - Enhance Emergency Service Capabilities	6.1.1 - Continue exercises to prepare for response to transportation accidents	Medium / 8 points High Priority	Emergency Management, Law Enforcement	Ongoing	County, City of Great Falls, MHP
		6.1.2 - Recruit and train EMS volunteers to staff Quick Response Units	Medium / 9 points High Priority	DES	Ongoing	County
	Objective 6.2 - Implement Structure Projects to Reduce Impact of Transportation Accidents	6.2.1 - Work with railroads to increase number of crossing gates	Medium / 7 points Medium-Low Priority	County Public Works	Long-Range	Railroads
		6.2.2 - Coordinate w/ Community Transportation Enhancement Program on their recommendations for highway safety.	Medium / 8 points Medium Priority	County Planning	Ongoing	County, MDT
		6.2.3 - Work with railroad to reconstruct Belt underpass to create a wider and straighter alignment	Medium / 9 points Medium Priority	DES, City of Belt	Long-Range	Railroads
Goal 7 - Reduce the Impacts from **Flooding and Levee Failure**	Objective 7.1 - Implement Actions to Prevent Impacts from Flooding/Levee Failure	7.1.1 - Re-certify the West Great Falls and Vaughn levees	Medium / 8 points High Priority	County Commissioners, City of Great Falls, Levee Districts, USACE	Short-Range	County, City of Great Falls, Congressional Earmark, USACE
		7.1.2 - Update flood regulations when DFIRMs are adopted to protect future development	Medium / 9 points High Priority	County & City Floodplain Administrators	Mid-Range	County
	Objective 7.2 - Provide Public Education and Awareness on Flooding and Levee Failure	7.2.1 - Educate homeowners on the advantages of purchasing flood insurance through the National Flood Insurance Program.	Medium / 9 points Medium Priority	County & City Floodplain Administrators and Planning Offices	Ongoing	County, City of Great Falls
		7.2.2 - Work towards achieving a lower rating through the National Flood Insurance Program Community Rating System.	Medium / 9 points Medium Priority	County & City Floodplain Administrators and Planning Offices	Ongoing	County, City of Great Falls, Towns
		7.2.3 - Participate in the National Weather Service's Flood Awareness Week	High / 11 points High Priority	Emergency Managers	Ongoing	County, City of Great Falls, NWS
		7.2.4 - Provide awareness training to repetitive loss property owners (and others) on mitigation programs to relocate, elevate, and floodproof structures in the floodplain	High / 10 points High Priority	DNRC, FEMA	Ongoing	DNRC, FEMA
		7.2.5 - Provide awareness training in agricultural areas that livestock grazing in floodplains should include a high spot where animals can evacuate to.	Medium / 8 points Low Priority	DES, NWS	Ongoing	County, NWS, FEMA

TABLE 5.4-1
CASCADE COUNTY MITIGATION STRATEGY

Goal	Objective	Project	Ranking / Score County Priority	Responsible Agency / Department	Schedule	Potential Funding Source
Goal 7 - Reduce the Impacts from **Flooding and Levee Failure**	Objective 7.3 - Enhance Opportunities to Protect Property from Flooding and Levee Failure	7.3.1 - Obtain river gauges for 6th Street SW bridge in Great Falls, in the town of Sun River, and elsewhere as needed.	High / 10 points High Priority	DES, Levee Districts, City of Great Falls, County	Mid-Range	USGS, DNRC, City of Great Falls, County
		7.3.2 - Obtain a slope mower with boom arm to maintain West Great Falls levee.	Medium / 9 points Medium Priority	West GF Flood Control District	Mid-Range	FEMA, City of Great Falls, Levee District
		7.3.3 - Remove woody vegetation from the edge of the county's levee and dikes.	High / 10 points Medium Priority	Levee Districts, City of Belt	Ongoing	FEMA, City of Belt, Levee Districts, County
		7.3.4 - Remove debris from floodways.	Medium / 9 points High Priority	Levee Districts, City of Belt, County Public Works, MDT	Ongoing	FEMA, County, City of Belt, MDT
		7.3.5 - Relocate, elevate and/or floodproof structures in the town of Sun River.	Medium / 7 points Medium Priority	DES, Private Homeowners	Long-Range	FEMA, Private Homeowners
		7.3.6 - Complete an engineering study of what needs to be done to mitigate flooding in the town of Sun River.	Medium / 9 points Medium Priority	DES, County Commissioners	Long-Range	FEMA, County
		7.3.7 - Install security fencing and signage on levees and dikes in the county.	Medium / 7 points High Priority	Levee Districts, City of Belt, Private Owners	Ongoing	FEMA, Levee Districts, Private Owners
		7.3 8 - Consider forming a flood control district in Belt to address concerns with the dike.	Medium / 9 points Medium Priority	City of Belt	Mid-Range	City of Belt
	Objective 7.4 - Implement Structural Projects to Reduce Impact of Flooding and Levee Failure	7.4.1 - Replace Sheep Creek bridge that has been compromised by flooding..	Medium / 6 points Low Priority	County Public Works	Long-Range	FEMA, County
		7.4.2 - Reduce flooding in the Gibson Flats area by installing drainage ditches in the vicinity of Gerber Road.	High / 10 points Low Priority	County Public Works	Long-Range	FEMA, County
		7.4.3 - Resize culverts in various locations throughout the county.	High / 10 points Medium Priority	County & City of GF Public Works	Mid-Range	FEMA, County
		7.4.4 - Identify locations throughout the county where culverts are needed.	High / 11 points Medium Priority	County & City of GF Public Works	Ongoing	County
		7.4.5 - Enhance and raise the dike in Belt.	High / 10 points Low Priority	City of Belt	Long-Range	FEMA, City of Belt
		7.4.6 - Redesign the storm drains system in Belt.	Medium / 9 points Low Priority	City of Belt	Long-Range	FEMA, City of Belt
		7.4.7 - Rehabilitate the sewer distribution system in Belt to withstand flood infiltration.	Medium / 9 points Medium Priority	City of Belt	Long-Range	FEMA, City of Belt
		7.4.8 - Dredge certain rivers/creeks in the county to increase carrying capacity.	Medium / 8 points Medium Priority	County, City of Belt	Long-Range	FEMA, County, City of Belt

TABLE 5.4-1
CASCADE COUNTY MITIGATION STRATEGY

Goal	Objective	Project	Ranking / Score County Priority	Responsible Agency / Department	Schedule	Potential Funding Source
Goal 7 - Reduce the Impacts from **Flooding and Levee Failure**	Objective 7.4 - Implement Structural Projects to Reduce Impact of Flooding and Levee Failure	7.4.9 - Re-establish an overflow canal in Sun River and install additional culverts	High / 10 points Medium Priority	County, Private Landowners	Long-Range	FEMA, County
		7.4.10 - Construct a dike on the west side of the town of Sun River	Medium / 9 points Low Priority	County	Long-Range	FEMA, County
Goal 8 - Reduce the Impacts from **Dam Failure**	Objective 8.1 - Enhance Opportunity to Protect Property from Dam Failure	8.1.1 - Encourage residents downstream from dams to get NOAA weather radios	Medium / 9 points Low Priority	DES	Ongoing	County, NWS, DNRC
	Objective 8.2 - Provide Public Education and Awareness on Dam Failure	8.2.1 - Conduct public outreach / education with residents living in inundation areas.	Medium / 9 points Medium Priority	DES	Ongoing	DNRC, County
Goal 9 - Reduce the Impacts from **All Hazards**	Objective 9.1 - Implement Actions to Prevent Impacts from All Hazards	9.1.1 - Obtain Reverse 911 for the County	Medium / 8 points High Priority	Emergency Management	Year 1 - 5	County, Homeland Security
		9.1.2 - Work with National Weather Service to get a radio signal for the town of Belt	Medium / 7 points Medium Priority	DES, City of Belt	Long-Range	County, NWS, City of Belt
		9.1.3 - Provide NOAA weather radios to all schools and critical facilities	High / 10 points High Priority	Emergency Management, NWS	Ongoing	County, NWS, FEMA
		9.1.4 - Look for corporate sponsorships to provide NOAA weather radios to the public	Medium / 9 points Medium Priority	Emergency Management	Ongoing	County, NWS
		9.1.5 - Negotiate with cell phone companies to get a tower in the town of Sun River	Medium / 7 points Low Priority	Sun River Valley Fire Service Area	Long-Range	County, Cell Companies
	Objective 9.2 - Enhance Emergency Service Capabilities	9.2.1 - Identify and secure a back-up location for the dispatch center	Medium / 8 points High Priority	Emergency Management	Mid-Range	County, City of Great Falls
		9.2.2 - Ensure continuity of operations by providing operable generator in 9-1-1 center	High / 11 points High Priority	Emergency Management	Short-Range	County, City of Great Falls
	Objective 9.3 - Provide Public Education and Awareness on All Hazards	9.3.1 - Encourage public to engage in Volunteer Organizations Active in Disaster (VOAD).	High / 10 points High Priority	Emergency Management	Ongoing	County, City of Great Falls

6.0 CAPABILITY ASSESSMENT

Cascade County's capabilities to implement mitigation projects include community planners, engineers, floodplain managers, GIS personnel, emergency managers, and financial, legal and regulatory requirements (zoning, building codes, subdivision regulations, and floodplain management ordinances) requirements. These resources have the responsibility to provide overview of past, current, and ongoing pre- and post-disaster mitigation planning projects including capital improvement programs, wildfire mitigation programs, stormwater management programs, and NFIP compliance projects. The goals and objectives used to mitigate natural and technological hazards builds on the community's existing capabilities.

6.1 DISASTER AND EMERGENCY SERVICES

Cascade County DES: 1) plans, organizes and manages the county emergency preparedness program; 2) evaluates, improves and promotes comprehensive disaster planning efforts; 3) organizes and facilitates effective operation of multi-jurisdiction, multi-discipline work groups and task forces; 4) promotes interagency coordination; 5) develops and reviews policies, contracts and interagency agreements; and, 6) is responsible for mitigation project administration. These efforts are designed to enhance the capacity of the local government to plan for, respond to, and mitigate the consequences of threats and disasters using an all-hazard framework.

The Cascade County DES office has a staff of two including a full time DES coordinator whose salary is federally-funded and an administrative professional whose salary is half federal and half county-funded. The City of Great Falls has a full time Emergency Preparedness Officer who performs DES functions on behalf of the city. This position is one-third federally funded and two-thirds funded by the City of Great Falls.

6.2 LOCAL EMERGENCY PLANNING COMMITTEE

The mission of the Cascade County Local Emergency Planning Committee is to provide resources and guidance to the community through education, coordination and assistance in disaster response planning; and to assure public health and safety. They do not function in actual emergency situations, but attempt to identify and catalogue potential hazards, identify available resources, and mitigate hazards when feasible. The LEPC consists of representatives from businesses, local government, emergency responders and citizen groups located in Cascade County. Bi-monthly meetings are held on the 1st Thursday of every other month at 10am at the Cascade County DES offices in Great Falls.

6.3 POTENTIAL FUNDING SOURCES

Although a number of the mitigation projects listed in *Section 5.1* may not be eligible for FEMA funding, Cascade County may secure alternate funding sources to implement these projects in the future including federal and state grant programs, and funds made available through the county. Alternate funding sources may include the following:

U.S. Department of Housing and Urban Development, Community Development Block Grants (CDBG). The CDBG program is a flexible program that provides communities with resources to address a wide range of unique community development needs. CDBG money can be used to match FEMA grant money. More Information:
http://www.hud.gov/offices/cpd/communitydevelopment/programs/

U.S. Bureau of Land Management, Rural Fire Assistance Program. BLM provides funds to rural fire department for wildfire fighting; also provides wildland fire equipment, training and/or prevention materials. More Information:
http://199.134.225.50/nwcc/t2_wa4/pdf/RuralAssistance.pdf

U.S. Department of Homeland Security. Enhances the ability of states, and local jurisdictions, and other regional authorities in the preparation, prevention, and response to terrorist attacks and other disasters, by distributing grant funds. Localities can use grants for planning, equipment, training and exercise needs. These grants include, but are not limited to areas of Critical Infrastructure Protection Equipment and Training for First Responders, and Homeland Security Grants. More information: http://www.dhs.gov/dhspublic/

FEMA, Hazard Mitigation Grant Program (HMGP). The HMGP provides grants to States, Indian Tribes, local governments, and private non-profit organizations to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. The HMGP is authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act.
More information: http://www.fema.gov/government/grant/hmgp/

FEMA, Pre-Disaster Mitigation Competitive (PDMC) Grant Program. The PDM program provides funds to states, territories, and local governments, communities, and universities for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. Funding these plans and projects reduces overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations. PDMC grants are to be awarded on a competitive basis and without reference to state allocations, quotas, or other formula-based allocation of funds.
More information: http://www.fema.gov/government/grant/pdm/index.shtm

National Fire Plan, State Fire Assistance Hazard Mitigation Program. These special state Fire Assistance funds are targeted at hazardous fuel treatments in the wildland-urban interface. Recipients include state forestry organization, local fire services, county emergency planning committees and private landowners. More information:
http://www.fs.fed.us/r1-r4/spf/coopfire_assistance.html

Fire Management Assistance Program is authorized under Section 420 of the Stafford Act. It allows for the mitigation, management, and control of fires burning on publicly or privately owned forest or grasslands that threaten destruction that would constitute a major disaster.
More information: http://www.fema.gov/government/grant/fmagp/index.shtm

U.S. Department of Agriculture, Community Facilities Loans and Grants. Provides grants (and loans) to cities, counties, states and other public entities to improve community facilities for essential services to rural residents. Projects can include fire and rescue services; funds have been provided to purchase fire-fighting equipment for rural areas. No match is required.
More information: http://www.rurdev.usda.gov/HCF_CF.html; or local Rural Development office.

General Services Administration, Sale of Federal Surplus Personal Property. This program sells property no longer needed by the federal government. The program provides individuals, businesses and organizations the opportunity to enter competitive bids for purchase of a wide variety of personal property and equipment. Normally, there are no restrictions on the property purchased. More information: http://www.govsales.gov/html/index.htm

FEMA, Readiness, Response and Recovery Directorate, Fire Management Assistance Grant Program. Program provides grants to states and local governments and local governments for the mitigation, management and control of any fire burning on publicly (non-federal) or privately owned forest or grassland that threatens such destruction as would constitute a major disaster. The grants are made in the form of cost sharing with the federal share being 75 percent of total eligible costs. Grant approvals are made within 1 to 72 hours from time of request.
More information: http://www.fema.gov/government/grant/fmagp/index.shtm

Hazardous Materials Emergency Preparedness Grants. Grant funds will be passed through to local emergency management offices and HazMat teams having functional and active LEPC groups. More information: http://www.phmsa.dot.gov/hazmat/grants

Renewable Resource Grant Program. Administered by the Montana Department of Natural Resources and Conservation, the Resource Grant and Loan Program provides both grant and loan funding for public facility and other renewable resource projects. Projects that conserve, manage, develop or protect Montana's renewable resources are eligible for funding. Numerous public facility projects including drinking water, wastewater and solid waste development and improvement projects have

received funding through this program. Other renewable resource projects that have been funded include irrigation rehabilitation, dam repair, soil and water conservation and forest enhancement.

More information: http://dnrc.mt.gov/cardd/ResDevBureau/renewable_grant_program.asp

7.0 PLAN MAINTENANCE PROCEDURES

The plan maintenance section of this document details the formal process that will ensure that the Cascade County PDM Plan remains an active and relevant document. The maintenance process includes a schedule for monitoring and evaluating the plan and producing a plan revision every five years. The plan can be revised more frequently than five years if the conditions under which it was developed change significantly (e.g. a major disaster occurs and projects are accomplished and/or new projects need to be identified, or funding availability changes). This section also describes how the county will monitor the progress of mitigation activities and be incorporated into existing planning mechanisms. The final section describes how the county will integrate public participation throughout the plan maintenance process.

7.1 MONITORING, EVALUATING AND UPDATING THE PLAN

The PDM Plan should be reviewed annually at meetings of the LEPC. These reviews may be more or less frequent, as deemed necessary by the DES Coordinator, but there will be a minimum of one review per year. The review should determine whether a plan update is needed prior to the required five-year update. The plan review should also consider any new hazards and vulnerabilities as well as document completed mitigation projects, identify new mitigation projects and evaluate mitigation priorities.

The DES Coordinator will be responsible for ensuring the PDM Plan review is on the LEPC meeting agenda so that applicability of the plan can be evaluated. The DES Coordinator should prepare a status report summarizing the outcome of the plan review and the minutes should be made available to interested stakeholders and kept in a permanent file designated for the PDM Plan update in 2016.

Three years after adoption of the plan, the DES Coordinator may apply for a planning grant through FEMA to start the updating of the PDM Plan. Upon receipt of funding, the county may solicit bids in accordance with applicable contracting procedures and hire a contractor to assist with the project. The proposed schedule for completion of the plan update is one year from award of a contract, to coincide with the five-year adoption date of the original PDM Plan.

The DES Coordinator will be responsible for the plan update. Before the end of the five-year period, the updated plan will be submitted to FEMA for approval. When concurrence is received that the updated plan complies with FEMA requirements, it will be submitted to the Board of County Commissioners, City Commissions/Town Councils for adoption. The DES Coordinator will send an e-mail to individuals and organizations on the stakeholder list to inform them that the updated plan is available on the county website.

7.2 MONITORING PROGRESS OF MITIGATION ACTIVITIES

The process for monitoring and evaluating mitigation projects will be the responsibility of the LEPC. This group is comprised of dedicated individuals from county and city departments, emergency response entities, local businesses, and non-profit organizations to engage in all aspects of emergency management. This group has accepted the responsibility for implementing mitigation projects on behalf of their jurisdiction and annual meetings will provide a venue for reporting and accountability. Minutes should be prepared from these meeting and should be distributed to interested stakeholders as well as kept in a permanent file for the 2016 PDM Plan update. Agencies and organizations "assigned" responsibility for various aspects of the mitigation strategy will have the opportunity to coordinate with other team members on challenges, success and opportunities.

Individual projects will be monitored by the department implementing the project or the grant. Generally, HMGP and PDMC projects will be monitored by the DES Coordinator and National Fire Plan/BLM Community Assistance Agreements projects will be monitored by the Rural Fire Districts. Each organization will track projects through a central database and issue quarterly reports to federal agencies.

7.3 IMPLEMENTATION THROUGH EXISTING PROGRAMS

Cascade County will have the opportunity to implement hazard mitigation projects through existing programs and procedures through plan revisions or amendments. The PDM Plan will be incorporated into the plans, regulations and ordinances as they are updated in the future or when new plans are developed. **Table 7.3-1** presents a summary of existing plans and ordinances and how integration of mitigation projects will occur.

TABLE 7.3-1
IMPLEMENTATION OF MITIGATION INTO EXISTING PLANS AND CODES

Type	Name	Integration Technique
Plans		
Emergency Operations	Cascade County Emergency Operations Plan	Integrated by reference in PDM Plan.
	Emergency Action Plan, Black Eagle Dam	Dam safety projects addressed in EAPs. Integration through reference in PDM Plan.
	Emergency Action Plan, Rainbow Dam	
	Emergency Action Plan, Ryan Dam	
	Emergency Action Plan, Cochrane Dam	
	Emergency Action Plan, Morony Dam	
	Emergency Action Plan. Holter Dam (Lewis & Clark County)	
	Emergency Action Plan, Hauser Dam (Lewis & Clark County)	
	Emergency Action Plan, Canyon Ferry Dam (Lewis & Clark County)	
	Emergency Action Plan, Gibson Dam (Teton/Lewis & Clark County)	
	Emergency Action Plan, Pishkun Dikes (Teton County)	
	Emergency Action Plan, Willow Creek Dam (Lewis & Clark County)	
Growth Policies	Cascade County Growth Policy	Integration will occur when these plans are revised.
	City of Great Falls Growth Policy	

TABLE 7.3-1
IMPLEMENTATION OF MITIGATION INTO EXISTING PLANS AND CODES

Type	Name	Integration Technique
Plans		
Land Use	Great Falls Urban Area Transportation Plan	
	Missouri River Urban Corridor Plan	
Wildfire Mitigation	Cascade County Community Wildfire Protection Plan	Mitigation projects in CWPP are incorporated into PDM by reference. Wildfire mitigation projects from PDM will be incorporated into CWPP at revision..
Codes, Regulations & Ordinances		
Zoning	Cascade County Zoning Ordinance	Integration will occur through revision. Hazard areas identified in PDM will be incorporated when these regulations are revised.
	City of Great Falls Zoning Ordinance	
Building Codes	City of Great Falls Building Code	
Development	City of Great Falls Land Development Code	
Subdivisions	Cascade County Subdivision Regulations	
	City of Great Falls Subdivision Regulations	
Floodplain	Cascade County Floodplain Regulations	

Cascade County and the City of Great Falls use a Growth Policy to guide and control development. Typically, a Growth Policy will address hazards; specifically, that life and property be protected from natural disasters and man-caused hazards. Mitigation goals in the PDM Plan will be recommended for incorporation into future revisions of these growth policies to ensure that high-hazard areas are being considered for low risk uses.

To ensure that the requirements of the PDM Plan are incorporated into other planning mechanisms and remain an on-going concern in Cascade County, job descriptions of various staff will be enhanced to include a mitigation component. The job descriptions of County and City Planners will be augmented to include involvement in the LEPC. Participation in this group will provide an awareness of new and on-going mitigation initiatives for the purpose that they be integrated into plans, codes and regulations during revision. The job description of the County and City GIS Coordinators will include responsibilities for management and update of the spatial data compiled for the hazard analysis including coordinates of critical facilities and digital floodplain, inundation, and wildfire layers so this data can be integrated into other planning efforts. The job description of the DES Coordinator will include responsibilities for implementing outreach activities for risk reduction in the county, coordinating with the Board of County Commissioners to secure funding for mitigation projects, ensure mitigation projects are implemented, and updating the PDM Plan. The DES Coordinator will also be responsible for maintaining a permanent master file for the PDM planning process, which will include damage figures from hazard events, records of mitigation projects, and notes/minutes from relevant meetings.

Meetings of the Board of County Commissioners will provide an opportunity for the DES Coordinator to report back on the progress made on the integration of mitigation planning elements into county planning documents and procedures.

7.4 CONTINUED PUBLIC INVOLVEMENT

Cascade County is dedicated to involving the public directly in review and updates of the PDM Plan. The public will have many opportunities to provide feedback about the plan. Hard copies of the plan will be kept at appropriate county offices as well as at the Great Falls public library. An electronic copy of the plan will be available on the county website. The existence and location of plan hard copies will be publicized on the county website. *Section 2.0* includes the address and the phone number of the DES Coordinator who will be responsible for keeping track of public comments on the plan.

A public meeting will also be held prior to the five year update, or at lesser intervals when deemed necessary by the DES Coordinator. The meetings will provide the public a forum for which they can express its concerns, opinions, or ideas about the plan. The DES Coordinator will be responsible for using county resources to publicize the public meetings and maintain public involvement through the newspapers, radio and internet.

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APPENDIX A

RESOLUTIONS ADOPTING PLAN

Cascade County, Montana
Pre-Disaster Mitigation Plan

BEFORE THE BOARD OF CASCADE COUNTY COMMISSIONERS

RETURN TO COMMISSION

IN THE MATTER OF
ADOPTING CASCADE COUNTY
PRE-DISASTER MITIGATION PLAN
CASCADE COUNTY, MONTANA **Resolution 11-120**

WHEREAS, in October of 2000 the President of the United States signed into law the "Disaster Mitigation Act of 2000" (PL 106-390) to amend the "Robert T. Stafford Disaster Relief and Emergency Act of 1988" which among other provisions requires local governments to adopt a Pre-Disaster Mitigation Plan in order to be eligible for hazard mitigation funding;

WHEREAS, Cascade County, Montana has worked closely with Cascade County Disaster and Emergency Services to develop a county-wide Pre-Disaster Mitigation Plan that will serve the needs of Cascade County;

WHEREAS, Cascade County supports the Cascade County Pre-Disaster Mitigation Plan as a logical means toward protecting people and property from the potential devastating effects of natural and man-made hazards;

NOW, THEREFORE, BE IT RESOLVED that the Cascade County Board of Commissioners adopt, by way of this resolution, the "Cascade County, Montana Pre-Disaster Mitigation Plan" as approved by the Montana Department of Emergency Services and the Federal Emergency Management Agency.

PASSED AND ADOPTED by the Board of County Commissioners of Cascade County, Montana, this 8th day of November 2011.

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Cascade County, Rina Ft Moore - Clerk & Recorder

Cascade County

BOARD OF COUNTY COMMISSIONERS,
CASCADE COUNTY, MONTANA

Bill Salina, Chairman

Joe Briggs, Commissioner

Jane Weber, Commissioner

Attest

On this 9th day of November 2011, I hereby attest the above-written signatures of Board of Cascade County Commissioners.

Rina Fontana Moore
Cascade County Clerk and Recorder

RESOLUTION 9949

A RESOLUTION ADOPTING THE CASCADE COUNTY
PRE-DISASTER MITIGATION PLAN

WHEREAS, in October of 2000, the President of the United States signed into law the "Disaster Mitigation Act of 2000" (PL 106-390) to amend the "Robert T. Stafford Disaster Relief and Emergency Act of 1988" which, among other provisions, requires local governments to adopt a Pre-Disaster Mitigation Plan in order to be eligible for hazard mitigation funding; and

WHEREAS, the City of Great Falls has worked closely with Cascade County Disaster and Emergency Services to develop a county-wide Pre-Disaster Mitigation Plan that will serve the needs of Cascade County; and

WHEREAS, the City of Great Falls supports the Cascade County Pre-Disaster Mitigation Plan as a logical means toward protecting people and property from the potential devastating effects of natural and man-made hazards.

NOW, THEREFORE, BE IT RESOLVED by the City Commission of the City of Great Falls that the "Cascade County, Montana Pre-Disaster Mitigation Plan," as approved by the Montana Department of Emergency Services (MDES) and the Federal Emergency Management Agency (FEMA), is hereby adopted.

PASSED by the City Commission of the City of Great Falls, Montana, this 6th day of December, 2011.

Michael J. Winters, Mayor

Attest:

Lisa Kunz, City Clerk

(SEAL OF CITY)

APPROVED FOR LEGAL CONTENT:

James W. Santoro, City Attorney

RESOLUTION # 664
TOWN OF BELT, MONTANA
RESOLUTION ADOPTING
CASCADE COUNTY PRE-DISASTER MITIGATION PLAN

WHEREAS, in October of 2000 the President of the United States signed into law the "Disaster Mitigation Act of 2000" (PL 106-390) to amend the "Robert T. Stafford Disaster Relief and Emergency Act of 1988" which among other provisions requires local governments to adopt a Pre-Disaster Mitigation Plan in order to be eligible for hazard mitigation funding;

WHEREAS, the Town of Belt, Montana has worked closely with Cascade County Disaster and Emergency Services to develop a county-wide Pre-Disaster Mitigation Plan that will serve the needs of Cascade County;

WHEREAS, the Town of Belt supports the Cascade County Pre-Disaster Mitigation Plan as a logical means toward protecting people and property from the potential devastating effects of natural and man-made hazards;

NOW, THEREFORE, BE IT RESOLVED that the Town of Belt Town Council adopt, by way of this resolution, the "Cascade County, Montana Pre-Disaster Mitigation Plan" as approved by the Montana Department of Emergency Services and the Federal Emergency Management Agency.

Passed this 16th day of November, 2011 by the Town Council of the Town of Belt, Montana.

APPROVED:

Mayor John Masonovich

ATTEST:

Clerk-treasurer Jean Fontana

Corporate Seal:

RESOLUTION 587

TOWN OF CASCADE, MONTANA
ADOPTING
CASCADE COUNTY PRE-DISASTER MITIGATION PLAN

WHEREAS, in October of 2000 the President of the United States signed into law the "Disaster Mitigation Act of 2000" (PL 106-390) to amend the "Robert T. Stafford Disaster Relief and Emergency Act of 1988" which among other provisions requires local governments to adopt a Pre-Disaster Mitigation Plan in order to be eligible for hazard mitigation funding;

WHEREAS, the Town of Cascade, Montana has worked closely with Cascade County Disaster and Emergency Services to develop a county-wide Pre-Disaster Mitigation Plan that will serve the needs of Cascade County;

WHEREAS, the Town of Cascade supports the Cascade County Pre-Disaster Mitigation Plan as a logical means toward protecting people and property from the potential devastating effects of natural and man-made hazards;

NOW, THEREFORE, BE IT RESOLVED that the Town of Cascade Town Council adopt, by way of this resolution, the "Cascade County, Montana Pre-Disaster Mitigation Plan" as approved by the Montana Department of Emergency Services and the Federal Emergency Management Agency.

William R. Peterson — 11-15-11
Mayor William R. Peterson — Date

Jodie A. Campbell — 11-15-11
Clerk Jodie A. Campbell — Date

RESOLUTION NO. _____

RESOLUTION ADOPTING
CASCADE COUNTY PRE-DISASTER MITIGATION PLAN
Town of Neihart, Montana

WHEREAS, in October of 2000 the President of the United States signed into law the "Disaster Mitigation Act of 2000" (PL 106-390) to amend the "Robert T. Stafford Disaster Relief and Emergency Act of 1988" which among other provisions requires local governments to adopt a Pre-Disaster Mitigation Plan in order to be eligible for hazard mitigation funding;

WHEREAS, the Town of Neihart, Montana has worked closely with Cascade County Disaster and Emergency Services to develop a county-wide Pre-Disaster Mitigation Plan that will serve the needs of Cascade County;

WHEREAS, the Town of Neihart supports the Cascade County Pre-Disaster Mitigation Plan as a logical means toward protecting people and property from the potential devastating effects of natural and man-made hazards.

NOW, THEREFORE, BE IT RESOLVED that the Town of Neihart Town Council adopt, by way of this resolution, the "Cascade County, Montana Pre-Disaster Mitigation Plan" as approved by the Montana Department of Emergency Services and the Federal Emergency Management Agency.

PASSED AND ADOPTED by the Council of the Town of Neihart, Montana this 6th day of December, 2011.

Joyce Kouri Councilperson	✓ Yes	_____ No	_____ Absent
Elizabeth O'Neil Councilperson	✓ Yes	_____ No	_____ Absent
_____ Councilperson	_____ Yes	_____ No	_____ Absent

Approved:

Michael McCord, Mayor

Approved as to Form and Content:

Jon M. Hesse, City Attorney

ATTEST:

Ann Peterson, Town Clerk

Jh.5.Neihart.11.11.Resolution.

APPENDIX B

PLANNING DOCUMENTATION

Cascade County, Montana
Pre-Disaster Mitigation Plan

Planning Team & Stakeholders

Cascade County, Montana
Pre-Disaster Mitigation Plan

CASCADE COUNTY PDM PLANNING TEAM			
Type	**First Name**	**Last Name**	**Affiliation**
County	Susan	Conell	Cascade County Planning
City - GF	Pat	Halcro	City of Great Falls GIS
Schools	Scott	Karaffa	MSU-Great Falls
County	Vince	Kolar	Cascade County DES
City - GF	Kristal	Kuhn	City of Great Falls EPO
State	Doug	Mahoney	Montana Air National Guard
County	Sandy	Mares	West Great Falls Flood Control & Drainage District
City- Neihart	Mike	McCord	Neihart - Mayor
County	Tom	Mital	Cascade County GIS
City - Cascade	Bill	Peterson	Cascade Town Mayor
Citiy - GF	Randall E.	Rappe	City of Great Falls Public Works
City - GF	Charlie	Sheets	City of Great Falls
Federal	Royce	Shipley	Malmstrom AFB
Response	Roy	Stock	Dearborn VFD
County	Bob	Wojciechowski	Cascade County Sheriffs Office/Firewarden

CASCADE COUNTY PRE-DISASTER MITIGATION PLAN
STAKEHOLDERS LIST

Type	First Name	Last Name	Affiliation
Airport	Kent	Funyak	Great Falls International Airport Authority
Business	Chris	Croff	Greenfield Industries
Business	Maureen	Krum	Montana Refining Company
Business	Rod	Meier	DVM
Business	James	Olson	Conoco/Yellowstone Pipeline
Citiy - GF	Randall E.	Rappe	City of Great Falls Public Works
City - Cascade	Jodie	Campbell	Cascade Town Clerk
City - Cascade	Bill	Peterson	Cascade Town Mayor
City - GF	Brant	Birkeland	City of Great Falls, Comprehensive Planner II
City - GF	Dave	Bowen	Great Falls Police Dept.
City - GF	Bill	Bronson	Great Falls City Commissioner
City - GF	Fred	Burow	Great Falls City Commissioner
City - GF	Andrew	Finch	City of Great Falls, Senior Planner
City - GF	Justin	Grohs	Great Falls Emergency Services Manager
City - GF	Corky	Grove	Great Falls Police Dept.
City - GF	Pat	Halcro	City of Great Falls GIS
City - GF	Mike	Haynes	City of Great Falls
City - GF	Steve	Hester	Great Falls Fire/Rescue
City - GF	Tanya	Houston	Citiy-County Health Dept.
City - GF	Mary	Jolley	Great Falls City Commissioner
City - GF	Bob	Jones	Great Falls City Commissioner
City - GF	Kristal	Kuhn	City of Great Falls EPO
City - GF	Randall E.	McCamley	Great Falls Fire/Rescue-Chief/EMS Administrator
City - GF	Kim	McCleary	City of Great Falls - Floodplain Administrator
City - GF	Charles	Sheets	City of Great Falls
City - GF	Chris	Sorensen	City of Great Falls - Public Works
City - GF	Micheal	Winters	City of Great Falls, Mayor
City- Neihart	Jasmine	Krotkov	Neihart Town Clerk
City- Neihart	Mike	McCord	Neihart - Mayor
City-Belt	Jean	Fontana	Belt Town Clerk
City-Belt	John	Masonovich	Belt Town Mayor
County	Jim	Adkins	Cascade County CERT
County	Joe	Briggs	Cascade County Commissioner - Dist 1
County	Linda	Cargill	Cascade County Risk/Safety Management
County	Susan	Conell	Cascade County Planning Department
County	Bob	Edwards	Cascade County Sheriff/Coroner
County	Kevin	Kanulaan	Cascade County Sheriff
County	Vince	Kolar	Cascade County DES
County	Sandy	Mares	West Great Falls Flood Control & Drainage District
County	Kate	Marone	City-County Health Dept.
County	Tom	Mital	Cascade County GIS Dept.
County	Bill	Salina	Cascade County Commisioner - Dist 2
County	Dave	Sutton	Cascade County Road & Bridge Dept.
County	Joe	Voss	Cascade Public Works Director
County	Jane	Weber	Cascade County Commissioner - Dist 3
County	Bob	Wojciechowski	Cascade County Sheriffs Office/Firewarden
County			Cascade County Dispatch Center
Federal	Jesse	Patton	U.S. Air Force
Federal	Col. Howard	Plouffe	Air Force EPLO
Federal	Ben	Schott	National Weather Service - Great Falls, Warning Coordination Meteorologist
Federal	Royce	Shipley	Malmstrom AFB
Medical	Louis	D'antuono	Benefis Health System
Medical	Laurie	Jackson	Benefis Trauma Coordinator
Medical	Dirk	Johnson	GFFR EMS Coordinator
Medical	Donna	Lee	Great Falls Clinic
Medical	Scott	Schandelson	Benefis Emergency Department
Medical	Dave	Simpson	Great Falls - EMS System Medical Director
Medical	John	Stowers	Great Falls Emergency Service Medical Administrator
Non-Profit	George	Forsyth	Great Falls Area Amateur Radio Club
Non-Profit	Kevin	Murszewski	American Red Cross
Non-Profit	Jesse	Oldham	Salvation Army
Non-Profit	Colleen	Tone	Red Cross-Mt Disaster Director
Non-Profit	Wellie	Weith	CERT
Other	Patty	Cadwell	Neighborhood Councils
Other DES	Kent	Atwood	SHMO
Other DES	Debra	Coverdell	Teton County DES
Other DES	Ed	Gierke	MT DES Dist. 2 Representative
Other DES	Bonnie	Ostertag	Judith Basin DES
Other DES	Richard	Seidlitz	Meagher County DES

CASCADE COUNTY PRE-DISASTER MITIGATION PLAN
STAKEHOLDERS LIST

Type	First Name	Last Name	Affiliation
Other DES	Linda	Williams	Chouteau County DES
Public	Terry	Bailey	General Public
Public	Stephen	Craig	General Public
Public	Miles	Diede	General Public
Public	Daralee	Pretat	General Public
Public	Steve	Pretat	General Public
Response	Dave	Anderson	Fort Shaw VFD
Response	Dan	Dobson	Malmstrom Fire Dept.
Response	Leonard	Lundby	Vaughn VFD
Response	Roy	Stock	Dearborn VFD
Schools	Mary Ellen	Baukol	MSU Great Falls - Assist. Dean for Administration & Finance
Schools	Ed	Binkley	MSU Great Falls
Schools	Dave	Houtz	Great Falls Public Schools
Schools	Scott	Karaffa	MSU-Great Falls
Schools	Pam	Parsons	MSU-Great Falls
Schools	Butch	Weedon	MSE-Ed FSTS
State	Dave	Hand	MT Dept. Transportation
State	Kenton	Hickethier	MT Highway Patrol
State	Shannon	Hopkins	Montana Air Guard
State	Michael	Johnson	MT Dept of Transportation - Great Falls Dist
State	Scot	Lawson	Montana Air National Guard
State	Doug	Mahoney	Montana Air National Guard
State	Bob	Rutherford	MANG Fire Dept.
State	Darnell	Stucker	MANG Fire Dept.
State	Dan	Zent	MANG Readiness

Meeting Notices

Cascade County, Montana
Pre-Disaster Mitigation Plan

CASCADE COUNTY
PRE-DISASTER MITIGATION PLAN

Cascade County is initiating a project to develop a mitigation strategy aimed at reducing the impact of natural and man-made hazards in the community. You're invited to bring your local knowledge and ideas to the kick-off meeting of the Cascade County Pre-Disaster Mitigation Plan.

Thursday, January 6th, 2011
10:00 to 11:00 am
521-1st Ave NW
Great Falls, Montana

For more information, please call Vince Kolar, Cascade County Disaster and Emergency Services at 406-454-6900

JANUARY 6, 2011

Cascade County seeking input on disaster-response plan

By Tribune Staff

Cascade County wants the public's input on a disaster response plan that its emergency manager says will allow the county to apply for federal funds to address trouble spots once the plan is complete.

For example, in the Sun River Valley, residences get flooded when the river gets high. With the plan in place, it's possible the county could apply for funding to address problem areas, said Vince Kolar, emergency manager of Cascade County Disaster and Emergency Services.

What's next

Residents are invited to give their input on predisaster planning at a meeting from 10 to 11 a.m. today at Cascade County Disaster and Emergency Services, 521 1st Ave. N.W. For more information, call Vince Kolar at 454-6900.

That's just one example of the benefits of developing a mitigation strategy aimed at reducing the impact of natural and man-made hazards in the community, Kolar said.

County officials want to hear from the public about predisaster planning at a meeting this morning.

"We want to get public input on hazards that exist," Kolar said. "If there's a culvert in a road that constantly floods a house or something, then we can get money to replace that culvert."

Kolar said the county hired Tetra Tech Inc. on Dec. 7 to do a predisaster mitigation plan. The total project cost is $20,000, but the Federal Emergency Management Agency gave the county a $15,000 grant. The remainder

See COUNTY, 2M

$873,000, and spent another $30,000 for equipment. The truck was a demonstration model, so it cost less than a special-order fire vehicle.

The federal grant means the city will be able to repay most of a loan the City Commission approved from its Central Garage Fund. The city should be able to repay the rest of the loan over the next few years, according to a press release.

McCamley thanked the department's staff members who worked on the grant proposal, as well as U.S. Rep. Denny Rehberg, R-Mont., and U.S. Sens. Max Baucus and Jon Tester, both Montana Democrats, for their support and help in securing the grant.

Reach Tribune Staff Writer Richard Ecke at recke@greatfallstribune.com, or at 406-791-1467 or 800-438-6600.

ACROSS *the* BIG SKY

The indictment was

Fehr said 65-year-old

County: Plan hould be al in fall

FROM 1M

of the cost will be paid with a local match from the county.

With a FEMA-approved plan, the county will be able to apply for federal mitigation money to address problems, and "quite a hunk" of money is available, according to Kolar. The plan probably will be finalized by next fall, he added.

An analysis will be conducted during the meeting on hazards that exist in Cascade County. Wildfires, flooding, hazardous materials and fuel spills typically make the list, Kolar said.

"We'll go through a process to revisit that to make the sure the hazards we have listed are still viable," he said.

The county is required to update the plan every five years.

Police: Local residents online display of crime

FROM 1M

"It's that fast. It's that effective," he said.

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Missouri, Sun rivers could rise again

Massive snowpack leaves flooding risk high

By KARL PUCKETT
Tribune Staff Writer

The National Weather Service on Friday lifted the flood warning for the Sun River near the communities of Simms and Sun River but cautioned residents that more flooding remains possible into July.

The risk of flooding is highest on the Missouri and Sun rivers and Belt Creek, meteorologist Jim Brusda said at a meeting of county, city and state officials Friday in Great Falls to discuss flooding issues.

Those three systems are especially susceptible to melting snow, and massive amounts of water remain in mountain snowpack, which high temperatures or a heavy rain would release, he said.

Measurements in the Little Belt Mountains and along the Rocky Mountain Front show 2½ feet of water equivalent remaining in the snowpack, which continues to absorb moisture.

The levels of water are four times the usual amount for this time of year.

"Having 400 percent or more is truly an extraordinary amount of water content that's still in there," Brusda said.

Significant snowmelt at higher elevations is not in the forecast for the next two to five days, Brusda said. However, forecast models are hinting that warmer weather could move into the area after Wednesday, he said. Average temperatures are expected to approach 75 degrees by June 30.

The Sun spilled out of its banks June 9, flooding the community of Sun River, population 130, west of Great Falls.

At least 50 homes were flooded, said Vince Kolar, county Disaster and Emergency Services coordinator.

Even with gradual melting, snowmelt will make rivers and streams flow high with water well into July, which recreationists should keep in mind, weather service officials said. Debris also will be a concern.

Area streams and rivers typically begin to drop in June.

"This easily could keep the rivers 3 to 4 feet higher," Brusda said.

As of 1:30 p.m. Friday, the Sun River at Simms, just upstream from the community of Sun River, had dropped to 7.1 feet — below the 7.5-foot flood stage, prompting the warning to expire. Depending on precipitation, the river could surpass flood stage again next week, but probably not by much, Brusda said.

A flood warning remains in effect for the Missouri River at Ulm, where the river was 13.7 feet Friday, with the possibility of rising to 14.1 feet by Sunday. Increased releases — from 14,300 cubic feet per second to 15,700 cfs — from Canyon Ferry Reservoir are the cause, Brusda said. The record release from Canyon Ferry Reservoir is 25,700 cfs.

The high-flowing Missouri caused flooding in Woodland Estates south of Great Falls last Saturday.

Elsewhere, the Sun River at Vaughn dropped to 5.3 feet Friday. Flood stage is 6 feet. The flood warning for Vaughn was lifted earlier this week.

Even though the river levels fell below flood stage, they still are within a foot of that level, so it won't take much rain or snowmelt to push them back above flood stage, Brusda said.

Scattered showers are forecast for this weekend, with high temperatures in the upper 60s and lower 70s today, and highs in the mid-60s on Sunday.

Reach Tribune Staff Writer Karl Puckett at 406-791-1471, 800-438-6600 or kpuckett@greatfallstribune.com.

ROADS OPENED

Cascade County Public Works Director Brian Clifton said Friday that McIver and Sun River-Cascade roads have been reopened.

DISASTER PLAN MEETINGS SET

Cascade County Disaster and Emergency Services is planning three meetings on a pre-disaster mitigation plan being developed.

The public is invited to comment on the results of a risk assessment and mitigation strategy to reduce the impact of natural and manmade hazards.

The development of the plan began before the recent flooding, said Vince Kolar, coordinator of Cascade County Disaster and Emergency Services.

The meetings are at:

» 6:30 p.m. Wednesday in the Belt School cafeteria.

» 10 a.m. Thursday in the Disaster and Emergency Services conference room, 521 1st Ave. N.W., Great Falls.

» 3 p.m. Thursday, Sun River Valley Senior Center, Fort Shaw.

Flooding: State eligible for FEMA

Continued from 1A

Valley and Yellowstone counties each reported just more than $1 million in damage to roads, buildings, equipment and utility systems — the most in the state.

Damage on the Crow Indian Reservation is listed at $879,168.

In northcentral Montana, Fergus County reported $692,608 in damage, while and Judith Basin County reported $457,688 in damage.

Cascade County reported $287,785 in damage — or $3.58 per resident.

he said.

Counties eligible for aid are Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Dawson, Fallon, Fergus, Garfield, Golden Valley, Hill, Judith Basin, McCone, Meagher, Musselshell, Petroleum, Phillips, Powder River, Prairie, Roosevelt, Rosebud, Stillwater, Sweet Grass, Treasure, Valley, Wheatland, Wibaux and Yellowstone.

Eligible reservations are the Crow, Fort Belknap, Northern Cheyenne and Rocky Boy's.

Meeting Sign-In Sheets

Cascade County, Montana
Pre-Disaster Mitigation Plan

CASCADE COUNTY PRE-DISASTER MITIGATION PLAN
PUBLIC MEETING

DATE: 1-6-11 **LOCATION:** Great Falls, MT

Name: (Please Print) Organization:	Affiliation or Title: Federally Salaried? (Yes or No)	Miles Traveled Round Trip to Attend Meeting	E-mail Address: Phone No.
RANDALL RAPPE City of Great Falls (Public Works)	Circle One: Yes (No)		BRAPPE@greatfallsmt.net
Louis D'Antuono Benefis Health System	Circle One: Yes (No)		dantbuj@benefis.org
Bill Peterson Mayor Cascade	Circle One: Yes (No)	50	Flattop1958@gmail.com
Doug Mahoney MANG FD	Circle One: (Yes) No	5	douglas.mahoney@ang.af.mil (406) 791-0233
Kevin Murszewski ARCMT	Circle One: Yes (No)	4	murszewskik@usa.redcross.org 406 552 5902
Susan Conell Cascade County Planning Director	Circle One: Yes (No)	2	sconell@co.cascade.mt.us (406) 454-6905
Keith Kantelaar Cascade Co Sheriff	Circle One: Yes (No)	4	
Ed BINKLEY MSU-COT	Circle One: Yes (No)	5	ebinkley@msugf.edu 771-4307
SCOTT KARAFFA	Circle One: Yes (No)	5	skaraffa@msugf.edu 788-8124 CELL 771-5140 office
Vince Kolar Cascade Co DES	Circle One: (Yes) No		vkolar@co.cascade.mt.us 454-6902
Laurie Jackson Benefis Heath System - ER	Circle One: Yes (No)	5	lauri jackson@benefis.org 406 455 4458
Meeting Start Time: 10 am		Meeting End Time: 12 NOON	

CASCADE COUNTY PRE-DISASTER MITIGATION PLAN
PUBLIC MEETING

DATE: JAN 6, 2011 **LOCATION:** GREAT FALLS

Name: (Please Print) Organization:	Affiliation or Title: Federally Salaried? (Yes or No)	Miles Traveled Round Trip to Attend Meeting	E-mail Address: Phone No.
WEILLIE-WEITH Certs-	Circle One: Yes (No)	406/453 4425 8	1700 39st South GF 59405
Daphne Digrindakis Tetra Tech	Circle One: Yes No		daphne.digrindakis@tetratech.com 406-443-5210
Terry Bailey	Circle One: Yes (No)		Firedude 6411@Bresnan.net
Stephen A. Hester Great Falls Fire Rescue	Circle One: Yes (No)		shester@greatfallsmt.net.
Olson Tommot ConocoPhillips	Circle One: Yes (No)	5	Thomas.J.olson@ConocoPhillips.com
George Forsyth NCMARES CCSO Comm Posse	Circle One: Yes (No)	2	AA7GS@ARRL.net 868-2212
Daralee Pretat private contractor	Circle One: Yes (No)	4	daraleepretat@hotmail.com 868-7673
Steve Pretat private contractor	Circle One: Yes (No)	4	taters19@bresnan.net 868-9626
Donna C Lee Great Falls Clinic Med Ctr.	Circle One: Yes (No)	10	donna.lee@gfclinic.com 216-8027
CHRIS SORENSON COGF	Circle One: Yes (No)	2	
Rod Meier DVM	Circle One: Yes (No)	20	rodmeierdvm@hotmail.com 799-3655

Meeting Start Time: 10am Meeting End Time: 12 NOON

CASCADE COUNTY PRE-DISASTER MITIGATION PLAN
PUBLIC MEETING

DATE: JAN. 6 2011 **LOCATION:** Great Falls, MT

Name: (Please Print) Organization:	Affiliation or Title: Federally Salaried? (Yes or No)	Miles Traveled Round Trip to Attend Meeting	E-mail Address: Phone No.
DAVE NOUTZ GFPS	GFPS - Sup. of Spec. Services Circle One: Yes No		268-6016
ROY STOCK DEARBORN VFD	Circle One: Yes (No)	90	DEARBORNVFD@ME.COM 468-0041
Andrew Finch GREAT FALLS MPO (Transp. Planning)	Sr. Transp. Planner pass through funds Circle One: (Yes) No	.5	afinch@greatfallsmt.net 455-8434
Tom MITAL Cascade County G.I.S.	Circle One: Yes (No)	2	gis@co.cascade.mt.us 454-6727
Linda CARGILL Cascade County Safety/Risk	Circle One: Yes (No)	2	lcargill@co.cascade.mt.us 788-9148 / 454-6813
MIKE HAYNES CITY OF GREAT FALLS	Circle One: Yes (No)	2	mhaynes@greatfallsmt.net
CHARLES SHEETS CITY of GREAT FALLS	Circle One: Yes (No)	2	CSheets@greatfallsmt.net
Scot Lawson Montana Air National Guard	Circle One: (Yes) No	2	scot.lawson@ang.af.mil
Shannon J Hopkins Montana Air Guard	Circle One: (Yes) No	2	Shannon.Hopkins@ang.af.mil
Jesse Oldham The Salvation Army	Circle One: Yes (No)	2	jesse.oldham@usw.salvationarmy.org 788-1709
R. WOJCIECHOWSKI CASCADE Co. S.O.	Circle One: Yes (No)	5	RWOJCIECHOWSKI@CCSO.PSEMAIL.COM
Meeting Start Time: 10am		Meeting End Time: 12 NOON	

DUPE X

CASCADE COUNTY PRE-DISASTER MITIGATION PLAN
PUBLIC MEETING

DATE: 1/6/2011 **LOCATION:** Great Falls, MT

Name: (Please Print) Organization:	Affiliation or Title: Federally Salaried? (Yes or No)	Miles Traveled Round Trip to Attend Meeting	E-mail Address: Phone No.
Kate Marone City-County Health Dept.	Circle One: (Yes) No	3	Kmarone@co.cascade.mt.us 452-0881 x314
Tanya Houston City-County Health Dept	Circle One: (Yes) No	3	thouston@co.cascade.mt.us 452-0881 x311
DAVID SIMPSON, CO 911 SYSTEMS MED DIR / GFFD MED DIR	Circle One: Yes (No)	35	DSIMPSON@3RIVERS.NET 406-264-5418 (h) 406-799-5418
Mike McCord MAYOR, Neihart	Circle One: Yes (No)	5	mmccord@wradvisors.~~net~~com 406-781-4332
Kenton Hiekathier Commander MHP/State Patrol	Circle One: Yes (No)	5	Khiekathier@mt.gov 406-453-1121
Stephen F Craig private	Circle One: Yes (No)	3	406-952-1724
Miles Diede	Circle One: Yes (No)	7	406-761-8155
Butch Weeder	Circle One: Yes (No)	1	Bweeder@montana.edu 788-0222
Dupe X Willie Watt	Circle One: Yes (No)	8	453 4425
Dupe X George Forsyth NCMARES	Circle One: Yes (No)	2	HA7GS@ARRL.net 868-2212
Jesse Oldham Salvation Army	Circle One: Yes No	—	788-1709
Meeting Start Time: 10am		Meeting End Time: 12 NOON	
Dupe X Kevin Murszewski ARCMT	(NO)	4	Murszewskik@usa.redcross.org

CASCADE COUNTY PRE-DISASTER MITIGATION PLAN
PUBLIC MEETING

DATE: Jan. 6, 2011 **LOCATION:** Great Falls, MT

Name: (Please Print) Organization:	Affiliation or Title: Federally Salaried? (Yes or No)	Miles Traveled Round Trip to Attend Meeting	E-mail Address: Phone No.
Sandy Mares West Gt. Fls Flood Control + Drainage District	Commissioner Circle One: Yes (No)	+/- 4.0 miles	autofixer59@gmail.com commissioner Dan Klein jan (406) 727-8961
	Circle One: Yes No		
	Circle One: Yes No		
	Circle One: Yes No		
	Circle One: Yes No		
	Circle One: Yes No		
	Circle One: Yes No		
	Circle One: Yes No		
	Circle One: Yes No		
	Circle One: Yes No		

Meeting Start Time: 10am Meeting End Time: 12 Noon

CASCADE COUNTY PRE-DISASTER MITIGATION PLAN
PUBLIC MEETING

DATE: 6/22/11 **LOCATION:** Belt School

Name: (Please Print) Organization:	Affiliation or Title: Federally Salaried? (Yes or No)	Miles Traveled Round Trip to Attend Meeting	E-mail Address: Phone No.
Dennis Velesar Resident of Belt	Circle One: Yes No		dvelesar@msugf.edu
Daphne Digrindakis Tetra Tech	Circle One: Yes No		Daphne.Digrindakis@tetratech.com 406-443-5210
Jean Fontana Town of Belt	Circle One: Yes No		bch@3rivers.net
DOUG WILMOT MT DEPT OF TRANSPORTATION	DISTRICT CONST. Circle One: Yes (No)		dwilmot@mt.gov 406-454-5910
Dennis Oliver MT Dept of Trans.	MDT Maint. Supt. Circle One: Yes (No)		doliver@mt.gov 406-454-5891
Ed Nevak ~~Carol Adams~~	Circle One: Yes (No)		277-3272
Carol Adams	Circle One: Yes (No)		adamfmly@3rivers.net
Robin Franzen Belt Volunteer Fire Dept / TOWN OF BELT	Circle One: Yes (No)		RLFranzen0663@yahoo.com
Kathleen Prody Belt School	Circle One: Yes (No)		Kprody@beltschool.com 277-3351
Vince Kohn Cascade Co DES	Circle One: (Yes) No		
	Circle One: Yes No		

Meeting Start Time: 6:30 Meeting End Time: 8:00

CASCADE COUNTY PRE-DISASTER MITIGATION PLAN
PUBLIC MEETING

DATE: 6/23/2011 **LOCATION:** Great Falls

Name: (Please Print) Organization:	Affiliation or Title: Federally Salaried? (Yes or No)	Miles Traveled Round Trip to Attend Meeting	E-mail Address: Phone No.
Butch Gellerson Cascade Well	Circle One: Yes (No)		
Doug Mahoney MANG FD	Circle One: Yes (No)		Douglas.mahoney@ang.af.mil
Cheryl Ulmer Senator Jon Tester	Circle One: Yes No		Cheryl_ulmer@tester.senate.gov
Sandy Mares West G.F. Flood Control + Drain. Dist.	Circle One: Yes (No)	+/- 5	727-8961
DAVE HOUTZ GFPS	Circle One: (Yes) No	1.3	268-6016
BEN SCHOTT NOAA/NWS	Circle One: (Yes) No	8	ben.schott@noaa.gov 727-0283
Erin Schermele KRTV	Circle One: Yes (No)	3	erin@KRTV.com 529-5396
Bonnie Keller Senator MAX Baucus	Circle One: Yes No		bonnie_keller@baucus.senate.gov 406-761-1574
Paula Guisti Cascade Co. DES	Circle One: 1/2 (Yes) No		
	Circle One: Yes No		
	Circle One: Yes No		

Meeting Start Time: 10:00 Meeting End Time: 12:00

CASCADE COUNTY PRE-DISASTER MITIGATION PLAN
PUBLIC MEETING

DATE: 6/23/2011 **LOCATION:** Great Falls

Name: (Please Print) Organization:	Affiliation or Title: Federally Salaried? (Yes or No)	Miles Traveled Round Trip to Attend Meeting	E-mail Address: Phone No.
Daphne Digmudakis Tetra Tech	Circle One: Yes (No)		daphne.digmudakis@tetratech.com 406-443-5210
Vince Kolan Cascade Co DES	Circle One: (Yes) No		VKolan@co.cascade.mt.us 454-6900
Randall Rappe City of Great Falls	Circle One: Yes (No)		rrappe@greatfallsmt.net 727-8390
Jesse Oldham The Salvation Army	Circle One: Yes (No)		788-1709
Roy Stock Dearborn VFD	Circle One: Yes (No)		
Susan Conell County Planning	Circle One: Yes (No)		sconell@co.cascade.mt.us
Jim Adkins CRWT	Circle One: Yes (No)		
Louis D'Antuono Benefis Health System	Circle One: Yes (No)		louisdantuono@benefis.org (406) 455-5127
Kristal Kuhn City of Great Falls	Circle One: (Yes) No		
Tanya Hanston Cascade City-County Health Dept	Circle One: (Yes) No		
Charles Sheets City Planning & Com. Dev.	Circle One: Yes (No)		
Meeting Start Time: 10:00		Meeting End Time: 12:00	

CASCADE COUNTY PRE-DISASTER MITIGATION PLAN
PUBLIC MEETING

DATE: 6/23/2011 **LOCATION:** Fort Shaw

Name: (Please Print) Organization:	Affiliation or Title: Federally Salaried? (Yes or No)	Miles Traveled Round Trip to Attend Meeting	E-mail Address: Phone No.
Daphne Dignindakis Tetra Tech	Circle One: Yes (No)		daphne.dignindakis@tetratech.com 406-443-5210
Vrnce Kolar Cascade Co DES	Circle One: (Yes) No		VKolar@co.cascade.mt.us 454-6900
Jerry L. Fossnap	Circle One: Yes (No)		264-5174
major Joe Huttenlocker The Salvation Army	Circle One: Yes (No)		Joe.Huttenlocker@usw.salvationarmy.org
Major Nila Huttenlocker The Salvation Army	Circle One: Yes (No)		Nila.Huttenlocker@usw.salvationarmy.org 406-453-0391
Sharon Kunkel	Circle One: Yes (No)		
Steve Kunkel	Circle One: Yes (No)		Box 116 Sun River MT 59483
Debbie Kibbele Nygquist	Circle One: Yes (No)		Po Box 32 590-0967 Sun River MT 59483
TRISH Manner	Circle One: Yes (No)		245 Largent 7508119 Sun River MT 59483
Tony Hancock	Circle One: Yes (No)		1917 8th Ave N Great Falls, MT 799.3329
Esther Parker	Circle One: Yes (No)		49 Parker Rd Fort Shaw MT 59443

Meeting Start Time: 3:15 Meeting End Time: 4:45

CASCADE COUNTY PRE-DISASTER MITIGATION PLAN
PUBLIC MEETING

DATE: 6/23/2011 **LOCATION:** Fort Shaw

Name: (Please Print) Organization:	Affiliation or Title: Federally Salaried? (Yes or No)	Miles Traveled Round Trip to Attend Meeting	E-mail Address: Phone No.
Marcella MacDonald	Circle One: Yes (No)	20	marcellamacdonald22@gmail 590-9599
P Anderson	Circle One: Yes (No)		
Robert Muehlhoff HD-26 ST Rep.	Circle One: Yes (No)		Rmuehlhoff@Yahoo.com
	Circle One: Yes No		
	Circle One: Yes No		
	Circle One: Yes No		
	Circle One: Yes No		
	Circle One: Yes No		
	Circle One: Yes No		
	Circle One: Yes No		
	Circle One: Yes No		

Meeting Start Time: 3:15 Meeting End Time: 4:45

Meeting Notes & Presentations

Cascade County, Montana
Pre-Disaster Mitigation Plan

Cascade County Pre-Disaster Mitigation Plan

Contractor: Tetra Tech, Inc.
Daphne Digrindakis
406-443-5210

PROJECT BACKGROUND

- Plan was initiated in 2006 but was never completed.
- In 2009, Cascade County submitted a planning grant application to FEMA to fund a project to complete the Plan.
- Grant was awarded; 75% federal/25% local match
- Tetra Tech contracted to develop Plan
- 12 month project schedule

WHAT IS MITIGATION?

- Mitigation is a sustainable action that will reduce or eliminate injury to citizens, damages to structures and allow continuity of critical society function.
- Mitigation activities may be implemented prior to, during, or after an indent.

WHY HAVE A HAZARD MITIGATION PLAN

- Hazard mitigation is most effective when based on an inclusive, comprehensive, long-term plan that is developed before a disaster occurs.
- Required by FEMA to receive disaster mitigation funds.
- $100 million available annually through competitive grants for hazard mitigation projects.

APROACH FOR PDM PLAN DEVELOPMENT

- Implement planning process for community involvement
- Identify hazards
- Develop risk assessment
- Develop mitigation goals, objectives & projects
- Establish plan maintenance procedures
- Formally adopt plan

PLANNING PROCESS FOR 2010 PDM PLAN

- Kick-off Meeting
- Identify Project Stakeholders
- Establish Planning Team
- Review Existing Plans and Studies
- Set-up Project Website
  - www.cascadepdm.com
- Hold Public Meetings

RISK ASSESSMENT – IDENTIFY HAZARDS

- Natural Hazards
  - Wildfire
  - Severe Summer Weather
    - Hail, Thunderstorm Wind, Tornadoes
  - Severe Winter Weather
    - Extended Cold, Extreme Winds, Winter Storms
  - Drought
  - Avalanche
- Hydrologic Hazards
  - Flooding
    - Riverine, Flash Floods, Ice Jams, Urban Flooding
- Geologic Hazards
  - Landslide/Mudslide
  - Volcanic Ash
  - Earthquake

RISK ASSESSMENT – IDENTIFY HAZARDS

- Technological or Human-Caused Hazards
  - Structure Fire
  - Hazardous Material Incidents
  - Dam/Levee Failure
  - Transportation Accidents
    - Aircraft, Railroad, Highway
  - Communicable Disease
    - Human, Livestock, Agricultural
  - Terrorism/Violence

RISK ASSESSMENT – IDENTIFY & RANK HAZARDS

- Calculated Priority Risk Index (CPRI)
  - Probability
  - Magnitude/Severity
  - Warning Time
  - Duration
- Used to Prioritize Hazards

HAZARD RISK ASSESSMENT

- Profile Hazards
  - Frequency & Magnitude using SHELDUS data
  - Map Hazard Risk Zones
- Inventory Assets
  - Critical Facilities – governments services, utilities, transportation, infrastructure
    - Need replacement values
  - Vulnerable Populations – schools, senior centers, hospitals
- Estimate Losses
  - People Affected (census data) & Impact to Structures
  - Calculate Risk

MITIGATION STRATEGY

- Identify new/ongoing mitigation projects
  - Focus on mitigation – not response projects
- Determine any mitigation projects which have been completed
- Rank and prioritize mitigation projects
  - County Priorities
  - Cost/Benefit Analysis
    - Population Protected
    - Property Protected
    - Project Feasibility
    - Project Cost

PROJECT IMPLEMENTATION

- Implementation Schedule
- Responsible Agency/Organization
- Implementation Steps
- Possible Funding Sources

PLAN MAINTENANCE

- Establish process for monitoring, evaluating and updating the Plan.
- Identify methods to maintain community involvement.

PLAN REVIEW & ADOPTION SCHEDULE

- Stakeholder review – 30 days (August 2011)
- Revision to address stakeholder comments
- Submit to Montana DES & FEMA for compliance with Region 8 Crosswalk – 60 days (Sept/Oct 2011)
- Additional revision if necessary
- Submit to Cascade County and incorporated city of Great Falls and incorporated towns of Belt, Cascade and Neihart for adoption (Nov/Dec 2011)

THANK YOU

QUESTIONS?

CASCADE COUNTY PRE-DISASTER MITIGATION PLAN
NOTES FROM KICK-OFF MEETING IN GREAT FALLS
JANUARY 6, 2011

Planning Team Volunteers:

Susan	Conell	Cascade County Planning
Scott	Karaffa	MSU-Great Falls
Vince	Kolar	Cascade County DES
Kristal	Kuhn	City of Great Falls EPO
Doug	Mahoney	Montana Air National Guard
Sandy	Mares	West Great Falls Flood Control & Drainage District
John	Masonovich	Belt Town Mayor
Mike	McCord	Neihart - Mayor
Bill	Peterson	Cascade Town Mayor
Randall E.	Rappe	City of Great Falls Public Works
Royce	Shipley	Malmstrom AFB
Charlie	Sheets	City of Great Falls
Roy	Stock	Dearborn VFD
Bob	Wojciechowski	Cascade County Sheriffs Office/Firewarden

Comments on Hazards:

Microbursts – Neihart
Wildfire – Coyote Creek Fire (Neihart)
Dam Failure – 1964 Gibson dam failure; 1908 Missouri dam failure ; 1964 Swift Dam failed
Flooding – 1964, 1975. DFIRMs are on hold due to levee certification issues. 2002 FIRMs are available.

Potential Mitigation Projects:

Flooding – Tie downs for chemicals and tanks.

CASCADE COUNTY PDM PLAN UPDATE
PLANNING TEAM CONFERENCE CALL
TUESDAY, FEBRUARY 8, 2011
11am – 12:20am

Planning Team Roll Call:

Yes	Susan	Conell	Cascade County Planning
Yes	Scott	Karaffa	MSU-Great Falls
Yes	Vince	Kolar	Cascade County DES
Yes	Kristal	Kuhn	City of Great Falls EPO
Yes	Doug	Mahoney	Montana Air National Guard
Yes	Sandy	Mares	West Great Falls Flood Control & Drainage District
No	John	Masonovich	Belt Town Mayor
Yes	Mike	McCord	Neihart - Mayor
Yes	Jodie	Campbell	Cascade Town Clerk
Yes	Randall E.	Rappe	City of Great Falls Public Works
Yes	Royce	Shipley	Malmstrom AFB
Yes	Roy	Stock	Dearborn VFD
Yes	Bob	Wojciechowski	Cascade County Sheriffs Office/Firewarden

Handouts:

CPRI Worksheet
Hazards to Consider
Top Damaging Hazard Events from SHELDUS
Wildfire Events Showing Structure Loss from DNRC
Haz-Mat Incidents from NRC
Draft List of Critical Facilities

Review of CPRI Hazard Scoring from Kick-off Meeting:

	PROBABILITY				SEVERITY/MAGNITUDE				WARNING TIME				DURATION				Score
	Unlikely	Possibly	Likely	Highly Likely	Negligible	Limited	Critical	Catastrophic	< 6 hours	6 - 12 hours	12 - 24 hours	> 24 hours	< 6 hours	< 24 hours	< 1 week	> 1 week	
Communicable Disease/Pandemic				x				x			x					x	3.70
Wildfires				x			x		x						x		3.60
Structure Fire				x			x		x				x				3.40
Severe Summer Storms				x		x			x				x				3.10
Hazardous Materials Incidents			x				x		x					x			3.05
Transportation Accident (air, land, rail)			x				x		x				x				2.95
Severe Winter Storms				x		x						x			x		2.85
Flooding/Flash Flood (levee failure)			x				x					x				x	2.80
Drought			x				x					x				x	2.80
Volcanic Ash		x						x			x					x	2.80
Dam Failure		x						x				x			x		2.55
Landslides		x				x			x				x				2.20
Terrorism/Violence		x				x			x				x				2.20
Earthquake		x			x				x					x			2.00

Discussion:
Consider profiling the utility failure hazard. This can be looked at as a consequence of the summer storm/winter storm hazards.

CASCADE COUNTY PDM PLAN UPDATE
PLANNING TEAM CONFERENCE CALL
TUESDAY, FEBRUARY 8, 2011
11am – 12:20am

Consider changing the severity/magnitude of the flood hazard from "critical" to "catastrophic" since there have been two catastrophic floods - 1964, 1975. The levee projects in West Great Falls and Vaughn have mitigated the severity of these types of flood events and catastrophic floods haven't occurred since then. It was agreed that the flood hazard should stay as "critical" on the CPRI.

The warning time for levee failure is <6 hours and there is typically more lead time for dam failure. Levee failure should be addressed under flooding and dam failure should be on its own.

Transportation should be grouped together (railroad, highway, and aircraft accidents).

De-emphasize the communicable disease hazard since preparedness is handled on the county/state level.

De-emphasize the drought hazard since it is managed by the USDA and state.

Terrorism – magnitude is limited. De-emphasize because handled by state and federal.

Landslide/mudslide hazard is the result of wildfires; don't happen on their own.
Around Armington road slid; last summer. June, 2010. Could have been a sinkhole/ subsidence issue.

Avalanche not really a problem around Neihart – don't need to include.

Subsidence not really a big problem in the County – don't need to include.

Profile the hazards on the CPRI with varying degree of detail and we'll review for mitigation opportunities.

Review of Critical Facility List:
Bridges – check with Dept. Transportation
Vince to provide missile silos and repeaters
Check Growth Policy for water/wastewater facilities

Hazard Handouts
SHELDUS data doesn't represent the greatest floods that have affected the area (1953, 1964, 1975). The magnitude of these floods will be obtained from other sources.

Next Meeting:
Second Tuesday of each month – March 8th at 11am

CASCADE COUNTY PDM PLAN UPDATE
PLANNING TEAM CONFERENCE CALL
WEDNESDAY, MARCH 8, 2011
11am – 12:10pm

Planning Team Roll Call:

No	Susan	Conell	Cascade County Planning
Yes	Scott	Karaffa	MSU-Great Falls
Yes	Vince	Kolar	Cascade County DES
Yes	Kristal	Kuhn	City of Great Falls EPO
Yes	Doug	Mahoney	Montana Air National Guard
Yes	Sandy	Mares	West Great Falls Flood Control & Drainage District
No	John	Masonovich	Belt Town Mayor
Yes	Mike	McCord	Neihart - Mayor
No	Jodie	Campbell	Cascade Town Clerk
Yes	Randall E.	Rappe	City of Great Falls Public Works
No	Charlie	Sheets	City of Great Falls Planning & Community Dev.
No	Royce	Shipley	Malmstrom AFB
Yes	Roy	Stock	Dearborn VFD
No	Bob	Wojciechowski	Cascade County Sheriffs Office/Firewarden
Yes	Tom	Mital	Cascade County GIS
Yes	Pat	Halcro	Great Falls GIS

Handouts:

Cascade County Bridge Map (MDT data)
Cascade County Base Map
Hazard Risk Maps

Review of Prioritized Hazards for Plan

1- Wildfires
2 - Structure Fire
3 - Severe Summer Storms
4 - Hazardous Materials Incidents
5 - Transportation Accidents (air, land, rail)
6 - Severe Winter Storms
7 - Flooding/Flash Flood/Levee Failure
7 - Volcanic Ash
8 - Dam Failure
9 - Landslides
10 - Earthquake

Data Needs:

Structure fires in Cities and County

NFRIS report for City of Great Falls – Crystal can provide data for past 10 years
Roy has asked the State Fire Marshall to run a report for the entire county for a 10 year period. This data which will include property loss figures.

Highway Transportation Accidents

Highway Patrol or MDT may have data for accidents
PDM Plan will not consider mitigation for this hazard
Mitigation built into design and State/Federal funds are used for these projects

CASCADE COUNTY PDM PLAN UPDATE
PLANNING TEAM CONFERENCE CALL
WEDNESDAY, MARCH 8, 2011
11am – 12:10pm

Unresolved items since last conference call:

Bridges – should all 250 be included on critical facility list?

Reviewed map of bridges developed for this project using MDT data. Bridges on the primary routes should be considered critical facilities since there's a way around all the secondary routes. Vince will talk to County at get back to Tt with a list of the critical bridges to use in the PDM analysis.

To Do Items:

GIS layer of critical facilities - Tom MItal (County GIS) and Pat Halcro (City of GF GIS) will work with Corey Richardson of Tt to complete the spatial representation for the critical facilities. Pat has additional critical facilities which can be added (i.e. substations, W.GF and Vaughn levees).

Replacement values for critical facilities – Vince will work on this during the next month.

Discussion during review of Base Map:

What towns should be removed/added?

Since there is recognition of an area even though there is no town, the map legend should read "place names" instead of city/towns.

Anything else on the map?

Sheep Creek west of Hardy should be added.

Discussion during review of Hazard Risk Maps:

Earthquake (intensity of ground shaking)

Southern portion of county most shaking risk

Wind Speed (average annual)

Isn't representative of conditions since record gusts can be more damaging
Microbursts in Neihart not represented on map. These are different than the straight-line winds felt in Great Falls
City GIS doesn't have any better maps for wind. Contact NWS.
Wind will be considered uniform hazard in plan unless better data can be found.

Haz-Mat (buffer of highways, railroad, TRI facilities)

Other chemical/petroleum sites should be added: e.g. Agri-Basics, Wilbur Eliis, Bulk Fuel at Malmstrom, Conoco Phillips Terminal
Vince will go through Tier II reports and provide a list for map and PDM analysis.
Buffer should be shown on either side of highway – not over top because colors are not accurate.

CASCADE COUNTY PDM PLAN UPDATE
PLANNING TEAM CONFERENCE CALL
WEDNESDAY, MARCH 8, 2011
11am – 12:10pm

Landslide Prone Terrain (>55 % slope)

Map shows highway north of Monarch and at Cascade as landslide prone. Only instance of landslides in county is after wildfire/rain events. This occurred in Monarch area.

Flooding

Discussion of levee certification issue. De-certification on-hold due to congressional delegation.
Need to get funding for repair through earmark.
Levee needs to be shown on flood hazard map and indicated as critical facility.
Need blow-up figure in plan showing area protected by levee

Dam Inundation Areas

Take significant hazard dams off map or show with a different symbol/color
Dams in other counties that impact Cascade County should be shown and the inundation area indicated that dam is outside of county.
Cleanup map and don't show inundation areas in other counties that don't affect Cascade.
Vince has EAPs for out-of-county dams that need to be shown: Pishcum, Willow Creek, Gibson
BuRec owned by Gibson but it is maintained by Green Fields Irrigation.

Wildfire – incomplete (don't have WUI layer yet)

Next Meeting:
Second Tuesday of each month – April 12th at 11am

CASCADE COUNTY PDM PLAN UPDATE
PLANNING TEAM CONFERENCE CALL
TUESDAY, APRIL 12, 2011
11am – 12:10

Planning Team Roll Call:

No	Susan	Conell	Cascade County Planning
Yes	Scott	Karaffa	MSU-Great Falls
Yes	Vince	Kolar	Cascade County DES
Yes	Kristal	Kuhn	City of Great Falls EPO
No	Doug	Mahoney	Montana Air National Guard
Yes	Sandy	Mares	West Great Falls Flood Control & Drainage District
No	John	Masonovich	Belt Town Mayor
No	Mike	McCord	Neihart - Mayor
Yes	Jodie	Campbell	Cascade Town Clerk
Yes	Randall E.	Rappe	City of Great Falls Public Works
No	Charlie	Sheets	City of Great Falls Planning & Community Dev.
No	Royce	Shipley	Malmstrom AFB
Yes	Roy	Stock	Dearborn VFD
No	Bob	Wojciechowski	Cascade County Sheriffs Office/Firewarden
Yes	Tom	Mital	Cascade County GIS
Yes	Paula	Juisti	Cascade County DES
Yes	Bill	Peterson	Cascade - Mayor

Handouts:

- County Divisions for Risk Assessment Reporting
- PDMC Grant Eligible/Ineligible Projects
- Types of Mitigation Projects
- Example Mitigation Projects
- Revised Location Map and Updated Hazard Risk Maps: www.cascadepdm.com

Update on Data Needs:

Structure fires in Cities and County – State Fire Marshal provided data. Roy said to be advised that dataset may not be complete because some departments do not report their fires.

Highway Transportation Accidents – Data received from Montana Highway Patrol

Critical bridges – URBAN bridges weren't shown on the original map provided. This was an oversight and a new map will be prepared. The new map will be sent to Vince for his meeting with the bridge department.

GIS layer of critical facilities – Much progress made in the past month. City of Great Falls GIS was requested to find locations on some additional facilities.

Replacement values for critical facilities – Much progress made in the past month. What's missing is data on water/wastewater/schools for the towns. Vince will work on this.

Haz-Mat facilities – Vince/Paula are working on this and will provide to Tetra Tech.

Communication Sites – Roy noticed a missing communication site on Sheep Creek and the south repeater is shown incorrectly. This data came from Cascade County GIS and Tom will provide a new GIS layer. He asked the Tetra Tech's GIS analyst send him the GIS layer he's working with and indicate the projection.

Damage figures for Presidential disasters – Paula will look in DES files and provide any information to Tetra Tech.

CASCADE COUNTY PDM PLAN UPDATE
PLANNING TEAM CONFERENCE CALL
TUESDAY, APRIL 12, 2011
11am – 12:10

Revised Base Map and Hazard Risk Maps:

WUI Map – from CWPP. No comments.

Wind/Winter Storm Hazard Risk Areas

Discussed meeting with NWS regarding hazard areas for wind and snow. NWS recommended we use elevations over 5,500 feet for geographic representation of snow hazard and wind forecast zones for high wind hazard. FEMA's wind map designates a "special wind area" for the county which may be used for hazard analysis. Tom Mital has wind maps on the county website that he will provide to Tetra Tech.

Flood Prone Areas – Town of Belt has dike – add to critical facility list and add to map

Risk Assessment Reporting:

Map showing county divisions and census designated places (CDPs)

No comments

Mitigation Strategies:

Eligible/Ineligible projects in the PDMC grants program. Recommended that Planning Team read this on their own.

Establish Goals and Objectives – This will be developed over the next couple of conference calls.

Flooding Mitigation Projects

Check with Susan Connell on what could be done with repetitive loss properties

Sun River culverts are undersized or in wrong place causing flooding

Old Sun River School is in floodplain and community wants to make into park

Staff gauge at 6th SW bridge area

Levee slope mowing - boom arm mowers to maintain levees

Gibson Flats – county gets calls every year to. Runoff from GF heads that way. Vince will check

Early warning systems

Reverse 911 system

Certification of levee

Initial attack roads that don't have culverts even though they're private – Roy will work on this

Charles Sheets is floodplain administrator for City of Great Falls – Vince will talk about whether updated flood regulations are needed.

Bridges that may be impaired. Sheep Creek needs repair but only provides access to a few residences. Warden bridge (10th Ave. South) area of concern structurally identified by MDT (in newspaper recently).

Wildfire Mitigation Projects

Fuel treatments along evacuation routes – resistance by landowners

Continue education projects – recent grant raised consciousness of residents - Roy

Continue BLM grants that provide matching funds to landowners who perform defensible space fuel treatments – Roy

Check CWPP for mitigation projects

Could use more tenders with 4WD – Fire districts currently shuttle water with tenders.

No water sources where dry hydrants would be beneficial - Wells have been identified, permission granted.

CASCADE COUNTY PDM PLAN UPDATE
PLANNING TEAM CONFERENCE CALL
TUESDAY, APRIL 12, 2011
11am – 12:10

Recruiting and training of volunteer fire fighters.

Structure Fire

Montana legislature didn't pass International Fire Code this session.
Sprinklers not required by County unless the facility is a certain size
Requirement for sprinklers on city level – not known
Project - ADOPT international fire code

All Hazards

Need back-up dispatch center

Future Development Projects:

Need to identify several future projects and indicate location and construction type
Will identify on map intersected with composite hazard areas.
Kristal has a "wish list" for future development – will send.

Next Meeting:

May 10, 2011, Tuesday at 11am.

CASCADE COUNTY PDM PLAN UPDATE
PLANNING TEAM CONFERENCE CALL
TUESDAY, MAY 10, 2011
11am – 12:30pm

Planning Team Roll Call:

No	Susan	Conell	Cascade County Planning
Yes	Scott	Karaffa	MSU-Great Falls
Yes	Vince	Kolar	Cascade County DES
Yes	Kristal	Kuhn	City of Great Falls EPO
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No	Bob	Wojciechowski	Cascade County Sheriffs Office/Firewarden
Yes	Tom	Mital	Cascade County GIS
No	Paula	Juisti	Cascade County DES
No	Bill	Peterson	Cascade - Mayor

Handouts:

- Map showing FEMA's Special Wind Area for Cascade County
- Mitigation Projects from CWPP
- More Example Mitigation Projects
- Cascade County Draft Mitigation Strategy

Update on Data Needs:

- Critical bridges – Data from NRIS to be used for analysis. Contains information on span length and width so replacement costs can be extrapolated.
- GIS layer of critical facilities – Done. Using this for analysis.
- Replacement values for critical facilities – Done. Using existing list for analysis. Data on water/wastewater/schools for the towns was never received. This can be included in 5 year PDM update.
- Haz-Mat facilities – Analysis completed using facilities that were previously identified.
- Communication Sites – Cascade County GIS provided corrected layer.
- Damage figures for Presidential disasters – Sandy provided data on 1975 flood disaster. No other data available so analysis will be completed with existing data.

Hazard Risk Maps:

Wind/Winter Storm Hazard Risk Areas

- Wind maps on county website utilized the same data was the first wind map prepared by Tetra Tech; data for wind at 50 meters above ground surface (for wind farms). Not appropriate for PDM analysis.
- FEMA's wind map designates a "special wind area" for the county which may be used for hazard analysis. Planning team doesn't think this map accurately represents wind hazard in the county. For planning purposes, consider the wind hazard uniform across the county.

CASCADE COUNTY PDM PLAN UPDATE
PLANNING TEAM CONFERENCE CALL
TUESDAY, MAY 10, 2011
11am – 12:30pm

Mitigation Strategies:

Flood Mitigation Projects

Susan Connell (County Floodplain Administrator) will hopefully reveal what can be done to mitigate three repetitive loss properties.

Gibson Flats – Vince checked with Public Works and they indicated drainage ditches around Gerber Road are needed. These may need to be constructed on private property.

PROJECT: Reduce flooding in the Gibson Flats area by installing drainage ditches in the vicinity of Gerber Road.

Are updated flood regulations needed? Charles Sheets, floodplain administrator for City of Great Falls indicated that no new regulations are needed. Current city/county regulations in place are appropriate for the time being. Cascade County, the West Great Falls Control & Drainage District, and the City of Great Falls signed a PAL agreement with FEMA last week which gives district two years to get the levee certified. FEMA will move forward with the DFIRMs and the new maps will show that levee as being provisionally certified. District will move forward w/ studies and analysis to gain certification.

PROJECT: Remove woody vegetation 15 feet from the edge of the West Great Falls levee on the river side.

PROJECT: Remove woody debris that gets caught on bridge pilings and creates damming effect.

PROJECT: Work towards achieving a lower rating through the National Flood Insurance Program Community Rating System.

Structural/Hydraulics/Geotech/O&M plans are needed for the levee certification – CFR 65.10. Determine if any of these should b listed in the PDM Plan.

Wildfire Mitigation Projects

Reviewed projects in CWPP and determine which would be carried forward in PDM.

PROJECT: Identify equipment and training needs to enhance the capabilities of fire protection entities to suppress and mitigate wildfire risks.

PROJECT: Obtain internet connections at all rural fire district stations.

PROJECT: Install booster antennas to enhance cell service in fire districts where it would be beneficial.

PROJECT: Study creation of fire breaks in appropriate locations in Conservation Reserve Program lands.

CASCADE COUNTY PDM PLAN UPDATE
PLANNING TEAM CONFERENCE CALL
TUESDAY, MAY 10, 2011
11am – 12:30pm

PROJECT: Improve training and qualifications of personnel to more effectively interface with incoming Incident Management Teams deployed in the county.

PROJECT: Increase availability of water resources for wildland firefighting by strategic placement of water tanks and ponds.

PROJECT: Create a database of water sources for firefighting and make database available to rural fire districts.

PROJECT: Obtain additional repeaters or relocate existing repeaters to enhance radio communications in Sun River/Simms area, Neihart, and Sand Coulee.

Severe Summer Weather Projects:
No need for underground power projects in the county.

PROJECT: Participate in National Weather Service Severe Weather Week.

PROJECT: Become a National Weather Service Storm Ready Community.

Great Falls is a storm ready community; County and other towns are not. Need to have a radio site for better coverage in Belt & Neihart

Dam Failure Projects:
PROJECT: Provide NOAA radios to residents downstream from dams.

PROJECT: Conduct public outreach / education with residents in inundation areas.

Hazardous Materials Projects:
PROJECT: Ensure local emergency responders have adequate training to respond to haz-mat events consistent w/ local capabilities.

PROJECT: Obtain haz-mat trailers for response in the county.

PROJECT: Update resource list of emergency response supplies/vendors.

PROJECT: Explore the possibility of an alternate route for truck traffic carrying hazardous material loads to avoid population center.

Winter Storms Projects:
PROJECT: Update emergency shelters in each community.

PROJECT: Perform public outreach/education of location of emergency shelters.

PROJECT: Obtain generators for emergency shelters.

CASCADE COUNTY PDM PLAN UPDATE
PLANNING TEAM CONFERENCE CALL
TUESDAY, MAY 10, 2011
11am – 12:30pm

PROJECT: Conduct public outreach campaign where special needs residents would indicate where they live and what they need. Develop a database with this information.

PROJECT: Continue to aggressively address rural locations within the county so people's residences can be found for rescue purposes.

Transportation (Air, Highway, Rail) Accidents Projects:
Defer mitigation to private/state/federal managing agencies.

PROJECT: Continue exercises to prepare of accident response.

PROJECT: Work with RR to increase crossing gates

PROJECT: Coordinate w/ Community Transportation Enhancement Program on their recommendations for highway safety.
Charlie to talk to Andrew Finch and see if there are specific projects to include in PDM Plan.

Future Development Projects:

Charlie Sheets indicated the following projects are being considered in the next 10 years.

- NE of Malt Plant – 120 acre industrial park (MT Specialties)
- 52nd St & 18th Ave. N – BID industrial park
- Stuckey Road – Ag facility proposed
- Sports Complex – 24th Ave S. & 26th St. (old driving range)
- Wind farm development in Belt
- Highwood Generation Power Plant

Check Growth Policy for areas to be annexed for residential development

Plan Maintenance Procedures:

Didn't have time to discuss during this meeting.

Next Meeting:

Tuesday, June 14th, 11am.

APPENDIX C

RISK ASSESSMENT DOCUMENTATION

Cascade County, Montana
Pre-Disaster Mitigation Plan

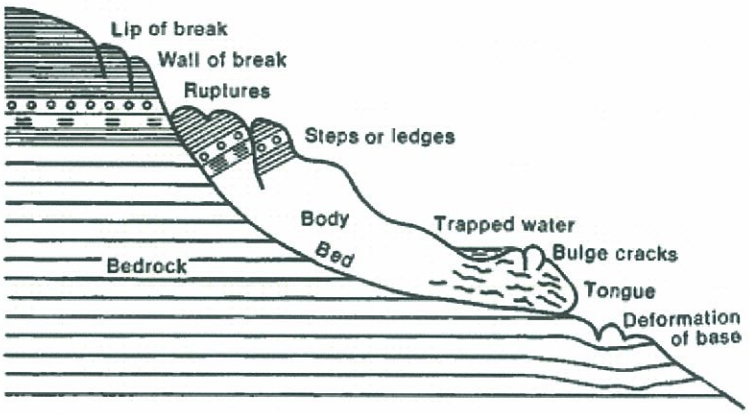
Additional Hazard Profiles

Cascade County, Montana
Pre-Disaster Mitigation Plan

LANDSLIDES | **CPRI SCORE = 2.2**

Description and History

A landslide is the movement of a soil and/or rock mass down a slope. Any area composed of very weak or fractured materials resting on a steep slope can and likely will experience landslides. Landslides, or debris flows, are often difficult to distinguish from flash floods and possess similar destructive potential and rapid onset. Debris flows generally occur during periods of intense rain fall or rapid snowmelt. They usually start on steep hillsides as shallow slides that liquefy and accelerate. The consistency of debris flow range from watery mud to thick, rocky mud that can carry large items such as boulders, trees and cars. When the flow reaches flatter ground, debris can spread over a broad area, sometimes accumulating in thick deposits. Any given mass movement is triggered by a single event. The two most common triggers are earthquakes and heavy rainfall.



Vulnerability and Area of Impact

Landslides appear to have a stronger association with faulting than with any specific geologic unit (MBMG, 2002b); however, some slides are most common where the underlying bedrock is sedimentary or volcanic. Volcanic-derived soils contain significant amounts of clay that can be susceptible to failure when wet or disturbed. Small slides and slumps can also occur along the steeper slopes of gullies and drainages. Steep slopes may be most vulnerable to debris flow, especially if the area were to burn.

The Planning Team indicated that landslides do not occur often in Cascade County and have not caused damage to local infrastructure. Square Butte in the Sun River Valley area has a large landslide on its south face. This particular slide is believed to have been caused by moisture in an extremely wet year, which provided lubrication (Cascade County Growth Policy, 2006).

Probability and Magnitude

Landslide risk was determined by using GIS data provided in the Montana State Hazard Mitigation Plan (Montana DES, 2010). Shape files used for the GIS layer included areas of mapped historic landslides, available from the Montana Bureau of Mines and Geology (MBMG) and slopes greater than 55 degrees, based on methodology developed by the U.S. Forest Service for a delineation of landslide prone areas in the Clearwater-Nez Perce National Forest. The landslide layer was intersected with the critical facility and MDOR parcel datasets to calculate building exposure. Vulnerable population was calculated by

census tract in the landslide hazard data. Loss estimation figures could not be calculated since there is no record of property damage from past landslides. **Figure** presents the landslide risk areas and critical facilities in Cascade County.

Based on the lack of recordable events, the probability for future landslides is rated as "possible". This rating indicates an event would occur less than once per decade but more than once in 100 years.

Future Development

Although the physical cause of many landslides cannot be removed, geologic investigations, good engineering practices, and effective enforcement of land-use management standards can reduce landslide hazards. Currently, Cascade County does not be permit development on slopes greater than 25 percent. The Cascade County Growth Policy (2006) identifies geologic hazards including landslides in several types of terrain as having development limitations, as follows:

Rough Breaks - Geologic Hazards include soil creep, slumping and landslides. The generally steep slopes are a serious limitation for building sites as well as being a major potential erosion area whenever the vegetation is removed.

Uplands - Geologic Hazards include faults and landslides. Erosion is evident in some areas and could potentially be hazardous. Landslides are common on the steeper slopes, as well as slumping and soil creep, at times of high rainfall.

Mountains - The only geologic hazards are those inherent to any mountainous, steeply, sloping terrain. Rock slides and talus slopes are common with some areas showing some instability in the form in soil creep and slumping.

Buttes - Hazardous conditions in the buttes landscape units are mainly landslides caused by breakdown of the formation from natural processes.

Future development projects currently being considered are not within the landslide risk area.

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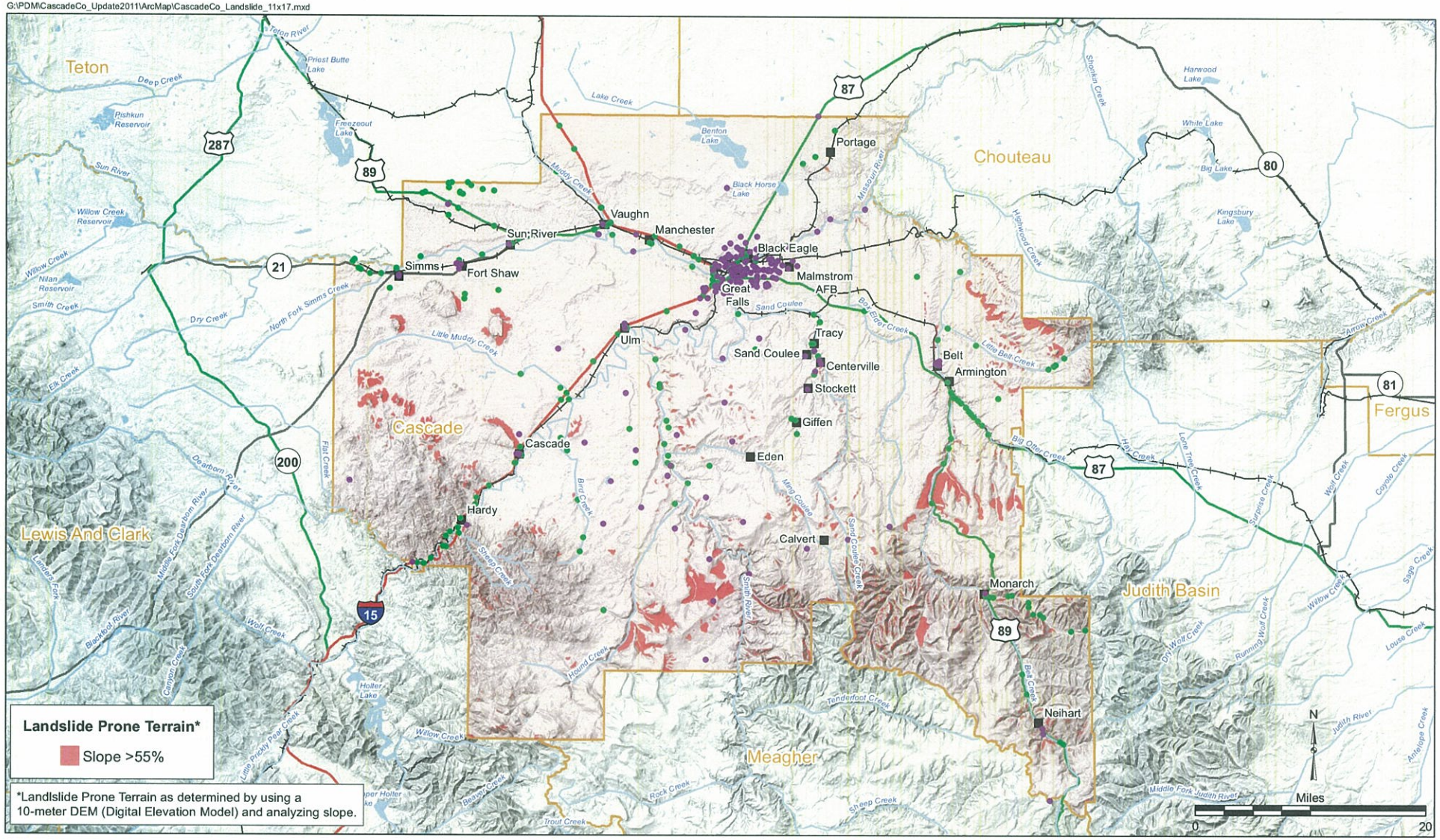


Critical Facilities
Bridges
Place Names
River/Stream
Lake/Reservoir
County Boundary
Interstate
U.S. Highway
Montana Highway
Rail

May 2011

Landslide Prone Terrain
Cascade County, Montana
Pre-Disaster Mitigation Plan

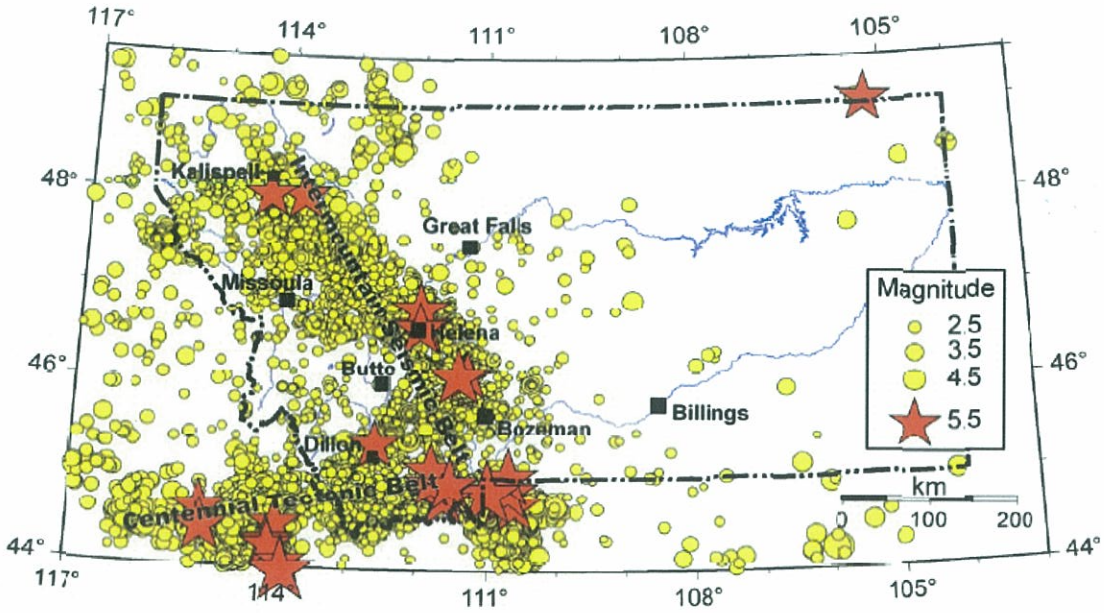
EARTHQUAKE | **CPRI SCORE = 2.0**

Description and History

An earthquake is a trembling of the ground resulting from the sudden shifting of rock beneath the earth's crust. Earthquakes most commonly occur along active faults. Earthquake size and severity is measured by magnitude and intensity, respectively. Magnitude is a measure of the amount of energy released by an earthquake and is proportional to the area of the fault plane and amount of slip. Magnitude is determined from seismographic readings and reported in terms of the Richter scale or the more modern Moment magnitude scale. Intensity, based on how strong the shock is felt and the degree of damage at a particular location, is measured by the modified Modified Mercalli scale. Intensity is typically greatest near the epicenter and decreases with greater distance. Earthquake hazard is defined as any physical phenomenon associated with an earthquake that may produce adverse effects on human activities. This includes surface faulting, ground shaking, landslides, liquefaction, tectonic deformation, tsunami, and seiche and their effects on land use, manmade structures, and socioeconomic systems.

Montana ranks fifth in the nation in terms of number of historic earthquakes greater than magnitude 6 (Anderson and Miyata, 2006 in Elliott and McDonald, 2009). Cascade County lies east of the Intermountain Seismic Belt, which extends from western Montana south to southern Nevada (**Figure**) and has had several lower magnitude earthquakes. Earthquake density within the Intermountain Seismic Belt is anomalous within North America, and eight of the 16 largest historic earthquakes in the belt occurred in Montana (Stickney, 2007 in Elliott and McDonald, 2009). Since 1900, Montana has experienced 16 earthquakes of magnitude 5.5 or greater (**Table X**).

Figure Intermountain Seismic Belt
(Source: MBMG, 2010)



History has shown that significant earthquakes (up to magnitude 6.5) may occur anywhere throughout the Intermountain Seismic Belt, even in areas where young faults are not recognized. Examples of

damaging earthquakes for which no known surface fault was recognized include the 1925 Clarkston earthquake (magnitude 6.6) and the 1935 Helena earthquakes (magnitude 6.3-5.9).

TABLE X
HISTORIC EARTHQUAKES OF MONTANA AND SURROUNDING REGIONS WITH MAGNITUDES OF 5.5 OR GREATER SINCE 1900

Date	Magnitude	Approximate Location	Date	Magnitude	Approximate Location
8/18/1959	7.5	Hebgen Lake	10/12/1935	5.9	Helena
10/28/1983	7.3	Challis, ID	4/1/1952	5.7	Swan Range
6/28/1925	6.6	Clarkston Valley	7/26/2005	5.6	Beaverhead County
8/18/1959	6.5	Hebgen Lake	8/22/1984	5.6	Challis, ID
8/18/1959	6.3	Hebgen Lake	10/21/1964	5.6	Hebgen Lake
10/19/1935	6.3	Helena	8/18/1959	5.6	Hebgen Lake
11/23/1947	6.1	Virginia City	2/16/1929	5.6	Clarkston Valley
7/12/1944	6.1	Central Idaho	10/29/1983	5.5	Challis, ID
8/19/1959	6.0	Hebgen Lake	10/29/1983	5.5	Challis, ID
8/18/1959	6.0	Hebgen Lake	12/8/1976	5.5	Yellowstone Park
2/14/1945	6.0	Central Idaho	9/23/1945	5.5	Flathead Valley
10/31/1935	6.0	Helena	5/16/1909	5.5	Northeast Montana
6/30/1975	5.9	Yellowstone Park			

Source: Stickney and others, 2000

Vulnerability and Area of Impact

The greatest activity on the Intermountain Seismic Belt passes to the west of Cascade County and it is most likely that future earthquakes that affect Cascade County will be centered at some distance away within the most seismically active region. **Figure** shows the earthquake risk in Cascade County. This figure is based on the U.S. Geological Survey's (USGS) peak ground acceleration maps which show the strength of seismic shaking that has a 2 percent probability of being exceeded in a 50 year period. The strength of the shaking is measured as a percent of the acceleration of gravity (%g). **Figure** shows the southern portion of the county has the potential for greater ground shaking from earthquakes than the north.

Data obtained from the Montana Bureau of Mines and Geology does not recognize any faults in Cascade County. However, the Cascade County Growth Policy (2006) indicates that earthquake faults can be found in some areas in the southern part of Cascade County and that the Carter Ranch Fault, southeast of Cascade is one of the largest.

Probability and Magnitude

The peak ground acceleration with a 2 percent chance of exceedance in 50 years indicates that the southern portion of Cascade County will experience seismic shaking greater than 12 to 18%g. According to Qamar ([2008] in Big Sky Hazard Management, 2009), at 9.2%g the earthquake is felt by all with many frightened. Some heavy furniture is moved with a few instances of fallen plaster. Damage is considered slight. At 18%g, damage is negligible in buildings of good design and construction, slight to moderate in

well-built ordinary structures, and considerable in poorly-built of badly designed structures. Some chimneys may be broken, and the shaking is noticed by people driving cars.

Although Cascade County has a low seismic risk; the probability of future earthquakes is rated as "possible" (less than 1 event every 10 years but greater than 1 event every 100 years).

Future Development

The City of Great Falls has adopted the 2009 International Building Code (IBC), and seismic provisions found in the IBC are what are required for new commercial construction. Compliance with the IBC is enforced through the building permit system which means new buildings will better withstand earthquakes.

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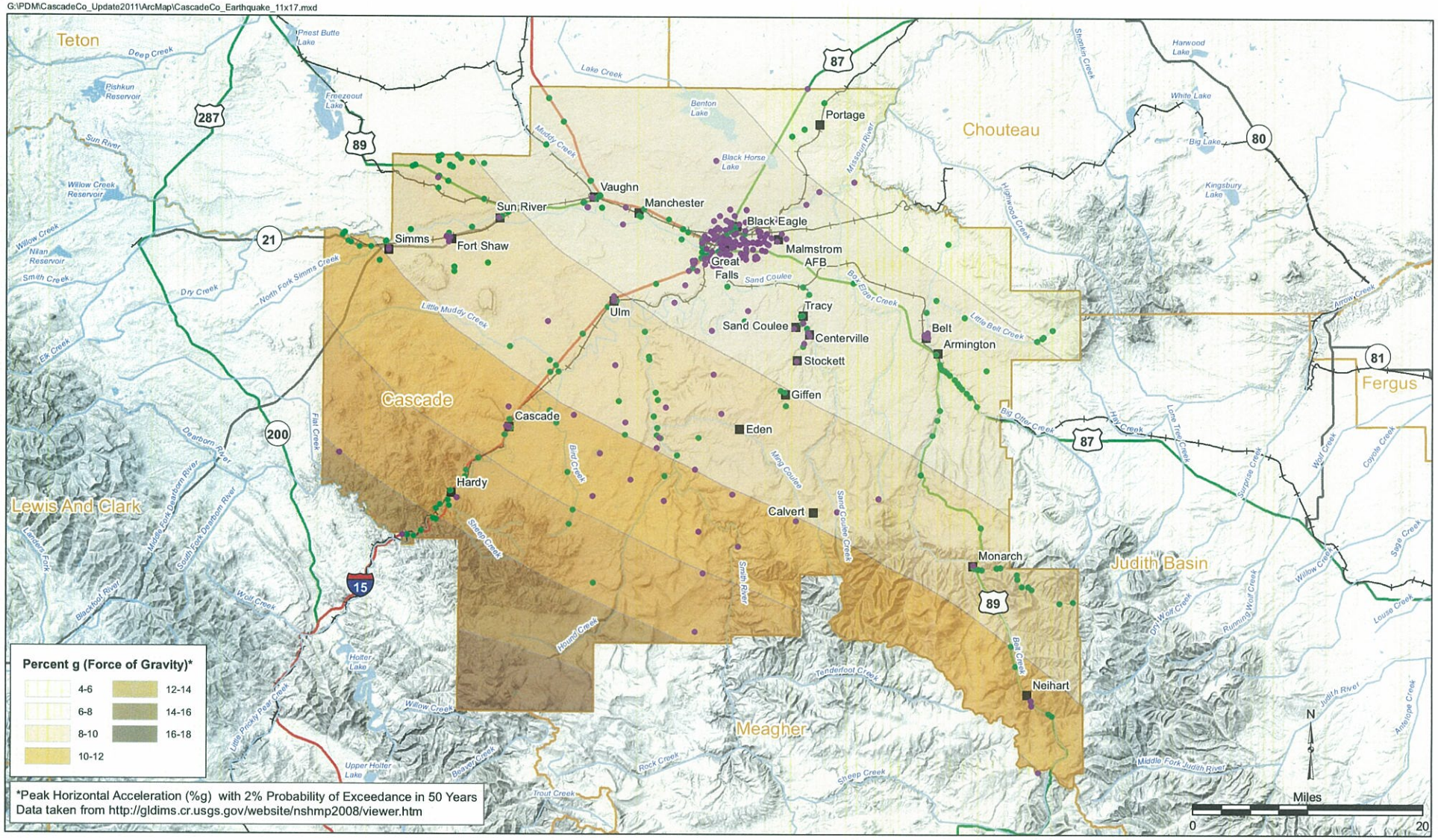

May 2011

Critical Facilities
Bridges
Place Names
River/Stream
Lake/Reservoir
County Boundary
Interstate
U.S. Highway
Montana Highway
Rail

Earthquake Risk - Intensity of Ground Shaking
Cascade County, Montana
Pre-Disaster Mitigation Plan

COMMUNICABLE DISEASE

Description and History

Communicable diseases, sometimes called infectious diseases, are illnesses caused by organisms such as bacteria, viruses, fungi and parasites. Sometimes the illness is not due to the organism itself, but rather a toxin that the organism produces after it has been introduced into a human host. Communicable disease may be transmitted (spread) either by: one infected person to another, from an animal to a human, from an animal to an animal, or from some inanimate object (doorknobs, table tops, etc.) to an individual. A pandemic is a global disease outbreak. Human diseases, particularly epidemics, are possible throughout the nation and Butte-Silver Bow is not immune to this hazard. In addition, livestock and animal disease could have a devastating effect on the economy and food supply in Cascade County and beyond. Highly contagious diseases are the most threatening to both populations.

Communicable disease could be devastating to the population or economy of Cascade County. Human diseases when on an epidemic scale, can lead to high infection rates in the population causing quarantines and mass fatalities. Diseases that have been eliminated from the United States population, such as smallpox, could be used in bioterrorism.

The following list gives examples of biological agents or diseases that could occur naturally or be used by terrorists as identified by the Centers for Disease Control and Prevention (2011).

- Anthrax
- Botulism
- Food borne outbreaks such as E. coli and Salmonella
- Measles
- Meningitis
- Norwalk Virus
- Pandemic Influenza (H1N1 – Swine Flu)
- Pertussis/Whooping Cough
- Pneumonic Plague
- SARS – Severe Acute Respiratory Syndrome
- Smallpox
- Tularemia (inhaled)
- Viral Hemorrhagic Fevers

These diseases can infect populations rapidly, particularly through groups of people in close proximity such as schools, assisted living facilities, and workplaces.

Historically, the Spanish influenza outbreak after World War I in 1918-1919 caused 9.9 deaths per 1,000 people in the State of Montana (Brainerd and Siegler, 2002). Historical records from newspapers show that the influenza outbreak was so bad in 1918 that residents were quarantined from November 30 to

December 17 after 18 people died and 53 new cases were discovered. In 1979 and again in late 2003, a flu epidemic hit the U.S. infecting hundreds of people. The swine flu (H1N1) pandemic of 2009 caused a number of fatalities in the country.

The Montana Department of Public Health and Human Services manages a database of reportable communicable disease occurrences. The communicable disease summary for Cascade County between 1997 and 2009 is presented in ***Table 4.5-1***.

TABLE
COMMUNICABLE DISEASE SUMMARY FOR CASCADE COUNTY

Disease	1997	1999	2000	2001	2003	2005	2006	2007	2008	2009
Vaccine Preventable Diseases										
Hepatitis A	11	1	1	2	1	--	--	--	--	--
Hepatitis B	--	12	3	--	2	4	3	--	1	--
Pertussis	2	--	--	1	33	--	--	12	6	1
Tuberculosis	3	1	--	1	--	1	--	--	2	--
Varicella	--	--	--	--	--	--	--	2	15	2
Enteric Diseases										
Campylobacter	13	--	5	16	7	9	10	12	4	11
Cryptosporidium	--	1	--	--	--	1	12	6	2	--
E Coli	2	1	5	10	5	2	6	--	--	--
Giardia	19	2	9	8	5	--	10	4	13	2
Salmonella	8	4	6	7	8	6	8	8	16	9
Shigella	--	--	1	--	--	--	1	--	--	--
Other Communicable Diseases										
West Nile Virus	--	--	--	--	--	5	10	11	1	--
Hantavirus	--	1	--	1	--	--	1	--	--	--
Sexually Transmitted Disease	173	136	122	287	--	357	358	379	363	265
TOTAL	**231**	**159**	**152**	**333**	**61**	**385**	**419**	**434**	**423**	**290**

Source: Montana Department of Public Health and Human Services, 2010

According to the Montana Department of Livestock, known livestock and animal diseases such as Foot and Mouth, Bovine Spongiform Encephalopathy (Mad Cow Disease), Exotic Newcastle, Rabies, Scabies, and Brucellosis could have damaging effects on the livestock population. Losses from those animals would be devastating and could have an economic effect countywide.

Vulnerability and Area of Impact

Diseases threaten the population, plants, and animals of Cascade County as opposed to structures. The entire population is at risk for contracting disease. The more urban nature of Cut Bank and Browning makes them more vulnerable to rapidly spreading and highly contagious diseases than other more rural parts of the county and Montana. Another contributing factor is that Cascade County has a higher percentage of persons over 65 years old than the State of Montana average. Approximately 15.9 percent of the population is over 65 compared to 14.6 percent for the state. The number of fatalities in the county would depend on the mortality rate and the percentage of the population affected. The ability to control the spread of disease will be dependent on the contagiousness of the disease and

movement of the population. Given the uncertain nature of diseases, Cascade County is assumed to have the same communicable disease risk countywide.

Probability and Magnitude

The probability of an epidemic in Cascade County is difficult to assess based on history and current data. Given the rural nature of most of the county, the probability of rapid infection is somewhat less than in urban areas. Individual infectious diseases will likely be reported on an annual basis giving this hazard a probability rating of "likely".

The magnitude of a communicable disease outbreak varies from common viral outbreaks to widespread bacterial infection. During the 1918 influenza pandemic, infection rates approached 28 percent in the United States (Billings, 1997). Other pandemics produced infection rates as high as 35 percent of the total population (World Health Organization, 2009). Such a pandemic affecting Cascade County represents a severe magnitude event. Almost any communicable disease that enters the regional population could overwhelm local health resources as would any rapidly spreading bioterrorism event for which there is no available vaccine or containment capability.

Future Development

There are no land use regulations for future development that could impact the communicable disease hazard. New residents and population add to the number of people threatened in the county, but the location of such population increases would not increase their vulnerability to the hazard.

Calculated Priority Ranking Index Summary

Cascade County, Montana
Pre-Disaster Mitigation Plan

CASCADE COUNTY PRE-DISASTER MITIGATION PLAN
CALCULATED PRIORITY RISK INDEX - SCORED AT KICK-OFF MEETING

	Unlikely	Possibly	Likely	Highly Likely	Negligible	Limited	Critical	Catastrophic	< 6 hours	6 - 12 hours	12 - 24 hours	> 24 hours	< 6 hours	< 24 hours	< 1 week	> 1 week	
Communicable Disease/Pandemic				x				x			x					x	3.70
Wildfires				x			x		x						x		3.60
Structure Fire				x			x		x				x				3.40
Severe Summer Storms				x		x			x				x				3.10
Hazardous Materials Incidents			x				x		x					x			3.05
Transportation Accident (air, land, rail)			x				x		x				x				2.95
Severe Winter Storms				x		x						x			x		2.85
Flooding/Flash Flood (levee failure)			x				x					x				x	2.80
Drought			x				x					x				x	2.80
Volcanic Ash		x						x			x					x	2.80
Dam Failure		x						x				x			x		2.55
Landslides/Mudslides		x				x			x				x				2.20
Terrorism/Violence		x				x			x				x				2.20
Earthquake		x			x				x					x			2.00

Critical Facilities

Cascade County, Montana
Pre-Disaster Mitigation Plan

CASCADE COUNTY PDM PLAN
CRITICAL FACILITIES

Name	PrimarySector	Address	City	Latitude	Longitude	Replacement Value	Contents Value	Yr Built	Sq Ft	Cost Source	COST ADJUSTMENT
Montana Refining	Business	1900-10th St. NE	Great Falls	47.5239	-111.2906						$0
Repeater - 744 East site	Communications	Fire Lookout at Porphyry Peak		46.83830556	-110.718	$20,000				COUNTY	$20,000
Repeater - 744 North site	Communications	160 Banjo Lane		47.60719444	-111.3180278	$20,000				COUNTY	$20,000
Repeater - 744 South site	Communications	End of Sheep Creek Rd near Cascade		47.1805	-111.7958333	$20,000				COUNTY	$20,000
Repeater - 744 West site	Communications	1 kilometer S of MM 15.5 US Hwy 89		47.58308333	-111.8378056	$20,000				COUNTY	$20,000
Repeater - 803 Belt	Communications	Atop Belt Butte		47.38080556	-110.8835556	$20,000				COUNTY	$20,000
Repeater - 963 Milligan site	Communications	Atop Milligan Hill along Milligan Rd		47.01494444	-111.35275	$20,000				COUNTY	$20,000
Repeater - Flying J site / 744 Central	Communications	4323 31st St SW		47.469139	-111.352583	$775,000				COUNTY	$775,000
Repeater - Pacific Steel Site / 744 Local	Communications	2930 Rainbow Dam Rd		47.530444	-111.262694	$775,000				COUNTY	$775,000
Black Eagle Dam	Dams			47.519693	-111.263188						$0
Cochrane Dam	Dams			47.552993	-111.149188						$0
Morony Dam	Dams			47.581493	-111.060088						$0
Rainbow	Dams			47.534393	-111.205588						$0
Ryan Dam	Dams			47.569293	-111.125688						$0
PreRelease Center	Detention	1019 15th St. N	Great Falls	47.5166	-111.2801		$724			COUNTY	$724
Youth Detention Center	Detention	1600 26th St. S	Great Falls	47.4882	-111.2633						$0
Belt Rural Fire Dist	Emergency Services	407 Bridge St	Belt	47.38602939	-110.9215404	$150,000				COUNTY	$150,000
Belt Vol Fire Dept	Emergency Services	16 Bridge St	Belt	47.38819643	-110.928398	$90,000				COUNTY	$90,000
Black Eagle VFD	Emergency Services	527 21st St	Black Eagle	47.5278	-111.2747	$70,000				COUNTY	$70,000
Cascade Volunteer FD	Emergency Services	15 1st St N	Cascade	47.271	-111.701						$0
Dearborn Vol Fire Co	Emergency Services	56 Dearborn River Road	Cascade	47.133392	-111.895537	$70,000				COUNTY	$70,000
Farmer/Rancher Fire Co	Emergency Services	21 1st St N	Cascade	47.27157828	-111.7010665						$0
Fort Shaw Rural VFD	Emergency Services	140 Campbell St	Fort Shaw	47.50856149	-111.8129515						$0
Cascade Co. Sheriff Office/Adult Detention Center	Emergency Services	3800 Ulm N Frontage Rd	Great Falls	47.4692	-111.3677	$24,709,414	$3,540,539	1997	118,037	COUNTY	$28,249,953
Cascade County Search & Resue	Emergency Services	3800 Ulm N Frontage Rd	Great Falls	47.4692	-111.3677	$370,351	$266,786	1991	5,000	COUNTY	$637,137
EOC/911 Center/GF Police Dept.	Emergency Services	112 1st Street South	Great Falls	47.5036	-111.3071	$5,136,277				COUNTY	$5,136,277
GF Emergency Services	Emergency Services	514 9 Ave. S	Great Falls	47.4951	-111.2981					COUNTY	$0
GF Fire Station 1	Emergency Services	105 9th St. S	Great Falls	47.5038	-111.2918	$2,932,579				COUNTY	$2,932,579
GF Fire Station 2	Emergency Services	731-6th St. NW	Great Falls	47.5158	-111.3234	$660,675				COUNTY	$660,675
GF Fire Station 3	Emergency Services	3325 Central Ave	Great Falls	47.5054	-111.2489	$660,675				COUNTY	$660,675
GF Fire Station 4	Emergency Services	1800 Fox Farm Road	Great Falls	47.4865	-111.328	$660,675				COUNTY	$660,675
GF Fire Training Center	Emergency Services	1900 9TH ST S	Great Falls	47.485	-111.293						$0
Gore Hill Vol Fire Co	Emergency Services	4401 62nd Ave SW	Great Falls	47.4506	-111.3749	$70,000				COUNTY	$70,000
Malstrom AFB Fire Dept	Emergency Services	21 73rd St. North	Great Falls	47.5102	-111.1869						$0
MANG FD	Emergency Services	2920 Airport Ave. B	Great Falls	47.4815	-111.3611						$0
Monarch Vol Fire Co	Emergency Services	7 Montana Ave	Monarch	47.09943282	-110.8371716	$70,000				COUNTY	$70,000
Neihart Volunteer Fire Dept	Emergency Services	220 N Main	NEIHART	46.929	-110.731	$227,000				COUNTY	$227,000
Sand Coulee Vol Fire Co	Emergency Services	520 E Hunter Rd	Sand Coulee	47.39728451	-111.1709963	$148,993	$10,719	1989	5,500	COUNTY	$159,712
Simms Vol Fire Co	Emergency Services	195 N Main	Simms	47.49345237	-111.9276906	$70,000				COUNTY	$70,000
Stockett Vol Fire Dept	Emergency Services	23 Crane Ave	Stockett	47.35569891	-111.1662632	$70,000				COUNTY	$70,000
Sun River Fire Service	Emergency Services	295 Largent St	Sun River	47.53378354	-111.722968	$70,000				COUNTY	$70,000
Ulm Vol Fire Co	Emergency Services	13 Old US Hwy 91	Ulm	47.43050756	-111.5074625	$70,000				COUNTY	$70,000
Vaughn VFD Manchester Stn	Emergency Services	38 Haven Lane	Vaughn			$45,000				COUNTY	$45,000
Vaughn Vol Fire Dept	Emergency Services	14 4th St	Vaughn	47.55961143	-111.5487606	$70,000				COUNTY	$70,000
Malmstrom AFB	Federal	6220 Goddard Dr	Great Falls	47.5068	-111.2034						$0
Benefis Health Care (East Campus)	Healthcare and Public	1101 26th St. S	Great Falls	47.492	-111.2617	$13,860,000				HAZUS-MH	$15,356,880
Benefis Healthcare (West Campus)	Healthcare and Public	500 15th Ave. S	Great Falls	47.4889	-111.299						$0
Central Montana Surgical Hospital	Healthcare and Public	1411 9th St. S	Great Falls	47.4896	-111.2915						$0
Great Falls Clinic	Healthcare and Public	2012 14th St. SW	Great Falls	47.4843	-111.3389						$0
Great Falls Clinic-Immediate Care Center	Healthcare and Public	1220 Central Ave.	Great Falls	47.505	-111.286						$0
Great Falls Clinic-NW Clinic	Healthcare and Public	1600 Division Rd.	Great Falls	47.5211	-111.3112						$0
Health Department & Community Health Care	Healthcare and Public	115 4th St. S	Great Falls	47.5034	-111.3006	$2,488,944	$1,533,893	1998	18,274	COUNTY	$4,022,837
Indian Family Health Clinic	Healthcare and Public	1220 Central Ave. Suite 1B	Great Falls	47.505	-111.2855						$0
Malmstrom Walk In Clinic	Healthcare and Public	7300 North Perimeter Rd	Great Falls	47.5162	-111.1954						$0

CASCADE COUNTY PDM PLAN
CRITICAL FACILITIES

Name	PrimarySector	Address	City	Latitude	Longitude	Replacement Value	Contents Value	Yr Built	Sq Ft	Cost Source	COST ADJUSTMENT
Wastewater Lagoons	Infrastructure	2055 Simms Cascade Rd	Cascade	47.296	-111.701						$0
Water Tanks 1 & 2	Infrastructure		Cascade								$0
GF Transit	Infrastructure	3905 North Star Blvd.	Great Falls	47.519	-111.2391						$0
GF Transit - transfer center	Infrastructure	326 1st Ave. S	Great Falls	47.504	-111.3011						$0
GF Water System - Boston Heights Storage Tank #1	Infrastructure	3315 Central Ave.	Great Falls	47.5054	-111.2497	$763,250				COUNTY	$763,250
GF Water System - Boston Heights Storage Tank #2	Infrastructure	3317 Central Ave.	Great Falls	47.5054	-111.2494	$3,557				COUNTY	$3,557
GF Water System - East Reservoir Storage Tank	Infrastructure	801 33rd St S.	Great Falls	47.4962	-111.2486	$2,322,000				COUNTY	$2,322,000
GF Water System - Ella Storage Tank	Infrastructure	4110 Ella Ave	Great Falls	47.4955	-111.2315	$1,593,000				COUNTY	$1,593,000
GF Water System - Gore Hill Storage Tank	Infrastructure	2500 Airport Dr.	Great Falls	47.4793	-111.3574	$1,269,351				COUNTY	$1,269,351
GF Water System - Hill 57 Storage Tank	Infrastructure	425 29th Ave NW	Great Falls	47.532	-111.3218	$2,378,781				COUNTY	$2,378,781
GF Water System - Skyline Storage Tank	Infrastructure	1400 36th Ave NE	Great Falls	47.5383	-111.283	$1,593,000				COUNTY	$1,593,000
West Great Falls Levee	Infrastructure	Along Sun River	Great Falls								$0
Water Treatment Plant	Infrastructure	O'Brien Street	NEIHART	46.923	-110.73	$790,000				COUNTY	$790,000
Simms Wastewater System	Infrastructure		Simms								$0
Stockett Wastewater System	Infrastructure		Stockett								$0
Sun Praire Wastewater System	Infrastructure	234 Sun Prairie Rd	Sun Praire	47.527	-111.492						$0
Vaughn-Cascade Co. Sewer District	Infrastructure	1110 6th Ave	Vaughn	47.548	-111.557						$0
Vaughn-Cascade Co. Sewer District	Infrastructure	1161 6th Ave	Vaughn	47.548	-111.558						$0
Vaughn-Cascade Co. Sewer District	Infrastructure		Vaughn								$0
Vaughn Levee	Infrastructure										$0
Belt Dikes/Levees	Intrastructure		Belt							COUNTY	$0
Wastewater System	Intrastructure	23 Orr Coulee Rd	Belt	47.392	-110.922						$0
Water Tank 1	Intrastructure		Belt								$0
Water Tank 2	Intrastructure		Belt								$0
Belt City Hall	Municipal	70 Castner St	Belt	47.388	-110.927						$0
City Hall	Municipal	9 Front St N	Cascade	47.271	-111.7						$0
Cascade County Courthouse	Municipal	415-2nd Ave. N.	Great Falls	47.5081	-111.2999	$17,740,370	$1,232,366	1903	48,723	COUNTY	$18,972,736
Cascade County Public Works	Municipal	279 Vaughn S. Frontage Road	Great Falls	47.54794565	-111.4866143	$5,016,568	$1,030,301	2008	35,000	COUNTY	$6,046,869
Courthouse Annex	Municipal	325-2nd Ave. N.	Great Falls	47.5077	-111.3012	$2,584,865	$1,542,857	1959	14,970	COUNTY	$4,127,722
DES Office	Municipal	521-1st Ave. NW	Great Falls	47.5089	-111.3212	$1,295,554	$589,350	1972	14,016	COUNTY	$1,884,904
GF Civic Center	Municipal	2 Park Drive South	Great Falls	47.5053	-111.3064	$20,568,534				COUNTY	$20,568,534
Great Falls Community Recreation Center	Municipal	801 2nd Ave N	Great Falls	47.5077	-111.2934	$7,865,618				COUNTY	$7,865,618
Great Falls Police Station (county equipment)	Municipal	12-1st Ave N	Great Falls	47.505	-111.309		$21,680			COUNTY	$21,680
Great Falls Public Library	Municipal	301 2nd Ave N	Great Falls	47.5078	-111.3021	$3,096,311				COUNTY	$3,096,311
Health Dept. NW Campus (old Surveyor/DES)	Municipal	415-3rd St NW	Great Falls	47.5116	-111.316	$376,972	$779,268	1972	2,398	COUNTY	$1,156,240
Public Works Complex (several buildings)	Municipal	1025 25th Ave. NE	Great Falls	47.5295	-111.2886	$5,504,565				COUNTY	$5,504,565
Senior Center/Town Hall	Municipal	200 S Main St	NEIHART	46.92959261	-110.7317646	$600,000				COUNTY	$600,000
BELT 7-8	School	1 Church Street	Belt	47.389503	-110.928096	$631,763				HAZUS-MH	$699,993
BELT HIGH SCHOOL	School	1 Church Street	Belt	47.389074	-110.9280019	$1,559,159				HAZUS-MH	$1,727,548
Belt School	School	1 Church Street	Belt	47.38924119	-110.9276302	$1,417,417				HAZUS-MH	$1,570,498
Pleasant Valley School	School	Hutterite Colony	Belt	47.38875	-110.92691	$263,235				HAZUS-MH	$291,664
CASCADE 7-8	School	321 Central Ave. W	Cascade	47.27162	-111.70426	$899,047				HAZUS-MH	$996,144
CASCADE HIGH SCHOOL	School	321 Central Ave. W	Cascade	47.27162	-111.70426	$2,026,906				HAZUS-MH	$2,245,812
Cascade School	School	321 Central Ave. W	Cascade	47.27183963	-111.705229	$1,660,403				HAZUS-MH	$1,839,726
CENTERVILLE 7-8	School	693 Stockett Road	Centerville	47.40409	-111.15447	$607,464				HAZUS-MH	$673,071
CENTERVILLE HIGH SCHOOL	School	693 Stockett Road	Centerville	47.40409	-111.15447	$1,289,849				HAZUS-MH	$1,429,153
Centerville School	School	693 Stockett Road	Centerville	47.38776484	-111.1419625	$1,123,809				HAZUS-MH	$1,245,181
BENTON LAKE SCHOOL	School	17557 BOOTLEGGER TRAIL	FLOWEREE	47.697897	-111.147955	$60,746				HAZUS-MH	$67,307
Cascade Colony School	School	2 School Loop Road	Fort Shaw	47.50891041	-111.8207908	$253,110				HAZUS-MH	$280,446
FORT SHAW ELEM SCHOOL	School	SCHOOL LOOP ROAD	Fort Shaw	47.50923	-111.81952	$961,819				HAZUS-MH	$1,065,695
Central Catholic	School	2800 18th Ave South	Great Falls	47.484	-111.2614	$850,450				HAZUS-MH	$942,299
Chief Joseph School	School	5305 3rd Ave S.	Great Falls	47.5024	-111.2197	$5,675,000				COUNTY	$5,675,000
CM Russell High School	School	228 17th Ave. NW	Great Falls	47.5204	-111.3193	$33,896,000				COUNTY	$33,896,000
Deep Creek School	School	1508 Millegan Road	Great Falls	47.25874042	-111.4203685	$20,249				HAZUS-MH	$22,436

CASCADE COUNTY PDM PLAN
CRITICAL FACILITIES

Name	PrimarySector	Address	City	Latitude	Longitude	Replacement Value	Contents Value	Yr Built	Sq Ft	Cost Source	COST ADJUSTMENT
East Middle School	School	4040 Central Ave.	Great Falls	47.504	-111.2356	$15,506,000				COUNTY	$15,506,000
Foothills Community Christian	School	2210 5th Ave North (59401)	Great Falls	47.5104	-111.2687	$1,927,687				HAZUS-MH	$2,135,877
Great Fall High School	School	1900 2nd Ave. S	Great Falls	47.5018	-111.2735	$20,793,000				COUNTY	$20,793,000
GREAT FALLS MONTESSORI SCHOOL	School	1521 1ST AVE N	Great Falls	47.506389	-111.281266	$50,622				HAZUS-MH	$56,089
Great Falls Public Schools Admin Building	School	1100 4th St S	Great Falls	47.493	-111.3	$3,520,000				COUNTY	$3,520,000
GREAT FALLS SDA SCHOOL	School	3102 Flood Rd	Great Falls	47.477639	-111.338384	$170,090				HAZUS-MH	$188,460
HERITAGE BAPTIST SCHOOL	School	5100 10TH AVE N	Great Falls	47.516405	-111.222413	$283,483				HAZUS-MH	$314,100
Holy Spirit Catholic School	School	2820 Central Ave.	Great Falls	47.5048	-111.2578	$3,110,218				HAZUS-MH	$3,446,121
Lewis & Clark Elementary School	School	3800 1st Ave. S	Great Falls	47.5039	-111.2411	$6,552,000				COUNTY	$6,552,000
LIGHTHOUSE CHRISTIAN ACADEMY	School	1600 5TH AVE NW	Great Falls	47.512525	-111.339449	$14,174				HAZUS-MH	$15,705
Lincoln Elementary School	School	624 27th St. S	Great Falls	47.4974	-111.2613	$4,405,000				COUNTY	$4,405,000
Longfellow Elementary School	School	1100 6th Ave. S	Great Falls	47.4981	-111.2887	$5,912,000				COUNTY	$5,912,000
Loy Elementary School	School	501 57th St. N	Great Falls	47.511	-111.214	$5,675,000				COUNTY	$5,675,000
Meadow Lark Elementary School	School	2204 Fox Farm Rd.	Great Falls	47.4824	-111.3286	$4,093,000				COUNTY	$4,093,000
Montana School for the Deaf and Blind	School	3911 Central Ave.	Great Falls	47.5055	-111.2393						$0
Morninside Elementary School	School	4119 7th Ave N	Great Falls	47.5131	-111.2354	$4,871,000				COUNTY	$4,871,000
Mountain View Elementary School	School	3420 15th Ave. S	Great Falls	47.4872	-111.2449	$4,851,000				COUNTY	$4,851,000
MT SCH FOR DEAF & BLND EL	School	3911 CENTRAL AVE	Great Falls	47.50535	-111.23998	$283,483				HAZUS-MH	$314,100
MT SCH FOR DEAF & BLND HS	School	3911 CENTRAL AVE	Great Falls	47.50535	-111.23998	$538,618				HAZUS-MH	$596,789
MSU-Great Falls	School	2100 16th Ave. S	Great Falls	47.4864	-111.2699						$0
North Middle School	School	2601 8th St. NE	Great Falls	47.5303	-111.2931	$13,689,000				COUNTY	$13,689,000
Our Lady of Lourdes School	School	1305 5th Ave. S	Great Falls	47.5	-111.2837	$2,502,753				HAZUS-MH	$2,773,051
Paris Gibson Ed Center	School	2420 Central Ave.	Great Falls	47.5045	-111.2652	$13,779,000				COUNTY	$13,779,000
Riverview Elementary School	School	100 Smelter Ave NW	Great Falls	47.5239	-111.3146	$4,845,000				COUNTY	$4,845,000
Roosevelt Elementary School	School	2501 2nd Ave N	Great Falls	47.5078	-111.2637	$3,614,000				COUNTY	$3,614,000
Sacajawea Elementary School	School	630 Sacajawea Dr	Great Falls	47.5326	-111.2987	$4,667,000				COUNTY	$4,667,000
Sunnyside Elementary School	School	1800 19th St. S	Great Falls	47.4856	-111.2755	$4,720,000				COUNTY	$4,720,000
TREASURE STATE ACADEMY	School	100 46TH ST N	Great Falls	47.506033	-111.227923	$311,832				HAZUS-MH	$345,510
University of Great Falls	School	1301 20th St. S	Great Falls	47.4913	-111.2718						$0
Valley View Elementary School	School	900 Ave A NW	Great Falls	47.5183	-111.3273	$4,648,000				COUNTY	$4,648,000
West Elementary School	School	1205 1st Ave. NW	Great Falls	47.5092	-111.3326	$8,664,000				COUNTY	$8,664,000
Whittier Elementary School	School	305 8th St. N	Great Falls	47.509	-111.2935	$3,158,000				COUNTY	$3,158,000
BIG STONE SCHOOL	School	251 GOONHILL ROAD	SAND COULEE	47.37792	-111.15285	$222,737				HAZUS-MH	$246,793
Simms High School	School	123 Walker Street	Simms	47.492	-111.928	$1,743,423				HAZUS-MH	$1,931,713
Sun River Middle School	School	301 Largent Street	Sun River	47.53369941	-111.7234111	$971,943				HAZUS-MH	$1,076,913
Fair Haven Colony School	School	124 Fairhaven Road	Ulm	47.40423502	-111.6303019	$192,364				HAZUS-MH	$213,139
ULM 7-8	School	6 ULM VAUGHN ROAD	Ulm	47.4305	-111.5063	$255,135				HAZUS-MH	$282,690
Ulm School	School	6 Ulm-Vaughn Road	Ulm	47.43624801	-111.5070994	$637,838				HAZUS-MH	$706,724
VAUGHN 7-8	School	480 CENTRAL AVENUE	Vaughn	47.56027	-111.54949	$230,837				HAZUS-MH	$255,767
Vaughn School	School	480 Central Avenue	Vaughn	47.56018034	-111.5494421	$668,211				HAZUS-MH	$740,378
Senior Citizen Center	Senior	19 Bridge Street	Belt	47.38798393	-110.9275993		$14,763				$14,763
Senior Center	Senior	2 Central Ave W	Cascade	47.27	-111.701		$1,072				$1,072
Centerville Senior Center	Senior	668 Stockett Road	Centerville	47.39219531	-111.144685		$3,974			COUNTY	$3,974
Senior Center	Senior	1004 Central Ave	Great Falls	47.505	-111.2899	$1,085,171	$210,309	1940	6,960	COUNTY	$1,295,480
SUN RIVER VALLEY SENIOR CENTER	Senior	13319 MT HIGHWAY 200		47.50242111	-111.8161176		$21,211			COUNTY	$21,211
Wedsworth Hall	Shelter	13 Front St N	Cascade	47.27	-111.7						$0
Montana Air National Guard	State	2700 Airport Ave. B	Great Falls	47.4777	-111.3601						$0
Mt Highway Patrol	State	812 14th S N	Great Falls	47.5148	-111.2838						$0
Great Falls International Airport	Transportation	2800 Terminal Dr.	Great Falls	47.4823	-111.3566						$0
GF Lift Station No. 18	Wastewater	1716 3rd Avenue S.W.	Great Falls	47.504	-111.3437	$1,015,560	$513,275			COUNTY	$1,528,835
GF Lift Station No. 5	Wastewater	1705 39th Street South	Great Falls	47.4855	-111.2399	$9,586	$2,180			COUNTY	$11,766
GF Lift Station No. 6	Wastewater	4909 10th Avenue South	Great Falls	47.4944	-111.2256	$11,982	$10,900			COUNTY	$22,882
GF Lift Station No. 8	Wastewater	404 1/2 20th Avenue South	Great Falls	47.4841	-111.3006	$17,974	$16,350			COUNTY	$34,324
GF Lift Station No. 1	Wastewater	600 River Drive South	Great Falls	47.4984	-111.3074	$897,322	$572,421			COUNTY	$1,469,743

CASCADE COUNTY PDM PLAN
CRITICAL FACILITIES

Name	PrimarySector	Address	City	Latitude	Longitude	Replacement Value	Contents Value	Yr Built	Sq Ft	Cost Source	COST ADJUSTMENT
GF Lift Station No. 10 & 11	Wastewater	4600 7th Avenue South	Great Falls	47.5126	-111.2275	$17,974	$29,649			COUNTY	$47,623
GF Lift Station No. 12	Wastewater	601 River Drive South	Great Falls	47.4982	-111.3062	$17,974	$16,350			COUNTY	$34,324
GF Lift Station No. 15	Wastewater	810 10th Avenue S.W.	Great Falls	47.4932	-111.3255	$1,485,300	$523,750			COUNTY	$2,009,050
GF Lift Station No. 16	Wastewater	1326 5th St NW	Great Falls	47.5187	-111.3223	$4,000	$13,625			COUNTY	$17,625
GF Lift Station No. 17	Wastewater	4201 Giant Springs Road	Great Falls	47.5295	-111.2357	$8,988	$10,900			COUNTY	$19,888
GF Lift Station No. 19	Wastewater	1601 2nd Avenue S.W.	Great Falls	47.5058	-111.342	$3,764	$2,180			COUNTY	$5,944
GF Lift Station No. 2	Wastewater	611 River Drive North	Great Falls	47.5119	-111.3058	$17,974	$16,350			COUNTY	$34,324
GF Lift Station No. 20	Wastewater	835 13th Street S.W.	Great Falls	47.4968	-111.3354	$4,250	$2,180			COUNTY	$6,430
GF Lift Station No. 21	Wastewater	2001 14th St SW	Great Falls	47.4847	-111.3379	$10,922				COUNTY	$10,922
GF Lift Station No. 22	Wastewater	2800 Terminal Drive	Great Falls	47.4823	-111.3566	$17,974	$16,350			COUNTY	$34,324
GF Lift Station No. 23	Wastewater	3116 Lower River Road	Great Falls	47.4737	-111.3125	$1,943,440	$239,053			COUNTY	$2,182,493
GF Lift Station No. 24	Wastewater	704 Juniper	Great Falls	47.481	-111.3249	$4,250	$4,360			COUNTY	$8,610
GF Lift Station No. 25	Wastewater	3015 Coyote Lane	Great Falls	47.4754	-111.323	$17,974	$16,350			COUNTY	$34,324
GF Lift Station No. 27	Wastewater	4120 North Star Boulevard	Great Falls	47.5186	-111.2346	$17,974	$16,350			COUNTY	$34,324
GF Lift Station No. 28	Wastewater	1715 Whispering Ridge Drive	Great Falls	47.4846	-111.2444	$17,974	$16,350			COUNTY	$34,324
GF Lift Station No. 29	Wastewater	3503 2nd Street N.E.	Great Falls	47.5381	-111.3112	$17,974	$16,350			COUNTY	$34,324
GF Lift Station No. 30	Wastewater	122 Black Eagle Road	Great Falls	47.5463	-111.2609	$754,805	$41,900			COUNTY	$796,705
GF Lift Station No. 31	Wastewater	4403 9th Street N.E.	Great Falls	47.5464	-111.2916	$17,974	$16,350			COUNTY	$34,324
GF Lift Station No. 32	Wastewater	3314 Lower River Road	Great Falls	47.472	-111.31	$17,974	$16,350			COUNTY	$34,324
GF Lift Station No. 4	Wastewater	100 River Drive South	Great Falls	47.5047	-111.3104	$2,731	$2,081			COUNTY	$4,812
GF Lift Station No. 7	Wastewater	3500 15th Avenue South	Great Falls	47.4878	-111.2425	$1,042,000	$517,764			COUNTY	$1,559,764
GF Lift Station No. 9	Wastewater	5102 1st Avenue South	Great Falls	47.5033	-111.2219	$17,974	$16,350			COUNTY	$34,324
Aeration Basins	Wastewater Plant	1600 6th St. NE	Great Falls	47.5207	-111.3004	$4,103,910				COUNTY	$4,103,910
Chlorine Building	Wastewater Plant	1600 6th St. NE	Great Falls	47.5207	-111.3004	$74,830				COUNTY	$74,830
Chlorine Contact Basin	Wastewater Plant	1600 6th St. NE	Great Falls	47.5207	-111.3004	$1,034,809				COUNTY	$1,034,809
Co-Generation Facility	Wastewater Plant	1600 6th St. NE	Great Falls	47.5207	-111.3004	$1,143,000				COUNTY	$1,143,000
Digester #1 Primary	Wastewater Plant	1600 6th St. NE	Great Falls	47.5207	-111.3004	$1,977,989				COUNTY	$1,977,989
Digester #2 - Secondary	Wastewater Plant	1600 6th St. NE	Great Falls	47.5207	-111.3004	$1,731,296				COUNTY	$1,731,296
Digester Control Bldg	Wastewater Plant	1600 6th St. NE	Great Falls	47.5207	-111.3004	$1,273,878				COUNTY	$1,273,878
Final Basins - Secondary Clarifier	Wastewater Plant	1600 6th St. NE	Great Falls	47.5207	-111.3004	$5,979,713				COUNTY	$5,979,713
Flotation Thickener Bldg	Wastewater Plant	1600 6th St. NE	Great Falls	47.5207	-111.3004	$2,828,965				COUNTY	$2,828,965
Gravity Thickener Bldg	Wastewater Plant	1600 6th St. NE	Great Falls	47.5207	-111.3004	$886,063				COUNTY	$886,063
Gravity Thickener Tank	Wastewater Plant	1600 6th St. NE	Great Falls	47.5207	-111.3004	$200,088				COUNTY	$200,088
Maintenance Building	Wastewater Plant	1600 6th St. NE	Great Falls	47.5207	-111.3004	$264,180				COUNTY	$264,180
Motor Control Building	Wastewater Plant	1600 6th St. NE	Great Falls	47.5207	-111.3004	$389,817				COUNTY	$389,817
Pipe Gallery	Wastewater Plant	1600 6th St. NE	Great Falls	47.5207	-111.3004	$1,204,090				COUNTY	$1,204,090
Preimary Division Structure Splitter box	Wastewater Plant	1600 6th St. NE	Great Falls	47.5207	-111.3004	$66,347				COUNTY	$66,347
Preimary Pump Station	Wastewater Plant	1600 6th St. NE	Great Falls	47.5207	-111.3004	$228,867				COUNTY	$228,867
Primary Clarifiers	Wastewater Plant	1600 6th St. NE	Great Falls	47.5207	-111.3004	$2,536,785				COUNTY	$2,536,785
Process Water Pump Station	Wastewater Plant	1600 6th St. NE	Great Falls	47.5207	-111.3004	$135,729				COUNTY	$135,729
Raw Waste Water Pump Station	Wastewater Plant	1600 6th St. NE	Great Falls	47.5207	-111.3004	$839,629				COUNTY	$839,629
Solids Processing Bldg	Wastewater Plant	1600 6th St. NE	Great Falls	47.5207	-111.3004	$2,225,975				COUNTY	$2,225,975
WWTP Admin Bldg	Wastewater Plant	1600 6th St. NE	Great Falls	47.5207	-111.3004	$1,772,281				COUNTY	$1,772,281
WWTP Sludge Holding Tank	Wastewater Plant	1600 6th St. NE	Great Falls	47.5207	-111.3004	$544,592				COUNTY	$544,592
Water Plant Filter Bldg	Water Plant	1300 Upper River Road	Great Falls	47.4907	-111.311	$12,680,663				COUNTY	$12,680,663
WP Backwash Pumphouse & Clarifier	Water Plant	1300 Upper River Road	Great Falls	47.4907	-111.311	$664,855				COUNTY	$664,855
WP Backwash Surge Tank	Water Plant	1300 Upper River Road	Great Falls	47.4907	-111.311	$266,616				COUNTY	$266,616
WP Carbon Bldg	Water Plant	1300 Upper River Road	Great Falls	47.4907	-111.311	$218,682				COUNTY	$218,682
WP Dechloriniation Bldg	Water Plant	1300 Upper River Road	Great Falls	47.4907	-111.311	$52,031				COUNTY	$52,031
WP Floculation Basins	Water Plant	1300 Upper River Road	Great Falls	47.4907	-111.311	$1,038,726				COUNTY	$1,038,726
WP Inlets Improvements	Water Plant	1300 Upper River Road	Great Falls	47.4907	-111.311	$307,667				COUNTY	$307,667
WP Preimary Clarif. Basins	Water Plant	1300 Upper River Road	Great Falls	47.4907	-111.311	$2,488,243				COUNTY	$2,488,243
WP Pumping Station/shop	Water Plant	1300 Upper River Road	Great Falls	47.4907	-111.311	$1,639,454				COUNTY	$1,639,454
WP Seasonal Complex	Water Plant	1300 Upper River Road	Great Falls	47.4907	-111.311	$3,465,698				COUNTY	$3,465,698

CASCADE COUNTY PDM PLAN
CRITICAL FACILITIES

Name	PrimarySector	Address	City	Latitude	Longitude	Replacement Value	Contents Value	Yr Built	Sq Ft	Cost Source	COST ADJUSTMENT
WP Seasonal Well	Water Plant	1300 Upper River Road	Great Falls	47.4907	-111.311	$685,468				COUNTY	$685,468
WP Secondary Basins	Water Plant	1300 Upper River Road	Great Falls	47.4907	-111.311	$1,961,015				COUNTY	$1,961,015
WP Sludge Basins	Water Plant	1300 Upper River Road	Great Falls	47.4907	-111.311	$133,502				COUNTY	$133,502
WP Solids Pump Station	Water Plant	1300 Upper River Road	Great Falls	47.4907	-111.311	$292,782				COUNTY	$292,782
Missile Site - A-9	Federal facility	Rural location		47.166	-111.090						$0
Missile Site - A-10	Federal facility	Rural location		47.183	-111.013						$0
Missile Site - G-2	Federal facility	Rural location		47.236	-112.014						$0
Missile Site - G-3	Federal facility	Rural location		47.238	-111.531						$0
Missile Site - G-4	Federal facility	Rural location		47.205	-111.474						$0
Missile Site - G-5	Federal facility	Rural location		47.184	-111.544						$0
Missile Site - H-5	Federal facility	Rural location		47.350	-111.504						$0
Missile Site - H-6	Federal facility	Rural location		47.278	-111.485						$0
Missile Site - H-7	Federal facility	Rural location		47.286	-111.580						$0
Missile Site - I-1	Federal facility	Rural location		47.188	-111.285						$0
Missile Site - I-2	Federal facility	Rural location		47.155	-111.167						$0
Missile Site - I-3	Federal facility	Rural location		47.122	-111.273						$0
Missile Site - I-4	Federal facility	Rural location		47.089	-111.339						$0
Missile Site - I-5	Federal facility	Rural location		47.141	-111.347						$0
Missile Site - I-6	Federal facility	Rural location		47.179	-111.411						$0
Missile Site - I-7	Federal facility	Rural location		47.219	-111.354						$0
Missile Site - I-8	Federal facility	Rural location		47.245	-111.425						$0
Missile Site - I-9	Federal facility	Rural location		47.297	-111.409						$0
Missile Site - I-10	Federal facility	Rural location		47.339	-111.320						$0
Missile Site - I-11	Federal facility	Rural location		47.290	-111.306						$0
Missile Site - J-8	Federal facility	Rural location		47.419	-111.257						$0
Missile Site - J-9	Federal facility	Rural location		47.394	-111.325						$0
Missile Site - J-10	Federal facility	Rural location		47.429	-111.395						$0

CASCADE COUNTY BRIDGES

ID	BRIDGE_NO	FEAT_CROSS	BRIDGE_LENGTH	ROADWAY_WIDTH	CLEARANCE_	CLEARANCE1	CAPACITY_R	UNIQUEID
1	P00060034+08971	BELT CREEK	29.75	8.75	99.99	0.00	71,869.96	305401000.BRG.3867
2	P00060040+03761	BELT CREEK	30.48	7.92	99.99	0.00	71,429.04	305401000.BRG.3868
3	P00060042+01931	BELT CREEK	43.89	12.19	99.99	0.00	71,429.04	305401000.BRG.3869
4	L07355009+09001	DRY FK BELT CREEK 050	6.10	6.16	99.99	0.00	71,429.04	305401000.BRG.1154
5			0.00	0.00	0.00	0.00	0.00	305401000.BRG.4681
6	L07361000+01001	BELT CREEK 019	19.81	7.74	99.99	0.00	61,949.26	305401000.BRG.1156
7	L07355006+06001	DRY FORK BELT CREEK 103	7.62	6.16	99.99	0.00	71,429.04	305401000.BRG.1153
8	L07355006+01001	DRY FK BELT CREEK 056	6.10	6.16	99.99	0.00	71,429.04	305401000.BRG.1152
9	L07355005+04001	DRY FK BELT CREEK 051	6.10	6.16	99.99	0.00	71,429.04	305401000.BRG.1151
10	L07355004+06001	DRY FK BELT CREEK 032	6.10	6.16	99.99	0.00	71,429.04	305401000.BRG.1150
11	L07427013+09001	WEST FK HOUND CREEK 120	16.15	0.00	99.99	0.00	71,429.04	305401000.BRG.1168
12	L07355004+03001	DRY FORK BELT CREEK 101	7.92	6.16	99.99	0.00	71,429.04	305401000.BRG.1149
13	L07355000+08001	DRY FK BELT CREEK 031	6.10	6.16	99.99	0.00	71,429.04	305401000.BRG.1145
14	L07355000+04001	DRY FORK BELT CREEK 077	12.19	6.16	99.99	0.00	71,429.04	305401000.BRG.1144
15	L07355002+01001	DRY FORK BELT CREEK 078	16.76	6.16	99.99	0.00	71,429.04	305401000.BRG.1146
16	P00060049+09501	DRY FORK BELT CREEK	9.91	7.32	99.99	0.00	53,792.24	305401000.BRG.3870
17	L07355002+05001	DRY FORK BELT CREEK 079	11.89	6.16	99.99	0.00	71,429.04	305401000.BRG.1147
18	L07357000+02001	DRY FORK BELT CREEK 102	7.01	5.39	99.99	0.00	61,949.26	305401000.BRG.1155
19	P00060053+06791	STOCKPASS	2.44	7.80	99.99	0.00	71,869.96	305401000.BRG.3871
20	I00015241+00011	MISSOURI RIVER	162.46	11.58	99.99	0.00	71,869.96	305401000.BRG.177
21	I00015241+00012	MISSOURI RIVER	162.46	11.58	99.99	0.00	71,869.96	305401000.BRG.178
22	I00015240+04151	INT DEARBORN, MISSOURI R	256.34	11.58	99.99	7.98	71,869.96	305401000.BRG.175
23	I00015240+04152	INT DEARBORN, MISSOURI R	259.08	11.58	99.99	7.75	71,869.96	305401000.BRG.176
24	I00015241+08671	MISSOURI RIVER, LOCAL	241.40	11.74	99.99	5.05	71,869.96	305401000.BRG.179
25	I00015241+08672	MISSOURI RIVER, LOCAL	249.63	12.05	99.99	5.05	71,869.96	305401000.BRG.180
26	L07427006+09001	BIRD CREEK 114	4.88	6.19	99.99	0.00	71,869.96	305401000.BRG.1167
27	L07604005+00001	NOVAK CREEK 005	13.41	6.71	99.99	0.00	53,792.24	305401000.BRG.1187
28	L07615000+01601	INT CANYON-I 15	56.08	8.60	99.99	5.26	71,429.04	305401000.BRG.1191
29	L07427005+07001	BIRD CREEK 113	4.88	6.19	99.99	0.00	71,869.96	305401000.BRG.1166
30	L07604006+04001	MISSOURI R, BN RR 069	167.64	6.03	4.34	7.32	43,871.54	305401000.BRG.1188
31	L07421010+04001	SHEEP CREEK 097	19.81	3.68	99.99	0.00	47,839.82	305401000.BRG.1164
32			0.00	0.00	0.00	0.00	0.00	305401000.BRG.4676
33	L07604007+03001	PREWETT CREEK 070	24.38	6.71	99.99	0.00	43,871.54	305401000.BRG.1189
34	I00015246+04051	BN RR, MISSOURI RIVER	225.25	9.30	99.99	7.92	71,869.96	305401000.BRG.181
35	I00015246+04052	BN RR, MISSOURI RIVER	225.25	9.04	99.99	7.92	71,869.96	305401000.BRG.182
36	I00015247+02991	INT HARDY & HARDY CREEK	64.31	11.28	99.99	4.52	71,869.96	305401000.BRG.183
37	I00015247+02992	INT HARDY & HARDY CREEK	64.31	11.03	99.99	4.83	71,869.96	305401000.BRG.184
38	L07340000+04001	BELT CREEK 015	27.43	6.16	99.99	0.00	65,917.54	305401000.BRG.1143
39	L07428000+03001	HOUND CREEK 028	34.44	7.92	99.99	0.00	71,429.04	305401000.BRG.1169
40	L07614000+01601	INT MISSOURI OVER	79.40	9.60	99.99	5.26	71,429.04	305401000.BRG.1190
41	L07427001+08001	BIRD CREEK 009	5.79	6.19	99.99	0.00	71,429.04	305401000.BRG.1165
42	I00015249+05052	INT TINTINGER	38.10	12.65	99.99	4.22	71,869.96	305401000.BRG.186
43	I00015249+05051	TINTINGER	40.84	13.41	99.99	5.23	71,869.96	305401000.BRG.185
44	L07418000+02001	SMITH RIVER 027	54.99	5.49	99.99	0.00	27,998.42	305401000.BRG.1162

CASCADE COUNTY BRIDGES

ID	BRIDGE_NO	FEAT_CROSS	BRIDGE_LENGTH	ROADWAY_WIDTH	CLEARANCE_	CLEARANCE1	CAPACITY_R	UNIQUEID
45	I00015251+06841	SEP COUNTY ROAD	25.60	13.41	99.99	4.32	71,869.96	305401000.BRG.187
46	I00015251+06842	SEP COUNTY ROAD	30.18	12.65	99.99	4.39	71,869.96	305401000.BRG.188
47	P00060064+11011	BELT CREEK	50.60	12.19	99.99	0.00	71,429.04	305401000.BRG.3872
48	L07418003+00001	BOSTON COULEE 026	5.80	0.00	99.99	0.00	71,429.04	305401000.BRG.1163
49	S00330016+06501	DRAINAGE / STOCKPASS	2.10	7.20	99.99	0.00	71,429.04	305401000.BRG.4331
50	S00330015+02001	SMITH RIVER	43.89	8.53	99.99	0.00	53,792.24	305401000.BRG.4330
51	L07417001+09001	FLAT CREEK 034	7.32	7.86	99.99	0.00	87,963.54	305401000.BRG.1161
52	I00015254+09421	INT S CASCADE	42.37	13.41	99.99	5.72	71,869.96	305401000.BRG.189
53	I00015254+09422	INT S CASCADE	40.84	12.65	99.99	4.85	71,869.96	305401000.BRG.190
54	S00330013+08001	STOCKPASS/DRAINAGE	6.74	7.20	99.99	0.00	71,869.96	305401000.BRG.4329
55	S00330036+06001	MISSOURI RIVER	199.03	7.32	99.99	0.00	53,792.24	305401000.BRG.4332
56	P00060066+03551	BELT CREEK	48.77	12.19	99.99	0.00	71,429.04	305401000.BRG.3873
57	L07415004+04001	BIRD CREEK 038	14.94	7.77	99.99	0.00	51,808.10	305401000.BRG.1160
58	I00015256+04831	INT N CASCADE	37.80	13.41	99.99	5.33	71,869.96	305401000.BRG.191
59	I00015256+04832	INT N CASCADE	39.32	12.65	99.99	4.93	71,869.96	305401000.BRG.192
60	S00330012+09001	STOCKPASS/DRAINAGE	3.81	8.00	99.99	0.00	71,429.04	305401000.BRG.4328
61	P00060067+02311	BELT CREEK	55.47	12.19	99.99	0.00	71,429.04	305401000.BRG.3874
62	L07242000+01001	OTTER CREEK 125	8.84	5.50	99.99	0.00	35,934.98	305401000.BRG.1137
63	L07411013+04001	BIRD CREEK 036	22.86	5.23	99.99	0.00	35,273.60	305401000.BRG.1158
64			0.00	0.00	0.00	0.00	0.00	305401000.BRG.4683
65	P00057003+00971	OTTER CREEK	31.39	8.53	99.99	0.00	71,869.96	305401000.BRG.3759
66	L07414004+01001	CASTNER COULEE 096	16.15	7.77	99.99	0.00	43,871.54	305401000.BRG.1159
67	S00330011+03001	STOCKPASS/DRAINAGE	3.51	9.14	99.99	0.00	71,429.04	305401000.BRG.4327
68	P00057003+06121	OTTER CREEK	31.39	8.65	99.99	0.00	71,869.96	305401000.BRG.3760
69	L07308002+02001	NUMBER FIVE COULEE 014	4.70	7.22	99.99	0.00	53,792.24	305401000.BRG.1138
70	P00057002+05551	OTTER CREEK	28.35	8.53	99.99	0.00	71,869.96	305401000.BRG.3758
71			0.00	0.00	0.00	0.00	0.00	305401000.BRG.4682
72	S00330010+07001	STOCKPASS/DRAINAGE	2.90	9.14	99.99	0.00	71,869.96	305401000.BRG.4326
73	P00057002+02131	OTTER CREEK	28.35	8.53	99.99	0.00	71,869.96	305401000.BRG.3757
74	P00057001+09091	OTTER CREEK	31.39	8.53	99.99	0.00	71,869.96	305401000.BRG.3756
75	P00057001+05031	OTTER CREEK	31.39	8.53	99.99	0.00	71,869.96	305401000.BRG.3755
76	P00057001+00291	OTTER CREEK	36.27	8.53	99.99	0.00	71,869.96	305401000.BRG.3754
77	P00057000+06761	OTTER CREEK	36.27	8.53	99.99	0.00	71,869.96	305401000.BRG.3753
78	L07241004+04001	CORA CREEK 075	9.10	5.90	99.99	0.00	75,838.24	305401000.BRG.1136
79	P00057000+03941	OTTER CREEK	37.80	8.53	99.99	0.00	71,869.96	305401000.BRG.3752
80	L07228004+05001	BIG OTTER CREEK 029	23.47	8.53	99.99	0.00	45,855.68	305401000.BRG.1130
81	P00060070+09451	BELT CREEK	49.99	12.19	99.99	0.00	71,869.96	305401000.BRG.3875
82	L07565000+06001	SEP I 15	87.17	8.38	99.99	5.36	71,429.04	305401000.BRG.1179
83	L07603008+01001	LITTLE MUDDY CREEK 090	23.47	6.13	99.99	0.00	51,808.10	305401000.BRG.1186
84	P00060071+02931	BELT CREEK	47.55	8.53	99.99	0.00	53,792.24	305401000.BRG.3876
85	I00015262+06421	LITTLE MUDDY CREEK	30.48	11.58	99.99	0.00	71,869.96	305401000.BRG.193
86	I00015262+06422	LITTLE MUDDY CREEK	30.48	11.58	99.99	0.00	71,869.96	305401000.BRG.194
87	L07410000+01001	SMITH RIVER 033	45.72	4.88	3.96	0.00	25,793.82	305401000.BRG.1157
88	L07237000+04001	BELT CREEK 084	47.24	6.19	99.99	0.00	47,839.82	305401000.BRG.1135

CASCADE COUNTY BRIDGES

ID	BRIDGE_NO	FEAT_CROSS	BRIDGE_LENGTH	ROADWAY_WIDTH	CLEARANCE_	CLEARANCE1	CAPACITY_R	UNIQUEID
89	L07565001+08001	LITTLE MUDDY CREEK 067	12.19	6.10	99.99	0.00	53,792.24	305401000.BRG.1180
90	S00330007+04001	STOCKPASS/DRAINAGE	2.44	9.14	99.99	0.00	71,429.04	305401000.BRG.4325
91	S00227008+02001	COTTONWOOD CREEK	6.40	7.50	99.99	0.00	37,919.12	305401000.BRG.4096
92	L07233010+01001	LITTLE BELT CREEK 100	7.62	5.90	99.99	0.00	95,900.10	305401000.BRG.1132
93	L07233010+04001	LITTLE BELT CREEK 099	8.00	5.90	99.99	0.00	95,900.10	305401000.BRG.1133
94	L07556011+06001	LITTLE MUDDY CREEK 040	11.28	7.83	99.99	0.00	51,808.10	305401000.BRG.1174
95	L07231004+03001	LITTLE BELT CREEK 037	7.74	7.21	99.99	0.00	49,823.96	305401000.BRG.1131
96	M07007000+00201	BELT CREEK 012	28.35	7.58	99.99	0.00	22,046.00	305401000.BRG.2881
97	L07233011+07001	LITTLE BELT CREEK 003	9.40	6.00	99.99	0.00	47,839.82	305401000.BRG.1134
98	L07565005+08001	SEP I 15	91.74	8.99	99.99	5.16	71,429.04	305401000.BRG.1181
99	S00330005+00001	SMITH RIVER	39.62	7.32	99.99	0.00	35,934.98	305401000.BRG.4324
100	L07312000+01001	SAND COULEE CREEK 081	7.92	5.94	99.99	0.00	71,429.04	305401000.BRG.1140
101	L07319000+04001	SAND COULEE CREEK 088	7.92	4.82	99.99	0.00	41,887.40	305401000.BRG.1142
102	S00226002+05001	DRAINAGE	2.44	8.44	99.99	0.00	140,433.02	305401000.BRG.4093
103	L07224004+01001	LITTLE BELT CREEK 004	13.50	7.10	99.99	0.00	113,977.82	305401000.BRG.1128
104	S00227005+01001	SAND COULEE CREEK	4.57	12.37	99.99	0.00	71,429.04	305401000.BRG.4095
105	L07315000+01001	SAND COULEE CREEK 087	7.95	7.92	99.99	0.00	35,934.98	305401000.BRG.1141
106	L07222000+03001	BELT CREEK 074	40.84	5.49	99.99	0.00	59,965.12	305401000.BRG.1126
107	L07603000+09001	MUDDY CREEK SLOUGH 111	10.36	6.20	99.99	0.00	43,871.54	305401000.BRG.1185
108	L07222001+08001	LITTLE BELT CREEK 098	11.28	7.16	99.99	0.00	115,961.96	305401000.BRG.1127
109	S00330000+04061	MISSOURI RIVER	161.67	10.15	99.99	0.00	71,429.04	305401000.BRG.4323
110	I00015270+04311	INT ULM	39.93	13.41	99.99	4.41	71,869.96	305401000.BRG.195
111	I00015270+04312	INT ULM	39.93	11.58	99.99	5.11	71,869.96	305401000.BRG.196
112	L07311000+01001	SAND COULEE CREEK 076	7.55	6.60	99.99	0.00	72,972.26	305401000.BRG.1139
113	S00227002+01001	SAND COULLE CREEK	6.40	7.50	99.99	0.00	37,919.12	305401000.BRG.4094
114	S00226001+05191	SAND COULEE CREEK	17.68	7.01	99.99	0.00	53,792.24	305401000.BRG.4092
115	P00060082+03731	BOX ELDER CREEK	23.47	11.98	99.99	0.00	71,869.96	305401000.BRG.3877
116	I00015274+02691	SEP COUNTY ROAD	24.08	12.75	99.99	4.29	71,869.96	305401000.BRG.197
117	I00015274+02692	SEP COUNTY ROAD	24.08	12.75	99.99	4.45	71,869.96	305401000.BRG.198
118	U05212000+05881	INT GORE HILL I 15	73.46	8.53	99.99	5.31	71,429.04	305401000.BRG.4620
119	L07588003+00001	FORT SHAW CANAL 011	5.79	6.26	99.99	0.00	71,429.04	305401000.BRG.1184
120	L07588002+07001	FORT SHAW CANAL 082	4.57	6.26	99.99	0.00	71,429.04	305401000.BRG.1183
121	L07519002+00001	IRRIGATION CANAL 010	6.10	6.26	99.99	0.00	71,429.04	305401000.BRG.1172
122	I00315000+00001	INT I-15	89.61	13.72	99.99	5.44	71,869.96	305401000.BRG.839
123	I00315000+03421	FAU 5225-14TH STREET SW	45.72	10.96	99.99	5.26	71,869.96	305401000.BRG.840
124	I00315000+03422	FAU 5225-14TH STREET SW	44.20	13.65	99.99	5.20	71,869.96	305401000.BRG.841
125	I00315000+03423	FAU 5225-14TH STREET SW	41.45	7.11	99.99	5.71	71,869.96	305401000.BRG.842
126	I00315001+00691	BNSF RAILROAD	54.25	13.60	99.99	6.63	71,869.96	305401000.BRG.843
127	I00315001+00692	BNSF RAILROAD	63.40	11.20	99.99	6.93	71,869.96	305401000.BRG.844
128	I00315001+00693	BNSF RAILROAD	56.69	7.11	99.99	0.00	71,869.96	305401000.BRG.845
129	L07569001+08001	FORT SHAW CANAL 041	9.45	8.08	99.99	0.00	65,917.54	305401000.BRG.1182
130	U05205000+04681	BNSF BY WATERWORKS	33.53	6.71	99.99	6.86	41,887.40	305401000.BRG.4613
131	U05201000+01031	SUN RIVER	154.23	26.82	99.99	0.00	71,869.96	305401000.BRG.4611
132	S00228010+05001	RED COULEE	17.98	8.44	99.99	0.00	53,792.24	305401000.BRG.4097

CASCADE COUNTY BRIDGES

ID	BRIDGE_NO	FEAT_CROSS	BRIDGE_LENGTH	ROADWAY_WIDTH	CLEARANCE_	CLEARANCE1	CAPACITY_R	UNIQUEID
133	L07852000+01001	SEP WEST HILL-I 15	97.54	8.53	99.99	5.30	53,792.24	305401000.BRG.1193
134	P00060094+08281	MISSOURI RV, U5205, BNSF	646.79	12.10	99.99	5.10	71,869.96	305401000.BRG.3878
135	P00060094+08282	MISSOURI RV, U5205, BNSF	637.95	8.53	99.99	6.40	71,869.96	305401000.BRG.3879
136	L07224017+04001	BELT CREEK 002	44.20	6.31	3.56	0.00	37,919.12	305401000.BRG.1129
137	I00015279+09761	SUN RIVER	147.83	8.53	99.99	0.00	71,869.96	305401000.BRG.199
138	I00015279+09762	SUN RIVER	147.83	8.53	99.99	0.00	71,869.96	305401000.BRG.200
139	I00015280+00941	SEP 5TH AVE SW	38.10	11.35	99.99	4.60	71,869.96	305401000.BRG.201
140	I00015280+00942	SEP 5TH AVE SW	38.10	11.35	99.99	4.57	71,869.96	305401000.BRG.202
141	U05210000+01601	CITY ST, BNSF RAILROAD	167.94	8.32	99.99	5.38	71,869.96	305401000.BRG.4616
142	U05210000+01602	CITY ST, BNSF RAILROAD	167.94	8.32	99.99	5.08	71,869.96	305401000.BRG.4617
143	U05210001+04961	MISSOURI RV, PED TRAIL	293.83	20.73	99.99	4.11	71,869.96	305401000.BRG.4618
144	L07561004+04001	SIMMS CREEK 112	45.72	6.40	99.99	0.00	57,760.52	305401000.BRG.1178
145	L07561003+04001	FORT SHAW CANAL 110	11.89	6.71	99.99	0.00	41,887.40	305401000.BRG.1177
146	U05210000+00001	INT CENTRAL AVE W I 15	80.47	8.55	99.99	5.13	71,869.96	305401000.BRG.4615
147	L07877000+04001	SUN RIVER 056	67.36	8.35	99.99	0.00	71,869.96	305401000.BRG.1194
148	L07561002+05001	HEPPLER COULEE 109	17.37	6.40	99.99	0.00	67,019.84	305401000.BRG.1176
149	S00565006+06501	GREENFIELD SOUTH CANAL	15.85	7.17	99.99	0.00	80,560.53	305401000.BRG.4577
150	S00565000+04501	SUN RIVER	115.52	9.54	99.99	0.00	71,429.04	305401000.BRG.4576
151			0.00	0.00	0.00	0.00	0.00	305401000.BRG.4679
152	U05209001+06251	RIVERS EDGE TRAIL	3.85	13.90	99.99	0.00	71,869.96	305401000.BRG.4614
153	L07561002+03001	STOCKPASS	6.10	6.46	99.99	0.00	62,831.10	305401000.BRG.1175
154	U05217001+05401	BNSF RAILROAD	21.34	12.50	99.99	7.04	37,919.12	305401000.BRG.4621
155	L07701000+06501	SEP 34TH ST-I 15	75.29	8.53	99.99	5.15	53,792.24	305401000.BRG.1192
156	U05211000+01071	MISSOURI RIVER / TRAIL	374.45	15.85	99.99	0.00	71,869.96	305401000.BRG.4619
157	P00010003+05341	MISSOURI R, RIVERS TRAIL	343.51	17.16	99.99	7.01	71,869.96	305401000.BRG.3251
158	L07006000+06001	SUN RIVER 063	83.50	7.20	99.99	0.00	76,279.16	305401000.BRG.1107
159	I00015282+05471	INT EMERSON, BN RR	107.90	8.55	99.99	6.76	71,869.96	305401000.BRG.203
160	I00015282+05472	INT EMERSON, BN RR	109.42	8.55	99.99	6.76	71,869.96	305401000.BRG.204
161	L07001000+03001	FORT SHAW CANAL 061	9.18	6.24	99.99	0.00	71,429.04	305401000.BRG.1104
162	U05204000+03801	FAP 10	33.22	12.19	99.99	4.42	39,903.26	305401000.BRG.4612
163	L07001000+06001	SUN RIVER 062	60.96	4.72	99.99	0.00	40,123.72	305401000.BRG.1105
164	L07002005+00001	BLACKFOOT COULEE 053	8.23	5.33	99.99	0.00	51,808.10	305401000.BRG.1106
165	L07014000+03001	SUN RIVER 060	14.94	6.02	99.99	0.00	33,950.84	305401000.BRG.1111
166	U05221000+09101	RIVERS EDGE TRAIL	9.14	8.84	99.99	0.00	71,869.96	305401000.BRG.4622
167			0.00	0.00	0.00	0.00	0.00	305401000.BRG.4684
168	I00015284+02351	JR GRADE SEP	5.49	38.30	99.99	3.58	71,869.96	305401000.BRG.205
169	L07502000+07001	SUN RIVER 055	86.00	8.40	99.99	0.00	71,869.96	305401000.BRG.1171
170	L07502000+05001	DRAINAGE 054	6.68	6.70	99.99	0.00	71,869.96	305401000.BRG.1170
171	P00024138+05111	SUN RIVER	81.15	12.19	99.99	0.00	71,869.96	305401000.BRG.3492
172	P00024139+00991	MILL COULEE CREEK	21.00	12.19	99.99	0.00	71,869.96	305401000.BRG.3493
173	I00015286+05752	INT MANCHESTER	33.53	11.55	99.99	4.61	71,869.96	305401000.BRG.207
174	I00015286+05751	INT MANCHESTER	33.53	11.55	99.99	4.51	71,869.96	305401000.BRG.206
175	L07530009+03001	SUN RIVER 057	65.84	5.79	99.99	0.00	27,998.42	305401000.BRG.1173
176	P00003011+00681	MILL COULEE CREEK	23.16	8.53	99.99	0.00	43,871.54	305401000.BRG.3114

CASCADE COUNTY BRIDGES

ID	BRIDGE_NO	FEAT_CROSS	BRIDGE_LENGTH	ROADWAY_WIDTH	CLEARANCE_	CLEARANCE1	CAPACITY_R	UNIQUEID
177	P00003008+03441	IRRIGATION CANAL	6.40	8.53	99.99	0.00	43,871.54	305401000.BRG.3112
178			0.00	0.00	0.00	0.00	0.00	305401000.BRG.4680
179	P00003001+04141	PED/BIKE CROSSING	3.60	23.40	99.99	0.00	71,869.96	305401000.BRG.3111
180	P00003000+04151	MUDDY CREEK	50.59	19.00	99.99	0.00	71,869.96	305401000.BRG.3110
181	P00003008+08371	MILL COULEE CREEK	23.16	8.53	99.99	0.00	57,980.98	305401000.BRG.3113
182	P00003000+02371	BNSF RAILROAD	76.12	19.00	99.99	7.12	71,869.96	305401000.BRG.3109
183	I00015289+03481	JR GRADE SEP	5.49	38.33	99.99	3.25	71,869.96	305401000.BRG.208
184	P00003000+00001	INT VAUGHN-I 15	67.67	8.55	99.99	5.07	71,869.96	305401000.BRG.3108
185	L07119001+01001	MILL COULEE CANAL 064	8.84	6.43	99.99	0.00	57,980.98	305401000.BRG.1124
186	I00015292+01892	SEP COUNTY ROAD	37.80	12.69	99.99	4.70	71,869.96	305401000.BRG.210
187	I00015292+01891	SEP COUNTY ROAD	37.80	12.69	99.99	4.79	71,869.96	305401000.BRG.209
188	P00003014+05331	MILL COULEE CANAL	7.62	8.60	99.99	0.00	43,871.54	305401000.BRG.3115
189	P00003015+04241	STOCKPASS	3.66	9.75	99.99	0.00	35,934.98	305401000.BRG.3116
190	L07025002+07001	MILL COULEE CANAL 046	10.97	7.62	99.99	0.00	39,903.26	305401000.BRG.1118
191	L07022000+09001	MILL COULEE CANAL 049	10.67	5.74	99.99	0.00	41,887.40	305401000.BRG.1115
192	P00003017+09661	GREENFIELD S.CANAL	19.20	11.63	99.99	0.00	71,869.96	305401000.BRG.3117
193			0.00	0.00	0.00	0.00	0.00	305401000.BRG.4678
194	L07021000+01001	GREENFIELD SO CANAL 045	17.45	6.01	99.99	0.00	27,998.42	305401000.BRG.1114
195	L07024000+06001	GREENFIELD SO CANAL 047	8.53	6.65	99.99	0.00	39,903.26	305401000.BRG.1117
196	L07023000+05001	BENCH SOUTH CANAL 048	9.14	7.41	99.99	0.00	59,965.12	305401000.BRG.1116
197	L07008000+05001	MILL COULEE CANAL 093	9.14	7.25	99.99	0.00	39,903.26	305401000.BRG.1109
198	L07011004+04001	BENCH SOUTH CANAL 066	9.84	7.71	99.99	0.00	37,919.12	305401000.BRG.1110
199	L07008000+01001	GREENFIELD SO CANAL 065	11.28	5.79	99.99	0.00	71,429.04	305401000.BRG.1108
200	L07019005+07001	GREENFIELD SO CANAL 043	9.75	7.32	99.99	0.00	65,917.54	305401000.BRG.1113
201	L07019004+03001	GREENFIELD CANAL 044	11.89	5.33	99.99	0.00	47,839.82	305401000.BRG.1112
202	L07039002+05001	MUDDY CREEK 042	24.38	8.53	99.99	0.00	47,839.82	305401000.BRG.1119
203	L07063002+05001	DRAINAGE 025	41.15	5.79	99.99	0.00	71,429.04	305401000.BRG.1121
204	L07063003+08001	PORTAGE COULEE 024	29.57	5.79	99.99	0.00	67,901.68	305401000.BRG.1122
205	L07060000+09001	INT GORDON I 15	105.46	9.60	99.99	5.17	71,869.96	305401000.BRG.1120
206	L07063006+07001	RYAN COULEE 023	1.83	7.30	99.99	0.00	63,933.40	305401000.BRG.1123
207	I00015300+02331	SEP COUNTY ROAD	43.59	12.65	99.99	5.16	71,869.96	305401000.BRG.211
208	I00015300+02332	SEP COUNTY ROAD	43.59	12.65	99.99	4.83	71,869.96	305401000.BRG.212
209	P00060034+04001	BELT CREEK	3.84	7.32	99.99	0.00	53,792.24	305401000.BRG.3866

Wildfire Risk Assessment Documentation

Cascade County, Montana
Pre-Disaster Mitigation Plan

CASCADE COUNTY WILDFIRE VULNERABILITY ANALYSIS

CENSUS DESIGNATION	FREQUENCY	MAGNITUDE	AREA SQ MI	WUI AREA SQ MI	VERY HIGH RISK WUI AREA SQ MI	HIGH RISK PERCENT WUI	WUI LOW RISK BUILDING EXPOSURE $	WUI MODERATE RISK BUILDING EXPOSURE $	WUI HIGH RISK BUILDING EXPOSURE $	WUI VERY HIGH RISK BUILDING EXPOSURE $	# OF RESIDENTIAL BUILDINGS AT VERY HIGH RISK	VERY HIGH RISK RESIDENTIAL BUILDING EXPOSURE $	VERY HIGH RISK ANNUAL LOSS TO RESIDENTIAL BUILDING STOCK	# OF COMMERCIAL BUILDINGS AT VERY HIGH RISK	VERY HIGH RISK COMMERCIAL BUILDING EXPOSURE $	VERY HIGH RISK ANNUAL LOSS TO COMMERCIAL BUILDING STOCK	CRIT FAC #	CRIT FAC # AT LOW RISK	CRIT FAC # AT MODERATE RISK	CRIT FAC # AT HIGH RISK	CRIT FAC # AT VERY HIGH RISK	TOTAL CRIT FAC $	CRIT FAC EXPOSURE LOW RISK $	CRIT FAC EXPOSURE MODERATE RISK $	CRIT FAC EXPOSURE HIGH RISK $	CRIT FAC EXPOSURE VERY HIGH RISK $	ANNUAL LOSS TO CF
Incorporated Communities & County																											
Belt	2.40	0.0001%	0.35	0.35	0.35	100.00%	$0	$0	$0	$21,564,664	214	$16,138,830	$23	54	$5,425,834	$8	7	0	0	0	7	$4,394,466	$0	$0	$0	$4,394,466	$6
Cascade	2.40	0.0001%	0.52	0.52	0.52	100.00%	$0	$0	$0	$32,569,146	235	$22,517,751	$32	76	$10,051,395	$14	8	0	0	0	8	$5,082,755	$0	$0	$0	$5,082,755	$7
Great Falls	2.40	0.0001%	22.24	22.24	22.18	99.73%	$0	$0	$46,306,587	$6,226,351,275	20,666	$2,555,386,799	$3,642	5,371	$3,670,964,476	$5,232	131	0	0	0	131	$351,087,457	$0	$0	$0	$351,087,457	$500
Neihart	2.40	0.0001%	1.99	1.99	1.84	92.45%	$0	$0	$160,616	$16,375,005	177	$14,994,082	$21	32	$1,380,923	$2	3	0	0	0	3	$1,617,000	$0	$0	$0	$1,617,000	$2
County (excluding the incorporated towns)			2684.43	1,382.59	398.42		$47,793,891	$66,994,720	$112,462,101	$1,114,208,587	6,476	$949,977,937	$1,354	1,850	$164,230,650	$234	84	5	2	2	54	$56,646,845	$213,139	$67,307	$20,000	$56,283,963	$81
			2709.53	**1,407.69**	**423.31**	**392.18%**	**$47,793,891**	**$66,994,720**	**$158,929,304**	**$7,411,068,677**	**27,768**	**$3,559,015,399**	**$5,073**	**7,383**	**$3,852,053,278**	**$5,490**	**233**	**5**	**2**	**2**	**203**	**$418,828,523**	**$213,139**	**$67,307**	**$20,000**	**$418,465,641**	**$597**
CENSUS Designated Places																											
Black Eagle	2.40	0.0001%	1.73	1.73	1.73	100.00%	$0	$0	$0	$75,824,530	493	$40,893,821	$58	184	$34,930,709	$50	3	0	0	0	3	$845,000	$0	$0	$0	$845,000	$1
Fort Shaw	2.40	0.0001%	5.68	5.68	3.87	68.26%	$0	$205,928	$1,209,055	$11,768,673	86	$10,108,637	$14	22	$1,660,036	$2	4	0	0	0	4	$1,367,352	$0	$0	$0	$1,367,352	$2
Gibson Flats	2.40	0.0001%	3.01	3.01	3.01	100.00%	$0	$0	$0	$18,616,584	103	$15,720,511	$22	16	$2,896,073	$4	0	0	0	0	0	$0	$0	$0	$0	$0	$0
Malmstrom AFB	2.40	0.0001%	5.08	5.08	5.07	99.69%	$0	$0	$0	$4,663,122	6	$454,348	$1	10	$4,208,774	$6	4	0	0	0	4	$5,675,000	$0	$0	$0	$5,675,000	$8
Sand Coulee	2.40	0.0001%	2.62	2.62	2.59	98.94%	$0	$0	$38,290	$7,375,641	65	$6,851,839	$10	12	$523,802	$1	2	0	0	0	2	$148,993	$0	$0	$0	$148,993	$0
Simms	2.40	0.0001%	7.68	7.60	5.19	68.29%	$692,778	$664,498	$1,437,027	$14,265,281	133	$12,430,303	$18	39	$1,834,978	$3	2	0	0	0	2	$2,001,713	$0	$0	$0	$2,001,713	$3
Stockett	2.40	0.0001%	1.47	1.47	1.47	100.00%	$0	$0	$0	$4,203,870	46	$3,911,615	$6	6	$292,255	$0	1	0	0	0	1	$70,000	$0	$0	$0	$70,000	$0
Sun Prairie	2.40	0.0001%	5.41	5.41	5.41	100.00%	$0	$0	$0	$63,946,110	438	$54,127,036	$77	223	$9,819,074	$14	1	0	0	0	1	$0	$0	$0	$0	$0	$0
Sun River	2.40	0.0001%	1.86	1.86	1.86	100.00%	$0	$0	$0	$4,891,984	54	$3,975,992	$6	29	$915,992	$1	2	0	0	0	2	$1,146,913	$0	$0	$0	$1,146,913	$2
Ulm	2.40	0.0001%	20.78	20.78	15.57	74.95%	$0	$12,636	$2,688,137	$34,238,536	229	$30,745,484	$44	48	$3,493,052	$5	3	0	0	0	3	$1,059,414	$0	$0	$0	$1,059,414	$2
Vaughn	2.40	0.0001%	3.57	3.57	3.57	100.00%	$0	$0	$0	$28,743,178	205	$25,062,986	$36	66	$3,680,192	$5	5	0	0	0	5	$1,066,145	$0	$0	$0	$1,066,145	$2
			58.87	**58.79**	**49.33**		**$692,778**	**$883,062**	**$5,372,509**	**$268,537,509**	**1,858**	**$204,282,572**	**$291**	**655**	**$64,254,937**	**$92**	**27**	**0**	**0**	**0**	**27**	**$13,380,529**	**$0**	**$0**	**$0**	**$13,380,529**	**$19**
CENSUS County Divisions																											
Belt	2.40	0.0001%	486.98	306.93	60.65	19.76%	$17,090,201	$18,900,097	$22,461,635	$60,427,588	449	$52,660,553	$75	105	$7,767,035	$11	11	0	0	1	9	$4,564,466	$0	$0	$20,000	$4,544,466	$7
Cascade	2.40	0.0001%	786.59	195.57	42.36	21.66%	$7,946,469	$11,153,578	$18,237,648	$104,962,176	700	$91,679,500	$131	132	$13,282,676	$19	24	2	0	0	11	$5,215,190	$0	$0	$0	$5,172,755	$7
Eden-Stockett	2.40	0.0001%	399.35	140.64	57.70	41.03%	$4,505,713	$5,215,257	$10,390,353	$66,402,411	393	$57,088,939	$81	66	$9,313,472	$13	17	1	0	0	9	$3,827,883	$0	$0	$0	$3,827,883	$5
Great Falls	2.40	0.0001%	202.99	176.62	119.50	67.66%	$4,055,944	$3,757,659	$61,881,761	$6,805,316,221	23,836	$3,099,349,388	$4,417	6,071	$3,705,966,833	$5,282	150	1	0	0	149	$390,135,980	$213,139	$0	$0	$389,922,841	$556
Great Falls North	2.40	0.0001%	297.75	223.76	60.73	27.14%	$5,884,061	$4,799,094	$12,612,525	$239,644,684	1,301	$137,052,456	$195	727	$102,592,228	$146	12	1	2	1	7	$7,775,881	$0	$67,307	$0	$7,708,574	$11
Monarch-Neihart	2.40	0.0001%	254.54	160.31	28.17	17.57%	$1,957,550	$1,450,891	$3,345,704	$41,457,622	384	$39,043,916	$56	55	$2,413,706	$3	5	0	0	0	4	$1,707,000	$0	$0	$0	$1,687,000	$2
Sun River Valley	2.40	0.0001%	281.33	203.86	54.20	26.59%	$6,353,953	$21,718,144	$29,999,678	$92,857,975	705	$82,140,647	$117	227	$10,717,328	$15	14	0	0	0	14	$5,602,122	$0	$0	$0	$5,602,122	$8
			2709.53	**1,407.69**	**423.31**		**$47,793,891**	**$66,994,720**	**$158,929,304**	**$7,411,068,677**	**27,768**	**$3,559,015,399**	**$5,073**	**7,383**	**$3,852,053,278**	**$5,490**	**233**	**5**	**2**	**2**	**203**	**$418,828,523**	**$213,139**	**$67,307**	**$20,000**	**$418,465,641**	**$597**

CASCADE COUNTY WILDFIRE RISK ASSESSMENT
CRITICAL FACILITIES IN WUI

Name	PrimarySec	City	Address	Latitude	Longitude	Replacement	Contents	Inflation / Total	Cost Source	RISK LEVEL
BELT 7-8	School	Belt	1 Church Street	47.389503	-110.928096	$631,763	$0	$699,993	HAZUS-MH	VERY HIGH
Belt City Hall	Municipal	Belt	70 Castner St	47.388000	-110.927000		$0	$0		VERY HIGH
BELT HIGH SCHOOL	School	Belt	1 Church Street	47.389074	-110.928002	$1,559,159	$0	$1,727,548	HAZUS-MH	VERY HIGH
Belt School	School	Belt	1 Church Street	47.389241	-110.927630	$1,417,417	$0	$1,570,498	HAZUS-MH	VERY HIGH
Belt Vol Fire Dept	Emergency Services	Belt	16 Bridge St	47.388196	-110.928398	$90,000	$0	$90,000	COUNTY	VERY HIGH
Pleasant Valley School	School	Belt	Hutterite Colony	47.388750	-110.926910	$263,235	$0	$291,664	HAZUS-MH	VERY HIGH
Senior Citizen Center	Senior	Belt	19 Bridge Street	47.387984	-110.927599		$14,763	$14,763		VERY HIGH
CASCADE 7-8	School	Cascade	321 Central Ave. W	47.271620	-111.704260	$899,047	$0	$996,144	HAZUS-MH	VERY HIGH
CASCADE HIGH SCHOOL	School	Cascade	321 Central Ave. W	47.271620	-111.704260	$2,026,906	$0	$2,245,812	HAZUS-MH	VERY HIGH
Cascade School	School	Cascade	321 Central Ave. W	47.271840	-111.705229	$1,660,403	$0	$1,839,726	HAZUS-MH	VERY HIGH
Cascade Volunteer FD	Emergency Services	Cascade	15 1st St N	47.271000	-111.701000		$0	$0		VERY HIGH
City Hall	Municipal	Cascade	9 Front St N	47.271000	-111.700000		$0	$0		VERY HIGH
Farmer/Rancher Fire Co	Emergency Services	Cascade	21 1st St N	47.271578	-111.701066		$0	$0		VERY HIGH
Senior Center	Senior	Cascade	2 Central Ave W	47.270000	-111.701000		$1,072	$1,072		VERY HIGH
Wedsworth Hall	Shelter	Cascade	13 Front St N	47.270000	-111.700000		$0	$0		VERY HIGH
Belt Rural Fire Dist	Emergency Services	County	407 Bridge St	47.386029	-110.921540	$150,000	$0	$150,000	COUNTY	VERY HIGH
BIG STONE SCHOOL	School	County	251 GOONHILL ROAD	47.377920	-111.152850	$222,737	$0	$246,793	HAZUS-MH	VERY HIGH
Black Eagle Dam	Dams	County		47.519693	-111.263188		$0	$0		VERY HIGH
Black Eagle VFD	Emergency Services	County	527 21st St	47.527800	-111.274700	$70,000	$0	$70,000	COUNTY	VERY HIGH
Cascade Co. Sheriff Office/Adult Detention Center	Emergency Services	County	3800 Ulm N Frontage Rd	47.469200	-111.367700	$24,709,414	$3,540,539	$28,249,953	COUNTY	VERY HIGH
Cascade Colony School	School	County	2 School Loop Road	47.508910	-111.820791	$253,110	$0	$280,446	HAZUS-MH	VERY HIGH
Cascade County Public Works	Municipal	County	279 Vaughn S. Frontage Road	47.547946	-111.486614	$5,016,568	$1,030,301	$6,046,869	COUNTY	VERY HIGH
Cascade County Search & Resue	Emergency Services	County	3800 Ulm N Frontage Rd	47.469200	-111.367700	$370,351	$266,786	$637,137	COUNTY	VERY HIGH
CENTERVILLE 7-8	School	County	693 Stockett Road	47.404090	-111.154470	$607,464	$0	$673,071	HAZUS-MH	VERY HIGH
CENTERVILLE HIGH SCHOOL	School	County	693 Stockett Road	47.404090	-111.154470	$1,289,849	$0	$1,429,153	HAZUS-MH	VERY HIGH
Centerville School	School	County	693 Stockett Road	47.387765	-111.141963	$1,123,809	$0	$1,245,181	HAZUS-MH	VERY HIGH
Centerville Senior Center	Senior	County	668 Stockett Road	47.392195	-111.144685		$3,974	$3,974	COUNTY	VERY HIGH
Dearborn Vol Fire Co	Emergency Services	County	56 Dearborn River Road	47.133392	-111.895537	$70,000	$0	$70,000	COUNTY	VERY HIGH
FORT SHAW ELEM SCHOOL	School	County	SCHOOL LOOP ROAD	47.509230	-111.819520	$961,819	$0	$1,065,695	HAZUS-MH	VERY HIGH
Fort Shaw Rural VFD	Emergency Services	County	140 Campbell St	47.508561	-111.812951		$0	$0		VERY HIGH
GF Lift Station No. 10 & 11	Wastewater	County	4600 7th Avenue South	47.512600	-111.227500	$17,974	$29,649	$47,623	COUNTY	VERY HIGH
GF Lift Station No. 28	Wastewater	County	1715 Whispering Ridge Drive	47.484600	-111.244400	$17,974	$16,350	$34,324	COUNTY	VERY HIGH
GF Lift Station No. 30	Wastewater	County	122 Black Eagle Road	47.546300	-111.260900	$754,805	$41,900	$796,705	COUNTY	VERY HIGH
GF Lift Station No. 31	Wastewater	County	4403 9th Street N.E.	47.546400	-111.291600	$17,974	$16,350	$34,324	COUNTY	VERY HIGH
GF Water System - Skyline Storage Tank	Infrastructure	County	1400 36th Ave NE	47.538300	-111.283000	$1,593,000	$0	$1,593,000	COUNTY	VERY HIGH
Gore Hill Vol Fire Co	Emergency Services	County	4401 62nd Ave SW	47.450600	-111.374900	$70,000	$0	$70,000	COUNTY	VERY HIGH
HERITAGE BAPTIST SCHOOL	School	County	5100 10TH AVE N	47.516405	-111.222413	$283,483	$0	$314,100	HAZUS-MH	VERY HIGH
Loy Elementary School	School	County	501 57th St. N	47.511000	-111.214000	$5,675,000	$0	$5,675,000	COUNTY	VERY HIGH
Malmstrom AFB	Federal	County	6220 Goddard Dr	47.506800	-111.203400		$0	$0		VERY HIGH
Malmstrom Walk In Clinic	Healthcare and Public Health	County	7300 North Perimeter Rd	47.516200	-111.195400		$0	$0		VERY HIGH
Malstrom AFB Fire Dept	Emergency Services	County	21 73rd St. North	47.510200	-111.186900		$0	$0		VERY HIGH
Missile Site - J-10	Federal facility	County	Rural location	47.429190	-111.394550		$0	$0		VERY HIGH
Missile Site - J-8	Federal facility	County	Rural location	47.418770	-111.257170		$0	$0		VERY HIGH
Missile Site - J-9	Federal facility	County	Rural location	47.393700	-111.324970		$0	$0		VERY HIGH
Monarch Vol Fire Co	Emergency Services	County	7 Montana Ave	47.099433	-110.837172	$70,000	$0	$70,000	COUNTY	VERY HIGH
Repeater - 744 North site	Communications	County	160 Banjo Lane	47.607194	-111.318028	$20,000	$0	$20,000	COUNTY	VERY HIGH
Repeater - 744 South site	Communications	County	End of Sheep Creek Rd near Cas	47.180500	-111.795833	$20,000	$0	$20,000	COUNTY	VERY HIGH
Repeater - 744 West site	Communications	County	1 kilometer S of MM 15.5 US Hw	47.583083	-111.837806	$20,000	$0	$20,000	COUNTY	VERY HIGH
Repeater - Flying J site / 744 Central	Communications	County	4323 31st St SWááá	47.469139	-111.352583	$775,000	$0	$775,000	COUNTY	VERY HIGH
Repeater - Pacific Steel Site / 744 Local	Communications	County	2930 Rainbow Dam Rd	47.530444	-111.262694	$775,000	$0	$775,000	COUNTY	VERY HIGH
Sand Coulee Vol Fire Co	Emergency Services	County	520 E Hunter Rd	47.397285	-111.170996	$148,993	$10,719	$159,712	COUNTY	VERY HIGH
Simms High School	School	County	123 Walker Street	47.492000	-111.928000	$1,743,423	$0	$1,931,713	HAZUS-MH	VERY HIGH
Simms Vol Fire Co	Emergency Services	County	195 N Main	47.493452	-111.927691	$70,000	$0	$70,000	COUNTY	VERY HIGH
Stockett Vol Fire Dept	Emergency Services	County	23 Crane Ave	47.355699	-111.166263	$70,000	$0	$70,000	COUNTY	VERY HIGH

CASCADE COUNTY WILDFIRE RISK ASSESSMENT
CRITICAL FACILITIES IN WUI

Name	PrimarySec	City	Address	Latitude	Longitude	Replacement	Contents	Inflation / Total	Cost Source	RISK LEVEL
Sun Praire Wastewater System	Infrastructure	County	234 Sun Prairie Rd	47.527000	-111.492000		$0	$0		VERY HIGH
Sun River Fire Service	Emergency Services	County	295 Largent St	47.533784	-111.722968	$70,000	$0	$70,000	COUNTY	VERY HIGH
Sun River Middle School	School	County	301 Largent Street	47.533699	-111.723411	$971,943	$0	$1,076,913	HAZUS-MH	VERY HIGH
SUN RIVER VALLEY SENIOR CENTER	Senior	County	13319 MT HIGHWAY 200	47.502421	-111.816118		$21,211	$21,211	COUNTY	VERY HIGH
TREASURE STATE ACADEMY	School	County	100 46TH ST N	47.506033	-111.227923	$311,832	$0	$345,510	HAZUS-MH	VERY HIGH
ULM 7-8	School	County	6 ULM VAUGHN ROAD	47.430500	-111.506300	$255,135	$0	$282,690	HAZUS-MH	VERY HIGH
Ulm School	School	County	6 Ulm-Vaughn Road	47.436248	-111.507099	$637,838	$0	$706,724	HAZUS-MH	VERY HIGH
Ulm Vol Fire Co	Emergency Services	County	13 Old US Hwy 91	47.430508	-111.507462	$70,000	$0	$70,000	COUNTY	VERY HIGH
VAUGHN 7-8	School	County	480 CENTRAL AVENUE	47.560270	-111.549490	$230,837	$0	$255,767	HAZUS-MH	VERY HIGH
Vaughn School	School	County	480 Central Avenue	47.560180	-111.549442	$668,211	$0	$740,378	HAZUS-MH	VERY HIGH
Vaughn Vol Fire Dept	Emergency Services	County	14 4th St	47.559611	-111.548761	$70,000	$0	$70,000	COUNTY	VERY HIGH
Vaughn-Cascade Co. Sewer District	Infrastructure	County	1161 6th Ave	47.548000	-111.558000		$0	$0		VERY HIGH
Vaughn-Cascade Co. Sewer District	Infrastructure	County	1110 6th Ave	47.548000	-111.557000		$0	$0		VERY HIGH
Wastewater Lagoons	Infrastructure	County	2055 Simms Cascade Rd	47.296000	-111.701000		$0	$0		VERY HIGH
Wastewater System	Intrastructure	County	23 Orr Coulee Rd	47.392000	-110.922000		$0	$0		VERY HIGH
Aeration Basins	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$4,103,910	$0	$4,103,910	COUNTY	VERY HIGH
Benefis Health Care (East Campus)	Healthcare and Public Health	Great Falls	1101 26th St. S	47.492000	-111.261700	$13,860,000	$0	$15,356,880	HAZUS-MH	VERY HIGH
Benefis Healthcare (West Campus)	Healthcare and Public Health	Great Falls	500 15th Ave. S	47.488900	-111.299000		$0	$0		VERY HIGH
Cascade County Courthouse	Municipal	Great Falls	415-2nd Ave. N.	47.508100	-111.299900	$17,740,370	$1,232,366	$18,972,736	COUNTY	VERY HIGH
Central Catholic	School	Great Falls	2800 18th Ave South	47.484000	-111.261400	$850,450	$0	$942,299	HAZUS-MH	VERY HIGH
Central Montana Surgical Hospital	Healthcare and Public Health	Great Falls	1411 9th St. S	47.489600	-111.291500		$0	$0		VERY HIGH
Chief Joseph School	School	Great Falls	5305 3rd Ave S.	47.502400	-111.219700	$5,675,000	$0	$5,675,000	COUNTY	VERY HIGH
Chlorine Building	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$74,830	$0	$74,830	COUNTY	VERY HIGH
Chlorine Contact Basin	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$1,034,809	$0	$1,034,809	COUNTY	VERY HIGH
CM Russell High School	School	Great Falls	228 17th Ave. NW	47.520400	-111.319300	$33,896,000	$0	$33,896,000	COUNTY	VERY HIGH
Co-Generation Facility	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$1,143,000	$0	$1,143,000	COUNTY	VERY HIGH
Courthouse Annex	Municipal	Great Falls	325-2nd Ave. N.	47.507700	-111.301200	$2,584,865	$1,542,857	$4,127,722	COUNTY	VERY HIGH
DES Office	Municipal	Great Falls	521-1st Ave. NW	47.508900	-111.321200	$1,295,554	$589,350	$1,884,904	COUNTY	VERY HIGH
Digester #1 Primary	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$1,977,989	$0	$1,977,989	COUNTY	VERY HIGH
Digester #2 - Secondary	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$1,731,296	$0	$1,731,296	COUNTY	VERY HIGH
Digester Control Bldg	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$1,273,878	$0	$1,273,878	COUNTY	VERY HIGH
East Middle School	School	Great Falls	4040 Central Ave.	47.504000	-111.235600	$15,506,000	$0	$15,506,000	COUNTY	VERY HIGH
EOC/911 Center/GF Police Dept.	Emergency Services	Great Falls	112 1st Street South	47.503600	-111.307100	$5,136,277	$0	$5,136,277	COUNTY	VERY HIGH
Final Basins - Secondary Clarifier	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$5,979,713	$0	$5,979,713	COUNTY	VERY HIGH
Flotation Thickener Bldg	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$2,828,965	$0	$2,828,965	COUNTY	VERY HIGH
Foothills Community Christian	School	Great Falls	2210 5th Ave North (59401)	47.510400	-111.268700	$1,927,687	$0	$2,135,877	HAZUS-MH	VERY HIGH
GF Civic Center	Municipal	Great Falls	2 Park Drive South	47.505300	-111.306400	$20,568,534	$0	$20,568,534	COUNTY	VERY HIGH
GF Emergency Services	Emergency Services	Great Falls	514 9 Ave. S	47.495100	-111.298100		$0	$0	COUNTY	VERY HIGH
GF Fire Station 1	Emergency Services	Great Falls	105 9th St. S	47.503800	-111.291800	$2,932,579	$0	$2,932,579	COUNTY	VERY HIGH
GF Fire Station 2	Emergency Services	Great Falls	731-6th St. NW	47.515800	-111.323400	$660,675	$0	$660,675	COUNTY	VERY HIGH
GF Fire Station 3	Emergency Services	Great Falls	3325 Central Ave	47.505400	-111.248900	$660,675	$0	$660,675	COUNTY	VERY HIGH
GF Fire Station 4	Emergency Services	Great Falls	1800 Fox Farm Road	47.486500	-111.328000	$660,675	$0	$660,675	COUNTY	VERY HIGH
GF Fire Training Center	Emergency Services	Great Falls	1900 9TH ST S	47.485000	-111.293000		$0	$0		VERY HIGH
GF Lift Station No. 1	Wastewater	Great Falls	600 River Drive South	47.498400	-111.307400	$897,322	$572,421	$1,469,743	COUNTY	VERY HIGH
GF Lift Station No. 12	Wastewater	Great Falls	601 River Drive South	47.498200	-111.306200	$17,974	$16,350	$34,324	COUNTY	VERY HIGH
GF Lift Station No. 15	Wastewater	Great Falls	810 10th Avenue S.W.	47.493200	-111.325500	$1,485,300	$523,750	$2,009,050	COUNTY	VERY HIGH
GF Lift Station No. 16	Wastewater	Great Falls	1326 5th St NW	47.518700	-111.322300	$4,000	$13,625	$17,625	COUNTY	VERY HIGH
GF Lift Station No. 17	Wastewater	Great Falls	4201 Giant Springs Road	47.529500	-111.235700	$8,988	$10,900	$19,888	COUNTY	VERY HIGH
GF Lift Station No. 18	Wastewater	Great Falls	1716 3rd Avenue S.W.	47.504000	-111.343700	$1,015,560	$513,275	$1,528,835	COUNTY	VERY HIGH
GF Lift Station No. 19	Wastewater	Great Falls	1601 2nd Avenue S.W.	47.505800	-111.342000	$3,764	$2,180	$5,944	COUNTY	VERY HIGH
GF Lift Station No. 2	Wastewater	Great Falls	611 River Drive North	47.511900	-111.305800	$17,974	$16,350	$34,324	COUNTY	VERY HIGH
GF Lift Station No. 20	Wastewater	Great Falls	835 13th Street S.W.	47.496800	-111.335400	$4,250	$2,180	$6,430	COUNTY	VERY HIGH
GF Lift Station No. 21	Wastewater	Great Falls	2001 14th St SW	47.484700	-111.337900	$10,922	$0	$10,922	COUNTY	VERY HIGH
GF Lift Station No. 22	Wastewater	Great Falls	2800 Terminal Drive	47.482300	-111.356600	$17,974	$16,350	$34,324	COUNTY	VERY HIGH

CASCADE COUNTY WILDFIRE RISK ASSESSMENT
CRITICAL FACILITIES IN WUI

Name	PrimarySec	City	Address	Latitude	Longitude	Replacement	Contents	Inflation / Total	Cost Source	RISK LEVEL
GF Lift Station No. 23	Wastewater	Great Falls	3116 Lower River Road	47.473700	-111.312500	$1,943,440	$239,053	$2,182,493	COUNTY	VERY HIGH
GF Lift Station No. 24	Wastewater	Great Falls	704 Juniper	47.481000	-111.324900	$4,250	$4,360	$8,610	COUNTY	VERY HIGH
GF Lift Station No. 25	Wastewater	Great Falls	3015 Coyote Lane	47.475400	-111.323000	$17,974	$16,350	$34,324	COUNTY	VERY HIGH
GF Lift Station No. 27	Wastewater	Great Falls	4120 North Star Boulevard	47.518600	-111.234600	$17,974	$16,350	$34,324	COUNTY	VERY HIGH
GF Lift Station No. 29	Wastewater	Great Falls	3503 2nd Street N.E.	47.538100	-111.311200	$17,974	$16,350	$34,324	COUNTY	VERY HIGH
GF Lift Station No. 32	Wastewater	Great Falls	3314 Lower River Road	47.472000	-111.310000	$17,974	$16,350	$34,324	COUNTY	VERY HIGH
GF Lift Station No. 4	Wastewater	Great Falls	100 River Drive South	47.504700	-111.310400	$2,731	$2,081	$4,812	COUNTY	VERY HIGH
GF Lift Station No. 5	Wastewater	Great Falls	1705 39th Street South	47.485500	-111.239900	$9,586	$2,180	$11,766	COUNTY	VERY HIGH
GF Lift Station No. 6	Wastewater	Great Falls	4909 10th Avenue South	47.494400	-111.225600	$11,982	$10,900	$22,882	COUNTY	VERY HIGH
GF Lift Station No. 7	Wastewater	Great Falls	3500 15th Avenue South	47.487800	-111.242500	$1,042,000	$517,764	$1,559,764	COUNTY	VERY HIGH
GF Lift Station No. 8	Wastewater	Great Falls	404 1/2 20th Avenue South	47.484100	-111.300600	$17,974	$16,350	$34,324	COUNTY	VERY HIGH
GF Lift Station No. 9	Wastewater	Great Falls	5102 1st Avenue South	47.503300	-111.221900	$17,974	$16,350	$34,324	COUNTY	VERY HIGH
GF Transit	Infrastructure	Great Falls	3905 North Star Blvd.	47.519000	-111.239100		$0	$0		VERY HIGH
GF Transit - transfer center	Infrastructure	Great Falls	326 1st Ave. S	47.504000	-111.301100		$0	$0		VERY HIGH
GF Water System - Boston Heights Storage Tank #1	Infrastructure	Great Falls	3315 Central Ave.	47.505400	-111.249700	$763,250	$0	$763,250	COUNTY	VERY HIGH
GF Water System - Boston Heights Storage Tank #2	Infrastructure	Great Falls	3317 Central Ave.	47.505400	-111.249400	$3,557	$0	$3,557	COUNTY	VERY HIGH
GF Water System - East Reservoir Storage Tank	Infrastructure	Great Falls	801 33rd St S.	47.496200	-111.248600	$2,322,000	$0	$2,322,000	COUNTY	VERY HIGH
GF Water System - Ella Storage Tank	Infrastructure	Great Falls	4110 Ella Ave	47.495500	-111.231500	$1,593,000	$0	$1,593,000	COUNTY	VERY HIGH
GF Water System - Gore Hill Storage Tank	Infrastructure	Great Falls	2500 Airport Dr.	47.479300	-111.357400	$1,269,351	$0	$1,269,351	COUNTY	VERY HIGH
GF Water System - Hill 57 Storage Tank	Infrastructure	Great Falls	425 29th Ave NW	47.532000	-111.321800	$2,378,781	$0	$2,378,781	COUNTY	VERY HIGH
Gravity Thickener Bldg	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$886,063	$0	$886,063	COUNTY	VERY HIGH
Gravity Thickener Tank	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$200,088	$0	$200,088	COUNTY	VERY HIGH
Great Fall High School	School	Great Falls	1900 2nd Ave. S	47.501800	-111.273500	$20,793,000	$0	$20,793,000	COUNTY	VERY HIGH
Great Falls Clinic	Healthcare and Public Health	Great Falls	2012 14th St. SW	47.484300	-111.338900		$0	$0		VERY HIGH
Great Falls Clinic-Immediate Care Center	Healthcare and Public Health	Great Falls	1220 Central Ave.	47.505000	-111.286000		$0	$0		VERY HIGH
Great Falls Clinic-NW Clinic	Healthcare and Public Health	Great Falls	1600 Division Rd.	47.521100	-111.311200		$0	$0		VERY HIGH
Great Falls Community Recreation Center	Municipal	Great Falls	801 2nd Ave N	47.507700	-111.293400	$7,865,618	$0	$7,865,618	COUNTY	VERY HIGH
Great Falls International Airport	Transportation	Great Falls	2800 Terminal Dr.	47.482300	-111.356600		$0	$0		VERY HIGH
GREAT FALLS MONTESSORI SCHOOL	School	Great Falls	1521 1ST AVE N	47.506389	-111.281266	$50,622	$0	$56,089	HAZUS-MH	VERY HIGH
Great Falls Police Station (county equipment)	Municipal	Great Falls	12-1st Ave N	47.505000	-111.309000		$21,680	$21,680	COUNTY	VERY HIGH
Great Falls Public Library	Municipal	Great Falls	301 2nd Ave N	47.507800	-111.302100	$3,096,311	$0	$3,096,311	COUNTY	VERY HIGH
Great Falls Public Schools Admin Building	School	Great Falls	1100 4th St S	47.493000	-111.300000	$3,520,000	$0	$3,520,000	COUNTY	VERY HIGH
GREAT FALLS SDA SCHOOL	School	Great Falls	3102 Flood Rd	47.477639	-111.338384	$170,090	$0	$188,460	HAZUS-MH	VERY HIGH
Health Department & Community Health Care	Healthcare and Public Health	Great Falls	115 4th St. S	47.503400	-111.300600	$2,488,944	$1,533,893	$4,022,837	COUNTY	VERY HIGH
Health Dept. NW Campus (old Surveyor/DES)	Municipal	Great Falls	415-3rd St NW	47.511600	-111.316000	$376,972	$779,268	$1,156,240	COUNTY	VERY HIGH
Holy Spirit Catholic School	School	Great Falls	2820 Central Ave.	47.504800	-111.257800	$3,110,218	$0	$3,446,121	HAZUS-MH	VERY HIGH
Indian Family Health Clinic	Healthcare and Public Health	Great Falls	1220 Central Ave. Suite 1B	47.505000	-111.285500		$0	$0		VERY HIGH
Lewis & Clark Elementary School	School	Great Falls	3800 1st Ave. S	47.503900	-111.241100	$6,552,000	$0	$6,552,000	COUNTY	VERY HIGH
LIGHTHOUSE CHRISTIAN ACADEMY	School	Great Falls	1600 5TH AVE NW	47.512525	-111.339449	$14,174	$0	$15,705	HAZUS-MH	VERY HIGH
Lincoln Elementary School	School	Great Falls	624 27th St. S	47.497400	-111.261300	$4,405,000	$0	$4,405,000	COUNTY	VERY HIGH
Longfellow Elementary School	School	Great Falls	1100 6th Ave. S	47.498100	-111.288700	$5,912,000	$0	$5,912,000	COUNTY	VERY HIGH
Maintenance Building	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$264,180	$0	$264,180	COUNTY	VERY HIGH
MANG FD	Emergency Services	Great Falls	2920 Airport Ave. B	47.481500	-111.361100		$0	$0		VERY HIGH
Meadow Lark Elementary School	School	Great Falls	2204 Fox Farm Rd.	47.482400	-111.328600	$4,093,000	$0	$4,093,000	COUNTY	VERY HIGH
Montana Air National Guard	State	Great Falls	2700 Airport Ave. B	47.477700	-111.360100		$0	$0		VERY HIGH
Montana Refining	Business	Great Falls	1900-10th St. NE	47.523900	-111.290600		$0	$0		VERY HIGH
Montana School for the Deaf and Blinc	School	Great Falls	3911 Central Ave.	47.505500	-111.239300		$0	$0		VERY HIGH
Morninside Elementary School	School	Great Falls	4119 7th Ave N	47.513100	-111.235400	$4,871,000	$0	$4,871,000	COUNTY	VERY HIGH
Motor Control Building	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$389,817	$0	$389,817	COUNTY	VERY HIGH
Mountain View Elementary School	School	Great Falls	3420 15th Ave. S	47.487200	-111.244900	$4,851,000	$0	$4,851,000	COUNTY	VERY HIGH
MSU-Great Falls	School	Great Falls	2100 16th Ave. S	47.486400	-111.269900		$0	$0		VERY HIGH
Mt Highway Patrol	State	Great Falls	812 14th S N	47.514800	-111.283800		$0	$0		VERY HIGH
MT SCH FOR DEAF & BLND EL	School	Great Falls	3911 CENTRAL AVE	47.505350	-111.239980	$283,483	$0	$314,100	HAZUS-MH	VERY HIGH
MT SCH FOR DEAF & BLND HS	School	Great Falls	3911 CENTRAL AVE	47.505350	-111.239980	$538,618	$0	$596,789	HAZUS-MH	VERY HIGH

CASCADE COUNTY WILDFIRE RISK ASSESSMENT
CRITICAL FACILITIES IN WUI

Name	PrimarySec	City	Address	Latitude	Longitude	Replacement	Contents	Inflation / Total	Cost Source	RISK LEVEL
North Middle School	School	Great Falls	2601 8th St. NE	47.530300	-111.293100	$13,689,000	$0	$13,689,000	COUNTY	VERY HIGH
Our Lady of Lourdes School	School	Great Falls	1305 5th Ave. S	47.500000	-111.283700	$2,502,753	$0	$2,773,051	HAZUS-MH	VERY HIGH
Paris Gibson Ed Center	School	Great Falls	2420 Central Ave.	47.504500	-111.265200	$13,779,000	$0	$13,779,000	COUNTY	VERY HIGH
Pipe Gallery	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$1,204,090	$0	$1,204,090	COUNTY	VERY HIGH
Preimary Division Structure Splitter box	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$66,347	$0	$66,347	COUNTY	VERY HIGH
Preimary Pump Station	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$228,867	$0	$228,867	COUNTY	VERY HIGH
PreRelease Center	Detention	Great Falls	1019 15th St. N	47.516600	-111.280100		$724	$724	COUNTY	VERY HIGH
Primary Clarifiers	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$2,536,785	$0	$2,536,785	COUNTY	VERY HIGH
Process Water Pump Station	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$135,729	$0	$135,729	COUNTY	VERY HIGH
Public Works Complex (several buildings)	Municipal	Great Falls	1025 25th Ave. NE	47.529500	-111.288600	$5,504,565	$0	$5,504,565	COUNTY	VERY HIGH
Raw Waste Water Pump Station	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$839,629	$0	$839,629	COUNTY	VERY HIGH
Riverview Elementary School	School	Great Falls	100 Smelter Ave NW	47.523900	-111.314600	$4,845,000	$0	$4,845,000	COUNTY	VERY HIGH
Roosevelt Elementary School	School	Great Falls	2501 2nd Ave N	47.507800	-111.263700	$3,614,000	$0	$3,614,000	COUNTY	VERY HIGH
Sacajawea Elementary School	School	Great Falls	630 Sacajawea Dr	47.532600	-111.298700	$4,667,000	$0	$4,667,000	COUNTY	VERY HIGH
Senior Center	Senior	Great Falls	1004 Central Ave	47.505000	-111.289900	$1,085,171	$210,309	$1,295,480	COUNTY	VERY HIGH
Solids Processing Bldg	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$2,225,975	$0	$2,225,975	COUNTY	VERY HIGH
Sunnyside Elementary School	School	Great Falls	1800 19th St. S	47.485600	-111.275500	$4,720,000	$0	$4,720,000	COUNTY	VERY HIGH
University of Great Falls	School	Great Falls	1301 20th St. S	47.491300	-111.271800		$0	$0		VERY HIGH
Valley View Elementary School	School	Great Falls	900 Ave A NW	47.518300	-111.327300	$4,648,000	$0	$4,648,000	COUNTY	VERY HIGH
Water Plant Filter Bldg	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$12,680,663	$0	$12,680,663	COUNTY	VERY HIGH
West Elementary School	School	Great Falls	1205 1st Ave. NW	47.509200	-111.332600	$8,664,000	$0	$8,664,000	COUNTY	VERY HIGH
Whittier Elementary School	School	Great Falls	305 8th St. N	47.509000	-111.293500	$3,158,000	$0	$3,158,000	COUNTY	VERY HIGH
WP Backwash Pumphouse & Clarifier	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$664,855	$0	$664,855	COUNTY	VERY HIGH
WP Backwash Surge Tank	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$266,616	$0	$266,616	COUNTY	VERY HIGH
WP Carbon Bldg	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$218,682	$0	$218,682	COUNTY	VERY HIGH
WP Dechloriniation Bldg	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$52,031	$0	$52,031	COUNTY	VERY HIGH
WP Floculation Basins	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$1,038,726	$0	$1,038,726	COUNTY	VERY HIGH
WP Inlets Improvements	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$307,667	$0	$307,667	COUNTY	VERY HIGH
WP Preimary Clarif. Basins	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$2,488,243	$0	$2,488,243	COUNTY	VERY HIGH
WP Pumping Station/shop	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$1,639,454	$0	$1,639,454	COUNTY	VERY HIGH
WP Seasonal Complex	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$3,465,698	$0	$3,465,698	COUNTY	VERY HIGH
WP Seasonal Well	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$685,468	$0	$685,468	COUNTY	VERY HIGH
WP Secondary Basins	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$1,961,015	$0	$1,961,015	COUNTY	VERY HIGH
WP Sludge Basins	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$133,502	$0	$133,502	COUNTY	VERY HIGH
WP Solids Pump Station	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$292,782	$0	$292,782	COUNTY	VERY HIGH
WWTP Admin Bldg	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$1,772,281	$0	$1,772,281	COUNTY	VERY HIGH
WWTP Sludge Holding Tank	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$544,592	$0	$544,592	COUNTY	VERY HIGH
Youth Detention Center	Detention	Great Falls	1600 26th St. S	47.488200	-111.263300		$0	$0		VERY HIGH
Neihart Volunteer Fire Dept	Emergency Services	Neihart	220 N Main	46.929000	-110.731000	$227,000	$0	$227,000	COUNTY	VERY HIGH
Senior Center/Town Hall	Municipal	Neihart	200 S Main St	46.929593	-110.731765	$600,000	$0	$600,000	COUNTY	VERY HIGH
Water Treatment Plant	Infrastructure	Neihart	O'Brien Street	46.923000	-110.730000	$790,000	$0	$790,000	COUNTY	VERY HIGH

Structure Fire Risk Assessment Documentation

Cascade County, Montana
Pre-Disaster Mitigation Plan

CASCADE COUNTY STRUCTURE FIRE VULNERABILITY ANALYSIS

JURISDICTION	FREQUENCY	MAGNITUDE	AREA SQ MI	TOTAL BUILDING STOCK	# OF RESIDENTIAL BUILDINGS AT RISK	RESIDENTIAL BUILDING EXPOSURE $	ANNUAL LOSS TO RESIDENTIAL BUILDING STOCK	# OF COMMERCIAL BUILDINGS AT RISK	COMMERCIAL BUILDING EXPOSURE $	ANNUAL LOSS TO COMMERCIAL BUILDING STOCK	TOTAL BUILDING EXPOSURE $	CRIT FAC #	TOTAL CRIT FAC $	ANNUAL LOSS TO CF
Incorporated Communities & County														
Belt	86.90	0.0003%	0.35	$21,564,664	214	$16,138,830	$4,825	54	$5,425,834	$1,622	$21,564,664	7	$4,394,466	$1,314
Cascade	86.90	0.0003%	0.52	$32,569,146	235	$22,517,751	$6,732	76	$10,051,395	$3,005	$32,569,146	8	$5,082,755	$1,520
Great Falls	86.90	0.0003%	22.24	$6,228,329,602	20,690	$2,557,237,526	$764,527	5,372	$3,671,092,076	$1,097,532	$6,228,329,602	131	$351,087,457	$104,963
Neihart	86.90	0.0003%	1.99	$16,436,011	178	$15,055,088	$4,501	32	$1,380,923	$413	$16,436,011	3	$1,617,000	$483
County (excluding the incorporated towns)			2684.43	$1,322,839,060	7,751	$1,134,301,276	$339,118	2,179	$188,537,784	$56,366	$1,322,839,060	84	$56,646,845	$16,935
			2709.53	**$7,621,738,483**	**29,068**	**$3,745,250,471**	**$1,119,703**	**7,713**	**$3,876,488,012**	**$1,158,939**	**$7,621,738,483**	**233**	**$418,828,523**	**$125,216**
CENSUS Designated Places														
Black Eagle	86.90	0.0003%	1.73	$75,824,530	493	$40,893,821	$12,226	184	$34,930,709	$10,443	$75,824,530	3	$845,000	$253
Fort Shaw	86.90	0.0003%	5.68	$12,289,259	92	$10,549,723	$3,154	27	$1,739,536	$520	$12,289,259	4	$1,367,352	$409
Gibson Flats	86.90	0.0003%	3.01	$18,616,584	103	$15,720,511	$4,700	16	$2,896,073	$866	$18,616,584	0	$0	$0
Malmstrom AFB	86.90	0.0003%	5.08	$4,663,122	6	$454,348	$136	10	$4,208,774	$1,258	$4,663,122	4	$5,675,000	$1,697
Sand Coulee	86.90	0.0003%	2.62	$7,375,641	65	$6,851,839	$2,048	12	$523,802	$157	$7,375,641	2	$148,993	$45
Simms	86.90	0.0003%	7.68	$15,554,071	141	$13,706,456	$4,098	41	$1,847,615	$552	$15,554,071	2	$2,001,713	$598
Stockett	86.90	0.0003%	1.47	$4,203,870	46	$3,911,615	$1,169	6	$292,255	$87	$4,203,870	1	$70,000	$21
Sun Prairie	86.90	0.0003%	5.41	$63,946,110	438	$54,127,036	$16,182	223	$9,819,074	$2,936	$63,946,110	1	$0	$0
Sun River	86.90	0.0003%	1.86	$4,891,984	54	$3,975,992	$1,189	29	$915,992	$274	$4,891,984	2	$1,146,913	$343
Ulm	86.90	0.0003%	20.78	$36,281,418	238	$32,771,679	$9,798	50	$3,509,739	$1,049	$36,281,418	3	$1,059,414	$317
Vaughn	86.90	0.0003%	3.57	$28,743,178	205	$25,062,986	$7,493	66	$3,680,192	$1,100	$28,743,178	5	$1,066,145	$319
			58.87	**$272,389,767**	**1,881**	**$208,026,006**	**$62,193**	**664**	**$64,363,761**	**$19,243**	**$272,389,767**	**27**	**$13,380,529**	**$4,000**
CENSUS County Divisions														
Belt	86.90	0.0003%	486.98	$123,079,954	736	$108,459,067	$32,426	175	$14,620,887	$4,371	$123,079,954	11	$4,564,466	$1,365
Cascade	86.90	0.0003%	786.59	$145,237,212	1,039	$131,078,237	$39,188	212	$14,158,975	$4,233	$145,237,212	24	$5,215,190	$1,559
Eden-Stockett	86.90	0.0003%	399.35	$91,730,390	577	$81,967,207	$24,505	99	$9,763,183	$2,919	$91,730,390	17	$3,827,883	$1,144
Great Falls	86.90	0.0003%	202.99	$6,823,987,128	23,911	$3,113,760,317	$930,909	6,090	$3,710,226,811	$1,109,232	$6,823,987,128	150	$390,135,980	$116,637
Great Falls North	86.90	0.0003%	297.75	$260,388,632	1,404	$150,457,511	$44,982	795	$109,931,121	$32,866	$260,388,632	12	$7,775,881	$2,325
Monarch-Neihart	86.90	0.0003%	254.54	$47,787,295	463	$45,288,217	$13,540	63	$2,499,078	$747	$47,787,295	5	$1,707,000	$510
Sun River Valley	86.90	0.0003%	281.33	$129,527,872	938	$114,239,915	$34,154	279	$15,287,957	$4,571	$129,527,872	14	$5,602,122	$1,675
			2709.53	**$7,621,738,483**	**29,068**	**$3,745,250,471**	**$1,119,703**	**7,713**	**$3,876,488,012**	**$1,158,939**	**$7,621,738,483**	**233**	**$418,828,523**	**$125,216**

Severe Summer Weather
Risk Assessment Documentation

Cascade County, Montana
Pre-Disaster Mitigation Plan

CASCADE COUNTY SEVERE SUMMER WEATHER VULNERABILITY ANALYSIS

JURISDICTION	FREQUENCY	MAGNITUDE	AREA SQ MI	TOTAL BUILDING STOCK	# OF RESIDENTIAL BUILDINGS AT RISK	RESIDENTIAL BUILDING EXPOSURE $	ANNUAL LOSS TO RESIDENTIAL BUILDING STOCK	# OF COMMERCIAL BUILDINGS AT RISK	COMMERCIAL BUILDING EXPOSURE $	ANNUAL LOSS TO COMMERCIAL BUILDING STOCK	TOTAL BUILDING EXPOSURE $	CRIT FAC #	TOTAL CRIT FAC $	ANNUAL LOSS TO CF
Incorporated Communities & County														
Belt	3.94	0.0009%	0.35	$21,564,664	214	$16,138,830	$544	54	$5,425,834	$183	$21,564,664	7	$4,394,466	$148
Cascade	3.94	0.0009%	0.52	$32,569,146	235	$22,517,751	$759	76	$10,051,395	$339	$32,569,146	8	$5,082,755	$171
Great Falls	3.94	0.0009%	22.24	$6,228,329,602	20,690	$2,557,237,526	$86,238	5,372	$3,671,092,076	$123,801	$6,228,329,602	131	$351,087,457	$11,840
Neihart	3.94	0.0009%	1.99	$16,436,011	178	$15,055,088	$508	32	$1,380,923	$47	$16,436,011	3	$1,617,000	$55
County (excluding the incorporated towns)			2684.43	$1,322,839,060	7,751	$1,134,301,276	$38,252	2,179	$188,537,784	$6,358	$1,322,839,060	84	$56,646,845	$1,910
			2709.53	**$7,621,738,483**	**29,068**	**$3,745,250,471**	**$126,302**	**7,713**	**$3,876,488,012**	**$130,728**	**$7,621,738,483**	**233**	**$418,828,523**	**$14,124**
CENSUS Designated Places														
Black Eagle	3.94	0.0009%	1.73	$75,824,530	493	$40,893,821	$1,379	184	$34,930,709	$1,178	$75,824,530	3	$845,000	$28
Fort Shaw	3.94	0.0009%	5.68	$12,289,259	92	$10,549,723	$356	27	$1,739,536	$59	$12,289,259	4	$1,367,352	$46
Gibson Flats	3.94	0.0009%	3.01	$18,616,584	103	$15,720,511	$530	16	$2,896,073	$98	$18,616,584	0	$0	$0
Malmstrom AFB	3.94	0.0009%	5.08	$4,663,122	6	$454,348	$15	10	$4,208,774	$142	$4,663,122	4	$5,675,000	$191
Sand Coulee	3.94	0.0009%	2.62	$7,375,641	65	$6,851,839	$231	12	$523,802	$18	$7,375,641	2	$148,993	$5
Simms	3.94	0.0009%	7.68	$15,554,071	141	$13,706,456	$462	41	$1,847,615	$62	$15,554,071	2	$2,001,713	$68
Stockett	3.94	0.0009%	1.47	$4,203,870	46	$3,911,615	$132	6	$292,255	$10	$4,203,870	1	$70,000	$2
Sun Prairie	3.94	0.0009%	5.41	$63,946,110	438	$54,127,036	$1,825	223	$9,819,074	$331	$63,946,110	1	$0	$0
Sun River	3.94	0.0009%	1.86	$4,891,984	54	$3,975,992	$134	29	$915,992	$31	$4,891,984	2	$1,146,913	$39
Ulm	3.94	0.0009%	20.78	$36,281,418	238	$32,771,679	$1,105	50	$3,509,739	$118	$36,281,418	3	$1,059,414	$36
Vaughn	3.94	0.0009%	3.57	$28,743,178	205	$25,062,986	$845	66	$3,680,192	$124	$28,743,178	5	$1,066,145	$36
			58.87	**$272,389,767**	**1,881**	**$208,026,006**	**$7,015**	**664**	**$64,363,761**	**$2,171**	**$272,389,767**	**27**	**$13,380,529**	**$451**
CENSUS County Divisions														
Belt	3.94	0.0009%	486.98	$123,079,954	736	$108,459,067	$3,658	175	$14,620,887	$493	$123,079,954	11	$4,564,466	$154
Cascade	3.94	0.0009%	786.59	$145,237,212	1,039	$131,078,237	$4,420	212	$14,158,975	$477	$145,237,212	24	$5,215,190	$176
Eden-Stockett	3.94	0.0009%	399.35	$91,730,390	577	$81,967,207	$2,764	99	$9,763,183	$329	$91,730,390	17	$3,827,883	$129
Great Falls	3.94	0.0009%	202.99	$6,823,987,128	23,911	$3,113,760,317	$105,006	6,090	$3,710,226,811	$125,121	$6,823,987,128	150	$390,135,980	$13,157
Great Falls North	3.94	0.0009%	297.75	$260,388,632	1,404	$150,457,511	$5,074	795	$109,931,121	$3,707	$260,388,632	12	$7,775,881	$262
Monarch-Neihart	3.94	0.0009%	254.54	$47,787,295	463	$45,288,217	$1,527	63	$2,499,078	$84	$47,787,295	5	$1,707,000	$58
Sun River Valley	3.94	0.0009%	281.33	$129,527,872	938	$114,239,915	$3,853	279	$15,287,957	$516	$129,527,872	14	$5,602,122	$189
			2709.53	**$7,621,738,483**	**29,068**	**$3,745,250,471**	**$126,302**	**7,713**	**$3,876,488,012**	**$130,728**	**$7,621,738,483**	**233**	**$418,828,523**	**$14,124**

Hazardous Material Incident
Risk Assessment Documentation

Cascade County, Montana
Pre-Disaster Mitigation Plan

CASCADE COUNTY HAZARDOUS-MATERIAL INCIDENT VULNERABILITY ANALYSIS

JURISDICTION	AREA SQ MI	HAZMAT AREA SQ MI	PERCENT HAZMAT	TOTAL BUILDING STOCK	# OF RESIDENTIAL BUILDINGS AT RISK	RESIDENTIAL BUILDING EXPOSURE $	# OF COMMERCIAL BUILDINGS AT RISK	COMMERCIAL BUILDING EXPOSURE $	TOTAL HAZMAT BUILDING EXPOSURE $	CRIT FAC #	CRIT FAC # AT RISK	TOTAL CRIT FAC $	CRIT FAC EXPOSURE RISK $
Incorporated Communities & County													
Belt	0.35	0.27	78.23%	$21,564,664	119	$9,695,700	39	$4,249,098	$13,944,798	7	7	$4,394,466	$4,394,466
Cascade	0.52	0.52	99.71%	$32,569,146	235	$22,517,751	76	$10,051,395	$32,569,146	8	8	$5,082,755	$5,082,755
Great Falls	22.24	12.61	56.71%	$6,228,329,602	9,576	$1,152,783,373	3,731	$2,640,876,194	$3,793,659,567	131	88	$351,087,457	$175,718,086
Neihart	1.99	1.22	61.18%	$16,436,011	156	$12,270,437	30	$1,380,023	$13,650,460	3	2	$1,617,000	$827,000
County (excluding incorporated towns)	2684.43	225.14		$1,322,839,060	3,231	$420,082,605	1,055	$122,729,395	$542,812,000	84	33	$56,646,845	$53,058,830
	2709.53	**239.76**	295.83%	**$7,621,738,483**	**13,317**	**$1,617,349,866**	**4,931**	**$2,779,286,105**	**$4,396,635,971**	**233**	**138**	**$418,828,523**	**$239,081,137**
CENSUS Designated Places													
Black Eagle	1.73	1.41	81.41%	$75,824,530	371	$27,838,188	153	$33,272,642	$61,110,830	3	2	$845,000	$775,000
Fort Shaw	5.68	3.67	64.72%	$12,289,259	87	$9,391,638	26	$1,716,542	$11,108,180	4	4	$1,367,352	$1,367,352
Gibson Flats	3.01	0.57	19.12%	$18,616,584	1	$56,951	1	$3,987	$60,938	0	0	$0	$0
Malmstrom AFB	5.08	0.85	16.78%	$4,663,122	3	$228,040	5	$2,808,898	$3,036,938	4	1	$5,675,000	$5,675,000
Sand Coulee	2.62	0.23	8.91%	$7,375,641	7	$1,485,091	1	$1,208	$1,486,299	2	0	$148,993	$0
Simms	7.68	4.85	63.19%	$15,554,071	115	$11,107,273	34	$1,795,051	$12,902,324	2	2	$2,001,713	$2,001,713
Stockett	1.47	0.00	0.00%	$4,203,870	0	$0	0	$0		1	0	$70,000	$0
Sun Prairie	5.41	1.98	36.51%	$63,946,110	265	$27,236,835	181	$7,786,530	$35,023,365	1	0	$0	$0
Sun River	1.86	1.12	60.32%	$4,891,984	52	$3,874,897	28	$902,151	$4,777,048	2	2	$1,146,913	$1,146,913
Ulm	20.78	4.66	22.45%	$36,281,418	142	$17,843,779	32	$2,847,683	$20,691,462	3	3	$1,059,414	$1,059,414
Vaughn	3.57	2.84	79.53%	$28,743,178	199	$23,925,052	64	$3,400,494	$27,325,546	5	5	$1,066,145	$1,066,145
	58.87	**22.19**		**$272,389,767**	**1,242**	**$122,987,744**	**525**	**$54,535,186**	**$177,522,930**	**27**	**19**	**$13,380,529**	**$13,091,536**
CENSUS County Divisions													
Belt	486.98	53.01	10.89%	$123,079,954	376	$54,675,693	90	$6,618,398	$61,294,091	11	7	$4,564,466	$4,394,466
Cascade	786.59	33.04	4.20%	$145,237,212	590	$80,582,695	124	$13,240,730	$93,823,425	24	9	$5,215,190	$5,152,755
Eden-Stockett	399.35	7.68	1.92%	$91,730,390	143	$16,374,488	18	$454,287	$16,828,775	17	3	$3,827,883	$2,102,224
Great Falls	202.99	39.03	19.23%	$6,823,987,128	10,369	$1,281,525,084	3,928	$2,641,203,254	$3,922,728,338	150	96	$390,135,980	$213,246,689
Great Falls North	297.75	52.36	17.58%	$260,388,632	835	$76,847,349	521	$101,938,937	$178,786,286	12	6	$7,775,881	$7,685,881
Monarch-Neihart	254.54	9.54	3.75%	$47,787,295	358	$34,948,482	52	$2,412,521	$37,361,003	5	3	$1,707,000	$897,000
Sun River Valley	281.33	45.11	16.03%	$129,527,872	646	$72,396,075	198	$13,417,978	$85,814,053	14	14	$5,602,122	$5,602,122
	2709.53	**239.76**		**$7,621,738,483**	**13,317**	**$1,617,349,866**	**4,931**	**$2,779,286,105**	**$4,396,635,971**	**233**	**138**	**$418,828,523**	**$239,081,137**

CASCADE COUNTY HAZARDOUS MATERIAL INCIDENT RISK ASSESSMENT
CRITICAL FACILITIES IN HAZ-MAT BUFFER

Name	Primary Sector	City	Address	Latitude	Longitude	Replacement	Contents	Inflation / Total	Cost Source
Senior Citizen Center	Senior	Belt	19 Bridge Street	47.387984	-110.927599		$14,763	$14,763	
Belt City Hall	Municipal	Belt	70 Castner St	47.388000	-110.927000		$0	$0	
Belt Vol Fire Dept	Emergency Services	Belt	16 Bridge St	47.388196	-110.928398	$90,000	$0	$90,000	COUNTY
Pleasant Valley School	School	Belt	Hutterite Colony	47.388750	-110.926910	$263,235	$0	$291,664	HAZUS-MH
BELT HIGH SCHOOL	School	Belt	1 Church Street	47.389074	-110.928002	$1,559,159	$0	$1,727,548	HAZUS-MH
Belt School	School	Belt	1 Church Street	47.389241	-110.927630	$1,417,417	$0	$1,570,498	HAZUS-MH
BELT 7-8	School	Belt	1 Church Street	47.389503	-110.928096	$631,763	$0	$699,993	HAZUS-MH
Senior Center	Senior	Cascade	2 Central Ave W	47.270000	-111.701000		$1,072	$1,072	
Wedsworth Hall	Shelter	Cascade	13 Front St N	47.270000	-111.700000		$0	$0	
Cascade Volunteer FD	Emergency Services	Cascade	15 1st St N	47.271000	-111.701000		$0	$0	
City Hall	Municipal	Cascade	9 Front St N	47.271000	-111.700000		$0	$0	
Farmer/Rancher Fire Co	Emergency Services	Cascade	21 1st St N	47.271578	-111.701066		$0	$0	
CASCADE 7-8	School	Cascade	321 Central Ave. W	47.271620	-111.704260	$899,047	$0	$996,144	HAZUS-MH
CASCADE HIGH SCHOOL	School	Cascade	321 Central Ave. W	47.271620	-111.704260	$2,026,906	$0	$2,245,812	HAZUS-MH
Cascade School	School	Cascade	321 Central Ave. W	47.271840	-111.705229	$1,660,403	$0	$1,839,726	HAZUS-MH
GF Lift Station No. 32	Wastewater	Great Falls	3314 Lower River Road	47.472000	-111.310000	$17,974	$16,350	$34,324	COUNTY
GF Lift Station No. 23	Wastewater	Great Falls	3116 Lower River Road	47.473700	-111.312500	$1,943,440	$239,053	$2,182,493	COUNTY
GREAT FALLS SDA SCHOOL	School	Great Falls	3102 Flood Rd	47.477639	-111.338384	$170,090	$0	$188,460	HAZUS-MH
Montana Air National Guard	State	Great Falls	2700 Airport Ave. B	47.477700	-111.360100		$0	$0	
GF Water System - Gore Hill Storage Tank	Infrastructure	Great Falls	2500 Airport Dr.	47.479300	-111.357400	$1,269,351	$0	$1,269,351	COUNTY
Great Falls Clinic	Healthcare and Public Health	Great Falls	2012 14th St. SW	47.484300	-111.338900		$0	$0	
GF Lift Station No. 21	Wastewater	Great Falls	2001 14th St SW	47.484700	-111.337900	$10,922	$0	$10,922	COUNTY
Water Plant Filter Bldg	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$12,680,663	$0	$12,680,663	COUNTY
WP Backwash Pumphouse & Clarifier	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$664,855	$0	$664,855	COUNTY
WP Backwash Surge Tank	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$266,616	$0	$266,616	COUNTY
WP Carbon Bldg	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$218,682	$0	$218,682	COUNTY
WP Dechloriniation Bldg	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$52,031	$0	$52,031	COUNTY
WP Floculation Basins	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$1,038,726	$0	$1,038,726	COUNTY
WP Inlets Improvements	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$307,667	$0	$307,667	COUNTY
WP Preimary Clarif. Basins	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$2,488,243	$0	$2,488,243	COUNTY
WP Pumping Station/shop	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$1,639,454	$0	$1,639,454	COUNTY
WP Seasonal Complex	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$3,465,698	$0	$3,465,698	COUNTY
WP Seasonal Well	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$685,468	$0	$685,468	COUNTY
WP Secondary Basins	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$1,961,015	$0	$1,961,015	COUNTY
WP Sludge Basins	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$133,502	$0	$133,502	COUNTY
WP Solids Pump Station	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$292,782	$0	$292,782	COUNTY
University of Great Falls	School	Great Falls	1301 20th St. S	47.491300	-111.271800		$0	$0	
Benefis Health Care (East Campus)	Healthcare and Public Health	Great Falls	1101 26th St. S	47.492000	-111.261700	$13,860,000	$0	$15,356,880	HAZUS-MH
Great Falls Public Schools Admin Building	School	Great Falls	1100 4th St S	47.493000	-111.300000	$3,520,000	$0	$3,520,000	COUNTY
GF Lift Station No. 15	Wastewater	Great Falls	810 10th Avenue S.W.	47.493200	-111.325500	$1,485,300	$523,750	$2,009,050	COUNTY
GF Lift Station No. 6	Wastewater	Great Falls	4909 10th Avenue South	47.494400	-111.225600	$11,982	$10,900	$22,882	COUNTY
GF Emergency Services	Emergency Services	Great Falls	514 9 Ave. S	47.495100	-111.298100		$0	$0	COUNTY
GF Water System - Ella Storage Tank	Infrastructure	Great Falls	4110 Ella Ave	47.495500	-111.231500	$1,593,000	$0	$1,593,000	COUNTY
GF Water System - East Reservoir Storage Tank	Infrastructure	Great Falls	801 33rd St S.	47.496200	-111.248600	$2,322,000	$0	$2,322,000	COUNTY
GF Lift Station No. 20	Wastewater	Great Falls	835 13th Street S.W.	47.496800	-111.335400	$4,250	$2,180	$6,430	COUNTY
Lincoln Elementary School	School	Great Falls	624 27th St. S	47.497400	-111.261300	$4,405,000	$0	$4,405,000	COUNTY
GF Lift Station No. 12	Wastewater	Great Falls	601 River Drive South	47.498200	-111.306200	$17,974	$16,350	$34,324	COUNTY
GF Lift Station No. 1	Wastewater	Great Falls	600 River Drive South	47.498400	-111.307400	$897,322	$572,421	$1,469,743	COUNTY
Our Lady of Lourdes School	School	Great Falls	1305 5th Ave. S	47.500000	-111.283700	$2,502,753	$0	$2,773,051	HAZUS-MH
Health Department & Community Health Care	Healthcare and Public Health	Great Falls	115 4th St. S	47.503400	-111.300600	$2,488,944	$1,533,893	$4,022,837	COUNTY

CASCADE COUNTY HAZARDOUS MATERIAL INCIDENT RISK ASSESSMENT
CRITICAL FACILITIES IN HAZ-MAT BUFFER

Name	Primary Sector	City	Address	Latitude	Longitude	Replacement	Contents	Inflation / Total	Cost Source
EOC/911 Center/GF Police Dept.	Emergency Services	Great Falls	112 1st Street South	47.503600	-111.307100	$5,136,277	$0	$5,136,277	COUNTY
GF Lift Station No. 18	Wastewater	Great Falls	1716 3rd Avenue S.W.	47.504000	-111.343700	$1,015,560	$513,275	$1,528,835	COUNTY
GF Transit - transfer center	Infrastructure	Great Falls	326 1st Ave. S	47.504000	-111.301100		$0	$0	
GF Lift Station No. 4	Wastewater	Great Falls	100 River Drive South	47.504700	-111.310400	$2,731	$2,081	$4,812	COUNTY
Great Falls Police Station (county equipment)	Municipal	Great Falls	12-1st Ave N	47.505000	-111.309000		$21,680	$21,680	COUNTY
Indian Family Health Clinic	Healthcare and Public Health	Great Falls	1220 Central Ave. Suite 1B	47.505000	-111.285500		$0	$0	
GF Civic Center	Municipal	Great Falls	2 Park Drive South	47.505300	-111.306400	$20,568,534	$0	$20,568,534	COUNTY
GF Lift Station No. 19	Wastewater	Great Falls	1601 2nd Avenue S.W.	47.505800	-111.342000	$3,764	$2,180	$5,944	COUNTY
GREAT FALLS MONTESSORI SCHOOL	School	Great Falls	1521 1ST AVE N	47.506389	-111.281266	$50,622	$0	$56,089	HAZUS-MH
Great Falls Public Library	Municipal	Great Falls	301 2nd Ave N	47.507800	-111.302100	$3,096,311	$0	$3,096,311	COUNTY
DES Office	Municipal	Great Falls	521-1st Ave. NW	47.508900	-111.321200	$1,295,554	$589,350	$1,884,904	COUNTY
West Elementary School	School	Great Falls	1205 1st Ave. NW	47.509200	-111.332600	$8,664,000	$0	$8,664,000	COUNTY
Health Dept. NW Campus (old Surveyor/DES)	Municipal	Great Falls	415-3rd St NW	47.511600	-111.316000	$376,972	$779,268	$1,156,240	COUNTY
GF Lift Station No. 2	Wastewater	Great Falls	611 River Drive North	47.511900	-111.305800	$17,974	$16,350	$34,324	COUNTY
LIGHTHOUSE CHRISTIAN ACADEMY	School	Great Falls	1600 5TH AVE NW	47.512525	-111.339449	$14,174	$0	$15,705	HAZUS-MH
Mt Highway Patrol	State	Great Falls	812 14th S N	47.514800	-111.283800		$0	$0	
GF Fire Station 2	Emergency Services	Great Falls	731-6th St. NW	47.515800	-111.323400	$660,675	$0	$660,675	COUNTY
PreRelease Center	Detention	Great Falls	1019 15th St. N	47.516600	-111.280100		$724	$724	COUNTY
Valley View Elementary School	School	Great Falls	900 Ave A NW	47.518300	-111.327300	$4,648,000	$0	$4,648,000	COUNTY
GF Lift Station No. 27	Wastewater	Great Falls	4120 North Star Boulevard	47.518600	-111.234600	$17,974	$16,350	$34,324	COUNTY
GF Lift Station No. 16	Wastewater	Great Falls	1326 5th St NW	47.518700	-111.322300	$4,000	$13,625	$17,625	COUNTY
GF Transit	Infrastructure	Great Falls	3905 North Star Blvd.	47.519000	-111.239100		$0	$0	
Aeration Basins	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$4,103,910	$0	$4,103,910	COUNTY
Chlorine Building	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$74,830	$0	$74,830	COUNTY
Chlorine Contact Basin	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$1,034,809	$0	$1,034,809	COUNTY
Co-Generation Facility	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$1,143,000	$0	$1,143,000	COUNTY
Digester #1 Primary	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$1,977,989	$0	$1,977,989	COUNTY
Digester #2 - Secondary	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$1,731,296	$0	$1,731,296	COUNTY
Digester Control Bldg	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$1,273,878	$0	$1,273,878	COUNTY
Final Basins - Secondary Clarifier	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$5,979,713	$0	$5,979,713	COUNTY
Flotation Thickener Bldg	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$2,828,965	$0	$2,828,965	COUNTY
Gravity Thickener Bldg	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$886,063	$0	$886,063	COUNTY
Gravity Thickener Tank	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$200,088	$0	$200,088	COUNTY
Maintenance Building	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$264,180	$0	$264,180	COUNTY
Motor Control Building	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$389,817	$0	$389,817	COUNTY
Pipe Gallery	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$1,204,090	$0	$1,204,090	COUNTY
Preimary Division Structure Splitter box	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$66,347	$0	$66,347	COUNTY
Preimary Pump Station	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$228,867	$0	$228,867	COUNTY
Primary Clarifiers	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$2,536,785	$0	$2,536,785	COUNTY
Process Water Pump Station	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$135,729	$0	$135,729	COUNTY
Raw Waste Water Pump Station	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$839,629	$0	$839,629	COUNTY
Solids Processing Bldg	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$2,225,975	$0	$2,225,975	COUNTY
WWTP Admin Bldg	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$1,772,281	$0	$1,772,281	COUNTY
WWTP Sludge Holding Tank	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$544,592	$0	$544,592	COUNTY
Great Falls Clinic-NW Clinic	Healthcare and Public Health	Great Falls	1600 Division Rd.	47.521100	-111.311200		$0	$0	
Montana Refining	Business	Great Falls	1900-10th St. NE	47.523900	-111.290600		$0	$0	
Public Works Complex (several buildings)	Municipal	Great Falls	1025 25th Ave. NE	47.529500	-111.288600	$5,504,565	$0	$5,504,565	COUNTY
GF Lift Station No. 17	Wastewater	Great Falls	4201 Giant Springs Road	47.529500	-111.235700	$8,988	$10,900	$19,888	COUNTY
Neihart Volunteer Fire Dept	Emergency Services	Neihart	220 N Main	46.929000	-110.731000	$227,000	$0	$227,000	COUNTY
Senior Center/Town Hall	Municipal	Neihart	200 S Main St	46.929593	-110.731765	$600,000	$0	$600,000	COUNTY

CASCADE COUNTY HAZARDOUS MATERIAL INCIDENT RISK ASSESSMENT
CRITICAL FACILITIES IN HAZ-MAT BUFFER

Name	Primary Sector	City	Address	Latitude	Longitude	Replacement	Contents	Inflation / Total	Cost Source
Monarch Vol Fire Co	Emergency Services	County	7 Montana Ave	47.099433	-110.837172	$70,000	$0	$70,000	COUNTY
Dearborn Vol Fire Co	Emergency Services	County	56 Dearborn River Road	47.133392	-111.895537	$70,000	$0	$70,000	COUNTY
CENTERVILLE 7-8	School	County	693 Stockett Road	47.404090	-111.154470	$607,464	$0	$673,071	HAZUS-MH
CENTERVILLE HIGH SCHOOL	School	County	693 Stockett Road	47.404090	-111.154470	$1,289,849	$0	$1,429,153	HAZUS-MH
Missile Site - J-8	Federal facility	County	Rural location	47.418770	-111.257170		$0	$0	
ULM 7-8	School	County	6 ULM VAUGHN ROAD	47.430500	-111.506300	$255,135	$0	$282,690	HAZUS-MH
Ulm Vol Fire Co	Emergency Services	County	13 Old US Hwy 91	47.430508	-111.507462	$70,000	$0	$70,000	COUNTY
Ulm School	School	County	6 Ulm-Vaughn Road	47.436248	-111.507099	$637,838	$0	$706,724	HAZUS-MH
Cascade Co. Sheriff Office/Adult Detention Center	Emergency Services	County	3800 Ulm N Frontage Rd	47.469200	-111.367700	$24,709,414	$3,540,539	$28,249,953	COUNTY
Cascade County Search & Resue	Emergency Services	County	3800 Ulm N Frontage Rd	47.469200	-111.367700	$370,351	$266,786	$637,137	COUNTY
Simms High School	School	County	123 Walker Street	47.492000	-111.928000	$1,743,423	$0	$1,931,713	HAZUS-MH
Simms Vol Fire Co	Emergency Services	County	195 N Main	47.493452	-111.927691	$70,000	$0	$70,000	COUNTY
SUN RIVER VALLEY SENIOR CENTER	Senior	County	13319 MT HIGHWAY 200	47.502421	-111.816118		$21,211	$21,211	COUNTY
Fort Shaw Rural VFD	Emergency Services	County	140 Campbell St	47.508561	-111.812951		$0	$0	
Cascade Colony School	School	County	2 School Loop Road	47.508910	-111.820791	$253,110	$0	$280,446	HAZUS-MH
FORT SHAW ELEM SCHOOL	School	County	SCHOOL LOOP ROAD	47.509230	-111.819520	$961,819	$0	$1,065,695	HAZUS-MH
Loy Elementary School	School	County	501 57th St. N	47.511000	-111.214000	$5,675,000	$0	$5,675,000	COUNTY
HERITAGE BAPTIST SCHOOL	School	County	5100 10TH AVE N	47.516405	-111.222413	$283,483	$0	$314,100	HAZUS-MH
Black Eagle Dam	Dams	County		47.519693	-111.263188		$0	$0	
Repeater - Pacific Steel Site / 744 Local	Communications	County	2930 Rainbow Dam Rd	47.530444	-111.262694	$775,000	$0	$775,000	COUNTY
Sun River Middle School	School	County	301 Largent Street	47.533699	-111.723411	$971,943	$0	$1,076,913	HAZUS-MH
Sun River Fire Service	Emergency Services	County	295 Largent St	47.533784	-111.722968	$70,000	$0	$70,000	COUNTY
Rainbow	Dams	County		47.534393	-111.205588		$0	$0	
GF Water System - Skyline Storage Tank	Infrastructure	County	1400 36th Ave NE	47.538300	-111.283000	$1,593,000	$0	$1,593,000	COUNTY
GF Lift Station No. 30	Wastewater	County	122 Black Eagle Road	47.546300	-111.260900	$754,805	$41,900	$796,705	COUNTY
Cascade County Public Works	Municipal	County	279 Vaughn S. Frontage Road	47.547946	-111.486614	$5,016,568	$1,030,301	$6,046,869	COUNTY
Vaughn-Cascade Co. Sewer District	Infrastructure	County	1161 6th Ave	47.548000	-111.558000		$0	$0	
Vaughn-Cascade Co. Sewer District	Infrastructure	County	1110 6th Ave	47.548000	-111.557000		$0	$0	
Vaughn Vol Fire Dept	Emergency Services	County	14 4th St	47.559611	-111.548761	$70,000	$0	$70,000	COUNTY
Vaughn School	School	County	480 Central Avenue	47.560180	-111.549442	$668,211	$0	$740,378	HAZUS-MH
VAUGHN 7-8	School	County	480 CENTRAL AVENUE	47.560270	-111.549490	$230,837	$0	$255,767	HAZUS-MH
Repeater - 744 West site	Communications	County	1 kilometer S of MM 15.5 US Hv	47.583083	-111.837806	$20,000	$0	$20,000	COUNTY
BENTON LAKE SCHOOL	School	County	17557 BOOTLEGGER TRAIL	47.697897	-111.147955	$60,746	$0	$67,307	HAZUS-MH

Transportation Accident Risk Assessment Documentation

Cascade County, Montana
Pre-Disaster Mitigation Plan

CASCADE COUNTY HIGHWAY ACCIDENT VULNERABILITY ANALYSIS

JURISDICTION	FREQUENCY	MAGNITUDE	AREA SQ MI	TOTAL BUILDING STOCK	# OF RESIDENTIAL BUILDINGS AT RISK	RESIDENTIAL BUILDING EXPOSURE $	ANNUAL LOSS TO RESIDENTIAL BUILDING STOCK	# OF COMMERCIAL BUILDINGS AT RISK	COMMERCIAL BUILDING EXPOSURE $	ANNUAL LOSS TO COMMERCIAL BUILDING STOCK	TOTAL BUILDING EXPOSURE $	CRIT FAC #	TOTAL CRIT FAC $	ANNUAL LOSS TO CF
Incorporated Communities & County														
Belt	2280.90	0.000001%	0.35	$21,564,664	214	$16,138,830	$286	54	$5,425,834	$96	$21,564,664	7	$4,394,466	$78
Cascade	2280.90	0.000001%	0.52	$32,569,146	235	$22,517,751	$399	76	$10,051,395	$178	$32,569,146	8	$5,082,755	$90
Great Falls	2280.90	0.000001%	22.24	$6,228,329,602	20,690	$2,557,237,526	$45,262	5,372	$3,671,092,076	$64,977	$6,228,329,602	131	$351,087,457	$6,214
Neihart	2280.90	0.000001%	1.99	$16,436,011	178	$15,055,088	$266	32	$1,380,923	$24	$16,436,011	3	$1,617,000	$29
County (excluding the incorporated towns)			2684.43	$1,322,839,060	7,751	$1,134,301,276	$20,077	2,179	$188,537,784	$3,337	$1,322,839,060	84	$56,646,845	$1,003
			2709.53	**$7,621,738,483**	**29,068**	**$3,745,250,471**	**$66,290**	**7,713**	**$3,876,488,012**	**$68,613**	**$7,621,738,483**	**233**	**$418,828,523**	**$7,413**
CENSUS Designated Places														
Black Eagle	2280.90	0.000001%	1.73	$75,824,530	493	$40,893,821	$724	184	$34,930,709	$618	$75,824,530	3	$845,000	$15
Fort Shaw	2280.90	0.000001%	5.68	$12,289,259	92	$10,549,723	$187	27	$1,739,536	$31	$12,289,259	4	$1,367,352	$24
Gibson Flats	2280.90	0.000001%	3.01	$18,616,584	103	$15,720,511	$278	16	$2,896,073	$51	$18,616,584	0	$0	$0
Malmstrom AFB	2280.90	0.000001%	5.08	$4,663,122	6	$454,348	$8	10	$4,208,774	$74	$4,663,122	4	$5,675,000	$100
Sand Coulee	2280.90	0.000001%	2.62	$7,375,641	65	$6,851,839	$121	12	$523,802	$9	$7,375,641	2	$148,993	$3
Simms	2280.90	0.000001%	7.68	$15,554,071	141	$13,706,456	$243	41	$1,847,615	$33	$15,554,071	2	$2,001,713	$35
Stockett	2280.90	0.000001%	1.47	$4,203,870	46	$3,911,615	$69	6	$292,255	$5	$4,203,870	1	$70,000	$1
Sun Prairie	2280.90	0.000001%	5.41	$63,946,110	438	$54,127,036	$958	223	$9,819,074	$174	$63,946,110	1	$0	$0
Sun River	2280.90	0.000001%	1.86	$4,891,984	54	$3,975,992	$70	29	$915,992	$16	$4,891,984	2	$1,146,913	$20
Ulm	2280.90	0.000001%	20.78	$36,281,418	238	$32,771,679	$580	50	$3,509,739	$62	$36,281,418	3	$1,059,414	$19
Vaughn	2280.90	0.000001%	3.57	$28,743,178	205	$25,062,986	$444	66	$3,680,192	$65	$28,743,178	5	$1,066,145	$19
			58.87	**$272,389,767**	**1,881**	**$208,026,006**	**$3,682**	**664**	**$64,363,761**	**$1,139**	**$272,389,767**	**27**	**$13,380,529**	**$237**
CENSUS County Divisions														
Belt	2280.90	0.000001%	486.98	$123,079,954	736	$108,459,067	$1,920	175	$14,620,887	$259	$123,079,954	11	$4,564,466	$81
Cascade	2280.90	0.000001%	786.59	$145,237,212	1,039	$131,078,237	$2,320	212	$14,158,975	$251	$145,237,212	24	$5,215,190	$92
Eden-Stockett	2280.90	0.000001%	399.35	$91,730,390	577	$81,967,207	$1,451	99	$9,763,183	$173	$91,730,390	17	$3,827,883	$68
Great Falls	2280.90	0.000001%	202.99	$6,823,987,128	23,911	$3,113,760,317	$55,112	6,090	$3,710,226,811	$65,670	$6,823,987,128	150	$390,135,980	$6,905
Great Falls North	2280.90	0.000001%	297.75	$260,388,632	1,404	$150,457,511	$2,663	795	$109,931,121	$1,946	$260,388,632	12	$7,775,881	$138
Monarch-Neihart	2280.90	0.000001%	254.54	$47,787,295	463	$45,288,217	$802	63	$2,499,078	$44	$47,787,295	5	$1,707,000	$30
Sun River Valley	2280.90	0.000001%	281.33	$129,527,872	938	$114,239,915	$2,022	279	$15,287,957	$271	$129,527,872	14	$5,602,122	$99
			2709.53	**$7,621,738,483**	**29,068**	**$3,745,250,471**	**$66,290**	**7,713**	**$3,876,488,012**	**$68,613**	**$7,621,738,483**	**233**	**$418,828,523**	**$7,413**

Severe Winter Weather Risk Assessment Documentation

Cascade County, Montana
Pre-Disaster Mitigation Plan

CASCADE COUNTY SEVERE WINTER WEATHER VULNERABILITY ANALYSIS

JURISDICTION	FREQUENCY	MAGNITUDE	AREA SQ MI	TOTAL BUILDING STOCK	# OF RESIDENTIAL BUILDINGS AT RISK	RESIDENTIAL BUILDING EXPOSURE $	ANNUAL LOSS TO RESIDENTIAL BUILDING STOCK	# OF COMMERCIAL BUILDINGS AT RISK	COMMERCIAL BUILDING EXPOSURE $	ANNUAL LOSS TO COMMERCIAL BUILDING STOCK	TOTAL BUILDING EXPOSURE $	CRIT FAC #	TOTAL CRIT FAC $	ANNUAL LOSS TO CF
Incorporated Communities & County														
Belt	3.22	0.0005%	0.35	$21,564,664	214	$16,138,830	$240	54	$5,425,834	$81	$21,564,664	7	$4,394,466	$65
Cascade	3.22	0.0005%	0.52	$32,569,146	235	$22,517,751	$335	76	$10,051,395	$150	$32,569,146	8	$5,082,755	$76
Great Falls	3.22	0.0005%	22.24	$6,228,329,602	20,690	$2,557,237,526	$38,090	5,372	$3,671,092,076	$54,680	$6,228,329,602	131	$351,087,457	$5,229
Neihart	3.22	0.0005%	1.99	$16,436,011	178	$15,055,088	$224	32	$1,380,923	$21	$16,436,011	3	$1,617,000	$24
County (excluding the incorporated towns)			2684.43	$1,322,839,060	7,751	$1,134,301,276	$16,895	2,179	$188,537,784	$2,808	$1,322,839,060	84	$56,646,845	$844
			2709.53	**$7,621,738,483**	**29,068**	**$3,745,250,471**	**$55,785**	**7,713**	**$3,876,488,012**	**$57,740**	**$7,621,738,483**	**233**	**$418,828,523**	**$6,238**
CENSUS Designated Places														
Black Eagle	3.22	0.0005%	1.73	$75,824,530	493	$40,893,821	$609	184	$34,930,709	$520	$75,824,530	3	$845,000	$13
Fort Shaw	3.22	0.0005%	5.68	$12,289,259	92	$10,549,723	$157	27	$1,739,536	$26	$12,289,259	4	$1,367,352	$20
Gibson Flats	3.22	0.0005%	3.01	$18,616,584	103	$15,720,511	$234	16	$2,896,073	$43	$18,616,584	0	$0	$0
Malmstrom AFB	3.22	0.0005%	5.08	$4,663,122	6	$454,348	$7	10	$4,208,774	$63	$4,663,122	4	$5,675,000	$85
Sand Coulee	3.22	0.0005%	2.62	$7,375,641	65	$6,851,839	$102	12	$523,802	$8	$7,375,641	2	$148,993	$2
Simms	3.22	0.0005%	7.68	$15,554,071	141	$13,706,456	$204	41	$1,847,615	$28	$15,554,071	2	$2,001,713	$30
Stockett	3.22	0.0005%	1.47	$4,203,870	46	$3,911,615	$58	6	$292,255	$4	$4,203,870	1	$70,000	$1
Sun Prairie	3.22	0.0005%	5.41	$63,946,110	438	$54,127,036	$806	223	$9,819,074	$146	$63,946,110	1	$0	$0
Sun River	3.22	0.0005%	1.86	$4,891,984	54	$3,975,992	$59	29	$915,992	$14	$4,891,984	2	$1,146,913	$17
Ulm	3.22	0.0005%	20.78	$36,281,418	238	$32,771,679	$488	50	$3,509,739	$52	$36,281,418	3	$1,059,414	$16
Vaughn	3.22	0.0005%	3.57	$28,743,178	205	$25,062,986	$373	66	$3,680,192	$55	$28,743,178	5	$1,066,145	$16
			58.87	**$272,389,767**	**1,881**	**$208,026,006**	**$3,099**	**664**	**$64,363,761**	**$959**	**$272,389,767**	**27**	**$13,380,529**	**$199**
CENSUS County Divisions														
Belt	3.22	0.0005%	486.98	$123,079,954	736	$108,459,067	$1,615	175	$14,620,887	$218	$123,079,954	11	$4,564,466	$68
Cascade	3.22	0.0005%	786.59	$145,237,212	1,039	$131,078,237	$1,952	212	$14,158,975	$211	$145,237,212	24	$5,215,190	$78
Eden-Stockett	3.22	0.0005%	399.35	$91,730,390	577	$81,967,207	$1,221	99	$9,763,183	$145	$91,730,390	17	$3,827,883	$57
Great Falls	3.22	0.0005%	202.99	$6,823,987,128	23,911	$3,113,760,317	$46,379	6,090	$3,710,226,811	$55,263	$6,823,987,128	150	$390,135,980	$5,811
Great Falls North	3.22	0.0005%	297.75	$260,388,632	1,404	$150,457,511	$2,241	795	$109,931,121	$1,637	$260,388,632	12	$7,775,881	$116
Monarch-Neihart	3.22	0.0005%	254.54	$47,787,295	463	$45,288,217	$675	63	$2,499,078	$37	$47,787,295	5	$1,707,000	$25
Sun River Valley	3.22	0.0005%	281.33	$129,527,872	938	$114,239,915	$1,702	279	$15,287,957	$228	$129,527,872	14	$5,602,122	$83
			2709.53	**$7,621,738,483**	**29,068**	**$3,745,250,471**	**$55,785**	**7,713**	**$3,876,488,012**	**$57,740**	**$7,621,738,483**	**233**	**$418,828,523**	**$6,238**

Flood/Levee Failure Risk Assessment Documentation

Cascade County, Montana
Pre-Disaster Mitigation Plan

CASCADE COUNTY 100-YEAR FLOOD VULNERABILITY ANALYSIS

JURISDICTION	FREQUENCY	MAGNITUDE	AREA SQ MI	100 YR FLOOD AREA SQ MI	100 YR PERCENT FLOOD	ACRES IN 100-YEAR FLOODPLAIN	TOTAL BUILDING STOCK	TOTAL RESIDENTIAL BUILDING STOCK $	100 YR FLOOD # OF RESIDENTIAL BUILDINGS AT RISK	100 YR RESIDENTIAL BUILDING EXPOSURE $	100 YR FLOOD ANNUAL LOSS TO RESIDENTIAL BUILDING STOCK	TOTAL COMMERCIAL BUILDING STOCK $	100 YR # OF COMMERCIAL BUILDINGS AT RISK	100 YR COMMERCIAL BUILDING EXPOSURE $	100 YR FLOOD ANNUAL LOSS TO COMMERCIAL BUILDING STOCK	100 YR FLOOD TOTAL BUILDING EXPOSURE $	ANNUAL LOSS TO RESIDENTIAL BUILDING STOCK	CRIT FAC #	TOTAL CRIT FAC $	100 YR FLOOD CRIT FAC # AT RISK	100 YR CRIT FAC EXPOSURE RISK $	100 YR ANNUAL LOSS TO CF
Incorporated Communities & County																						
Belt	0.19	0.11%	0.35	0.14	39%	88	$21,564,664	$16,138,830	110	$8,865,776	$1,807	$5,425,834	34	$4,708,606	$960	$13,574,382	$4,395	7	$4,394,466	2	$2,270,491	$463
Cascade	0.19	0.11%	0.52	0.46	89%	296	$32,569,146	$22,517,751	227	$20,597,413	$4,198	$10,051,395	72	$9,012,735	$1,837	$29,610,148	$6,637	8	$5,082,755	8	$5,082,755	$1,036
Great Falls	0.19	0.11%	22.24	1.89	8%	1,208	$6,228,329,602	$2,557,237,526	905	$123,710,664	$25,212	$3,671,092,076	126	$111,234,635	$22,669	$234,945,299	$1,269,311	131	$351,087,457	9	$12,144,809	$2,475
Neihart	0.19	0.11%	1.99	0.00	0%	0	$16,436,011	$15,055,088	0	$0	$0	$1,380,923	0	$0	$0	$0	$3,350	3	$1,617,000	0	$0	$0
County (excluding the incorporated towns)			2684.43	77.03		49,297	$1,322,839,060	$1,134,301,276	1,523	$270,556,020	$55,138	$188,537,784	304	$23,169,688	$4,722	$293,725,708	$269,590	84	$56,646,845	7	$3,408,849	$695
			2709.53	**79.51**	**137%**	**50,889**	**$7,621,738,483**	**$3,745,250,471**	**2,765**	**$423,729,873**	**$86,355**	**$3,876,488,012**	**536**	**$148,125,664**	**$30,187**	**$571,855,537**	**$1,553,283**	**233**	**$418,828,523**	**26**	**$22,906,904**	**$4,668**
CENSUS Designated Places																						
Black Eagle	0.19	0.11%	1.73	0.14	8%	89	$75,824,530	$40,893,821	0	$0	$0	$34,930,709	1	$410,000	$84	$410,000	$15,453	3	$845,000	1	$0	$0
Fort Shaw	0.19	0.11%	5.68	0.40	7%	257	$12,289,259	$10,549,723	6	$1,331,137	$271	$1,739,536	4	$1,043,078	$213	$2,374,215	$2,505	4	$1,367,352	0	$0	$0
Gibson Flats	0.19	0.11%	3.01	1.37	45%	875	$18,616,584	$15,720,511	76	$9,108,400	$1,856	$2,896,073	10	$1,047,731	$214	$10,156,131	$3,794	0	$0	0	$0	$0
Malmstrom AFB	0.19	0.11%	5.08	0.00	0%	0	$4,663,122	$454,348	0	$0	$0	$4,208,774	0	$0	$0	$0	$950	4	$5,675,000	0	$0	$0
Sand Coulee	0.19	0.11%	2.62	0.22	9%	143	$7,375,641	$6,851,839	30	$2,832,130	$577	$523,802	7	$176,658	$36	$3,008,788	$1,503	2	$148,993	1	$159,712	$33
Simms	0.19	0.11%	7.68	1.74	23%	1,115	$15,554,071	$13,706,456	17	$2,371,252	$483	$1,847,615	3	$47,940	$10	$2,419,192	$3,170	2	$2,001,713	0	$0	$0
Stockett	0.19	0.11%	1.47	0.05	3%	30	$4,203,870	$3,911,615	7	$537,441	$110	$292,255	0	$0	$0	$537,441	$857	1	$70,000	0	$0	$0
Sun Prairie	0.19	0.11%	5.41	1.92	36%	1,232	$63,946,110	$54,127,036	125	$18,255,942	$3,720	$9,819,074	49	$2,027,362	$413	$20,283,304	$13,032	1	$0	0	$0	$0
Sun River	0.19	0.11%	1.86	1.82	98%	1,167	$4,891,984	$3,975,992	52	$3,712,662	$757	$915,992	28	$852,692	$174	$4,565,354	$997	2	$1,146,913	2	$1,146,913	$234
Ulm	0.19	0.11%	20.78	3.70	18%	2,371	$36,281,418	$32,771,679	5	$1,288,631	$263	$3,509,739	3	$90,010	$18	$1,378,641	$7,394	3	$1,059,414	0	$0	$0
Vaughn	0.19	0.11%	3.57	0.84	23%	535	$28,743,178	$25,062,986	22	$4,922,447	$1,003	$3,680,192	4	$263,285	$54	$5,185,732	$5,858	5	$1,066,145	0	$0	$0
CENSUS County Divisions																						
Belt	0.19	0.11%	486.98	2.36	0%	1,510	$123,079,954	$108,459,067	195	$21,812,739	$4,445	$14,620,887	46	$5,557,568	$1,133	$27,370,307	$25,083	11	$4,564,466	2	$2,270,491	$463
Cascade	0.19	0.11%	786.59	22.65	3%	14,493	$145,237,212	$131,078,237	432	$54,688,970	$11,145	$14,158,975	95	$9,818,297	$2,001	$64,507,267	$29,599	24	$5,215,190	8	$5,082,755	$1,036
Eden-Stockett	0.19	0.11%	399.35	7.27	2%	4,655	$91,730,390	$81,967,207	179	$28,520,076	$5,812	$9,763,183	31	$4,427,767	$902	$32,947,843	$18,694	17	$3,827,883	4	$2,261,936	$461
Great Falls	0.19	0.11%	202.99	24.11	12%	15,428	$6,823,987,128	$3,113,760,317	1,624	$272,198,584	$55,473	$3,710,226,811	239	$122,744,847	$25,015	$394,943,431	$1,390,704	150	$390,135,980	9	$12,144,809	$2,475
Great Falls North	0.19	0.11%	297.75	2.58	1%	1,654	$260,388,632	$150,457,511	132	$19,231,323	$3,919	$109,931,121	53	$2,474,806	$504	$21,706,129	$53,066	12	$7,775,881	1	$0	$0
Monarch-Neihart	0.19	0.11%	254.54	0.00	0%	0	$47,787,295	$45,288,217	0	$0	$0	$2,499,078	0	$0	$0	$0	$9,739	5	$1,707,000	0	$0	$0
Sun River Valley	0.19	0.11%	281.33	20.55	7%	13,149	$129,527,872	$114,239,915	203	$27,278,181	$5,559	$15,287,957	72	$3,102,379	$632	$30,380,560	$26,397	14	$5,602,122	2	$1,146,913	$234
			2709.53	**79.51**		**50,889**	**$7,621,738,483**	**$3,745,250,471**	**2,765**	**$423,729,873**	**$86,355**	**$3,876,488,012**	**536**	**$148,125,664**	**$30,187**	**$571,855,537**	**$1,553,283**	**233**	**$418,828,523**	**26**	**$22,906,904**	**$4,668**

CASCADE COUNTY FLOOD RISK ASSESSMENT
CRITICAL FACILITIES IN 100-YEAR FLOOD HAZARD AREA

Name	Primary Sector	Jurisdiction	Address	Latitude	Longitude	Replacement	Contents	Cost Source	Inflation / Total
Belt School	School	Belt	1 Church Street	47.389241	-110.927630	$1,417,417	$0	HAZUS-MH	$1,570,498
BELT 7-8	School	Belt	1 Church Street	47.389503	-110.928096	$631,763	$0	HAZUS-MH	$699,993
Senior Center	Senior	Cascade	2 Central Ave W	47.270000	-111.701000		$1,072		$1,072
Wedsworth Hall	Shelter	Cascade	13 Front St N	47.270000	-111.700000		$0		$0
Cascade Volunteer FD	Emergency Services	Cascade	15 1st St N	47.271000	-111.701000		$0		$0
City Hall	Municipal	Cascade	9 Front St N	47.271000	-111.700000		$0		$0
Farmer/Rancher Fire Co	Emergency Services	Cascade	21 1st St N	47.271578	-111.701066		$0		$0
CASCADE 7-8	School	Cascade	321 Central Ave. W	47.271620	-111.704260	$899,047	$0	HAZUS-MH	$996,144
CASCADE HIGH SCHOOL	School	Cascade	321 Central Ave. W	47.271620	-111.704260	$2,026,906	$0	HAZUS-MH	$2,245,812
Cascade School	School	Cascade	321 Central Ave. W	47.271840	-111.705229	$1,660,403	$0	HAZUS-MH	$1,839,726
GF Lift Station No. 32	Wastewater	Great Falls	3314 Lower River Road	47.472000	-111.310000	$17,974	$16,350	COUNTY	$34,324
GF Lift Station No. 23	Wastewater	Great Falls	3116 Lower River Road	47.473700	-111.312500	$1,943,440	$239,053	COUNTY	$2,182,493
GF Lift Station No. 24	Wastewater	Great Falls	704 Juniper	47.481000	-111.324900	$4,250	$4,360	COUNTY	$8,610
GF Lift Station No. 15	Wastewater	Great Falls	810 10th Avenue S.W.	47.493200	-111.325500	$1,485,300	$523,750	COUNTY	$2,009,050
GF Lift Station No. 20	Wastewater	Great Falls	835 13th Street S.W.	47.496800	-111.335400	$4,250	$2,180	COUNTY	$6,430
GF Lift Station No. 1	Wastewater	Great Falls	600 River Drive South	47.498400	-111.307400	$897,322	$572,421	COUNTY	$1,469,743
GF Lift Station No. 18	Wastewater	Great Falls	1716 3rd Avenue S.W.	47.504000	-111.343700	$1,015,560	$513,275	COUNTY	$1,528,835
GF Lift Station No. 2	Wastewater	Great Falls	611 River Drive North	47.511900	-111.305800	$17,974	$16,350	COUNTY	$34,324
Morninside Elementary School	School	Great Falls	4119 7th Ave N	47.513100	-111.235400	$4,871,000	$0	COUNTY	$4,871,000
Sand Coulee Vol Fire Co	Emergency Services	County	520 E Hunter Rd	47.397285	-111.170996	$148,993	$10,719	COUNTY	$159,712
CENTERVILLE 7-8	School	County	693 Stockett Road	47.404090	-111.154470	$607,464	$0	HAZUS-MH	$673,071
CENTERVILLE HIGH SCHOOL	School	County	693 Stockett Road	47.404090	-111.154470	$1,289,849	$0	HAZUS-MH	$1,429,153
Missile Site - J-10	Federal facility	County	Rural location	47.429190	-111.394550		$0		$0
Black Eagle Dam	Dams	County		47.519693	-111.263188		$0		$0
Sun River Middle School	School	County	301 Largent Street	47.533699	-111.723411	$971,943	$0	HAZUS-MH	$1,076,913
Sun River Fire Service	Emergency Services	County	295 Largent St	47.533784	-111.722968	$70,000	$0	COUNTY	$70,000

CASCADE COUNTY 500-YEAR FLOOD VULNERABILITY ANALYSIS

JURISDICTION	FREQUENCY	MAGNITUDE	AREA SQ MI	500 YR FLOOD AREA SQ MI	500 YR PERCENT FLOOD	ACRES IN 500-YEAR FLOODPLAIN	TOTAL BUILDING STOCK	TOTAL RESIDENTIAL BUILDING STOCK $	500 YR FLOOD # OF RESIDENTIAL BUILDINGS AT RISK	500 YR RESIDENTIAL BUILDING EXPOSURE $	500 YR FLOOD ANNUAL LOSS TO RESIDENTIAL BUILDING STOCK	TOTAL COMMERCIAL BUILDING STOCK $	500 YR # OF COMMERCIAL BUILDINGS AT RISK	500 YR COMMERCIAL BUILDING EXPOSURE $	500 YR FLOOD ANNUAL LOSS TO COMMERCIAL BUILDING STOCK	500 YR FLOOD TOTAL BUILDING EXPOSURE $	CRIT FAC #	TOTAL CRIT FAC $	500 YR FLOOD CRIT FAC # AT RISK	500 YR CRIT FAC EXPOSURE RISK $	500 YR ANNUAL LOSS TO CF
Incorporated Communities & County																					
Belt	0.19	0.11%	0.35	0.35	100.00%	224	$21,564,664	$16,138,830	214	$16,138,830	$3,289	$5,425,834	54	$5,425,834	$1,106	$21,564,664	7	$4,394,466	7	$4,394,466	$896
Cascade	0.19	0.11%	0.52	0.51	98.31%	327	$32,569,146	$22,517,751	234	$22,369,488	$4,559	$10,051,395	76	$10,051,395	$2,048	$32,420,883	8	$5,082,755	8	$5,082,755	$1,036
Great Falls	0.19	0.11%	22.24	17.07	76.76%	10,926	$6,228,329,602	$2,557,237,526	19,821	$2,384,624,999	$485,978	$3,671,092,076	5,116	$3,407,280,263	$694,391	$5,791,905,262	131	$351,087,457	118	$341,506,417	$69,598
Neihart	0.19	0.11%	1.99	0.10	5.19%	66	$16,436,011	$15,055,088	65	$5,570,183	$1,135	$1,380,923	16	$1,172,245	$239	$6,742,428	3	$1,617,000	1	$227,000	$46
County (excluding the incorporated towns)			2684.43	172.23		110,225	$1,322,839,060	$1,134,301,276	3,890	$563,509,584	$114,841	$188,537,784	1,145	$108,260,431	$22,063	$671,770,015	84	$56,646,845	31	$18,056,932	$3,680
			2709.53	**190.26**	**280.26%**	**121,769**	**$7,621,738,483**	**$3,745,250,471**	**24,224**	**$2,992,213,084**	**$609,802**	**$3,876,488,012**	**6,407**	**$3,532,190,168**	**$719,848**	**$6,524,403,252**	**233**	**$418,828,523**	**165**	**$369,267,570**	**$75,255**
CENSUS Designated Places																					
Black Eagle	0.19	0.11%	1.73	1.26	72.68%	803	$75,824,530	$40,893,821	493	$40,893,821	$8,334	$34,930,709	183	$34,920,635	$7,117	$75,814,456	3	$845,000	3	$845,000	$172
Fort Shaw	0.19	0.11%	5.68	1.64	28.96%	1,052	$12,289,259	$10,549,723	22	$3,381,974	$689	$1,739,536	7	$1,120,241	$228	$4,502,215	4	$1,367,352	3	$1,346,141	$274
Gibson Flats	0.19	0.11%	3.01	2.17	72.06%	1,387	$18,616,584	$15,720,511	87	$10,466,966	$2,133	$2,896,073	13	$1,355,264	$276	$11,822,230	0	$0	0	$0	$0
Malmstrom AFB	0.19	0.11%	5.08	0.00	0.00%	0	$4,663,122	$454,348	0	$0	$0	$4,208,774	0	$0	$0	$0	4	$5,675,000	0	$0	$0
Sand Coulee	0.19	0.11%	2.62	1.01	38.71%	649	$7,375,641	$6,851,839	62	$6,398,015	$1,304	$523,802	12	$523,802	$107	$6,921,817	2	$148,993	2	$163,686	$33
Simms	0.19	0.11%	7.68	4.71	61.26%	3,011	$15,554,071	$13,706,456	130	$12,673,840	$2,583	$1,847,615	38	$1,828,071	$373	$14,501,911	2	$2,001,713	2	$2,001,713	$408
Stockett	0.19	0.11%	1.47	0.36	24.79%	233	$4,203,870	$3,911,615	42	$3,431,783	$699	$292,255	4	$282,724	$58	$3,714,507	1	$70,000	1	$70,000	$14
Sun Prairie	0.19	0.11%	5.41	5.41	100.00%	3,464	$63,946,110	$54,127,036	438	$54,127,036	$11,031	$9,819,074	223	$9,819,074	$2,001	$63,946,110	1	$0	1	$0	$0
Sun River	0.19	0.11%	1.86	1.86	100.00%	1,190	$4,891,984	$3,975,992	54	$3,975,992	$810	$915,992	29	$915,992	$187	$4,891,984	2	$1,146,913	2	$1,146,913	$234
Ulm	0.19	0.11%	20.78	7.33	35.29%	4,692	$36,281,418	$32,771,679	155	$21,874,802	$4,458	$3,509,739	33	$2,709,744	$552	$24,584,546	3	$1,059,414	3	$1,059,414	$216
Vaughn	0.19	0.11%	3.57	3.22	90.15%	2,060	$28,743,178	$25,062,986	155	$21,735,986	$4,430	$3,680,192	45	$2,636,171	$537	$24,372,157	5	$1,066,145	2	$0	$0
CENSUS County Divisions																					
Belt	0.19	0.11%	486.98	8.30	1.70%	5,309	$123,079,954	$108,459,067	388	$41,669,868	$8,492	$14,620,887	96	$7,429,883	$1,514	$49,099,751	11	$4,564,466	9	$4,544,466	$926
Cascade	0.19	0.11%	786.59	56.32	7.16%	36,047	$145,237,212	$131,078,237	581	$79,048,693	$16,110	$14,158,975	126	$12,211,123	$2,489	$91,259,816	24	$5,215,190	9	$5,102,755	$1,040
Eden-Stockett	0.19	0.11%	399.35	14.92	3.74%	9,548	$91,730,390	$81,967,207	306	$44,126,884	$8,993	$9,763,183	50	$5,540,610	$1,129	$49,667,494	17	$3,827,883	8	$3,827,883	$780
Great Falls	0.19	0.11%	202.99	60.80	29.95%	38,909	$6,823,987,128	$3,113,760,317	21,376	$2,658,036,375	$541,698	$3,710,226,811	5,364	$3,431,150,097	$699,256	$6,089,186,472	150	$390,135,980	123	$344,158,831	$70,138
Great Falls North	0.19	0.11%	297.75	10.65	3.58%	6,814	$260,388,632	$150,457,511	992	$100,784,848	$20,540	$109,931,121	592	$66,018,557	$13,454	$166,803,405	12	$7,775,881	5	$6,891,869	$1,405
Monarch-Neihart	0.19	0.11%	254.54	0.66	0.26%	420	$47,787,295	$45,288,217	66	$5,580,058	$1,137	$2,499,078	16	$1,172,245	$239	$6,752,303	5	$1,707,000	2	$247,000	$50
Sun River Valley	0.19	0.11%	281.33	38.63	13.73%	24,721	$129,527,872	$114,239,915	515	$62,966,358	$12,832	$15,287,957	163	$8,667,653	$1,766	$71,634,011	14	$5,602,122	9	$4,494,767	$916
			2709.53	**190.26**		**121,769**	**$7,621,738,483**	**$3,745,250,471**	**24,224**	**$2,992,213,084**	**$609,802**	**$3,876,488,012**	**6,407**	**$3,532,190,168**	**$719,848**	**$6,524,403,252**	**233**	**$418,828,523**	**165**	**$369,267,570**	**$75,255**

CASCADE COUNTY FLOOD RISK ASSESSMENT
CRITICAL FACILITIES IN 500-YEAR FLOOD HAZARD AREA

Name	Primary Sector	City Division	Address	Latitude	Longitude	Replacement	Contents	Inflation / Total	Cost Source
Senior Citizen Center	Senior	Belt	19 Bridge Street	47.387984	-110.927599		$14,763	$14,763	
Belt City Hall	Municipal	Belt	70 Castner St	47.388000	-110.927000		$0	$0	
Belt Vol Fire Dept	Emergency Services	Belt	16 Bridge St	47.388196	-110.928398	$90,000	$0	$90,000	COUNTY
Pleasant Valley School	School	Belt	Hutterite Colony	47.388750	-110.926910	$263,235	$0	$291,664	HAZUS-MH
BELT HIGH SCHOOL	School	Belt	1 Church Street	47.389074	-110.928002	$1,559,159	$0	$1,727,548	HAZUS-MH
Belt School	School	Belt	1 Church Street	47.389241	-110.927630	$1,417,417	$0	$1,570,498	HAZUS-MH
BELT 7-8	School	Belt	1 Church Street	47.389503	-110.928096	$631,763	$0	$699,993	HAZUS-MH
Senior Center	Senior	Cascade	2 Central Ave W	47.270000	-111.701000		$1,072	$1,072	
Wedsworth Hall	Shelter	Cascade	13 Front St N	47.270000	-111.700000		$0	$0	
Cascade Volunteer FD	Emergency Services	Cascade	15 1st St N	47.271000	-111.701000		$0	$0	
City Hall	Municipal	Cascade	9 Front St N	47.271000	-111.700000		$0	$0	
Farmer/Rancher Fire Co	Emergency Services	Cascade	21 1st St N	47.271578	-111.701066		$0	$0	
CASCADE 7-8	School	Cascade	321 Central Ave. W	47.271620	-111.704260	$899,047	$0	$996,144	HAZUS-MH
CASCADE HIGH SCHOOL	School	Cascade	321 Central Ave. W	47.271620	-111.704260	$2,026,906	$0	$2,245,812	HAZUS-MH
Cascade School	School	Cascade	321 Central Ave. W	47.271840	-111.705229	$1,660,403	$0	$1,839,726	HAZUS-MH
GF Lift Station No. 32	Wastewater	Great Falls	3314 Lower River Road	47.472000	-111.310000	$17,974	$16,350	$34,324	COUNTY
GF Lift Station No. 23	Wastewater	Great Falls	3116 Lower River Road	47.473700	-111.312500	$1,943,440	$239,053	$2,182,493	COUNTY
GF Lift Station No. 25	Wastewater	Great Falls	3015 Coyote Lane	47.475400	-111.323000	$17,974	$16,350	$34,324	COUNTY
GREAT FALLS SDA SCHOOL	School	Great Falls	3102 Flood Rd	47.477639	-111.338384	$170,090	$0	$188,460	HAZUS-MH
GF Lift Station No. 24	Wastewater	Great Falls	704 Juniper	47.481000	-111.324900	$4,250	$4,360	$8,610	COUNTY
Meadow Lark Elementary School	School	Great Falls	2204 Fox Farm Rd.	47.482400	-111.328600	$4,093,000	$0	$4,093,000	COUNTY
Great Falls Clinic	Healthcare and Public Health	Great Falls	2012 14th St. SW	47.484300	-111.338900		$0	$0	
GF Lift Station No. 21	Wastewater	Great Falls	2001 14th St SW	47.484700	-111.337900	$10,922	$0	$10,922	COUNTY
GF Fire Training Center	Emergency Services	Great Falls	1900 9TH ST S	47.485000	-111.293000		$0	$0	
Sunnyside Elementary School	School	Great Falls	1800 19th St. S	47.485600	-111.275500	$4,720,000	$0	$4,720,000	COUNTY
MSU-Great Falls	School	Great Falls	2100 16th Ave. S	47.486400	-111.269900		$0	$0	
GF Fire Station 4	Emergency Services	Great Falls	1800 Fox Farm Road	47.486500	-111.328000	$660,675	$0	$660,675	COUNTY
Mountain View Elementary School	School	Great Falls	3420 15th Ave. S	47.487200	-111.244900	$4,851,000	$0	$4,851,000	COUNTY
Benefis Healthcare (West Campus)	Healthcare and Public Health	Great Falls	500 15th Ave. S	47.488900	-111.299000		$0	$0	
Central Montana Surgical Hospital	Healthcare and Public Health	Great Falls	1411 9th St. S	47.489600	-111.291500		$0	$0	
Water Plant Filter Bldg	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$12,680,663	$0	$12,680,663	COUNTY
WP Backwash Pumphouse & Clarifier	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$664,855	$0	$664,855	COUNTY
WP Backwash Surge Tank	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$266,616	$0	$266,616	COUNTY
WP Carbon Bldg	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$218,682	$0	$218,682	COUNTY
WP Dechloriniation Bldg	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$52,031	$0	$52,031	COUNTY
WP Floculation Basins	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$1,038,726	$0	$1,038,726	COUNTY
WP Inlets Improvements	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$307,667	$0	$307,667	COUNTY
WP Preimary Clarif. Basins	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$2,488,243	$0	$2,488,243	COUNTY
WP Pumping Station/shop	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$1,639,454	$0	$1,639,454	COUNTY
WP Seasonal Complex	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$3,465,698	$0	$3,465,698	COUNTY
WP Seasonal Well	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$685,468	$0	$685,468	COUNTY
WP Secondary Basins	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$1,961,015	$0	$1,961,015	COUNTY
WP Sludge Basins	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$133,502	$0	$133,502	COUNTY
WP Solids Pump Station	Water Plant	Great Falls	1300 Upper River Road	47.490700	-111.311000	$292,782	$0	$292,782	COUNTY
University of Great Falls	School	Great Falls	1301 20th St. S	47.491300	-111.271800		$0	$0	
Benefis Health Care (East Campus)	Healthcare and Public Health	Great Falls	1101 26th St. S	47.492000	-111.261700	$13,860,000	$0	$15,356,880	HAZUS-MH
Great Falls Public Schools Admin Building	School	Great Falls	1100 4th St S	47.493000	-111.300000	$3,520,000	$0	$3,520,000	COUNTY
GF Lift Station No. 15	Wastewater	Great Falls	810 10th Avenue S.W.	47.493200	-111.325500	$1,485,300	$523,750	$2,009,050	COUNTY
GF Lift Station No. 6	Wastewater	Great Falls	4909 10th Avenue South	47.494400	-111.225600	$11,982	$10,900	$22,882	COUNTY
GF Emergency Services	Emergency Services	Great Falls	514 9 Ave. S	47.495100	-111.298100		$0	$0	COUNTY

CASCADE COUNTY FLOOD RISK ASSESSMENT
CRITICAL FACILITIES IN 500-YEAR FLOOD HAZARD AREA

Name	Primary Sector	City Division	Address	Latitude	Longitude	Replacement	Contents	Inflation / Total	Cost Source
GF Water System - Ella Storage Tank	Infrastructure	Great Falls	4110 Ella Ave	47.495500	-111.231500	$1,593,000	$0	$1,593,000	COUNTY
GF Water System - East Reservoir Storage Tank	Infrastructure	Great Falls	801 33rd St S.	47.496200	-111.248600	$2,322,000	$0	$2,322,000	COUNTY
GF Lift Station No. 20	Wastewater	Great Falls	835 13th Street S.W.	47.496800	-111.335400	$4,250	$2,180	$6,430	COUNTY
Lincoln Elementary School	School	Great Falls	624 27th St. S	47.497400	-111.261300	$4,405,000	$0	$4,405,000	COUNTY
Longfellow Elementary School	School	Great Falls	1100 6th Ave. S	47.498100	-111.288700	$5,912,000	$0	$5,912,000	COUNTY
GF Lift Station No. 12	Wastewater	Great Falls	601 River Drive South	47.498200	-111.306200	$17,974	$16,350	$34,324	COUNTY
GF Lift Station No. 1	Wastewater	Great Falls	600 River Drive South	47.498400	-111.307400	$897,322	$572,421	$1,469,743	COUNTY
Our Lady of Lourdes School	School	Great Falls	1305 5th Ave. S	47.500000	-111.283700	$2,502,753	$0	$2,773,051	HAZUS-MH
Great Fall High School	School	Great Falls	1900 2nd Ave. S	47.501800	-111.273500	$20,793,000	$0	$20,793,000	COUNTY
Health Department & Community Health Care	Healthcare and Public Health	Great Falls	115 4th St. S	47.503400	-111.300600	$2,488,944	$1,533,893	$4,022,837	COUNTY
EOC/911 Center/GF Police Dept.	Emergency Services	Great Falls	112 1st Street South	47.503600	-111.307100	$5,136,277	$0	$5,136,277	COUNTY
GF Fire Station 1	Emergency Services	Great Falls	105 9th St. S	47.503800	-111.291800	$2,932,579	$0	$2,932,579	COUNTY
Lewis & Clark Elementary School	School	Great Falls	3800 1st Ave. S	47.503900	-111.241100	$6,552,000	$0	$6,552,000	COUNTY
GF Lift Station No. 18	Wastewater	Great Falls	1716 3rd Avenue S.W.	47.504000	-111.343700	$1,015,560	$513,275	$1,528,835	COUNTY
GF Transit - transfer center	Infrastructure	Great Falls	326 1st Ave. S	47.504000	-111.301100		$0	$0	
East Middle School	School	Great Falls	4040 Central Ave.	47.504000	-111.235600	$15,506,000	$0	$15,506,000	COUNTY
Paris Gibson Ed Center	School	Great Falls	2420 Central Ave.	47.504500	-111.265200	$13,779,000	$0	$13,779,000	COUNTY
GF Lift Station No. 4	Wastewater	Great Falls	100 River Drive South	47.504700	-111.310400	$2,731	$2,081	$4,812	COUNTY
Holy Spirit Catholic School	School	Great Falls	2820 Central Ave.	47.504800	-111.257800	$3,110,218	$0	$3,446,121	HAZUS-MH
Great Falls Police Station (county equipment)	Municipal	Great Falls	12-1st Ave N	47.505000	-111.309000		$21,680	$21,680	COUNTY
Senior Center	Senior	Great Falls	1004 Central Ave	47.505000	-111.289900	$1,085,171	$210,309	$1,295,480	COUNTY
Great Falls Clinic-Immediate Care Center	Healthcare and Public Health	Great Falls	1220 Central Ave.	47.505000	-111.286000		$0	$0	
Indian Family Health Clinic	Healthcare and Public Health	Great Falls	1220 Central Ave. Suite 1B	47.505000	-111.285500		$0	$0	
GF Civic Center	Municipal	Great Falls	2 Park Drive South	47.505300	-111.306400	$20,568,534	$0	$20,568,534	COUNTY
MT SCH FOR DEAF & BLND EL	School	Great Falls	3911 CENTRAL AVE	47.505350	-111.239980	$283,483	$0	$314,100	HAZUS-MH
MT SCH FOR DEAF & BLND HS	School	Great Falls	3911 CENTRAL AVE	47.505350	-111.239980	$538,618	$0	$596,789	HAZUS-MH
GF Water System - Boston Heights Storage Tank #1	Infrastructure	Great Falls	3315 Central Ave.	47.505400	-111.249700	$763,250	$0	$763,250	COUNTY
GF Water System - Boston Heights Storage Tank #2	Infrastructure	Great Falls	3317 Central Ave.	47.505400	-111.249400	$3,557	$0	$3,557	COUNTY
GF Fire Station 3	Emergency Services	Great Falls	3325 Central Ave	47.505400	-111.248900	$660,675	$0	$660,675	COUNTY
Montana School for the Deaf and Blind	School	Great Falls	3911 Central Ave.	47.505500	-111.239300		$0	$0	
GF Lift Station No. 19	Wastewater	Great Falls	1601 2nd Avenue S.W.	47.505800	-111.342000	$3,764	$2,180	$5,944	COUNTY
GREAT FALLS MONTESSORI SCHOOL	School	Great Falls	1521 1ST AVE N	47.506389	-111.281266	$50,622	$0	$56,089	HAZUS-MH
Courthouse Annex	Municipal	Great Falls	325-2nd Ave. N.	47.507700	-111.301200	$2,584,865	$1,542,857	$4,127,722	COUNTY
Great Falls Community Recreation Center	Municipal	Great Falls	801 2nd Ave N	47.507700	-111.293400	$7,865,618	$0	$7,865,618	COUNTY
Great Falls Public Library	Municipal	Great Falls	301 2nd Ave N	47.507800	-111.302100	$3,096,311	$0	$3,096,311	COUNTY
Roosevelt Elementary School	School	Great Falls	2501 2nd Ave N	47.507800	-111.263700	$3,614,000	$0	$3,614,000	COUNTY
Cascade County Courthouse	Municipal	Great Falls	415-2nd Ave. N.	47.508100	-111.299900	$17,740,370	$1,232,366	$18,972,736	COUNTY
DES Office	Municipal	Great Falls	521-1st Ave. NW	47.508900	-111.321200	$1,295,554	$589,350	$1,884,904	COUNTY
Whittier Elementary School	School	Great Falls	305 8th St. N	47.509000	-111.293500	$3,158,000	$0	$3,158,000	COUNTY
West Elementary School	School	Great Falls	1205 1st Ave. NW	47.509200	-111.332600	$8,664,000	$0	$8,664,000	COUNTY
Foothills Community Christian	School	Great Falls	2210 5th Ave North (59401)	47.510400	-111.268700	$1,927,687	$0	$2,135,877	HAZUS-MH
Health Dept. NW Campus (old Surveyor/DES)	Municipal	Great Falls	415-3rd St NW	47.511600	-111.316000	$376,972	$779,268	$1,156,240	COUNTY
GF Lift Station No. 2	Wastewater	Great Falls	611 River Drive North	47.511900	-111.305800	$17,974	$16,350	$34,324	COUNTY
LIGHTHOUSE CHRISTIAN ACADEMY	School	Great Falls	1600 5TH AVE NW	47.512525	-111.339449	$14,174	$0	$15,705	HAZUS-MH
Morninside Elementary School	School	Great Falls	4119 7th Ave N	47.513100	-111.235400	$4,871,000	$0	$4,871,000	COUNTY
Mt Highway Patrol	State	Great Falls	812 14th S N	47.514800	-111.283800		$0	$0	
GF Fire Station 2	Emergency Services	Great Falls	731-6th St. NW	47.515800	-111.323400	$660,675	$0	$660,675	COUNTY
PreRelease Center	Detention	Great Falls	1019 15th St. N	47.516600	-111.280100		$724	$724	COUNTY
Valley View Elementary School	School	Great Falls	900 Ave A NW	47.518300	-111.327300	$4,648,000	$0	$4,648,000	COUNTY
GF Lift Station No. 27	Wastewater	Great Falls	4120 North Star Boulevard	47.518600	-111.234600	$17,974	$16,350	$34,324	COUNTY

CASCADE COUNTY FLOOD RISK ASSESSMENT
CRITICAL FACILITIES IN 500-YEAR FLOOD HAZARD AREA

Name	Primary Sector	City Division	Address	Latitude	Longitude	Replacement	Contents	Inflation / Total	Cost Source
GF Lift Station No. 16	Wastewater	Great Falls	1326 5th St NW	47.518700	-111.322300	$4,000	$13,625	$17,625	COUNTY
GF Transit	Infrastructure	Great Falls	3905 North Star Blvd.	47.519000	-111.239100		$0	$0	
CM Russell High School	School	Great Falls	228 17th Ave. NW	47.520400	-111.319300	$33,896,000	$0	$33,896,000	COUNTY
Aeration Basins	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$4,103,910	$0	$4,103,910	COUNTY
Chlorine Building	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$74,830	$0	$74,830	COUNTY
Chlorine Contact Basin	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$1,034,809	$0	$1,034,809	COUNTY
Co-Generation Facility	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$1,143,000	$0	$1,143,000	COUNTY
Digester #1 Primary	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$1,977,989	$0	$1,977,989	COUNTY
Digester #2 - Secondary	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$1,731,296	$0	$1,731,296	COUNTY
Digester Control Bldg	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$1,273,878	$0	$1,273,878	COUNTY
Final Basins - Secondary Clarifier	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$5,979,713	$0	$5,979,713	COUNTY
Flotation Thickener Bldg	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$2,828,965	$0	$2,828,965	COUNTY
Gravity Thickener Bldg	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$886,063	$0	$886,063	COUNTY
Gravity Thickener Tank	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$200,088	$0	$200,088	COUNTY
Maintenance Building	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$264,180	$0	$264,180	COUNTY
Motor Control Building	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$389,817	$0	$389,817	COUNTY
Pipe Gallery	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$1,204,090	$0	$1,204,090	COUNTY
Preimary Division Structure Splitter box	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$66,347	$0	$66,347	COUNTY
Preimary Pump Station	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$228,867	$0	$228,867	COUNTY
Primary Clarifiers	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$2,536,785	$0	$2,536,785	COUNTY
Process Water Pump Station	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$135,729	$0	$135,729	COUNTY
Raw Waste Water Pump Station	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$839,629	$0	$839,629	COUNTY
Solids Processing Bldg	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$2,225,975	$0	$2,225,975	COUNTY
WWTP Admin Bldg	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$1,772,281	$0	$1,772,281	COUNTY
WWTP Sludge Holding Tank	Wastewater Plant	Great Falls	1600 6th St. NE	47.520700	-111.300400	$544,592	$0	$544,592	COUNTY
Great Falls Clinic-NW Clinic	Healthcare and Public Health	Great Falls	1600 Division Rd.	47.521100	-111.311200		$0	$0	
Riverview Elementary School	School	Great Falls	100 Smelter Ave NW	47.523900	-111.314600	$4,845,000	$0	$4,845,000	COUNTY
Montana Refining	Business	Great Falls	1900-10th St. NE	47.523900	-111.290600		$0	$0	
Public Works Complex (several buildings)	Municipal	Great Falls	1025 25th Ave. NE	47.529500	-111.288600	$5,504,565	$0	$5,504,565	COUNTY
North Middle School	School	Great Falls	2601 8th St. NE	47.530300	-111.293100	$13,689,000	$0	$13,689,000	COUNTY
GF Water System - Hill 57 Storage Tank	Infrastructure	Great Falls	425 29th Ave NW	47.532000	-111.321800	$2,378,781	$0	$2,378,781	COUNTY
Sacajawea Elementary School	School	Great Falls	630 Sacajawea Dr	47.532600	-111.298700	$4,667,000	$0	$4,667,000	COUNTY
GF Lift Station No. 29	Wastewater	Great Falls	3503 2nd Street N.E.	47.538100	-111.311200	$17,974	$16,350	$34,324	COUNTY
Neihart Volunteer Fire Dept	Emergency Services	Neihart	220 N Main	46.929000	-110.731000	$227,000	$0	$227,000	COUNTY
Repeater - 744 East site	Communications	County	Fire Lookout at Porphyry Peak	46.838306	-110.718000	$20,000	$0	$20,000	COUNTY
Repeater - 744 South site	Communications	County	End of Sheep Creek Rd near Cas	47.180500	-111.795833	$20,000	$0	$20,000	COUNTY
Stockett Vol Fire Dept	Emergency Services	County	23 Crane Ave	47.355699	-111.166263	$70,000	$0	$70,000	COUNTY
BIG STONE SCHOOL	School	County	251 GOONHILL ROAD	47.377920	-111.152850	$222,737	$0	$246,793	HAZUS-MH
Belt Rural Fire Dist	Emergency Services	County	407 Bridge St	47.386029	-110.921540	$150,000	$0	$150,000	COUNTY
Centerville School	School	County	693 Stockett Road	47.387765	-111.141963	$1,123,809	$0	$1,245,181	HAZUS-MH
Wastewater System	Intrastructure	County	23 Orr Coulee Rd	47.392000	-110.922000		$0	$0	
Centerville Senior Center	Senior	County	668 Stockett Road	47.392195	-111.144685		$3,974	$3,974	COUNTY
Missile Site - J-9	Federal facility	County	Rural location	47.393700	-111.324970		$0	$0	
Sand Coulee Vol Fire Co	Emergency Services	County	520 E Hunter Rd	47.397285	-111.170996	$148,993	$10,719	$159,712	COUNTY
CENTERVILLE 7-8	School	County	693 Stockett Road	47.404090	-111.154470	$607,464	$0	$673,071	HAZUS-MH
CENTERVILLE HIGH SCHOOL	School	County	693 Stockett Road	47.404090	-111.154470	$1,289,849	$0	$1,429,153	HAZUS-MH
Missile Site - J-10	Federal facility	County	Rural location	47.429190	-111.394550		$0	$0	
ULM 7-8	School	County	6 ULM VAUGHN ROAD	47.430500	-111.506300	$255,135	$0	$282,690	HAZUS-MH
Ulm Vol Fire Co	Emergency Services	County	13 Old US Hwy 91	47.430508	-111.507462	$70,000	$0	$70,000	COUNTY
Ulm School	School	County	6 Ulm-Vaughn Road	47.436248	-111.507099	$637,838	$0	$706,724	HAZUS-MH

CASCADE COUNTY FLOOD RISK ASSESSMENT
CRITICAL FACILITIES IN 500-YEAR FLOOD HAZARD AREA

Name	Primary Sector	City Division	Address	Latitude	Longitude	Replacement	Contents	Inflation / Total	Cost Source
Simms High School	School	County	123 Walker Street	47.492000	-111.928000	$1,743,423	$0	$1,931,713	HAZUS-MH
Simms Vol Fire Co	Emergency Services	County	195 N Main	47.493452	-111.927691	$70,000	$0	$70,000	COUNTY
Fort Shaw Rural VFD	Emergency Services	County	140 Campbell St	47.508561	-111.812951		$0	$0	
Cascade Colony School	School	County	2 School Loop Road	47.508910	-111.820791	$253,110	$0	$280,446	HAZUS-MH
FORT SHAW ELEM SCHOOL	School	County	SCHOOL LOOP ROAD	47.509230	-111.819520	$961,819	$0	$1,065,695	HAZUS-MH
Black Eagle Dam	Dams	County		47.519693	-111.263188		$0	$0	
Sun Praire Wastewater System	Infrastructure	County	234 Sun Prairie Rd	47.527000	-111.492000		$0	$0	
Black Eagle VFD	Emergency Services	County	527 21st St	47.527800	-111.274700	$70,000	$0	$70,000	COUNTY
Repeater - Pacific Steel Site / 744 Local	Communications	County	2930 Rainbow Dam Rd	47.530444	-111.262694	$775,000	$0	$775,000	COUNTY
Sun River Middle School	School	County	301 Largent Street	47.533699	-111.723411	$971,943	$0	$1,076,913	HAZUS-MH
Sun River Fire Service	Emergency Services	County	295 Largent St	47.533784	-111.722968	$70,000	$0	$70,000	COUNTY
GF Water System - Skyline Storage Tank	Infrastructure	County	1400 36th Ave NE	47.538300	-111.283000	$1,593,000	$0	$1,593,000	COUNTY
Cascade County Public Works	Municipal	County	279 Vaughn S. Frontage Road	47.547946	-111.486614	$5,016,568	$1,030,301	$6,046,869	COUNTY
Vaughn-Cascade Co. Sewer District	Infrastructure	County	1161 6th Ave	47.548000	-111.558000		$0	$0	
Vaughn-Cascade Co. Sewer District	Infrastructure	County	1110 6th Ave	47.548000	-111.557000		$0	$0	

Dam Failure Risk Assessment Documentation

Cascade County, Montana
Pre-Disaster Mitigation Plan

CASCADE COUNTY DAM FAILURE VULNERABILITY ANALYSIS

JURISDICTION	AREA SQ MI	INUNDATION AREA SQ MI	PERCENT INUNDATION	ACRES IN INUNDATION AREA	TOTAL BUILDING STOCK	# OF RESIDENTIAL BUILDINGS AT RISK	RESIDENTIAL BUILDING EXPOSURE $	# OF COMMERCIAL BUILDINGS AT RISK	COMMERCIAL BUILDING EXPOSURE $	TOTAL BUILDING EXPOSURE $	CRIT FAC #	CRIT FAC # AT RISK	TOTAL CRIT FAC $	CRIT FAC EXPOSURE RISK $
Incorporated Communities & County														
Belt	0.35	0.00	0.00%	224	$21,564,664	0	$0	0	$0	$0	7	0	$4,394,466	$0
Cascade	0.52	0.21	40.38%	333	$32,569,146	124	$11,876,609	59	$3,979,380	$15,855,989	8	5	$5,082,755	$1,072
Great Falls	22.24	5.49	24.69%	14,234	$6,228,329,602	3,624	$429,570,429	1,452	$991,632,500	$1,421,202,929	131	48	$351,087,457	$102,552,667
Neihart	1.99	0.00	0.00%	1,274	$16,436,011	0	$0	0	$0	$0	3	0	$1,617,000	$0
County (excluding the incorporated towns)	2684.43	131.47		1,718,035	$1,322,839,060	2,604	$421,269,022	700	$48,043,905	$469,312,927	84	21	$56,646,845	$10,636,764
	2709.53	**137.17**	**65.07%**	**1,734,099**	**$7,621,738,483**	**6,352**	**$862,716,060**	**2,211**	**$1,043,655,785**	**$1,906,371,845**	**233**	**74**	**$418,828,523**	**$113,190,503**
CENSUS Designated Places														
Black Eagle	1.73	0.31	17.70%	1,105	$75,824,530	0	$0	1	$410,000	$410,000	3	1	$845,000	$0
Fort Shaw	5.68	0.56	9.93%	3,632	$12,289,259	9	$1,895,688	4	$1,043,078	$2,938,766	4	0	$1,367,352	$0
Gibson Flats	3.01	0.00	0.00%	1,924	$18,616,584	0	$0	0	$0	$0	0	0	$0	$0
Malmstrom AFB	5.08	0.00	0.00%	3,252	$4,663,122	0	$0	0	$0	$0	4	0	$5,675,000	$0
Sand Coulee	2.62	0.00	0.00%	1,676	$7,375,641	0	$0	0	$0	$0	2	0	$148,993	$0
Simms	7.68	4.39	57.13%	4,915	$15,554,071	130	$12,665,339	39	$1,830,147	$14,495,486	2	2	$2,001,713	$2,001,713
Stockett	1.47	0.00	0.00%	940	$4,203,870	0	$0	0	$0	$0	1	0	$70,000	$0
Sun Prairie	5.41	5.23	96.67%	3,464	$63,946,110	437	$53,965,736	220	$8,789,764	$62,755,500	1	1	$0	$0
Sun River	1.86	1.84	99.00%	1,190	$4,891,984	54	$3,975,992	29	$915,992	$4,891,984	2	2	$1,146,913	$1,146,913
Ulm	20.78	11.64	56.00%	13,297	$36,281,418	164	$23,429,467	35	$2,424,078	$25,853,545	3	2	$1,059,414	$352,690
Vaughn	3.57	3.06	85.63%	2,285	$28,743,178	188	$23,912,599	58	$3,496,861	$27,409,460	5	5	$1,066,145	$1,066,145
CENSUS County Divisions														
Belt	486.98	1.14	0.23%	311,667	$123,079,954	0	$0	0	$0	$0	11	0	$4,564,466	$0
Cascade	786.59	45.19	5.75%	503,418	$145,237,212	519	$74,885,234	116	$7,312,991	$82,198,225	24	6	$5,215,190	$23,508
Eden-Stockett	399.35	11.62	2.91%	255,584	$91,730,390	79	$23,267,448	12	$2,152,274	$25,419,722	17	1	$3,827,883	$0
Great Falls	202.99	38.57	19.00%	129,914	$6,823,987,128	4,768	$646,024,786	1,620	$1,004,996,161	$1,651,020,947	150	51	$390,135,980	$102,905,357
Great Falls North	297.75	10.40	3.49%	190,560	$260,388,632	480	$58,754,070	294	$20,972,362	$79,726,432	12	7	$7,775,881	$6,046,869
Monarch-Neihart	254.54	0.00	0.00%	162,906	$47,787,295	0	$0	0	$0	$0	5	0	$1,707,000	$0
Sun River Valley	281.33	30.25	10.75%	180,051	$129,527,872	506	$59,784,522	169	$8,221,997	$68,006,519	14	9	$5,602,122	$4,214,770
	2709.53	**137.17**		**1,734,099**	**$7,621,738,483**	**6,352**	**$862,716,060**	**2,211**	**$1,043,655,785**	**$1,906,371,845**	**233**	**74**	**$418,828,523**	**$113,190,503**

CASCADE COUNTY DAM FAIILURE RISK ASSESSMENT
CRITICAL FACILTIES IN INUNDATION AREAS

Name	Primary Sector	Address	Jurisdiction	Latitude	Longitude	Replacement	Contents	Cost Source	Inflation / Total Cost
Senior Center	Senior	2 Central Ave W	Cascade	47.270000	-111.701000		$1,072		$1,072
Wedsworth Hall	Shelter	13 Front St N	Cascade	47.270000	-111.700000		$0		$0
Cascade Volunteer FD	Emergency Services	15 1st St N	Cascade	47.271000	-111.701000		$0		$0
City Hall	Municipal	9 Front St N	Cascade	47.271000	-111.700000		$0		$0
Farmer/Rancher Fire Co	Emergency Services	21 1st St N	Cascade	47.271578	-111.701066		$0		$0
GF Lift Station No. 32	Wastewater	3314 Lower River Road	Great Falls	47.472000	-111.310000	$17,974	$16,350	COUNTY	$34,324
GF Lift Station No. 23	Wastewater	3116 Lower River Road	Great Falls	47.473700	-111.312500	$1,943,440	$239,053	COUNTY	$2,182,493
GF Lift Station No. 25	Wastewater	3015 Coyote Lane	Great Falls	47.475400	-111.323000	$17,974	$16,350	COUNTY	$34,324
GF Lift Station No. 24	Wastewater	704 Juniper	Great Falls	47.481000	-111.324900	$4,250	$4,360	COUNTY	$8,610
Meadow Lark Elementary School	School	2204 Fox Farm Rd.	Great Falls	47.482400	-111.328600	$4,093,000	$0	COUNTY	$4,093,000
GF Fire Station 4	Emergency Services	1800 Fox Farm Road	Great Falls	47.486500	-111.328000	$660,675	$0	COUNTY	$660,675
GF Lift Station No. 15	Wastewater	810 10th Avenue S.W.	Great Falls	47.493200	-111.325500	$1,485,300	$523,750	COUNTY	$2,009,050
GF Lift Station No. 20	Wastewater	835 13th Street S.W.	Great Falls	47.496800	-111.335400	$4,250	$2,180	COUNTY	$6,430
GF Lift Station No. 12	Wastewater	601 River Drive South	Great Falls	47.498200	-111.306200	$17,974	$16,350	COUNTY	$34,324
GF Lift Station No. 1	Wastewater	600 River Drive South	Great Falls	47.498400	-111.307400	$897,322	$572,421	COUNTY	$1,469,743
Health Department & Community Health Care	Healthcare and Public Health	115 4th St. S	Great Falls	47.503400	-111.300600	$2,488,944	$1,533,893	COUNTY	$4,022,837
EOC/911 Center/GF Police Dept.	Emergency Services	112 1st Street South	Great Falls	47.503600	-111.307100	$5,136,277	$0	COUNTY	$5,136,277
GF Lift Station No. 18	Wastewater	1716 3rd Avenue S.W.	Great Falls	47.504000	-111.343700	$1,015,560	$513,275	COUNTY	$1,528,835
GF Transit - transfer center	Infrastructure	326 1st Ave. S	Great Falls	47.504000	-111.301100		$0		$0
GF Lift Station No. 4	Wastewater	100 River Drive South	Great Falls	47.504700	-111.310400	$2,731	$2,081	COUNTY	$4,812
Great Falls Police Station (county equipment)	Municipal	12-1st Ave N	Great Falls	47.505000	-111.309000		$21,680	COUNTY	$21,680
GF Civic Center	Municipal	2 Park Drive South	Great Falls	47.505300	-111.306400	$20,568,534	$0	COUNTY	$20,568,534
GF Lift Station No. 19	Wastewater	1601 2nd Avenue S.W.	Great Falls	47.505800	-111.342000	$3,764	$2,180	COUNTY	$5,944
Courthouse Annex	Municipal	325-2nd Ave. N.	Great Falls	47.507700	-111.301200	$2,584,865	$1,542,857	COUNTY	$4,127,722
Great Falls Public Library	Municipal	301 2nd Ave N	Great Falls	47.507800	-111.302100	$3,096,311	$0	COUNTY	$3,096,311
Cascade County Courthouse	Municipal	415-2nd Ave. N.	Great Falls	47.508100	-111.299900	$17,740,370	$1,232,366	COUNTY	$18,972,736
DES Office	Municipal	521-1st Ave. NW	Great Falls	47.508900	-111.321200	$1,295,554	$589,350	COUNTY	$1,884,904
Health Dept. NW Campus (old Surveyor/DES)	Municipal	415-3rd St NW	Great Falls	47.511600	-111.316000	$376,972	$779,268	COUNTY	$1,156,240
GF Lift Station No. 2	Wastewater	611 River Drive North	Great Falls	47.511900	-111.305800	$17,974	$16,350	COUNTY	$34,324
LIGHTHOUSE CHRISTIAN ACADEMY	School	1600 5TH AVE NW	Great Falls	47.512525	-111.339449	$14,174	$0	HAZUS-MH	$15,705
Aeration Basins	Wastewater Plant	1600 6th St. NE	Great Falls	47.520700	-111.300400	$4,103,910	$0	COUNTY	$4,103,910
Chlorine Building	Wastewater Plant	1600 6th St. NE	Great Falls	47.520700	-111.300400	$74,830	$0	COUNTY	$74,830
Chlorine Contact Basin	Wastewater Plant	1600 6th St. NE	Great Falls	47.520700	-111.300400	$1,034,809	$0	COUNTY	$1,034,809
Co-Generation Facility	Wastewater Plant	1600 6th St. NE	Great Falls	47.520700	-111.300400	$1,143,000	$0	COUNTY	$1,143,000
Digester #1 Primary	Wastewater Plant	1600 6th St. NE	Great Falls	47.520700	-111.300400	$1,977,989	$0	COUNTY	$1,977,989
Digester #2 - Secondary	Wastewater Plant	1600 6th St. NE	Great Falls	47.520700	-111.300400	$1,731,296	$0	COUNTY	$1,731,296
Digester Control Bldg	Wastewater Plant	1600 6th St. NE	Great Falls	47.520700	-111.300400	$1,273,878	$0	COUNTY	$1,273,878
Final Basins - Secondary Clarifier	Wastewater Plant	1600 6th St. NE	Great Falls	47.520700	-111.300400	$5,979,713	$0	COUNTY	$5,979,713
Flotation Thickener Bldg	Wastewater Plant	1600 6th St. NE	Great Falls	47.520700	-111.300400	$2,828,965	$0	COUNTY	$2,828,965
Gravity Thickener Bldg	Wastewater Plant	1600 6th St. NE	Great Falls	47.520700	-111.300400	$886,063	$0	COUNTY	$886,063
Gravity Thickener Tank	Wastewater Plant	1600 6th St. NE	Great Falls	47.520700	-111.300400	$200,088	$0	COUNTY	$200,088
Maintenance Building	Wastewater Plant	1600 6th St. NE	Great Falls	47.520700	-111.300400	$264,180	$0	COUNTY	$264,180
Motor Control Building	Wastewater Plant	1600 6th St. NE	Great Falls	47.520700	-111.300400	$389,817	$0	COUNTY	$389,817
Pipe Gallery	Wastewater Plant	1600 6th St. NE	Great Falls	47.520700	-111.300400	$1,204,090	$0	COUNTY	$1,204,090
Preimary Division Structure Splitter box	Wastewater Plant	1600 6th St. NE	Great Falls	47.520700	-111.300400	$66,347	$0	COUNTY	$66,347
Preimary Pump Station	Wastewater Plant	1600 6th St. NE	Great Falls	47.520700	-111.300400	$228,867	$0	COUNTY	$228,867
Primary Clarifiers	Wastewater Plant	1600 6th St. NE	Great Falls	47.520700	-111.300400	$2,536,785	$0	COUNTY	$2,536,785
Process Water Pump Station	Wastewater Plant	1600 6th St. NE	Great Falls	47.520700	-111.300400	$135,729	$0	COUNTY	$135,729
Raw Waste Water Pump Station	Wastewater Plant	1600 6th St. NE	Great Falls	47.520700	-111.300400	$839,629	$0	COUNTY	$839,629
Solids Processing Bldg	Wastewater Plant	1600 6th St. NE	Great Falls	47.520700	-111.300400	$2,225,975	$0	COUNTY	$2,225,975
WWTP Admin Bldg	Wastewater Plant	1600 6th St. NE	Great Falls	47.520700	-111.300400	$1,772,281	$0	COUNTY	$1,772,281

CASCADE COUNTY DAM FAIILURE RISK ASSESSMENT
CRITICAL FACILTIES IN INUNDATION AREAS

Name	Primary Sector	Address	Jurisdiction	Latitude	Longitude	Replacement	Contents	Cost Source	Inflation / Total Cost
WWTP Sludge Holding Tank	Wastewater Plant	1600 6th St. NE	Great Falls	47.520700	-111.300400	$544,592	$0	COUNTY	$544,592
Great Falls Clinic-NW Clinic	Healthcare and Public Health	1600 Division Rd.	Great Falls	47.521100	-111.311200		$0		$0
Deep Creek School	School	1508 Millegan Road	County	47.258740	-111.420369	$20,249	$0	HAZUS-MH	$22,436
Missile Site - J-9	Federal facility	Rural location	County	47.393700	-111.324970		$0		$0
Missile Site - J-10	Federal facility	Rural location	County	47.429190	-111.394550		$0		$0
ULM 7-8	School	6 ULM VAUGHN ROAD	County	47.430500	-111.506300	$255,135	$0	HAZUS-MH	$282,690
Ulm Vol Fire Co	Emergency Services	13 Old US Hwy 91	County	47.430508	-111.507462	$70,000	$0	COUNTY	$70,000
Simms High School	School	123 Walker Street	County	47.492000	-111.928000	$1,743,423	$0	HAZUS-MH	$1,931,713
Simms Vol Fire Co	Emergency Services	195 N Main	County	47.493452	-111.927691	$70,000	$0	COUNTY	$70,000
Black Eagle Dam	Dams		County	47.519693	-111.263188		$0		$0
Sun Praire Wastewater System	Infrastructure	234 Sun Prairie Rd	County	47.527000	-111.492000		$0		$0
Sun River Middle School	School	301 Largent Street	County	47.533699	-111.723411	$971,943	$0	HAZUS-MH	$1,076,913
Sun River Fire Service	Emergency Services	295 Largent St	County	47.533784	-111.722968	$70,000	$0	COUNTY	$70,000
Rainbow	Dams		County	47.534393	-111.205588		$0		$0
Cascade County Public Works	Municipal	279 Vaughn S. Frontage Roa	County	47.547946	-111.486614	$5,016,568	$1,030,301	COUNTY	$6,046,869
Vaughn-Cascade Co. Sewer District	Infrastructure	1161 6th Ave	County	47.548000	-111.558000		$0		$0
Vaughn-Cascade Co. Sewer District	Infrastructure	1110 6th Ave	County	47.548000	-111.557000		$0		$0
Cochrane Dam	Dams		County	47.552993	-111.149188		$0		$0
Vaughn Vol Fire Dept	Emergency Services	14 4th St	County	47.559611	-111.548761	$70,000	$0	COUNTY	$70,000
Vaughn School	School	480 Central Avenue	County	47.560180	-111.549442	$668,211	$0	HAZUS-MH	$740,378
VAUGHN 7-8	School	480 CENTRAL AVENUE	County	47.560270	-111.549490	$230,837	$0	HAZUS-MH	$255,767
Ryan Dam	Dams		County	47.569293	-111.125688		$0		$0
Morony Dam	Dams		County	47.581493	-111.060088		$0		$0

APPENDIX D

MITIGATION DOCUMENTATION

Cascade County, Montana
Pre-Disaster Mitigation Plan

Example Mitigation Strategies

Cascade County, Montana
Pre-Disaster Mitigation Plan

CASCADE COUNTY, MONTANA
PRE-DISASTER MITIGATION PLAN
EXAMPLE MITIGATION STRATEGIES

DAM FAILURE	EARTHQUAKE
Prevention ➢ Develop planning and zoning guidelines for open space preservation within the floodway ➢ Adopt building codes using a flood protection elevation based on dam failure ➢ Conduct dam safety inspections ➢ Drain reservoir when conditions appear unsafe ➢ Prepare Emergency Action Plans of High Hazard Dams	***Prevention*** ➢ Develop planning and zoning guidelines to keep critical facilities away from fault line ➢ Develop planning/zoning ordinances and building codes for areas below steep slopes and soils subject to liquefaction ➢ Adopt building codes to prohibit loose masonry, overhangs,
Property Protection ➢ Acquire buildings in the path of a dam breach flood ➢ Purchase flood insurance ➢ Purchase sirens alerting public of bending breach	***Property Protection*** ➢ Acquire and clear high hazard areas ➢ Retrofit structures; add braces, remove overhangs, provide flexible utility connections and tie downs – Build with shatter-proof techniques ➢ Secure objects that would fall during an object ➢ Structurally retrofit unreinforced masonry buildings ➢ Structurally retrofit roofs during re-roofing ➢ Replace brittle equipment in electrical substations ➢ Acquire earthquake insurance riders
Structural Projects ➢ Construct dam improvements, spillway enlargements ➢ Remove unsafe dams ➢ Reconstruct rip rap on earthen dams	***Structural Projects*** ➢ Stabilize slopes ➢ Analyze/strengthen water towers ➢ Retrofit bridges, overpasses, and other critical transportation links ➢ Provide shut-off valves in distribution lines for water and gas service ➢ Add seismic connections such as bolting ➢ Add shearwalls in buildings ➢ Brace equipment that could block building exits or kill or injure people ➢ Brace parapet walls on buildings; brace or demolish outdoor shelters that pose collapse hazards ➢ Brace equipment (such as mechanical equipment, generators) whose failure may disrupt the operation of a critical facility such as a hospital. ➢ Brace equipment (such as sprinkler piping) whose failure could lead to increase building damages
Emergency Services ➢ Conduct dam condition monitoring ➢ Maintain copies of Emergency Operation Plans	***Emergency Services*** ➢ Prepare earthquake response plans to account for secondary problems; fires and hazardous materials spills ➢ Provide emergency back-up power to critical facilities; emergency generators, secondary feeds ➢ Harden critical wireless emergency communication systems
Public Information ➢ Conduct outreach projects on hazard mitigation measures	***Public Information*** ➢ Provide maps of faults and vulnerable areas ➢ Create outreach projects on hazard mitigation measures ➢ Provide real estate disclosure ➢ Provide technical assistance on retrofitting

From: Clancy Philipsborn, May, 1996.

CASCADE COUNTY, MONTANA
PRE-DISASTER MITIGATION PLAN
EXAMPLE MITIGATION STRATEGIES

FLOODING

Prevention

- Create planning and zoning guidelines for development within the floodplain
- Create planning and zoning guidelines to preserve open space within the floodplain
- Create floodplain ordinances
- Develop storm water management guidelines
- Perform maintenance on drainage systems
- Complete floodplain mapping
- Complete elevation survey of structures in floodplain

Property Protection

- Relocate residences outside floodplain
- Relocate furnaces, hot water heaters, and electrical panels from flood-prone areas
- Acquire and demolish residences in flood-prone areas
- Elevate residences above flood elevation on a new foundation
- Construct barriers and wet or dry flood proofing
- Create structural openings in foundation walls allowing floodwaters in and out, thus avoiding collapse
- Protect sewers from backing up by:
  - Installing backflow valves or plugs in drains and toilets to prevent floodwaters from entering home
  - Purchasing and installing sump pumps with back-up power
- Purchase National Flood Insurance or basement backup insurance

Natural Resource Protection

- Protect wetlands
- Employ erosion and sediment control
- Employ best management practices

Structural Projects

- Reservoirs
- Diversions
- Levees/floodwalls/seawalls
- Repair Impaired Bridges
- Replace Culverts With Bridges to Mitigate Impacts of Runoff
- Storm sewers
- Channel modifications, including;
  - Dredging
  - Drainage modifications

Emergency Services

- Develop flood warning system
- Establish flood response activities
  - Activate emergency operations center
  - Sandbag certain areas
  - Close streets or bridges
  - Shut off power to threatened areas
  - Release children from school
  - Order evacuation
  - Open evacuation shelters
  - Monitor water levels
  - Guard sandbag walls and other protection measures
- Protect critical facilities, including:
  - Locations vital to flood response effort
  - Locations that if flooded, would create secondary disasters
- Perform health and safety maintenance
  - Patrol evacuated areas to prevent looting
  - Provide safe drinking water
  - Vaccinate residents for tetanus
  - Clear streets
  - Clean up debris and garbage

Public Information

- Provide map information
- Create outreach projects, including:
  - Mass mailings or newsletters to all residents
  - Notices directed to floodplain residents
  - Displays in public buildings, shopping centers
  - Newspaper articles and special sections
  - Radio and TV news releases and interview shows
  - Local flood proofing video for cable TV programs or to loan to organizations
  - Detailed property owner handbook tailored for local conditions
  - Presentations at meetings of neighborhood groups
- Provide for real estate disclosure
- Provide technical assistance
- Provide environmental education
- Provide appropriate documents in library

From: Clancy Philipsborn, May 1996.

CASCADE COUNTY, MONTANA
PRE-DISASTER MITIGATION PLAN
EXAMPLE MITIGATION STRATEGIES

HAZARDOUS MATERIALS	***TERRORISM, VIOLENCE, CIVIL UNREST***
Emergency Response ➢ Increase Haz-Mat Response Capabilities by providing training to emergency service personal ➢ Develop evacuation procedures for homes near transportation networks that commonly carry hazardous materials and near storage faculties and pipelines the house hazardous materials ➢ Develop alternative routes when major arteries are compromised ➢ Develop alternative routes when major arteries are compromised ➢ Monitor wind speeds and direction to identify safe zones away from poisonous fumes *Prevention* ➢ Increase security at bulk storage facilities ➢ Implement Meth Watch Program in communities *Public Outreach* ➢ Provide public education on methamphetamine labs and how to identify signs of labs and the dangers of labs ➢ Increase public awareness of common hazardous materials either stored, used or transported through the area	*Emergency Response* ➢ Develop bomb threats action plans for hospitals, schools, government and commercial buildings. ➢ Coordinate with hospitals federal, state, and local agencies immediately following any disaster ➢ Implement evacuation procedures ➢ Identify safe zones away from hazard ➢ Impose and enforce curfews ➢ Utilize media outlets to maintain communications with public and provide appropriate instruction *Prevention* ➢ Implement security systems in hospitals and schools ➢ Increase security at water supplies and bulk storage facilities ➢ Implement Neighborhood Watch programs in neighborhoods and Rural Community Watch programs. ➢ Increase security around potential terrorist targets *Public Outreach* ➢ Provide education materials to increase public awareness of radical groups in Montana

CASCADE COUNTY, MONTANA
PRE-DISASTER MITIGATION PLAN
EXAMPLE MITIGATION STRATEGIES

WILDFIRE

Prevention

- Create zoning districts to reflect fire risk zones
- Develop planning and zoning guidelines to restrict development to areas near fire protection and water sources
- Require new subdivisions to space buildings, provide fire breaks, on-site water storage, wide roads, multiple access, require defensible space and inspection of new development in the Wildland urban interface
- Adopt building code standards for roof materials, spark arresters
- Perform maintenance clearing dead or dry brush/trees
- Promote sprinkler system installation in commercial structures
- Institute regulations on open fires

Property Protection

- Retrofit roofs with fire-resistant materials and add spark arrestors
- Remove vegetation and combustible materials around structures
- Focus on water supply primary and alternative locations, quantity and availability
- Establish insurance rates based on distance from fire protection

Natural Resource Protection

- Prohibit development in sensitive areas
- Employ mechanical thinning and prescribed burning to abate the risk of catastrophic fire
- Protect watersheds from erosion, prevent water pollution to the public water supply from wildfires
- Clear trimmings, trees, brush, and other debris completely from sites to reduce fire risk.

Structural Projects

- Create fire breaks to prevent the spread of fire
- Provide fire roads to aid in fire fighting
- Provide more than one means of access into and out of a community
- Equip water storage facilities with fire-resistant electrical pump when not connected to a community water system
- Develop alternative firefighting water sources

Emergency Services

- Recruit and train volunteer fire fighters
- Enhance emergency services to increase the efficiency of wildfire response and recovery activities
- Install more fire reporting stations for better access and coverage
- Develop a county call list that includes all at-risk urban/wildland interface residents in order to contact them during evacuations
- Coordinate fire departments and other emergency services in prevention and response activities

Public Information

- Educate agency personnel on the full array of federal assistance available to local agencies.
- Provide technical assistance on retrofitting and protection measures
- Develop fuels mapping for public and private lands
- Publicize fire season
- Develop partnerships to provide for fire mitigation activities and suppression preparedness.
- Develop and disseminate updated maps relating to fire hazard to assist builders and homeowners in wildfire mitigation and guide emergency services during response.
- Promote FIREWISE type Programs
- Create wildfire outreach projects to include:
  - Visit urban interface neighborhoods and rural areas and conduct education and outreach activities
  - Conduct community-based demonstration projects of fire prevention and mitigation in the urban interface
  - Establish neighborhood "drive-through" activities that pinpoint site-specific mitigation activities.
  - Perform public outreach and information activities at local fire stations by creating "Wildfire Awareness Week"

From: Clancy Philipsborn, May 1996.

CASCADE COUNTY, MONTANA
PRE-DISASTER MITIGATION PLAN
EXAMPLE MITIGATION STRATEGIES

WIND

- Develop strategies for managing overhead utility lines
  - Provide higher grade poles for electrical distribution
  - Provide guy wires on poles subject to failure
  - Protect traffic lights from high winds
  - Analyze communication lines on power poles; if they cause unacceptable loads, remove when possible
- Support/encourage electrical utilities to use underground construction methods where possible to reduce power outages from windstorms
- Provide emergency back-up power to critical facilities; emergency generators, secondary feeds, portable generators with standard camlock connections
- Develop and implement programs to keep trees from threatening lives, property, and public infrastructure during windstorm events
  - Develop partnerships between utility providers and county & local agencies to identify potentially hazardous trees
  - Thin trees to reduce wind damages and plant species of plants that are more resistant to wind damage
  - Make sure right-of-way around power lines is free of trees or limbs that may cause damage
  - Develop strategies for clearing roads of fallen trees, and clearing debris from public and private property
- Structurally analyze all buildings or rooms identified as shelters and strengthen these as necessary
- Encourage development and enforcement of wind resistant buildings and construction codes
  - Evaluate current building codes for efficiency in protecting structures from wind damage
  - Install shutters on windows and doors or otherwise protect building openings from wind damage
  - Ensure that roof-mounted equipment is securely mounted
  - Install additional tie downs to resist wind loads
  - Reinforce existing unreinforced masonry walls with the addition of reinforced columns and bond beams
- Increase public awareness of windstorm mitigation activities
  - Map and publicize locations that have the highest incidence of extreme windstorms
  - Distribute educational materials to organizations and county residents regarding preparedness for no power situations

SEVERE WINTER STORMS

- Enhance strategies for debris management for severe winter storm events
  - Develop coordinated management strategies for de-icing roads, plowing snow, clearing roads of fallen trees, and clearing debris from public and private property
- Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms
  - Partner with responsible agencies and organizations to design and implement programs that reduce risk to life, property, and utility systems
  - Develop partnerships between utility providers and county and local public works agencies to document known hazard areas
- Increase public awareness of severe winter storm mitigation activities
  - Collect information on public education materials for protecting life, property, and the environment from severe winter storm events
  - Distribute educational materials to county/tribal residents and public and private sector organizations regarding evacuation routes during road closures
  - Target the vulnerable populace for disseminating preparedness information
- Enhance weather monitoring to attain earlier severe winter storm warnings
- Increase public awareness of severe winter storm mitigation activities
  - Coordinate with appropriate organizations to evaluate the need for more weather stations and/or weather instrumentation
- Enhance Emergency Shelter Facilities
  - Provide Disaster Supply Kits in Shelter Facilities

From: Clancy Philipsborn, May 1996 and
Clackamas County Oregon Natural Hazards Mitigation Plan, September 2002.

CASCADE COUNTY PDM PLAN
EXAMPLE MITIGAION PROJECTS

Example Haz-Mat Mitigation Projects

- Educate teachers and school staff in schools near hazardous materials facilities and transportation routes in how to limit exposure to hazardous materials to students during an incident.
- Pursue zoning regulations to ensure that perimeter security is provided at bulk chemical and petroleum facilities
- Ensure local emergency responders have adequate training to respond to hazardous material events consistent with local capabilities
- Pursue funding for supplies and equipment trailer
- Obtain haz-mat trailers for county.
- Obtain decontamination trailers that can be placed around county.
- Update resource list of emergency response supplies/vendors.

Example Winter Storm Mitigation Projects

- Prepare a guide book for special needs populations on winter weather survival
- Perform engineering study of public buildings and shelters to determine which may need retrofits to withstand snow loads.
- Perform retrofits on public buildings and shelters that could become compromised by snow loads.
- Provide training or video on how to measure snow moisture to determine when shoveling of roofs is necessary.
- Develop and distribute educational material on how to prepare for winter.
- Develop a resource list of people who shovel snow from roofs.
- Implement a building code that requires roofs to be designed to withstand appropriate snow load.
- Obtain generators for schools to maintain power supply during winter.
- Develop coordinated management strategies for de-icing roads, plowing snow, clearing roads of fallen trees, and clearing debris.
- Install markers on fences to determine mileages so people's residences can be found for rescue purposes.
- Obtain generators for emergency shelters.
- Identify emergency shelters in each community.

Example Wind Mitigation Projects

- Create partnerships with utility companies and negotiate for shorter span distances between power poles to better withstand snow loads and severe storms.
- Negotiate with utility companies for replacement of weak or rotten power poles.
- Relocate power underground where possible.

Example Dam Failure Mitigation Projects

- Install movement sensors on faces of dams to detect pending failure.
- Install an early warning system to interface with dispatch.
- Equip dams with sirens to alert downstream residents of impending breach.
- Provide NOAA weather radios to residents downstream from dams.
- Develop evacuation plans, including means of transporting people and evacuation routes.

- Evaluate structural soundness of dams.
- Implement zoning below and around dams.

Example Structure Fire Mitigation Projects

- Promote public education on the benefit of smoke detectors and BSB Fire Department's Smoke Detector Program
- Pursue local ordinance that all new commercial occupancies be equipped with fire sprinklers.

Mitigation Strategy Action Plans

Cascade County, Montana
Pre-Disaster Mitigation Plan

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 1 - Reduce the Impacts from Wildfire		
Objective	*Objective 1.1 - Enhance Opportunities to Protect Property from Wildifre*		
Project	**Project 1.1.1 - Perform fuel treatments along evacuation routes.**		
Category	Property Protection		
Hazard(s) Addressed	Wildfire		
Jurisdiction(s)	Cascade County		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)	x	2
	Low = < $100,000 (3 points)		
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)	x	2
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	10	x
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	DES, Fire Service Areas, County Fire Council		
Potential Funding Source(s)	FEMA, DNRC, USFS, BLM, County		
Implementation Schedule	Year 1 - 5		

CASCADE COUNTY MONTANA PDM PLAN

Mitigation Action Plan

Goal	Goal 1 - Reduce the Impacts from Wildfire		
Objective	*Objective 1.1 - Enhance Opportunities to Protect Property from Wildifre*		
Project	**Project 1.1.2 - Continue grants programs for landowners to create defensible space.**		
Category	Property Protection		
Hazard(s) Addressed	Wildfire		
Jurisdiction(s)	Cascade County		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)	x	2
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	x	11
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	DES, Fire Service Areas, County Fire Council		
Potential Funding Source(s)	FEMA, DNRC, County, USFS, BLM		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 1 - Reduce the Impacts from Wildfire		
Objective	*Objective 1.1 - Enhance Opportunities to Protect Property from Wildifre*		
Project	**Project 1.1.3 - Study creation of fire breaks in appropriate locations in Conservation Reserve Program lands and areas of future development.**		
Category	Property Protection		
Hazard(s) Addressed	Wildfire		
Jurisdiction(s)	Cascade County		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)	x	2
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	9
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	DES, Fire Service Areas, Farm Service Agency		
Potential Funding Source(s)	County, Farm Service Agency		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 1 - Reduce the Impacts from Wildfire		
Objective	*Objective 1.2 - Provide Public Education and Awareness on Wildfire*		
Project	**Project 1.2.1 - Continue education programs to raise consciousness of landowners on wildfire.**		
Category	Public Education and Awareness		
Hazard(s) Addressed	Wildfire		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)	x	3
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	x	12
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	Fire Service Areas, FireSafe Montana		
Potential Funding Source(s)	County, USFS, BLM		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 1 - Reduce the Impacts from Wildfire		
Objective	*Objective 1.3 - Enhance Emergency Service Capabilities to fight Wildfire*		
Project	**Project 1.3.1 - Recruit and train volunteer fire fighters**		
Category	Emergency Services		
Hazard(s) Addressed	Wildfire		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)	x	3
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	x	11
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	County Fire Council, Fire Service Areas		
Potential Funding Source(s)	FEMA, County, DNRC		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 1 - Reduce the Impacts from Wildfire		
Objective	*Objective 1.3 - Enhance Emergency Service Capabilities to fight Wildfire*		
Project	**Project 1.3.2 - Obtain more 4-WD fire tenders**		
Category	Emergency Services		
Hazard(s) Addressed	Wildfire		
Jurisdiction(s)	Cascade County		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)	x	2
	Low = < $100,000 (3 points)		
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	8
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	County Fire Council, Fire Service Areas		
Potential Funding Source(s)	GSA, FEMA, DNRC		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 1 - Reduce the Impacts from Wildfire		
Objective	*Objective 1.3 - Enhance Emergency Service Capabilities to fight Wildfire*		
Project	**Project 1.3.3 - Install culverts on initial attack roads**		
Category	Emergency Services		
Hazard(s) Addressed	Wildfire		
Jurisdiction(s)	Cascade County		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)	x	2
	Low = < $100,000 (3 points)		
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)	x	2
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	x	10
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	County Fire Council, County Commissioners, Public Works, Private Landowners, Fire Service Areas		
Potential Funding Source(s)	FEMA, County, USFS, BLM, DNRC		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 1 - Reduce the Impacts from Wildfire		
Objective	*Objective 1.3 - Enhance Emergency Service Capabilities to fight Wildfire*		
Project	**Project 1.3.4 - Install booster antennas to enhance cell service in fire districts where it would be beneficial.**		
Category	Emergency Services		
Hazard(s) Addressed	Wildfire		
Jurisdiction(s)	Cascade County		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)	x	2
	Low = < $100,000 (3 points)		
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)	x	2
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	9
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	County Fire Council		
Potential Funding Source(s)	FEMA, County		
Implementation Schedule	Mid-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 1 - Reduce the Impacts from Wildfire		
Objective	*Objective 1.3 - Enhance Emergency Service Capabilities to fight Wildfire*		
Project	**Project 1.3.5 - Improve training and qualifications of personnel to more effectively interface with incoming Incident Management Teams deployed in the county.**		
Category	Emergency Services		
Hazard(s) Addressed	Wildfire		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)	x	2
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	x	10
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	DNRC, USFS, FEMA, Emergency Management, County Fire Council		
Potential Funding Source(s)	FEMA, DNRC, County		
Implementation Schedule	Mid-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 1 - Reduce the Impacts from Wildfire		
Objective	*Objective 1.3 - Enhance Emergency Service Capabilities to fight Wildfire*		
Project	**Project 1.3.6 - Obtain additional repeaters or relocate existing repeaters to enhance radio communications in Sun River/Simms area, Neihart, and Sand Coulee.**		
Category	Emergency Services		
Hazard(s) Addressed	Wildfire		
Jurisdiction(s)	Cascade County, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)	x	2
	Low = < $100,000 (3 points)		
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)	x	2
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	9
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	DES, County Communications		
Potential Funding Source(s)	County, FEMA		
Implementation Schedule	Short-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 1 - Reduce the Impacts from Wildfire		
Objective	*Objective 1.3 - Enhance Emergency Service Capabilities to fight Wildfire*		
Project	**Project 1.3.7 - Increase availability of water resources for wildland firefighting by strategic placement of water tanks and ponds.**		
Category	Emergency Services		
Hazard(s) Addressed	Wildfire		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)	x	2
	Low = < $100,000 (3 points)		
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)	x	2
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	9
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Low	
Responsible Agency	County Fire Council, DNRC		
Potential Funding Source(s)	County, FEMA, DNRC		
Implementation Schedule	Long-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 1 - Reduce the Impacts from Wildfire		
Objective	*Objective 1.3 - Enhance Emergency Service Capabilities to fight Wildfire*		
Project	**Project 1.3.8 - Create a database of water sources for firefighting and make database available to rural fire districts.**		
Category	Emergency Services		
Hazard(s) Addressed	Wildfire		
Jurisdiction(s)	Cascade County, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)	x	2
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	x	11
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	County & City of Great Falls GIS		
Potential Funding Source(s)	County, City of Great Falls		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 1 - Reduce the Impacts from Wildfire		
Objective	*Objective 1.3 - Enhance Emergency Service Capabilities to fight Wildfire*		
Project	**Project 1.3.9 - Consider increasing air support in Cascade County for wildfire suppression.**		
Category	Emergency Services		
Hazard(s) Addressed	Wildfire		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)	x	2
	Low = < $100,000 (3 points)		
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)	x	2
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	9
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium-Low	
Responsible Agency	DNRC, FEMA		
Potential Funding Source(s)	DNRC, FEMA		
Implementation Schedule	Long-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 1 - Reduce the Impacts from Wildfire		
Objective	*Objective 1.4 - Implement Actions to Prevent Impacts from Wildfires*		
Project	**Project 1.4.1 - Review subdivision regulation to reexamine water supply requirements.**		
Category	Prevention		
Hazard(s) Addressed	Wildfire		
Jurisdiction(s)	Cascade County		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)	x	1
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	7
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	County Planning		
Potential Funding Source(s)	County		
Implementation Schedule	Short-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 1 - Reduce the Impacts from Wildfire		
Objective	*Objective 1.4 - Implement Actions to Prevent Impacts from Wildfires*		
Project	**Project 1.4.2 - Complete a study of impact fees for rural residents to fund more reliable water supplies and fire safety.**		
Category	Prevention		
Hazard(s) Addressed	Wildfire		
Jurisdiction(s)	Cascade County		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	9
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	County Planning		
Potential Funding Source(s)	County		
Implementation Schedule	Short-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 2 - Reduce the Impacts from Structure Fire		
Objective	*Objective 2.1 - Enhance Emergency Service Capabilities to fight structure fires*		
Project	**Project 2.1.1 - Recruit and train volunteer fire fighters**		
Category	Emergency Services		
Hazard(s) Addressed	Structure Fire		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)	x	3
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	x	11
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	Fire Service Areas		
Potential Funding Source(s)	FEMA, Fire Services Training School		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 2 - Reduce the Impacts from Structure Fire		
Objective	*Objective 2.1 - Enhance Emergency Service Capabilities to fight structure fires*		
Project	**Project 2.1.2 - Increase availability of water resources for structure fire suppression by creating reliable water supplies in rural areas.**		
Category	Emergency Services		
Hazard(s) Addressed	Structure Fire		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)	x	2
	Low = < $100,000 (3 points)		
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)	x	2
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	9
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	Fire Service Areas		
Potential Funding Source(s)	County, FEMA		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 2 - Reduce the Impacts from Structure Fire		
Objective	*Objective 2.1 - Enhance Emergency Service Capabilities to Fight Structure Fires*		
Project	**Project 2.1.3 - Update equipment needed for suppressing structure fires**		
Category	Emergency Services		
Hazard(s) Addressed	Structure Fire		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)	x	2
	Low = < $100,000 (3 points)		
Population Benefit	High = > 50% of County residents (3 points)	x	3
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	x	10
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	Fire Service Areas		
Potential Funding Source(s)	County, GSA, FEMA, DNRC		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 3 - Reduce the Impacts from Severe Summer Weather		
Objective	*Objective 3.1 - Enhance Opportunties to Protect Property from Severe Summer Weather*		
Project	**Project 3.1.1 - Install 3-mil window film on windows of existing and future schools and critical facilities to prevent shattering.**		
Category	Property Protection		
Hazard(s) Addressed	Severe Summer Weather		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)	x	2
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)	x	2
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	x	10
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Low	
Responsible Agency	DES, School District		
Potential Funding Source(s)	FEMA, County, Schools		
Implementation Schedule	Long-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 3 - Reduce the Impacts from Severe Summer Weather		
Objective	*Objective 3.2 - Provide Public Education and Awareness on Severe Summer Weather*		
Project	**Project 3.2.1 - Promote the National Weather Service's Severe Weather Awareness Week.**		
Category	Public Education and Awareness		
Hazard(s) Addressed	Severe Summer Weather		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)	x	3
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)	x	1
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	x	10
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	NWS, Emergency Management		
Potential Funding Source(s)	NWS, County		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 3 - Reduce the Impacts from Severe Summer Weather		
Objective	*Objective 3.2 - Provide Public Education and Awareness on Severe Summer Weather*		
Project	**Project 3.2.2 - Work towards Cascade County becoming a National Weather Service Storm Ready Community.**		
Category	Public Education and Awareness		
Hazard(s) Addressed	Severe Summer Weather		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)	x	3
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)	x	1
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	x	10
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	NWS, Emergency Management		
Potential Funding Source(s)	NWS, County		
Implementation Schedule	Mid-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 3 - Reduce the Impacts from Severe Summer Weather		
Objective	*Objective 3.2 - Provide Public Education and Awareness on Severe Summer Weather*		
Project	**Project 3.2.3 - Promote National Weather Service's Severe Weather Spotter Training Program**		
Category	Public Education and Awareness		
Hazard(s) Addressed	Severe Summer Weather		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)	x	3
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)	x	1
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	x	10
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	Emergency Management, NWS		
Potential Funding Source(s)	NWS		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 4 - Reduce the Impacts from Hazardous Material Incidents		
Objective	*Incidents*		
Project	**Project 4.1.1 - Explore the possibility of an alternate route around Great Falls for trucks traffic carrying hazardous material loads and/or a signed hazardous material route to avoid population centers.**		
Category	Property Protection		
Hazard(s) Addressed	Hazardous Material Incidents		
Jurisdiction(s)	Great Falls		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)	x	3
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)	x	2
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	x	10
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	County & City Planning, MDT		
Potential Funding Source(s)	County, City, MDT		
Implementation Schedule	Mid-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 4 - Reduce the Impacts from Hazardous Material Incidents		
Objective	*Objective 4.2 - Enhance Emergency Service Capabilities*		
Project	**Project 4.2.1 - Ensure local emergency responders have adequate training to respond to haz-mat events consistent with local capabilities.**		
Category	Emergency Services		
Hazard(s) Addressed	Hazardous Material Incidents		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)	x	3
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)	x	1
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	9
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	Emergency Management, Fire Service Areas		
Potential Funding Source(s)	Fire Services Training School		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 4 - Reduce the Impacts from Hazardous Material Incidents		
Objective	*Objective 4.2 - Enhance Emergency Service Capabilities*		
Project	**Project 4.2.2 - Obtain regional containment equipment trailers and supplies to strategically position for response in the county**		
Category	Emergency Services		
Hazard(s) Addressed	Hazardous Material Incidents		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	x	10
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	DES, Fire Service Areas		
Potential Funding Source(s)	County		
Implementation Schedule	Mid-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 4 - Reduce the Impacts from Hazardous Material Incidents		
Objective	*Objective 4.2 - Enhance Emergency Service Capabilities*		
Project	**Project 4.2.3 - Update resource list of emergency response supplies/vendors.**		
Category	Emergency Services		
Hazard(s) Addressed	Hazardous Material Incidents		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)	x	1
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	8
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	Emergency Management		
Potential Funding Source(s)	County, City of GF		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 4 - Reduce the Impacts from Hazardous Material Incidents		
Objective	*Objective 4.2 - Enhance Emergency Service Capabilities*		
Project	**Project 4.2.4 - Explore creating a safe haven for haz-mat loads that may be in trouble.**		
Category	Emergency Services		
Hazard(s) Addressed	Hazardous Material Incidents		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)	x	2
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	x	10
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Low	
Responsible Agency	Emergency Management, MDT		
Potential Funding Source(s)	County, City, MDT		
Implementation Schedule	Long-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 5 - Reduce the Impacts from Severe Winter Weather		
Objective	*Objective 5.1 - Enhance Emergency Service Capabilities*		
Project	**Project 5.1.1 - Update list of emergency shelter locations in each community**		
Category	Emergency Services		
Hazard(s) Addressed	Severe Winter Weather		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)	x	3
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)	x	1
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	x	10
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	Emergency Management, Red Cross, VOAD, City & County GIS		
Potential Funding Source(s)	County, City of GF		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN

Mitigation Action Plan

Goal	Goal 5 - Reduce the Impacts from Severe Winter Weather
Objective	*Objective 5.1 - Enhance Emergency Service Capabilities*
Project	**Project 5.1.2 - Obtain generators for emergency shelters.**
Category	Emergency Services
Hazard(s) Addressed	Severe Winter Weather
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart

Benefit-Cost Ranking	Options	Selection	Score
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)	x	2
	Low = < $100,000 (3 points)		
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)	x	2
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)	x	1
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	7
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Low	
Responsible Agency	Emergency Management		
Potential Funding Source(s)	GSA, Facility Owner		
Implementation Schedule	Long-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 5 - Reduce the Impacts from Severe Winter Weather		
Objective	*Objective 5.1 - Enhance Emergency Service Capabilities*		
Project	**Project 5.1.3 - Continue to aggressively address rural locations within the county so people's residences can be found for rescue purposes.**		
Category	Emergency Services		
Hazard(s) Addressed	Severe Winter Weather		
Jurisdiction(s)	Cascade County		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)	x	1
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	8
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	DES, GIS		
Potential Funding Source(s)	County		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 5 - Reduce the Impacts from Severe Winter Weather		
Objective	*Objective 5.1 - Enhance Emergency Service Capabilities*		
Project	**Project 5.1.4 - Coordinate with DPHHS on emergency access requirements at licensed private facilities.**		
Category	Emergency Services		
Hazard(s) Addressed	Severe Winter Weather		
Jurisdiction(s)	Cascade County		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)	x	1
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	8
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	LEPC Special Needs & Health Emergencies Subcommittees		
Potential Funding Source(s)	County		
Implementation Schedule	Mid-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 5 - Reduce the Impacts from Severe Winter Weather		
Objective	*Objective 5.1 - Enhance Emergency Service Capabilities*		
Project	**Project 5.1.5 - Consider enhanced snow removal services to support public safety and infrastructure protection**		
Category	Emergency Services		
Hazard(s) Addressed	Severe Winter Weather		
Jurisdiction(s)	Cascade County		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	9
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	Fire Service Areas, County Public Works		
Potential Funding Source(s)	County		
Implementation Schedule	Short-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 5 - Reduce the Impacts from Severe Winter Weather		
Objective	*Objective 5.1 - Enhance Emergency Service Capabilities*		
Project	**Project 5.1.6 - Survey boundary description of current access routes (Dearborn) and establish a legal easement for emergency response purposes in order to maintain access.**		
Category	Emergency Services		
Hazard(s) Addressed	Severe Winter Weather		
Jurisdiction(s)	Cascade County		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	9
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	County Attorney		
Potential Funding Source(s)	County		
Implementation Schedule	Mid-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 5 - Reduce the Impacts from Severe Winter Weather		
Objective	*Objective 5.2 - Provide Public Education and Awareness on Severe Winter Weather*		
Project	**Project 5.2.1 - Perform public outreach/education on location of emergency shelters.**		
Category	Emergency Services		
Hazard(s) Addressed	Severe Winter Weather		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)	x	3
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)	x	1
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	x	10
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	Emergency Management		
Potential Funding Source(s)	County, City of GF		
Implementation Schedule	Mid-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 5 - Reduce the Impacts from Severe Winter Weather		
Objective	*Objective 5.2 - Provide Public Education and Awareness on Severe Winter Weather*		
Project	**Project 5.2.2 - Conduct public outreach campaign where special needs residents would provide information on where they live and what they need. Develop a database with this information.**		
Category	Public Education and Awareness		
Hazard(s) Addressed	Severe Winter Weather		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)	x	1
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	7
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	Emergency Management, LEPC Subcommittees		
Potential Funding Source(s)	County, City of Great Falls		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 5 - Reduce the Impacts from Severe Winter Weather		
Objective	*Objective 5.2 - Provide Public Education and Awareness on Severe Winter Weather*		
Project	**Project 5.2.3 - Promote the National Weather Service's Winter Weather Awareness Week**		
Category	Public Education and Awareness		
Hazard(s) Addressed	Severe Winter Weather		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)	x	3
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)	x	1
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	x	10
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	Emergency Management, NWS		
Potential Funding Source(s)	County, City of GF, NWS		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 5 - Reduce the Impacts from Severe Winter Weather		
Objective	*Objective 5.3 - Implement Activities to Prevent the Impacts from Severe Winter Weather*		
Project	**Project 5.3.1 - Work with utility companies to bury power lines where interuption of service is frequent.**		
Category	Prevention		
Hazard(s) Addressed	Severe Winter Weather		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)	x	2
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)	x	1
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	8
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	Emergency Management, Public Works, Utility Companies		
Potential Funding Source(s)	County, Utility Companies		
Implementation Schedule	Long-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 6 - Reduce the Impacts from Transportation Accidents		
Objective	*Objective 6.1 - Enhance Emergency Service Capabililties*		
Project	**Project 6.1.1 - Continue exercises to prepare for response to transportation accidents**		
Category	Emergency Service		
Hazard(s) Addressed	Transportation Accident		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)	x	1
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	8
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	Emergency Management, Law Enforcement		
Potential Funding Source(s)	County, City, MHP		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN

Mitigation Action Plan

Goal	Goal 6 - Reduce the Impacts from Transportation Accidents
Objective	*Objective 6.1 - Enhance Emergency Service Capabililties*
Project	**Project 6.1.2 - Recruit and train EMS volunteers to staff Quick Response Units**
Category	Emergency Service
Hazard(s) Addressed	Transportation Accident
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart

Benefit-Cost Ranking	Options	Selection	Score
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)	x	3
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)	x	1
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	9
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	DES		
Potential Funding Source(s)	County		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN

Mitigation Action Plan

Goal	Goal 6 - Reduce the Impacts from Transportation Accidents		
Objective	*Accidents*		
Project	**Project 6.2.1 - Work with railroads to increase number of crossing gates**		
Category	Structural		
Hazard(s) Addressed	Transportation Accidents		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)	x	1
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	7
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium-Low	
Responsible Agency	Public Works		
Potential Funding Source(s)	Railroads		
Implementation Schedule	Long-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 6 - Reduce the Impacts from Transportation Accidents		
Objective	*Accidents*		
Project	**Project 6.2.2 - Coordinate w/ Community Transportation Enhancement Program on their recommendations for highway safety.**		
Category	Structural		
Hazard(s) Addressed	Transportation Accident		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)	x	1
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	8
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	County Planning		
Potential Funding Source(s)	County, MDT		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 6 - Reduce the Impacts from Transportation Accidents		
Objective	*Accidents*		
Project	**Project 6.2.3 - Work with railroad to reconstruct Belt underpass to create a wider and straighter alignment.**		
Category	Structural		
Hazard(s) Addressed	Transportation Accident		
Jurisdiction(s)	Belt		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	9
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	DES, City of Belt		
Potential Funding Source(s)	Railroads		
Implementation Schedule	Long-Range		

CASCADE COUNTY MONTANA PDM PLAN

Mitigation Action Plan

Goal	Goal 7 - Reduce the Impacts from Flooding and Levee Failure		
Objective	*Objective 7.1 - Implement Actions to Prevent Impacts from Flooding/Levee Failure*		
Project	**Project 7.1.1 - Re-certify the West Great Falls and Vaughn levees**		
Category	Prevention		
Hazard(s) Addressed	Flooding and Levee Failure		
Jurisdiction(s)	Cascade County, Great Falls		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)	x	1
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)		
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)	x	2
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	8
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	County Commissioners, City of Great Falls, Levee Districts, USACE		
Potential Funding Source(s)	County, City of GF, Congressional earmark, USACE		
Implementation Schedule	Short-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 7 - Reduce the Impacts from Flooding and Levee Failure		
Objective	*Objective 7.1 - Implement Actions to Prevent Impacts from Flooding/Levee Failure*		
Project	**Project 7.1.2 - Update flood regulations when DFIRMs are adopted to protect future development**		
Category	Prevention		
Hazard(s) Addressed	Flooding and Levee Failure		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	9
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	County and City Floodplain Administrators		
Potential Funding Source(s)	County		
Implementation Schedule	Mid-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 7 - Reduce the Impacts from Flooding and Levee Failure		
Objective	*Objective 7.2 - Provide Public Education and Awareness on Flooding and Levee Failure*		
Project	**Project 7.2.1 - Educate homeowners on the advantages of purchasing flood insurance through the National Flood Insurance Program.**		
Category	Public Education and Awareness		
Hazard(s) Addressed	Flooding and Levee Failure		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	9
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	County & City Floodplain Administrators and Planning Offices		
Potential Funding Source(s)	County & City of GF		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 7 - Reduce the Impacts from Flooding and Levee Failure		
Objective	*Objective 7.2 - Provide Public Education and Awareness on Flooding and Levee Failure*		
Project	**Project 7.2.2 - Work towards achieving a lower rating through the National Flood Insurance Program Community Rating System.**		
Category	Public Education and Awareness		
Hazard(s) Addressed	Flooding and Levee Failure		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	9
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	City & County Floodplain Administrators and Planning Offices		
Potential Funding Source(s)	County, City of GF, and Towns		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 7 - Reduce the Impacts from Flooding and Levee Failure		
Objective	*Objective 7.2 - Provide Public Education and Awareness on Flooding and Levee Failure*		
Project	**Project 7.2.3 - Participate in the National Weather Service's Flood Awareness Week**		
Category	Public Education and Awareness		
Hazard(s) Addressed	Flooding and Levee Failure		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)	x	2
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	x	11
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	Emergency Managers		
Potential Funding Source(s)	County, City of GF, NWS		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 7 - Reduce the Impacts from Flooding and Levee Failure		
Objective	*Objective 7.2 - Provide Public Education and Awareness on Flooding and Levee Failure*		
Project	**Project 7.2.4 - Provide awareness training to repetive loss property owners (and others) on mitigation programs to relocate, elevate, and floodproof structures in the floodplain**		
Category	Public Education and Awareness		
Hazard(s) Addressed	Flooding and Levee Failure		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	x	10
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	DNRC, FEMA		
Potential Funding Source(s)	DNRC, FEMA		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 7 - Reduce the Impacts from Flooding and Levee Failure		
Objective	*Objective 7.2 - Provide Public Education and Awareness on Flooding and Levee Failure*		
Project	**Project 7.2.5 - Provide awareness training in agricultural areas that livestock grazing in floodplains should include a high spot where animals can evacuate to.**		
Category	Public Education and Awareness		
Hazard(s) Addressed	Flooding and Levee Failure		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)	x	1
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	8
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Low	
Responsible Agency	DES, NWS		
Potential Funding Source(s)	County, NWS, FEMA		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 7 - Reduce the Impacts from Flooding and Levee Failure		
Objective	*Objective 7.3 - Enhance Opportunities to Protect Property from Flooding and Levee Failure*		
Project	**Project 7.3.1 - Obtain river gauges for 6th Street SW bridge in Great Falls, in the town of Sun River, and elsewhere as needed.**		
Category	Property Protection		
Hazard(s) Addressed	Flooding and Levee Failure		
Jurisdiction(s)	Cascade County, Great Falls		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	x	10
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	DES, Levee District, USGS, DNRC		
Potential Funding Source(s)	USGS, DNRC, City of Great Falls, Cascade County		
Implementation Schedule	Mid-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 7 - Reduce the Impacts from Flooding and Levee Failure		
Objective	*Objective 7.3 - Enhance Opportunities to Protect Property from Flooding and Levee Failure*		
Project	**Project 7.3.2 - Obtain a slope mower with boom arm to maintain West Great Falls levee**		
Category	Property Protection		
Hazard(s) Addressed	Flooding and Levee Failure		
Jurisdiction(s)	Great Falls		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	9
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	West Great Falls Flood Control & Drainge District		
Potential Funding Source(s)	FEMA, City of Great Falls, W GF Flood Control District		
Implementation Schedule	Mid-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 7 - Reduce the Impacts from Flooding and Levee Failure		
Objective	*Objective 7.3 - Enhance Opportunities to Protect Property from Flooding and Levee Failure*		
Project	**Project 7.3.3 - Remove woody vegetation from the edge of the county's levees and dikes.**		
Category	Property Protection		
Hazard(s) Addressed	Flooding and Levee Failure		
Jurisdiction(s)	Cascade County, Great Falls, Belt		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	x	10
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	Levee Districts, City of Belt		
Potential Funding Source(s)	FEMA, City of Belt, Levee Districts, Cascade County		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 7 - Reduce the Impacts from Flooding and Levee Failure		
Objective	*Objective 7.3 - Enhance Opportunities to Protect Property from Flooding and Levee Failure*		
Project	**Project 7.3.4 - Remove debris from floodways**		
Category	Property Protection		
Hazard(s) Addressed	Flooding and Levee Failure		
Jurisdiction(s)	Cascade County, Great Falls, Cascade, Belt, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	9
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	Levee Districts, City of Belt, Public Works, MDT		
Potential Funding Source(s)	FEMA, County, City of Belt, MDT		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 7 - Reduce the Impacts from Flooding and Levee Failure		
Objective	*Objective 7.3 - Enhance Opportunities to Protect Property from Flooding and Levee Failure*		
Project	**Project 7.3.5 - Relocate, elevatate and/or floodproof structures in the town of Sun River**		
Category	Property Protection		
Hazard(s) Addressed	Flooding and Levee Failure		
Jurisdiction(s)	Cascade County		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)	x	1
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)		
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	7
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	DES, Private Homeowners		
Potential Funding Source(s)	FEMA, Private Homeowners		
Implementation Schedule	Long-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 7 - Reduce the Impacts from Flooding and Levee Failure		
Objective	*Objective 7.3 - Enhance Opportunities to Protect Property from Flooding and Levee Failure*		
Project	**Project 7.3.6 - Complete an engineering study of what needs to be done to mitigate flooding in the town of Sun River**		
Category	Property Protection		
Hazard(s) Addressed	Flooding and Levee Failure		
Jurisdiction(s)	Cascade County		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)	x	2
	Low = < $100,000 (3 points)		
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	9
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	DES, County Commissioners		
Potential Funding Source(s)	FEMA, County		
Implementation Schedule	Long-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 7 - Reduce the Impacts from Flooding and Levee Failure		
Objective	*Objective 7.3 - Enhance Opportunities to Protect Property from Flooding and Levee Failure*		
Project	**Project 7.3.7 - Install security fencing and signage on levees and dikes in the county**		
Category	Property Protection		
Hazard(s) Addressed	Flooding and Levee Failure		
Jurisdiction(s)	Cascade County, Great Falls, Belt		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)	x	2
	Low = < $100,000 (3 points)		
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)	x	1
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	7
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	Levee Districts, City of Belt, Private Owners		
Potential Funding Source(s)	FEMA, Levee Districts, Private Owners		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 7 - Reduce the Impacts from Flooding and Levee Failure		
Objective	*Objective 7.3 - Enhance Opportunities to Protect Property from Flooding and Levee Failure*		
Project	**Project 7.3 8 - Consider forming a flood control district in Belt to address concerns with the dike.**		
Category	Property Protection		
Hazard(s) Addressed	Flooding and Levee Failure		
Jurisdiction(s)	Belt		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	9
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	City of Belt		
Potential Funding Source(s)	City of Belt		
Implementation Schedule	Mid-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 7 - Reduce the Impacts from Flooding and Levee Failure		
Objective	*Objective 7.4 - Implement Structural Projects to Reduce Impact of Flooding and Levee Failure*		
Project	**Project 7.4.1 - Replace Sheep Creek bridge that has been compromised by flooding.**		
Category	Structural		
Hazard(s) Addressed	Flooding and Levee Failure		
Jurisdiction(s)	Cascade County		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)	x	2
	Low = < $100,000 (3 points)		
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)	x	1
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	6
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Low	
Responsible Agency	County Public Works		
Potential Funding Source(s)	FEMA, County		
Implementation Schedule	Long-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 7 - Reduce the Impacts from Flooding and Levee Failure		
Objective	*Objective 7.4 - Implement Structural Projects to Reduce Impact of Flooding and Levee Failure*		
Project	**Project 7.4.2 - Reduce flooding in the Gibson Flats area by installing drainage ditches in the vicinity of Gerber Road.**		
Category	Structural		
Hazard(s) Addressed	Flooding and Levee Failure		
Jurisdiction(s)	Cascade County		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	x	10
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Low	
Responsible Agency	County Public Works		
Potential Funding Source(s)	FEMA, County		
Implementation Schedule	Long-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 7 - Reduce the Impacts from Flooding and Levee Failure		
Objective	*Objective 7.4 - Implement Structural Projects to Reduce Impact of Flooding and Levee Failure*		
Project	**Project 7.4.3 - Resize culverts in various locations throughout the county.**		
Category	Structural		
Hazard(s) Addressed	Flooding and Levee Failure		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)	x	2
	Low = < $100,000 (3 points)		
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)	x	2
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	x	10
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	County and City of GF Public Works Departments		
Potential Funding Source(s)	FEMA, County		
Implementation Schedule	Mid-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 7 - Reduce the Impacts from Flooding and Levee Failure		
Objective	*Objective 7.4 - Implement Structural Projects to Reduce Impact of Flooding and Levee Failure*		
Project	**Project 7.4.4 - Identify locations throughout the county where culverts are needed**		
Category	Structural		
Hazard(s) Addressed	Flooding and Levee Failure		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)	x	2
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	x	11
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	County and City Public Works Departments		
Potential Funding Source(s)	County		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 7 - Reduce the Impacts from Flooding and Levee Failure		
Objective	*Objective 7.4 - Implement Structural Projects to Reduce Impact of Flooding and Levee Failure*		
Project	**Project 7.4.5 - Enhance and raise the dike in Belt**		
Category	Structural		
Hazard(s) Addressed	Flooding and Levee Failure		
Jurisdiction(s)	Belt		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	x	10
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Low	
Responsible Agency	City of Belt		
Potential Funding Source(s)	FEMA, City of Belt		
Implementation Schedule	Long-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 7 - Reduce the Impacts from Flooding and Levee Failure		
Objective	*Objective 7.4 - Implement Structural Projects to Reduce Impact of Flooding and Levee Failure*		
Project	**Project 7.4.6 - Redesign the storm drains system in Belt**		
Category	Structural		
Hazard(s) Addressed	Flooding and Levee Failure		
Jurisdiction(s)	Belt		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)	x	2
	Low = < $100,000 (3 points)		
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	9
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Low	
Responsible Agency	City of Belt		
Potential Funding Source(s)	FEMA, City of Belt		
Implementation Schedule	Long-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 7 - Reduce the Impacts from Flooding and Levee Failure		
Objective	*Objective 7.4 - Implement Structural Projects to Reduce Impact of Flooding and Levee Failure*		
Project	**Project 7.4.7 - Rehabilitate the sewer distribution system in Belt to withstand flood infiltration**		
Category	Structural		
Hazard(s) Addressed	Flooding and Levee Failure		
Jurisdiction(s)	Belt		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)	x	2
	Low = < $100,000 (3 points)		
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	9
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	City of Belt		
Potential Funding Source(s)	FEMA, City of Belt		
Implementation Schedule	Long-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 7 - Reduce the Impacts from Flooding and Levee Failure		
Objective	*Objective 7.4 - Implement Structural Projects to Reduce Impact of Flooding and Levee Failure*		
Project	**Project 7.4.8 - Dredge certain rivers/creeks in the county to increase carrying capacity.**		
Category	Structural		
Hazard(s) Addressed	Flooding and Levee Failure		
Jurisdiction(s)	Cascade County, Belt		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)	x	2
	Low = < $100,000 (3 points)		
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	8
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	Cascade County, City of Belt		
Potential Funding Source(s)	FEMA, Cascade County, City of Belt		
Implementation Schedule	Long-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 7 - Reduce the Impacts from Flooding and Levee Failure		
Objective	*Objective 7.4 - Implement Structural Projects to Reduce Impact of Flooding and Levee Failure*		
Project	**Project 7.4.9 - Re-establish an overflow canal in Sun River and install additional culverts**		
Category	Structural		
Hazard(s) Addressed	Flooding and Levee Failure		
Jurisdiction(s)	Cascade County		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	x	10
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	Cascade County, Private Landowner		
Potential Funding Source(s)	FEMA, County		
Implementation Schedule	Long-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 7 - Reduce the Impacts from Flooding and Levee Failure		
Objective	*Objective 7.4 - Implement Structural Projects to Reduce Impact of Flooding and Levee Failure*		
Project	**Project 7.4.10 - Construct a dike on the west side of the town of Sun River**		
Category	Structural		
Hazard(s) Addressed	Flooding and Levee Failure		
Jurisdiction(s)	Cascade County		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	9
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Low	
Responsible Agency	Cascade County		
Potential Funding Source(s)	FEMA, County		
Implementation Schedule	Long-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 8 - Reduce the Impacts from Dam Failure		
Objective	*Objective 8.1 - Enhance Opportunity to Protect Property from Dam Failure*		
Project	**Project 8.1.1 - Encourage residents downstream from dams to get NOAA weather radios**		
Category	Property Protection		
Hazard(s) Addressed	Dam Failure		
Jurisdiction(s)	Cascade County, Great Falls, Cascade		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)	x	2
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)	x	1
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	9
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Low	
Responsible Agency	DES		
Potential Funding Source(s)	County, NWS, DNRC		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN

Mitigation Action Plan

Goal	Goal 8 - Reduce the Impacts from Dam Failure		
Objective	*Objective 8.2 - Provide Public Education and Awareness on Dam Failure*		
Project	**Project 8.2.1 - Conduct public outreach / education with residents living in inundation areas.**		
Category	Public Education and Awareness		
Hazard(s) Addressed	Dam Failure		
Jurisdiction(s)	Cascade County, Great Falls, Cascade		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)	x	2
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)	x	1
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	9
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	DES		
Potential Funding Source(s)	DNRC, County		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 9 - Reduce the Impacts from All Hazards		
Objective	*Objective 9.1 - Implement Actions to Prevent Impacts from All Hazards*		
Project	**Project 9.1.1 - Obtain Reverse 911 for the County**		
Category	Prevention		
Hazard(s) Addressed	All Hazards		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)	x	2
	Low = < $100,000 (3 points)		
Population Benefit	High = > 50% of County residents (3 points)	x	3
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)	x	1
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	8
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	Emergency Management		
Potential Funding Source(s)	County, Homeland Security		
Implementation Schedule	Year 1 - 5		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 9 - Reduce the Impacts from All Hazards		
Objective	*Objective 9.1 - Implement Actions to Prevent Impacts from All Hazards*		
Project	**Project 9.1.2 - Work with National Weather Service to get a radio signal for the town of Belt**		
Category	Prevention		
Hazard(s) Addressed	All Hazards		
Jurisdiction(s)	Belt		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)	x	1
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	7
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	DES, City of Belt		
Potential Funding Source(s)	County, NWS, City of Belt		
Implementation Schedule	Long-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 9 - Reduce the Impacts from All Hazards		
Objective	*Objective 9.1 - Implement Actions to Prevent Impacts from All Hazards*		
Project	**Project 9.1.3 - Provide NOAA weather radios to all schools and critical facilities**		
Category	Prevention		
Hazard(s) Addressed	All Hazards		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)	x	3
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)	x	1
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	x	10
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	Emergency Management, National Weather Service		
Potential Funding Source(s)	County, NWS, FEMA		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 9 - Reduce the Impacts from All Hazards		
Objective	*Objective 9.1 - Implement Actions to Prevent Impacts from All Hazards*		
Project	**Project 9.1.4 - Look for corporate sponsorships to provide NOAA weather radios to the public**		
Category	Prevention		
Hazard(s) Addressed	All Hazards		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)	x	3
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)	x	1
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	9
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Medium	
Responsible Agency	Emergency Management		
Potential Funding Source(s)	County, NWS		
Implementation Schedule	Ongoing		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 9 - Reduce the Impacts from All Hazards		
Objective	*Objective 9.1 - Implement Actions to Prevent Impacts from All Hazards*		
Project	**Project 9.1.5 - Negotiate with cell phone companies to get a tower in the town of Sun River**		
Category	Prevention		
Hazard(s) Addressed	All Hazards		
Jurisdiction(s)	Cascade County		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)		
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)	x	1
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)	x	1
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	7
	Low = 3 to 5 points		
County Priority	High, Medium, Low	Low	
Responsible Agency	Sun River Valley Fire Service Areas		
Potential Funding Source(s)	County, Cell Companies		
Implementation Schedule	Long-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 9 - Reduce the Impacts from All Hazards		
Objective	*Objective 9.2 - Enhance Emergency Service Capabilities*		
Project	**Project 9.2.1 - Identify and secure a back-up location for the dispatch center**		
Category	Emergency Services		
Hazard(s) Addressed	All Hazards		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)	x	2
	Low = < $100,000 (3 points)		
Population Benefit	High = > 50% of County residents (3 points)	x	3
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)	x	1
Feasibility	High = Technology available/implementation likely (3 points)		
	Medium = Technology may be available/implementation could be difficult (2 points)	x	2
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points		
	Medium = 6 to 9 points	x	8
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	Emergency Management		
Potential Funding Source(s)	County, City of GF		
Implementation Schedule	Mid-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 9 - Reduce the Impacts from All Hazards		
Objective	*Objective 9.2 - Enhance Emergency Service Capabilities*		
Project	**Project 9.2.2 - Ensure continuity of operations by providing operable generator in 9-1-1 center**		
Category	Emergency Services		
Hazard(s) Addressed	All Hazards		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)	x	2
	Low = < $100,000 (3 points)		
Population Benefit	High = > 50% of County residents (3 points)	x	3
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)	x	3
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)		
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	x	11
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	Emergency Management		
Potential Funding Source(s)	County & City of GF		
Implementation Schedule	Short-Range		

CASCADE COUNTY MONTANA PDM PLAN			
Mitigation Action Plan			
Goal	Goal 9 - Reduce the Impacts from All Hazards		
Objective	*Objective 9.3 - Provide Public Education and Awareness on All Hazards*		
Project	**Project 9.3.1 - Encourage public to engage in Volunteer Organizations Active in Disaster (VOAD).**		
Category	Public Education and Awareness		
Hazard(s) Addressed	All Hazards		
Jurisdiction(s)	Cascade County, Great Falls, Belt, Cascade, Neihart		
Benefit-Cost Ranking	**Options**	**Selection**	**Score**
Estimated Cost	High = > $500,000 (1 point)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (3 points)	x	3
Population Benefit	High = > 50% of County residents (3 points)	x	3
	Medium = 20 to 50% of County residents (2 points)		
	Low = < 20% County residents (1 point)		
Property Benefit	High = > $500,000 (3 points)		
	Medium = $100,000 to $500,000 (2 points)		
	Low = < $100,000 (1 point)	x	1
Feasibility	High = Technology available/implementation likely (3 points)	x	3
	Medium = Technology may be available/implementation could be difficult (2 points)		
	Low = No technology available/implementation unlikely (1 point)		
Total Score	High = 10 to 12 points	x	10
	Medium = 6 to 9 points		
	Low = 3 to 5 points		
County Priority	High, Medium, Low	High	
Responsible Agency	Emergency Management		
Potential Funding Source(s)	County & City GF		
Implementation Schedule	Ongoing		

APPENDIX E

RELEVANT PLANS

Cascade County, Montana
Pre-Disaster Mitigation Plan

Cascade County Community Wildfire Protection Plan

Prepared By

firelogistics INCORPORATED

PMB 2164, 1 Jackson Creek, Montana City, MT 59634

The Cascade County Community Wildfire Protection Plan has been prepared by, reviewed and/or approved by the following signatories:

Bruce Suenram

Prepared by: Bruce Suenram, Fire Logistics, Inc.

Chair, Board of County Commissioners

Cascade County Fire Warden

President, Cascade County Fire Council

BLM – Lewistown Field Office

Lewis & Clark National Forest

Central Land Office, MT Dept. of Natural Resources & Conservation

CASCADE COUNTY COMMUNITY WILDFIRE PROTECTION PLAN

1. Executive Summary

1.1. Problem Overview

Cascade County is located in North Central Montana east of the continental divide. Cascade County is a relatively large county covering an area of 2,698 square miles. Under the current conditions, Cascade County has a high degree of potential for extended wildland fire seasons ranging from March through October or November. Cascade County has 19 fire departments located throughout the county, including, the Malmstrom AF Fire Department and the Montana Air National Guard (MANG) Fire Department. Cascade County has the potential to interact with not only DNRC, but also the Bureau of Land Management, Lewistown Field Office and the Lewis and Clark NF and law enforcement, search and rescue, Disaster & Emergency Services , thus providing a high degree of interagency complexity. As with numerous counties in Montana, there is an increasing development of wildland-urban interface areas, with potential access problems and a general lack of understanding of the need for an asset protection zone to protect the improvements. As a general matter, Cascade County's Fire Departments have had to deal with multiple ignitions throughout the county from lightning storms.

1.2. Process Overview

The Cascade County Community Wildfire Protection Plan -- hereafter known as "CWPP," has been developed to assist Cascade County, Cascade County's Fire Departments and the federal, state, tribal wildland agencies in the identification of private and public lands at risk of severe wildland fires and to explore strategies for the prevention and suppression of such fires. The CWPP is intended to outline the Cascade County's plans and activities targeted at reducing the risk of a catastrophic wildland and/or a wildland-urban interface (WUI) or structural fire event in Cascade County. The intent of this planning document will ensure that the health, safety and welfare of Cascade County's citizens remain secure from the threats of structural and wildland fires in the county.

1.3. Overall Goals

The CWPP will improve planning and fire suppression tools for county and the county fire departments alike, which will result in Cascade County providing its citizens with tools to live more safely in a fire prone ecosystem. The CWPP fosters the preservation of the economy of Cascade County by maintaining and improving the efficiency of the overall fire protection system in the County.

1.4. Methodology

Fire Logistics, Inc. uses Geographic Information System (GIS) based analysis approach to development of the fire hazard assessment for Cascade County. This enables personnel from Fire Logistics to look at specific areas of high risk in the county such as wildland-urban interface or subdivision areas and focus on issues that should be included in the wildland fire mitigation plan as recommended projects.

Personnel from Fire Logistics, Inc. spent 3 days in Cascade County in October of 2005 gathering data and touring around the county gathering intelligence for the CWPP. Additional information was gathered from the County during visits in March, April, May, June and July of 2006.

Fire Logistics staff developed a draft of our approach to the Cascade County CWPP between October of 2005 and November of 2006. The rough draft was circulated to collaborators and comments where incorporated into the final version of the Cascade County CWPP.

1.5. Mitigation Strategy – The Action Plan

Summary of the specific action is provided, which were developed in the *mitigation plan* of Chapter 7 to include mitigation goals such as evaluate, upgrade and maintain emergency wildfire protection responsibilities, decrease fuels, etc. The assumptions for planning priorities of the community fire plan are: protect human health and life, protect critical community infrastructure, protect private property, and protect natural resources. The existing mitigation efforts are described, which include asset protection zones, neighborhood preparedness and fire protection response, and the coordination of prevention programs, protection projects and response plans. Several recommended projects and programs are included as part of the mitigation effort for Cascade County.

2. Introduction

2.1. Background and History

The Cascade County Community Wildfire Protection Plan (CWPP) has been developed to assist Cascade County, Cascade County's Fire Departments and the federal and state wildland agencies in the identification of private and public lands at risk of severe wildland fires and to explore strategies for the prevention and suppression of such fires. The CWPP is intended to outline the Cascade County Fire's plans and activities targeted at reducing the risk of a catastrophic wildland, wildland-urban interface (WUI) or structural fire event in Cascade County. The intent of this planning document will ensure that the health, safety and welfare of Cascade County citizens remains secure from the threats of structural and wildland fires in the county.

The CWPP will improve planning tools for county and the fire departments alike, which will result in better building and development codes and regulations, as they relate to the development of the WUI and urban development. The CWPP fosters the preservation of the economy of Cascade County by maintaining and improving the fire protection capability of the County.

The Chouteau County Conservation District retained the services of Fire Logistics, Inc. to:

1. Development of a countywide Community Wildfire Protection Plan (CWPP) that meets NFP, HFRA and FEMA standards for each of the three counties: Cascade, Chouteau, and Meagher. The CWPP must be a stand alone plan. The process must follow the guidance specified in *Preparing a Community Wildfire Protection Plan - A Handbook for Wildland-Urban Interface Communities.* This document is a collaboration of a number of organizations, and can be found at the website for the Society of American Foresters http://www.safnet.org/policyandpress/cwpphandbook.pdf **This guidebook is incorporated by reference into this RFP**. All the elements listed in the "Summary and Checklist" of this planning guide must be covered in the CWPP; the term "forest areas" should be understood to include all vegetation types that may be subject to wildfire. Mapped components must be provided in both hard copy and GIS layers.
2. Development of a county Pre-Disaster Mitigation Plan (PDM) that meets FEMA standards for each of the three counties: Cascade, Chouteau, and Meagher. Finished plans will conform to the Federal Disaster Mitigation Act of 2000, 44CFR Parts 201 and 206; Interim Final Rule. The CWPP will cover the wildland fire hazard for each county and as such should be incorporated into the PDM plan. Guidance for FEMA compliance should be taken from FEMA's *Multi-Hazard Mitigation Planning Guidance,* available at FEMA's website http://www.fema.gov/fima/resources.shtm **This guidance is incorporated by reference into this RFP**. Mapped components must be provided in both hard copy and GIS layers.

3. Prepare GIS layers including: Evacuation Routes, Fuels, Floodplain, Wildland-Urban-Rural Interface Boundary, Past Fire Occurrence, Fire Prone Landscapes (interpretation of fuels, topography, fire history etc.), Critical Infrastructure, etc. Fire occurrence data should include federal, state and county records. Working with local dispatch and rural fire districts will be necessary to insure completeness of the county fire records. See Attachment A for a list of currently existing GIS layers for each county. Additional existing GIS layers are available through state, BLM and USFS sources.

4. Coordinate meetings with local committees, fire district personnel, local governments, state and federal agencies and keep them informed of activities of the countywide fire and all-hazard planning processes.

5. Establish and maintain effective working relationships with federal, state, local governments, local fire districts and councils, corporate, and private landowners that will assist in the planning project.

6. Prepare materials and make presentations, both orally and in writing, to individuals or groups about the fire and all-hazard mitigation plans.

7. Prepare news releases, articles, and public service announcements for use by media to enhance public relations, inform the public of the fire mitigation plans.

8. Conduct assessments of individual communities and develop a prioritized list (high, medium, low) of recommended mitigation projects including both private and public lands.

9. Analyze and review the information collected and develop strategies to address fire and other hazards in each county. The hazards to be analyzed in detail (in addition to wildland fire) for each county are:
    - Cascade County: flood-dam failure; severe weather, hazardous materials spill
    - Chouteau County: flood-dam failure; severe weather, hazardous materials spill
    - Meagher County: flood-dam failure; severe weather, earthquake.

10. Provide separate budgets for the CWPP's (all counties combined) and the additional increment for the PDM plans (all counties combined). Quarterly reports detailing the planning, assessment, educational or outreach activities and accomplishments as well as dollars spent in the current period and to date for CWPP's and PDM plans separately.
11. Each county will appoint a local contact person to work with the contractor and facilitate setting up public meetings. Locations for public meetings will be determined in consultation with the counties. Public meetings are expected to be required in 3-4 locations for Cascade and Chouteau counties; one or two locations for Meagher may be adequate as long as joint meetings occur in some locations for Cascade and Meagher (e.g., Monarch, Neihart or King's Hill).

2.2. Mission

The mission of the Cascade County Community Wildfire Protection Plan is:

"The mission of the Cascade County Community Wildfire Protection Plan is to protect the county's natural and manmade resources by mobilizing our community to make their homes, neighborhoods and community's fire safe."

2.3. Current Relevant Fire Policies

A brief discussion of the relevant fire policies is provided to educate the community.

2.3.1 Federal Policies "Homeland Security is Fire Safety"

We have briefly described the relevant policies at the national level, which affect fire planning on the local level.

2.3.1.1 National Fire Plan

"The National Fire Plan (NFP) is a long-term investment that will help protect communities and natural resources, and most importantly, the lives of fire fighters and the public. It is a long term commitment based on cooperation and communication among federal agencies, states, local governments, tribes and interested publics." It mandates community participation in its implementation.[1] The NFP also mandates that local governments develop and adopt local land use plans and ordinances that provide for the maintenance of defensible space and fuel management on municipal and private property.[2]

[1] See www.fireplan.gov.
[2] See www.westgov.org/wga/initiatives/fire/implem_plan.pdf

2.3.1.2 Western Governor's Association, *10-Year Comprehensive Strategy for Reducing Wildland Fire Risks*[3] and *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment—Implementation Plan*

The goals of the 10-Year Comprehensive Strategy are to:

- Improve Prevention and Suppression
- Reduce Hazardous Fuels
- Restore Fire Adapted Ecosystems
- Promote Community Assistance.

This is done through a "Framework for Collaboration… Local Level—Successful implementation will include stakeholder groups with broad representation including Federal, State, and local agencies, tribes and the public, collaborating with local line officers on decision making to [4]establish priorities, cooperation on activities, and increase public awareness and participation to reduce the risks to communities and environments."[5]

2.3.1.3 Healthy Forests Restoration Act

The Healthy Forests Restoration Act (HFRA) represents the legislative component of the Healthy Forests Initiative, introduced by President Bush in January 2003. Title I of the HFRA authorizes the Secretaries of Agriculture and Interior to expedite the development and implementation of hazardous fuel reduction projects on federal land managed by the US Forest Service or Bureau of Land Management when certain conditions are met.

Priority areas for use of expedited authorities include the wildland-urban interface, municipal watersheds, areas impacted by wind throw or insect and disease epidemics, and critical wildlife habitat that would be negatively impacted by catastrophic wildfire.

The HFRA emphasizes the need for federal agencies to work collaboratively with communities in developing hazardous fuel reduction projects and places priority on treatment areas identified by the communities themselves in a CWPP.

2.3.1.4 Disaster Mitigation Act 2000

Disaster Mitigation Act 2000 (DMA 2000) sets policies for "disaster mitigation plans"—plans designed to avoid disasters such as fires and floods. DMA 2000 requires 4 elements in these plans:

1. A planning process.
2. An assessment of risks.
3. A mitigation strategy (action plan) and,
4. A plan maintenance and updating process.

Disaster Mitigation Plans must be approved by 11/04 to receive HMGP funds after that date.[6]

2.3.1.5 Local Implementation of Federal Fire Policies

Fire protection objectives on the state and private lands in Cascade County are addressed indirectly in the Cooperative Fire Management Agreement between USDI's Bureau of Land Management, National Park Service – Intermountain Region, Bureau of Indian Affairs – Portland and Billings Area, US Fish and

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[3] www.westgov.org/wga/initiatives/fire/final_fire_rpt.pdf
[4] The full text of the Act is available at http://thomas.loc.gov/. Type HR 1904 in the Bill Number box and then select the enrolled bill from the list of options.
[5] www.westgov.org/wga/initiatives/fire/implem_plan.pdf
[6] www.fema.gov/pdf/fima/howto1.pdf

Wildlife Service – Rocky Mountain Region; USDA's Forest Service – Northern Region; and the State of Montana – Department of Natural Resources and Conservation. This agreement requires that Annual Operating Plans be developed and approved by May 1 of each year specifying how the terms of the agreement will be carried out between the cooperating agencies and the state. Cooperation with local county governments is encouraged and additional agreements are executed with Cascade County. These agreements are to validate the arrangements desired between the county and a federal agency or the state in respect to assistance with their fire management programs.

As a minimum, those procedures for obtaining state and federal assistance for large wildland fire needs to be included in any agreements prepared at the local level. They should include an articulation of the suppression standards that need to be employed by federal or state agencies working on a fire on state and private land. The reverse is also true for county resources working on federal or state lands. In the former case the objective will most likely be to suppress the fire at the smallest size possible utilizing the full range of suppression resources available. In the latter case, however, certain land management objectives may preclude this approach, i.e., mechanical equipment in an Area of Critical Environmental Concern.

There may be circumstances where a fire is human caused and assistance in an investigation is needed. The skill to be a fire investigator can either be developed within the county or it can be brought in from another agency on an as needed basis. Whichever route is chosen, there should be no delay in utilizing a fire investigator when the situation is warranted.

2.3.2 State Policies

The Montana Legislature adopted the following state fire policy during the 2007 legislature. The legislature finds and declares that:

(1) the safety of the public and of firefighters is paramount in all wildfire suppression activities;
(2) it is a priority to minimize property and resource loss resulting from wildfire and to minimize expense to Montana taxpayers, which is generally accomplished through an aggressive and rapid initial attack effort;
(3) interagency cooperation and coordination among local, state, and federal agencies are intended and encouraged, including cooperation when restricting activity or closing areas to access becomes necessary;
(4) fire prevention, hazard reduction, and loss mitigation are fundamental components of this policy;
(5) all property in Montana has wildfire protection from a recognized fire protection entity;
(6) all private property owners and federal and state public land management agencies have a responsibility to manage resources, mitigate fire hazards, and otherwise prevent fires on their property;
(7) sound forest management activities to reduce fire risk, such as thinning, prescribed burning, and insect and disease treatments, improve the overall diversity and vigor of forested landscapes and improve the condition of related water, wildlife, recreation, and aesthetic resources; and
(8) development of fire protection guidelines for the wildland-urban interface is critical to improving public safety and for reducing risk and loss.

Currently there are no State policies that require a rural fire district or county fire organization to develop a community wildfire protection plan, however, it certainly is encouraged by the State Fire Policy.

It is the policy of the State to complete pre-disaster mitigation plans in compliance with the Federal direction noted above.

2.3.3 Local Policies

Cascade County adopted Cascade County Growth Policy in August of 2006 that includes the unincorporated areas of the County. In 1999, the Montana Legislature revised this community development and planning tool and renamed it the Growth Management Policy. The requirements of a

Growth Management Policy are detailed in 76-1-601, Montana Code Annotated. The Cascade County Growth Policy provides guidance as the community grows and develops. Special attention is given to specific land uses and the need for infrastructure to support those identified uses. Preparing a growth policy includes describing the historical base, establishing key indicators and monitoring the growth trends, and developing policies to accommodate the potential growth and changes in the community.

In the Cascade County Growth Policy, the Wildfire and Fire Protection Goal is:

> "Minimize risk of fire by management and planning, and to permit the effective and efficient suppression of fires in order to protect persons, property and forested areas."

Objectives which support the goal are:

1. Encourage fire protection measures throughout the county, giving special emphasis to the extreme fire hazards at the wildland-urban interface.
2. Subdivisions should be planned, designed, constructed and maintained so as to minimize the risk of fire. Developers should submit a defensible space plan for each subdivision to the appropriate fire district for its review.
3. Encourage fire resistant construction.
4. Promote cooperation with local fire districts and state and federal agencies to develop and provide a wildfire educational program.
5. Promote fire services for all subdivisions.
6. Promote adequate water supply systems.
7. Support adequate ingresses and egresses in all subdivision planning.
8. Promote vegetation policies that reduce fire hazards.

In Chapter VI – Public Facilities – Local Services, under the fire protection section recommended actions include:

1. All major subdivisions should be reviewed by the Rural Fire District prior to approval by the Planning Board.
2. The subdivider should be made aware and should provide information concerning fire protection prior to preliminary plat approval.

Subdivision regulations are normally developed after completion and adoption of the Growth Policy. The County is also in the process of up-dating their Subdivision Regulations. In ***Planning for Wildfires***, three strategies are offered for dealing with development in the wildland-urban interface, they include:

1. Conduct Wildfire Planning in a comprehensive planning context. This CWPP accomplishes this strategy.
2. Conduct a program of regulation and enforcement that stresses continuous individual responsibility by homeowners and property owners including:
    a. Subdivision regulations.
    b. Zoning regulations, such as a wildland-urban interface overlay.
    c. Building and fire codes
3. Conduct an effective ongoing program of education and outreach to affected residents and property owners.[7]

The City of Great Falls Growth Policy has direction which impacts this CWPP:

Goal – To provide and enhance crime prevention and law enforcement, fire prevention and protection, and emergency services for residents, businesses, and visitors.

Policy Statements in the Great Falls Growth Policy for Law Enforcement/Fire Rescue/Emergency Services:

[7] Planning for Wildfires; American Planning Association; 2005

1. The City shall maintain mutual aid agreements with surrounding jurisdictions for law enforcement, fire/rescue, and emergency response.
2. The City shall continue to ensure that public safety is a primary concern and that high quality services and equipment are provided and maintained.
3. The City should implement the Cascade County Emergency Preparedness Plan, which is adopted and incorporated into this Growth Policy by reference.

A Pre-Disaster Mitigation Plan (PDM), developed by Fire Logistics, Inc., is another tool developed to provide Cascade County with insight into the potential events, which might impact the County. Wildland fire was ranked as the top natural hazard in probability of occurrence in Cascade County. As a result, Cascade County's PDM has the following goals which apply to this CWPP:

- Conduct a SWOT (strength, weakness, opportunity, threats) and Gap analysis of community infrastructure to determine vulnerability, risk and community impact.
- Develop comprehensive strategic plans that:
    - Institutionalize disaster preparedness, mitigation measures, and the PDM Program
    - Improve response and recovery from natural and manmade disasters to include, wildland fires, floods, weather events, earthquakes, hazardous materials, terrorist attacks, agricultural threats, and disease outbreaks.
    - Promote public awareness and training to help the public prepare and mitigate the effects of a natural or manmade disaster.
    - Preventing personal injury, loss of life, damage to property, and damage to the environment from natural or manmade hazards.
    - Enhance the ability and capability of emergency services to respond to the effects of hazards on people, property, and the environment.
- Form partnerships with private and public sector agencies, businesses and organizations and develop comprehensive plans to maintain essential public services during the disaster and to speed the recovery of these essential services should failure occur.
- Creates additional benefits such as improving the City's and the County's ability to respond and recover, improves public safety, and improve the capabilities of emergency services
- Improve interoperable communications capabilities.

2.4. Planning Area Boundaries

The Cascade County CWPP covers Cascade County in its entirety. The county was further subdivided into sub-planning areas by the 5th Code Watershed. The purpose of the 5th Code Watershed is to provide a uniquely identified and uniformed method of subdividing large drainage areas. These smaller 5th Code Watershed units are approximately 40,000 acres to 250,000 acres and are useful for fire planning purposes as well as other programs by the Natural Resources and Conservation Service and other agencies (See Figure 1 and Planning Area Map in Map Section 10.5).

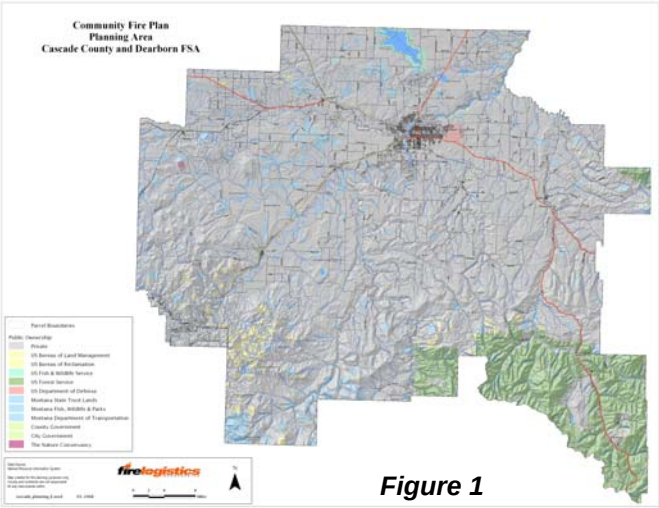


Figure 1

2.5. Community Legal Structure, Jurisdictional Boundaries

There is a mixture of fire protection organizations providing fire services to Cascade County. These include Great Falls Fire/Rescue, Belt City FD, and Neihart FD (MCA 7-33-4101-4133); Belt Rural Fire District

(RFD) (MCA 7-33-2101-2129); Fort Shaw FSA, Vaughn FSA, Black Eagle FSA, Cascade FSA, Gore Hill FSA, Monarch FSA, Sand Coulee FSA, Stockett FSA, Sun River FSA, Ulm FSA, Simms FSA, Dearborn FSA, Cascade Farmer/Rancher FSA, (MCA 7-33-2401-2405); Cascade County Fire Department (MCA 7-33-2201-2211); MT Department of Natural Resources and Conservation Direct Protection and County Cooperative Program; Lewis and Clark National Forest and Bureau of Land Management. The Montana Air National Guard has a fire department located at the Great Falls International Airport and the Malmstrom Air Force Base has a fire department located at the Air Force Base in Great Falls (See Figure 2 and Fire Resources Map in Map Section 10.5).

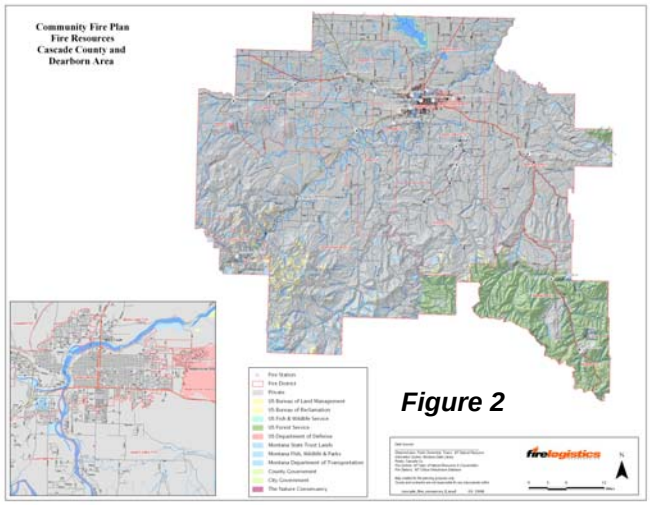


Figure 2

There is no county-wide automatic or mutual aid agreement under which resources can be requested to provide assistance to another fire entity. The Cascade County Rural Fire Dispatch Matrix calls for automatic and mutual aid, however there are no written agreements which provide the basis for the dispatch matrix. There is a written mutual aid agreement between Monarch FSA and Neihart FD and a separate mutual aid agreement between the Great Falls Fire/Rescue Department and the Montana Air National Guard and Malmstrom AFB Fire Departments. In addition, there is a mutual aid agreement between Simms, Fort Shaw, Sun River and Vaughn FSA and the Teton County Volunteer Fire Departments. There is also a mutual aid agreement between Dearborn FSA and Cascade Fire Department and Wolf Creek/Craig FSA.

The Bureau of Land Management is the responsible land management agency for BLM lands and assists the local agencies as needed. The Lewis and Clark NF is the land management agency responsible for the National Forest Lands in Cascade County and assists the County as needed.

The Department of Natural Resources and Conservation has scattered parcels of Direct Protection lands in southwest Cascade County and the DNRC County Cooperative Program provides fire support to counties when the county's capability has been exceeded and assistance is requested.

2.6. Acknowledgements

Fire Logistics, Inc. would like to thank the Cascade County Fire Warden; Cascade County DES, especially Vince Kolar; the Fire Chiefs of the Cascade County Fire Departments; Bureau of Land Management, especially Shannon Downey and Gary Kirpach; Lewis and Clark National Forest, especially Lee Clark Forest FMO, Jim Homison, Stanford District FMO and Jess Secrest, White Sulphur District FMO; Cascade County Planning Board; the Cascade County Local Emergency Planning Committee; the Cascade County Rural Fire Council and Cascade County Board of County Commissioners for their contributions to this plan.

3. Planning Process

3.1. Stakeholders

The following stakeholders are affected by wildland fire and have a stake in a successfully implemented CWPP:

Fort Shaw VFD
Belt City VFD
Belt Rural VFD
Black Eagle VFD
Cascade VFD
Gore Hill VFD
Monarch VFD
Neihart VFD
Sand Coulee VFD
Stockett VFD
Sun River VFD
Ulm VFD
Vaughn VFD
Manchester VFD
Sun Prairie VFD
Newman Bench VFD
Simms VFD
Dearborn VFD
Cascade Farmer/Rancher VFD
Great Falls Fire-Rescue
Cascade County Fire Warden
MT Dept. of Natural Resources and Conservation
Bureau of Land Management
Lewis & Clark NF
City of Great Falls
City of Belt
City of Neihart
Burlington Northern Santa Fe Railroad
Cascade County Local Emergency Planning Committee
Cascade County Road Department
Cascade County DES
Board of County Commissioners – Cascade County
Residents of Cascade County

3.2. Current Process and Plan Development

In the summer of 2005, the Chouteau County Conservation District awarded a contract to Fire Logistics, Inc. to complete a comprehensive risk assessment of Cascade County and to develop a mitigation plan which provides recommendations for improvements to the county's fire protection system, mitigation measures for treating the fuels and providing protection to structures. The Cascade County Community Wildfire Protection Plan (CWPP) is the result of that effort.

3.2.1 Avenues of Community and Public Input – Collaboration

Public meetings of the Cascade County LEPC and the Cascade County Rural Fire Council were held on September, October, & December of 2005, February, March, April, September and November of 2006 to discuss the CWPP. The following were discussed in these public meetings:

- Mission of the CWPP

- Goals of the CWPP
- Project identification
- Designation of wildland-urban interface areas
- Review draft of the CWPP

In addition, a draft of the CWPP was placed on Cascade County's web site and a press release was placed in the Great Falls Tribune to notify county residents of the ability to review the document and provide comments on the draft CWPP.

Comments were incorporated into the final version of the Cascade County CWPP.

3.3. Review of Existing Plans, Studies, Reports, Technical Documents

The following documents have been reviewed for data, which may need to be referenced and incorporated in the Cascade County CWPP:

- Cascade County Cooperative Fire Management Agreement
- Cascade County Growth Policy Plan; 2006.
- Draft Cascade County Subdivision Regulations, 2006.
- Cascade County Subdivision Regulations, 2004.
- Development Plan – Cascade County, 1979.
- Cascade County – Zoning Regulations, 2005.
- Cascade County – Emergency Operations Plan, 2004.
- Public Protection Classification Results – Neihart FD, 2004.
- Mutual Aid Agreement between Cascade County, Pondera County, Teton County, Toole County, Liberty County, Glacier County, Judith Basin County and Fergus County.
- Mutual Aid Agreement between Simms VFD, Fort Shaw VFD, Sun River VFD, Vaughn VFD and the Teton County Volunteer Fire Companies, 2000.
- Mutual Aid Agreement between Neihart FD and the Secretary of the Air Force, 2001.
- FY 2005 Annual Operating Plan between the USFS Lewis & Clark NF – Judith Ranger District and Cascade County Fire Districts; 2005.
- Advancing Wildland Fire Training for Fire Departments – Implementation Plan; 2006.

3.4. Local Jurisdictional Involvement, Approval, Adoption

Once the Cascade County CWPP is reviewed and approved by the Board of County Commissioners, it should be adopted as the fire component of Cascade County's Pre-Disaster Mitigation Plan.

4. Community Description

4.1. General Environmental Conditions

Cascade County is located in north central Montana, see Figure 3. It covers just over 2,712 square miles and has a population of about 79,569 (2005 estimate)[8] people. The county has five distinct watersheds, the Missouri River, the Smith River, the Sun River, the Dearborn River, and Belt Creek. Most lands in the county are used for some type of agriculture and as a result, agriculture is the county's number one industry. The majority of the terrain is relatively flat when compared with the western part of the state and the elevations in the County range from 8,621 feet in the Highwood Mountains to 2,700 where the Missouri River exits the County. The county receives approximately 15 inches of rainfall a year in Great Falls to a high of 29 inches a year in the Highwood Mountains, the Showdown Ski Resort receives approximately 200 inches of snow a year and the adapted ecosystems contain vegetative types and quantities commensurate with soil productivity and available moisture.

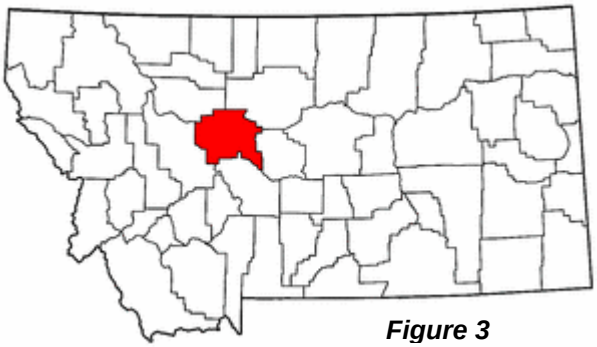


Figure 3

4.1.1. Topography, Slope, Aspect, Elevation

The main drainages are Missouri flows from the southwest to the northeast and Smith Rivers flowing generally south to north, Dearborn and Sun Rivers flowing from the west to the east, and Belt Creek flows from the southeast to the northwest. The northern portion of the county drains south into the Sun and Missouri Rivers, and the western portion of the county drains into the Sun and Dearborn Rivers, while the southern half of the county drains to the north into the Missouri and Smith Rivers and Belt Creek.

The majority of the County's terrain is made up of rolling upland plateaus and benches, with moderate deep canyons. The eastern portion of the county has elevation changes are more pronounced and approach 4,000 feet toward the eastern boundary of the county in the Highwood Mountains. Along the conifer covered ridges, the slopes fluctuate widely, with some steep pitches approaching 60% plus. The southern portion of the county ranges from rolling upland benches to hilly and mountainous terrain with elevations reaching 8,621 feet at Long Mountain near Neihart. Steep timbered slopes and deep canyons are the norm in the southern portion of the county.

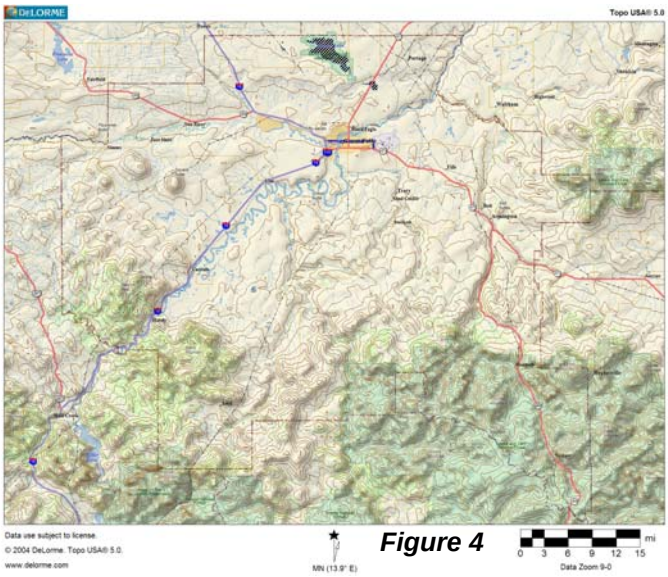


Figure 4

Aspect is the direction toward which a slope faces. Because of the topographic nature of Cascade County, the southern area of the county has more southern and western aspects that are more prone to exacerbate wildland fire behavior.

Figure 4 shows the topography of Cascade County and it is evident that there is some correlation between slope, elevation and vegetative cover types,

[8] http://quickfacts.census.gov

especially in the southern portion of the county. The pine forest is generally located on higher ground in distinct bands where soil and moisture conditions are conducive to its survival. The ponderosa pine type is usually denser on north and east aspects where the soils can retain moisture somewhat longer then they can on south and west aspects.

The tillable lands that can be irrigated are used for hay; grain and root crops while the remaining lands are left in a natural state or are in the Conservation Reserve Program (CRP). These CRP lands are source of great concern to government officials in Cascade County due to their extremely flammable nature and potential for large fire growth.

4.1.2. Meteorology, Climate, Precipitation and Fire Weather

Weather directly affects fire behavior, with wind and low humidity values being the major influencing factors due to their ability to rapidly dry fuels and allow fires to grow rapidly. Generally, steering winds at the surface and aloft over central Montana in the spring and summer prevail out of the south to west and are moderate to strong across open areas with lighter winds over hilly or mountain areas. Surface winds vary depending on the method used for developing the winds, elevation, aspect and openness of the local terrain. Southwest and west facing slopes are more exposed to the prevailing winds and have drier fuels, which relates to increased fire behavior activity. Fires generally spread from southwest to northeast.

Wind speeds are of great concern for fire fighters and strongly influence all fire activity. Winds are generally caused by one of four methods. The first method is pressure gradient winds. These winds are caused by winds trying to equalize pressure between high and low pressure systems. An example of this is a cold frontal passage accompanied by gusty winds. These winds are typical of open grassy areas found across large portions of northern Cascade County. A second method for generating winds is by diurnal heating and cooling of the land. These winds are typically found in mountain or hilly areas where daytime upslope and nighttime down slope winds occur. These winds are usually lighter than pressure gradient winds but can be over-ridden by strong pressure gradient winds. The third method of producing wind is by outflow from thunderstorm activity. These winds can be very erratic as well as very gusty and can challenge all wildland fire suppression efforts and lead to fire fighter safety concerns as well as the potential for large wildland fire growth. The fourth method is primarily a winter phenomena with strong to very strong lee slope winds.

The normal summer weather pattern for central Montana can best be understood by looking at the larger weather pattern for the entire western United States. The Bermuda High located in the Caribbean and Gulf of Mexico makes its way across Texas and New Mexico by July and cuts off a supply of low-level moisture from the Gulf of Mexico to the plains of North America. This cause's general thunderstorm activity to decrease across central Montana as the low level moisture diminishes. This allows the lower atmosphere to dry with a corresponding lowering of humidity values. This is timed with the development of a high-pressure system that sets up across Montana with subsidence within the high-pressure system that dries the atmosphere. This subsidence does two things; it brings very warm temperatures (95-110) to the area and it significantly lowers the relative humidity values. During this time overnight humidity recovery becomes poor allowing the drying of fuels of all size classes (1 hour, 10 hour, 100 hour, and 1000 hour plus time lag fuels). The 1-100 hours time lag fuels will show evidence of drying within 3-5 days. The 1000 hours fuels will take significantly longer to dry, usually in the 3-5 weeks range.

The typical fire season in central Montana is from early spring into the fall or early winter or from March through November. Spring, before green-up, can be a time of large fire growth as dry residual winter cured fuels combined with gusty winds pose a threat of large fires. Moisture in the spring provides for fuel growth and is a time for prescribed fire activity. As the season turns to summer, the amount of moisture from thunderstorms taper off while grasses and shrubs begin to lose their live fuel moisture, down fuels begin to dry, and fire conditions normally peak by late August. As autumn approaches, conditions generally begin to cool and killing frost begins to affect fuels. Dry cold frontal passages become common and can promote conditions of extreme fire behavior especially when accompanied by very strong winds. Late fall conditions in late October and November mark the transition into winter, but again, dry cold

frontal passages at this time of year and the lack of snow pack can lead to conditions of rapid fire growth and high intensity fire behavior during wind events.

Climatic seasonal changes can influence fire behavior as well. Winter months of December through February are generally non-fire months, but snow pack accumulations can be a key factor in potential fire activity for any given fire season. In the last half of the 20th century, spring seasons (April through June) were generally moist months with low fire frequencies. The ignitions that did occur resulted in mostly low intensity fires. Since 1988, the weather patterns have been changing to a warmer and dryer cycle resulting in extended fire seasons; spring months no longer can be counted on as a low fire period of the year. Long-term drought conditions have increased the fire complexity in central Montana and Cascade County and it is not unusual for significant pre green-up fires to occur in the early spring.

Moisture regimes in the spring and summer can be defined in terms of storm tracks, which typically move across the county from southwest to east. The storm track affecting the analysis area starts along the western or southern edges of Cascade County and tracks northeastward across the county before moving out onto the eastern plains of Montana. Significant moisture associated with these storm tracks will be higher in April and May and will trend downward in June with mainly dry thunderstorms expected in July and August. Thunderstorm activity is possible in September and early October but at a much-reduced rate compared to early spring.

Winters have been mild for the past few years with a pronounced drought that affected large portions of the Northern Rockies. Winter and spring snow events have been fewer with less snow accumulating over the mountains with streams and rivers flowing at or near record low levels. In addition, subsurface moisture continued to be short helping to stress vegetation of all types. Bug kill has spread across large portions of the Northern Rockies and forested areas of Cascade County over the past few drought years providing standing dead fuels for potential large fires. The winter of 2005-2006 continued this trend with warmer than normal conditions along with drier than normal moisture however several spring storm systems in March and April 2006 have provided much needed widespread moisture across large portions of Montana. While this moisture has helped the agriculture community and helped replenish surface and subsurface moisture with near normal streams and reservoirs, the long-term drought continues to pose potential large fire problems in the larger fuel types.

The higher elevations in the Little Belt Mountains of southern Cascade County provide the orographic lifting that results in more moisture to this forested area with a corresponding increase in thunderstorm activity. Heavy lightning activity associated with these storms contributes to a significant number of fire starts along the storm's path especially in late July and August. Dry lightning events increase during this period with these thunderstorms often producing strong down draft winds with little if any rain. These storms can be several miles wide at their bases with lightning expected anywhere within a 40-50 mile radius of the storms.

A review of the fire history for Cascade County for the years 1980-2005 showed the following:

1. Average maximum temperature warmest in July and August.
2. Average wind speed was strongest in winter, early spring and late fall. During the summer winds are moderate with the higher winds over open ground and from a westerly direction. Wind gusts during the summer were strongest from thunderstorm outflow winds.
3. August is consistently the driest month with weather records showing poor nighttime relative humidity recovery. During the day light hours the relative humidity begins to drop substantially beginning at 0900 and remains low until 2100. These lows bottom at the lower teens around 1700-1800. In reviewing the weather history, there are also days in August where relative humidity values remained low for multiple twenty-four hour periods.
4. Moisture events did occur in August, but were limited in location, content and duration. The remnants of these events kept the maximum relative humidity high in that particular area for a period of seven days after initiation.
5. Continued drought conditions have begun to modify but have stressed large fuels.
6. Drought stressed conifer stands contributed to large fire spread, where high fire intensities did not allow for aggressive initial attack or fire suppression with ground forces due to safety concerns.

7. Lightning occurrence usually begins in April with the heaviest occurrence in May and June. Dry Lightning is most prevalent July and August.

Tabular conditions of temperature, humidity, precipitation and winds are listed below. Caution should be used with the November data as the sample period is limited. These conditions are more typical of mountain locations while warmer temperatures, lower humidity valued and stronger winds can be expected over open areas.

Cascade County		Years	1980-2005						
Temp	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**
Max	38.2	38.7	73	75	74.8	72	75.5	61	36.2
Avg	24.1	35.3	46	54.8	66.9	66.9	59.1	40.9	33.6
Min	21.3	32.1	42.8	50.5	42	58.1	50.7	35.6	28.3
RH	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**
Max	79.5	63.4	56.8	57	91	49.3	68.1	61.5	84.8
Avg	72.9	62.9	52.6	49.5	34.6	33.2	37.5	54.4	60.1
Min	38.8	62.5	18	21.7	23.6	21.2	21.6	24	45
Pcpn	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**
Max	2.72	3.15	5.15	6.55	9.07	5.66	2.07	2.7	0.87
Avg	2.72	2.61	3.24	4.49	2.54	2.38	1.21	1.63	0.87
Min	2.72	2.08	2.01	3.03	0.23	0.3	0.35	0.91	0.87
Wind	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**
Max	17.2	13.6	12.2	15.8	13.6	11.9	15.9	15.7	15.5
Avg	14.8	11.9	10.9	11.1	9.8	9.9	11.1	13.3	13.6
Min	14.3	10.2	5	6.4	5.3	6.6	7.1	8	12.5

4.2. Population, Demographics

Population and demographics information was derived from the 2000 Census. The population for Cascade County was 80,357. The population of Great Falls is 56,690. In the county the population was spread out with 26.00% under the age of 18, 9.10% from 18 to 24, 28.10% from 25 to 44, 22.80% from 45 to 64, and 14.00% who were 65 years of age or older. The median age was 37 years. While these demographics don't indicate the population is aging, the demographics of Neihart indicate that the population over the age of 65 is a significant concern. Because of the aging population in the county's smaller communities and the fact that the majority of the county's younger residents must commute to Great Falls to find work, there is a significant problem in recruiting and retaining volunteer fire fighters for the county fire departments.

4.3. Infrastructure: Roads, Driveways, Utilities, Communication, and Water Supply

Interstate 15 bisects Cascade County from the southwest to Great Falls, and then exits the county to the northwest. Montana Highways 87, 89, and 200 are other primary highways that provide access throughout the county. Cascade County maintains an extensive network of paved and graveled roads that can be utilized to provide access for fire suppression activities.

There are significant access problems for fire departments in the Monarch FSA and Dearborn FSA response areas.

Burlington Northern Santa Fe Railroad tracks generally follow Highway 87 through the county and have a significant amount of rail traffic which has the potential to start wildland fires.

Large propane tanks are located throughout Cascade County at ranch and home sites. In the Great Falls area, Energy West provides natural gas services.

Electric transmission lines and distribution power lines along with telephone lines and railroad signal lines are concentrated along Highway 87 and local distribution lines to some populated areas. Northwestern Energy and the Sun River Electric Cooperative provide electrical power to the county.

Qwest, Chinook Wireless, 3 Rivers Communications provide telephone service to Cascade County.

Cellular phone service is generally available; however, there are areas within the county that do not have cellular phone service. Cellular phone service is provided Verizon, Altel, and Chinook Wireless.

There are municipal water systems serving the City of Great Falls, Belt, Neihart, Cascade and Ulm. In the County, there is limited developed water supply and water tenders must transport fire protection water to the fire scene. Stock ponds and creeks are available at times for a water supply point, but during periods of extended drought, water is a premium to ranchers.

Radio communication for Cascade County Fire Departments is generally very good except for some areas of Sand Coulee, Stockett, Monarch, Neihart and Vaughn.

4.4. Emergency Services

Emergency services within Cascade County include fire protection, emergency medical services including ambulance transportation, law enforcement, and emergency preparedness.

4.4.1. Fire Protection

There is a mixture of fire protection organizations providing fire services to Cascade County. These include Great Falls Fire/Rescue, Belt City FD, and Neihart FD (MCA 7-33-4101-4133); Belt Rural Fire District (RFD) (MCA 7-33-2101-2129); Fort Shaw FSA, Vaugh FSA, Black Eagle FSA, Cascade FSA, Gore Hill FSA, Monarch FSA, Sand Coulee FSA, Stockett FSA, Sun River FSA, Ulm FSA, Simms FSA, Dearborn FSA, Cascade Farmer/Rancher FSA, (MCA 7-33-2401-2405); Cascade County Fire Department (MCA 7-33-2201-2211); MT Department of Natural Resources and Conservation Direct Protection and County Cooperative Program; Lewis and Clark National Forest and Bureau of Land Management. The Montana Air National Guard has a fire department located at the Great Falls International Airport and the Malmstrom Air Force Base has a fire department located at the Air Force Base in Great Falls.

Wildland fire protection is provided by all of the above fire entities under the direction of the county fire warden with various fire suppression resources throughout the County under the Cascade County Co-Op plan. The wildland fire apparatus is located strategically throughout the county (See Figure 5 and Fire Resources Map in Map Section 10.5).

As a “Coop County,” if a wildland fire exceeds or threatens to exceed Cascade County’s capability and the county is fully committed to a wildland fire, the county can request assistance from Montana DNRC at no cost to the county. As part of the county equipment, Cascade County furnishes water tenders, dozers and

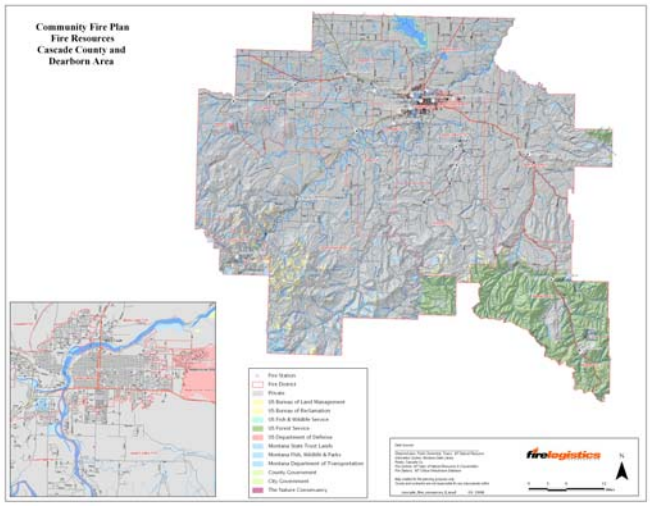


Figure 5

motor graders from the County Road & Bridge Department for wildland fire suppression efforts in the county.

Cascade County is within the Central Land Office (CLO) of Montana DNRC's geographic area. When State assistance is requested the CLO provides additional resources such as air tankers, helicopters, single engine air tankers and crews and overhead. During the fire season these resources may be committed to other incidents and may not be available.

The following photographs are representative examples of the fire protection facilities in Cascade County's fire protection system (See Figures 6-8).

Figure 6 Neihart FS

Figure 7 Vaughn FS

Figure 8 Great Falls Fire/Rescue FS # 4

4.4.1.1. Fire Engine Pump/Draft Source Sites

Water supply sources for wildland fire protection and structural fire protection throughout Cascade County are relatively scarce. They include rivers, creeks, stock ponds and the occasional water supply point, etc. Due to the long-term drought in Cascade County, most ranchers would not authorize fire protection entities to utilize their scarce water resources for fire protection. As a result during this extended drought period, water supply sources need to be delivered to the fire, through fire apparatus such as water tenders. There is no map of the water sources in the county.

4.4.1.2. Training, Certification, and Qualification

All incidents require different skill levels of incident management personnel. To assist in assigning appropriate incident commanders to wildland fire incidents, an incident analysis can be used as a guide to identify and mitigate certain complexity and safety issues by selecting a different strategy, tactic, or higher qualifications of incident command personnel. Certain assumptions are made in this analysis:

- As an incident becomes more complex, the need for more competent incident management personnel, an incident management team or organization increases.
- To facilitate assembling an efficient and effective organization, key managers should be involved during the early stages of the complexity analysis; this should include federal, state, and local partners.
- The incident analysis is not a cure-all for the decision process; local fire history, current fire conditions, and management experience must be considered.

All wildland fires, regardless of size, must have an assigned Incident Commander (IC). The training, certification and qualifications of the Incident Commander (IC) vary by the type, size and complexity of fire. General guidance is:

Type 5 Incident

- Resources required typically vary from two to six fire fighters
- The incident is generally contained within the first burning period and often within a few hours after resources arrive on scene.

Type 4 Incident

- Command staff and general staff functions are not activated.
- Resources vary from a single resource to several resources.
- The incident is usually limited to one operational period in the control phase.
- No written incident action plan (IAP) is required. However a documented operational briefing will be completed for all incoming resources (See Briefing Checklist – Incident Response Pocket Guide).

Type 3 Incident

- In-briefings and out-briefings are more formal.
- Some or all of the command and general staff positions may be activated, usually at the division/group supervisor and/or unit leader level.
- Type 3 organizations manage initial attack fires with a significant number of resources, an extended attack fire until containment/control is achieved, or an escaped fire until a Type 1 or Type 2 team assumes command.
- Resources vary from several resources to several task forces or strike teams.
- The incident may be divided into divisions.
- The incident may involve multiple operational periods prior to control, which may require a written IAP.
- A documented operational briefing will be completed for all incoming resources and before each operational period. See Briefing Checklist in Resources Section.
- Staging areas or an incident base may be used.

By completing an Incident Complexity Analysis, a fire county fire warden can assess the hazards and complexities of an incident and determine the specific incident management positions needed (See Northern Rockies Incident Organizer in Resources Section 10.4).

Required training, experience and prerequisites for various wildland fire management positions are contained in PMS 310-1 (Wildland and Prescribed Fire Qualification System Guide). PMS 310-1 has been adopted by the Northern Rockies Coordinating Group (NRCG) and, consequently, applies to all wildland fire fighting personnel in the state of Montana and Cascade County for mobilization outside of the county. Within the County, local standards would apply.

The United States Fire Administration and the National Fire Protection Association conducted a needs assessment of the fire service in the United States; one of the findings was that only 26% of the fire departments in the US can handle a wildland-urban interface fire affecting 500 acres with local trained personnel.[9] The Cascade County fire departments are in those very few fire departments in Montana that can manage such an incident.

4.4.2. Law Enforcement

The Cascade County Sheriff's Department, Great Falls Police Department, and the Belt Police Department provide law enforcement and evacuation services to the city and county. Due to limited resources in the Sheriff's Department, a significant evacuation during a wildland-urban interface fire will be a challenge.

4.4.3. Emergency Management

County emergency preparedness comes under the office of the Cascade County Disaster and Emergency Services.

Cascade County Disaster Emergency Services has mutual aid agreements with surrounding counties and these have recently been updated.

4.5. Insurance Ratings

The insurance premiums that residential and commercial customers pay are based on a rating system established by the Insurance Services Office (ISO). In its evaluation of a community, ISO considers the water system and the fire protection provided by the fire department. The relative weight of the components is:

Water Supply	-	50
Fire Department	-	40
Fire Dispatch	-	10

The ISO rating system produces ten different Public Protection Classifications, with Class 1 receiving the most insurance rate recognition and Class 10 receiving no recognition.[10] **A split rating such as Class 6/9 & 10 means that a department is rated as a Class 6 within 1,000 feet of a fire hydrant or certified water point, a Class 9 when over a 1,000 feet from a hydrant and within 5 miles of a fire station, and a Class 10 rating applies when the insured is more than 5 road miles from a fire station.**

The majority of Cascade County currently has an ISO rating of Class 10. However, the county's fire departments have worked to lower their ISO ratings. Individual fire departments ratings are listed in the following table:

[9] A Needs Assessment of the U.S. Fire Service, USFS & NFPA, 2002
[8] *Fire Protection Handbook,* NFPA 1997

Insurance Services Office Ratings of Fire Departments	
Department	**Rating**
Great Falls Fire/Rescue	Class 3
Belt City FD	Class 7
Belt Rural FD	Class 8/9/10
Black Eagle FSA	Class 7/8/9
Cascade FSA	Class 7/9
Fort Shaw FSA	Class 8
Gore Hill FSA	Class 6/8
Monarch FSA	Class 9
Neihart FD	Class 7/9
Sand Coulee FSA	Class 9
Stockett FSA	Class 10
Sun River FSA	Class 8/9
Ulm FSA	Class 8
Vaughn FSA	Class 6/9
Simms FSA	Class 8/9
Dearborn FSA	Class 9
Farmer-Rancher FSA	Class 10
Malmstrom AFB FD	Class 5

Improvements to the water delivery system, dispatch and the fire departments could improve the ISO rating for the individual fire protection agencies. This would result in potential annual insurance premium savings to the fire department's customers, e.g., home and business owners. It is important to note that some insurance companies will not insure structures that are outside of 5 road miles from a fire station.

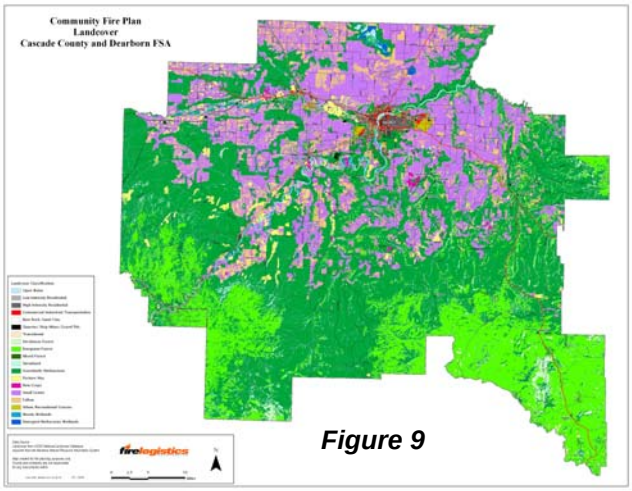


Figure 9

4.6. Land Use/Development Trends

The majority of land use in Cascade County is agricultural based (See Figure 9 and Land Cover Map in Map Section 10.5).

Currently new land development is at a slower pace than in the late 1990's, however, the Cascade County Planning Department processed 32 subdivisions in 2005. These subdivisions resulted in the development of 94 additional tracts of land in the County. It seems likely that development will continue to occur and may increase as the prices of real estate continue to escalate in the major markets of Southwest and Western Montana.

4.7. Air Quality

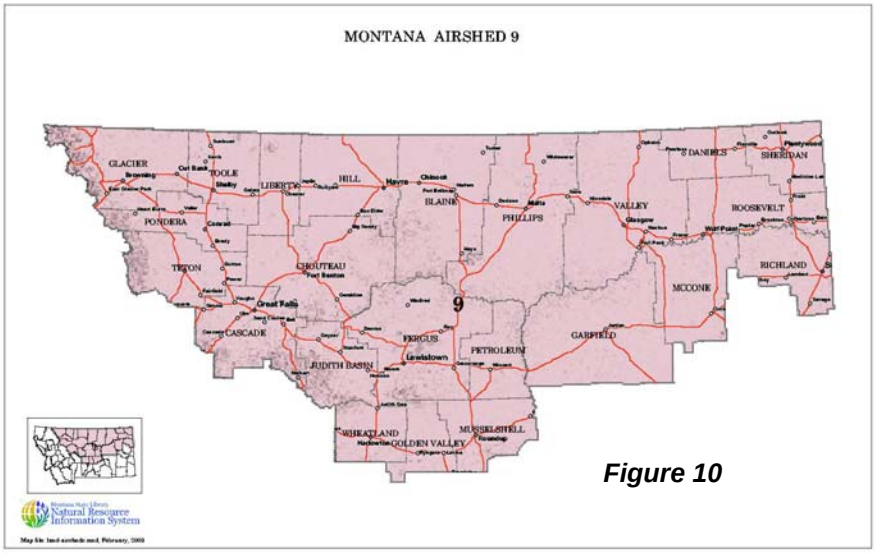


Figure 10

The State of Montana's air quality is managed by the Montana State Airshed Group through the Department of Environmental Quality. Cascade County is located in Airshed 9, see Figure 10. Generally, open burning is permitted year around in the eastern Montana opening burning zone (Airsheds 9 and 10), during December, January, and February the DEQ needs to be notified by telephone of agricultural open burning or a prescribed fire. In most cases this approval can be obtained for any proposed open burning in the eastern Montana zone because of good smoke dispersal and the lack of significant air quality issues such as the valley inversions experienced in western Montana.

4.8 Summary

The impacts of the elements of the community have on the wildland fire program and the delivery of wildland fire fighting services in Cascade County is summarized in Table 4.8.1.

Table 4.8.1

Element	Summary of Impact on Cascade County's Wildland Fire Program
Topography, Slope, Aspect, Elevation	Accessibility
	Increased rates of spread
Meteorology, Climate, Precipitation and Fire Weather	Accessibility of water supplies
	Increased number of high fire danger days
	Increased flammability of fuels
Population, Demographics	Reduced availability of volunteers
	Reduced availability of skills and experience
	Need for increased recruitment and training
	Need for fire protection planning
Infrastructure	Reduced accessibility
Fire Protection	High cost wildland-urban interface fires
Fire Engine Pump/Draft Source Sites	Accessibility of water supplies
	Increased damage
Training, Certification, and Qualification	Availability of personnel
	Financial Constraints
	Mitigate potential liability
Law Enforcement	Capacity to deliver evacuation services, security
Insurance Ratings	Predictor of service capability
	Increase or decrease in insurance premiums paid by customers
Land Use/Development Trends	Change of fire protection risk profiles
Air Quality	Ability to conduct prescribed burns

5. Current Fire Environment

The following narratives describe the current fire environment in Cascade County. These perspectives are a result of an on the ground tour conducted by Cascade County Fire Warden and Fire Logistics, Inc. personnel in October of 2005.

5.1. Wildfire Problem Definition

The Conservation Reserve Program (CRP) land and with the change of agricultural practices, i.e. no-till farming, have created a significant wildland fire problem in parts of the county. As stated in Chapter 4, Cascade County does have areas of forested land. Ponderosa pine and scattered juniper is the dominant conifer through the largest portion of the forested land in the county. However, the areas within the Highwood and Little Belt Mountains contain continuous stands of multi-storied Douglas fir, Lodgepole pine and sub-alpine fir. As will be discussed in the next section, these conifer species is a fire prone ecosystem is subject to repeated wildland fires. The impacts of those frequent fires can be quite variable depending on the values at risk (See Figure 11).

Figure 11

Currently, Cascade County fire departments are responsible for wildland protection on the state and private lands within Cascade County. The Bureau of Land Management and the United States Forest Service are responsible for providing wildland fire protection on federal lands within Cascade County.

An analysis of the placement of wildland engines through out Cascade County indicates that there are wildland engines generally located throughout the areas of the county where fire occurrence is the highest and where there is a willing host (typically a rancher or resident) who will make a commitment to attending required training and respond to wildland fires in the areas and throughout the county.

Figure 12

5.2. Wildland-Urban Interface

During the past several fire seasons of 2000 through 2003 it has become evident that wildland-urban interface fire losses have increased throughout the Western United States (See Figure 12). The expectation under the Federal Fire Policy is "that losses will increase in the future."[11]

The wildland-urban interface is defined as the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.[12] Similar terms are wildland/residential interface

[11] *Federal Fire Policy, 2001*
[12] *Ibid.*

and wildland-urban intermix. For the purposes of this CWPP, "the wildland-urban interface is defined as a group of homes and other structures with basic infrastructure and services within or adjacent to Federal land; in which conditions are conducive to a large scale wildfire event; and for which a significant threat to human life or property exists as a result of a wildland fire disturbance event."[13]

From a fire fighter's perspective there are nine Wildland-Urban Interface "Watchout" Situations that are significant to the safety of wildland fire fighters:

- Wooden construction and wood shake roofs
- Poor access and narrow congested one-way roads
- Inadequate water supply
- Natural fuels closer than 30 feet to structures
- Extreme fire behavior
- Strong winds
- Need to evacuate the public
- Structures located in chimneys, box or narrow canyons, or on steep slopes in flashy fuels
- Inadequate bridge load limits

Cascade County communities that are listed in the Federal Register as "Communities at Risk" from wildland fire include:

Monarch
Neihart

There are several additional areas of wildland-urban interface within the county, which have been identified during this planning process (See Figure 13 and Wildland-Urban Interface Area Map in Map Section 10.5).

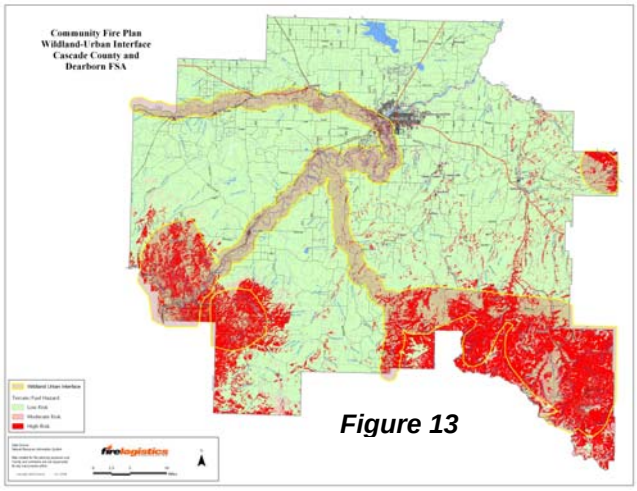


Figure 13

Additional areas of wildland-urban interface in Cascade County include:

Dearborn Area, including Cooper Ranch & Stickney Creek
Hardy - Missouri River Corridor
Logging Creek Area
Southwest side of the Highwood Mountains, adjacent to National Forest
Missouri, Sun, & Smith River Corridors

The current and potential development of portions of Cascade County into residential lots of varying sizes will contribute to the wildland-urban interface fire problem for the fire protection agencies in the county. This leads to several complex problems, which need to be addressed in the CWPP:

- Access
- Asset Protection Zones
- Water Supply
- Building Construction Requirements
- Fuel Reduction On All Ownerships
- Long term affects to fuels as a result of long term drought
- Insect and disease mortality in the mature conifer stands
- High costs of wildland fires when the structure protection resources need to be acquired from other areas of the state.
- Kinds And Types Of Fire Apparatus Required For Fire Protection

[13] Healthy Forest Restoration Act

5.3. Structure Fire Problem Definition

Currently, Great Falls Fire/Rescue, Belt City FD, and Neihart FD have fire protection responsibilities for all structure protection within the incorporated city limits. Great Falls Fire/Rescue contracts for fire protection with 16 rural fire districts, surrounding the City of Great Falls and provides fire protection to these fire districts. These departments plus the Belt Rural Fire District, Black Eagle FSA, Cascade FSA, Fort Shaw FSA, Gore Hill FSA, Monarch FSA, Sand Coulee FSA, Stockett FSA, Sun River FSA, Ulm FSA, Vaughn FSA, Simms FSA, Dearborn FSA, Farmer & Rancher FSA, Montana Air National Guard FD, and Malmstrom AFB FD provide structure protection for structures within the county.

The best way to quantify the structure fire problem in the Cascade County outside of the city limits of Great Falls is to conduct an occupancy risk assessment, which evaluates the severity of a specific structure in relation to the fire districts ability to handle the types and severity of emergencies with that structure.[14] Risk categories used in the Self-Assessment Manual developed by the International Commission on Fire Accreditation are: [15]

Category	Description
Maximum/Worst Risk	Occupancies classified as maximum risk will be of substantial size and contain a concentration of properties, which present a very high risk of life loss, loss of economic value to the community or large loss damage to property in the event of a fire. These risks impact the need for the fire department to have multiple alarm capability and have an adequate assessment of their ability to concentrate resources.
High Hazard/Key Risk	Built-up areas of substantial size with a concentration of property presenting a substantial risk of life loss, severe financial impact on the community or unusual potential damage to property in the event of fire.
Moderate/Typical Risk	Built up areas of average size, where the risk of life loss or damage to the property in the event of a fire in a single occupancy is usually limited to the occupants. In certain areas, such as small apartment complexes, the risk of death or injury may be relatively high. The moderate/typical risks are often the greatest factor in determining fire station locations and staffing due to the frequency of emergencies in this category. To assure an equitable response and to provide adequate initial attack/rescue capability to the majority of incidents, the typical risk is often used in determining needed resources.

Figure 14
Maximum/Worst Risk

Cascade County fire agencies have similar risks located throughout the county (See Figures 14-16). A heavy commitment of mutual aid resources and long duration incidents are required for incidents in these maximum/worst risks.

Figure 15 High Hazard/Key

[14] *Fire and Emergency Service Self-Assessment Manual, Commission on Fire Accreditation International, 6th ed.*
[15] *Ibid*

Figure 16
Moderate/Typical Risk

The Commission on Fire Accreditation International, *Fire and Emergency Service Self-Assessment Manual* outlines the needed staffing levels for incidents occurring in the different types of risk occupancies, which are detailed in the following table.[16]

Task	Maximum/ Worst Risk	High Risk	Moderate Risk	Low Risk
Attack Line	4 (16-18*)	4	2	2
Search and Rescue	4	2	2	
Ventilation	4	2	2	
Back-up-Line	2	3	3	
Pump Operator	1	1	1	1
Water Supply	1	1	1	
Utilities Support	1	1	1	
Command/Safety	2	2	1	1#
Forcible Entry	*			
Accountability	1			
Salvage	*			
Overhaul	*			
Communication	1*			
Chief's Aid	1	1		
Operations Officer	1			
Administration	1			
Logistics	*			
Planning		1*		
Staging		1*		
Rehabilitation	1			
Sector Officers	1-4*			
High-Rise Evacuation	10-30*			
Stairwell Support	10*			
Relief	*			
Investigation	*			
TOTALS	25-65*	17	13	3-4

Can often be handled by the first due officer.
* At maximum and high-risk fires, additional fire fighting personnel are needed

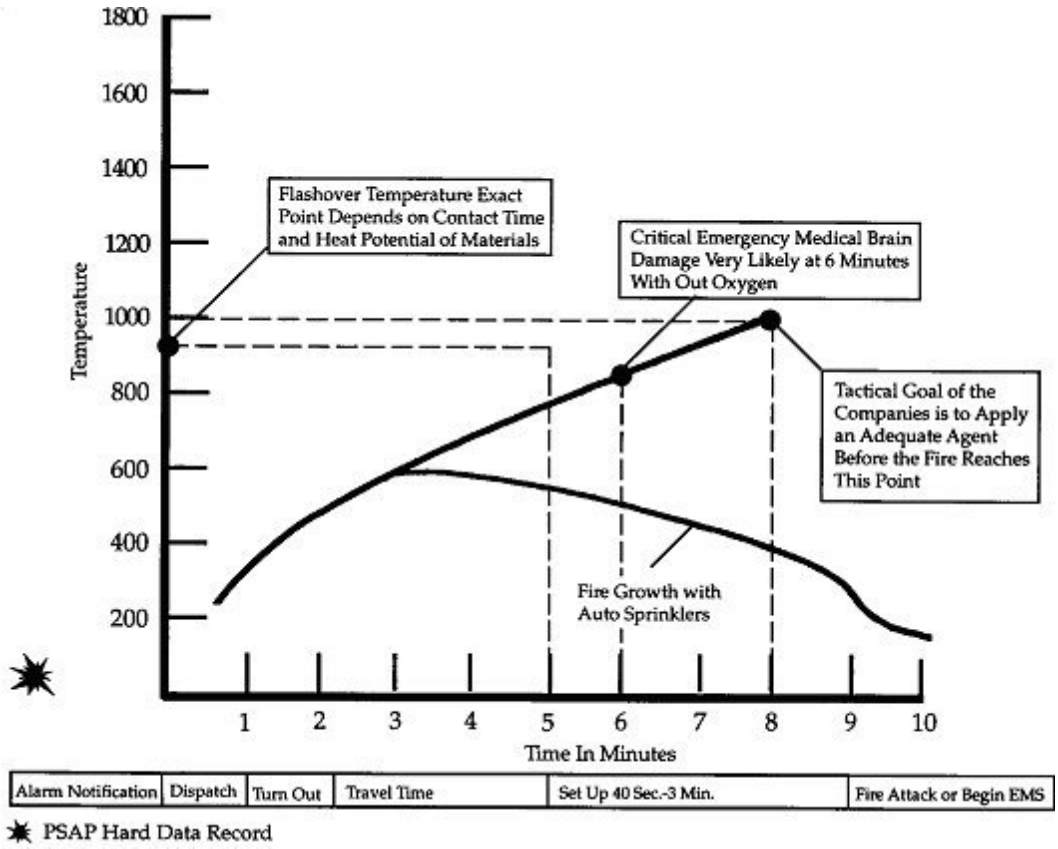
Structural fire suppression whether in a rural environment or in one of our cities requires the accomplishment of the above listed tasks, many of which must occur almost simultaneously to ensure effective and safe operations at the incident scene. To ensure an effective fire fighting force on the scene of significant fires in these kinds of risks, current staffing levels need to be augmented with paid-call fire fighters, volunteers and mutual aid from other fire departments.

A principal difference between rural fire departments and their municipal counterparts is that the rural departments must typically solve water supply issues, in addition to fighting the fire. Typical rural

[16] *Fire and Emergency Service Self-Assessment Manual, Commission on Fire Accreditation International, 6th ed.*

departments incorporate water tenders, portable tanks, draft points, etc. into their fire protection strategies for rural areas of Cascade County.

To be minimally effective in controlling a structure fire, the initial responding apparatus should reach the scene of the structural fire before "flashover" occurs.[17] The time from ignition to flashover varies based on the materials involved in the fire, but generally occurs somewhere between 4 and 10 minutes. The following chart illustrates the relationship between the response time or reflex time and flashover and/or critical brain damage in an EMS incident.



The Significance of Flashover

Pre-Flashover	*Post-Flashover*
Limited to one room	May spread beyond the room of origin
Requires smaller attack streams	Requires more larger attack lines
Search & Rescue is easier	Search and Rescue is difficult
Initial assignment can handle	Requires additional fire companies

For municipal departments in small and medium sized cities, all of the first alarm apparatus will not arrive at the fire scene simultaneously. For the departments in Cascade County, the typical scenario requires the volunteer fire fighters to be paged, the fire fighters either respond to the station or directly to the incident, if they respond to the station, then they don their personal protective equipment, board the apparatus and respond to the scene of the incident.

[17] Evaluation & Planning of Public Fire Protection, John Granito

There is currently a written mutual aid agreement between all of the fire agencies in Cascade County. In Cascade County, as in many areas of the country, fire services agencies are now transcending the traditional fire service hierarchy and geopolitical boundaries to meet increased service demands and reduce expenditures.[18]

5.4. Local Fire Ecology

The fire ecology of the forest and grassland habitat types is an integral part of the changing dynamics of the fuel conditions. By understanding fire's role within these plant communities coupled with the knowledge of the extent of the conservation reserve program (CRP) and potential subdivision development, one can further understand the present day risks.

A method of placing various forest and grassland habitats type into fire groups is commonly used to determine response of vegetation to fire and the path certain species take during succession. Fire groups describe the natural role of fire following a sequence from low to high elevation vegetative categories (Fisher, et. al. 1983). They paint an average picture of fire intensities and frequencies, and describe the natural role of fire prior to active fire suppression efforts. Fire groups correlate directly to Pfister's Habitat Types of Montana (1977), in how they respond to fire disturbance, and are grouped in this analysis based on vegetation similarities.

FORESTED ECOLOGY

There are a number of conifer species that have adapted to the ecology of Cascade County, with the most prevalent timber type being ponderosa pine. In Cascade County, the ponderosa pine is generally found at the lower elevations within the county near the Missouri River. Douglas fir and lodge pole pine are present in the county, but located predominately found at higher elevations in the Highwood Mountains and Little Belt Mountain. Some scattered stand can be found predominantly in sheltered, northern aspects, where moisture regimes support these conifer species.

The ponderosa pine type is a fire adapted tree species that has developed natural mechanisms to cope with frequent fire. It has a thick corky bark that insulates the tree's cambium from heat generated by wildland fires. The cambium is the living layer of cells between the bark and the woody portion of the tree stem and is responsible for the growth of both new wood and new bark. Ponderosa pine can be found on isolated dry sites such as those found in Cascade County. Because of the frequency of lightning storms in the county, it is estimated that fire burned in and under most of the natural pine stands at a 10-20 year interval and less than that in some areas. Because of this frequency fuel loadings were traditionally low in the stands as dead branch wood and needle litter were consumed during these fire events. The fires also tended to thin out patches of heavy regeneration that resulted from good cone crop years and favorable moisture conditions. The fires kept the density of trees lower by selectively killing some of the thinly barked seedlings and smaller individual trees. The trees that did survive had a greater supply of nutrients and water to nourish them and were stronger and healthier. In the absence of the heavy fuel loadings, periodic low intensity fires would have had no significant impacts on the older trees that remained.

Since the advent of fire protection, however, the situation has changed considerably. The natural litter occurring from the trees in these stands has accumulated for decades. In most areas there are many more trees per acre, resulting in multi storied stands of conifers then there would have been historically. These multi storied stands result, in situations where continuous fuel exists from the ground to the crowns of mature trees (ladder fuels). This results when too many seedlings survive and, because of intense competition for water and nutrients, form overcrowded pockets of spindly trees. These trees will survive to intermediate heights with many of them bent or broken by snow loads.

Today, when a wildland fire occurs it is much more likely to have greater negative consequence. The

[18] Klamath County Fire District No. 1 Deployment Process, 2000

higher fire intensity caused by a greater amount of fuel, results in an increased amount of heat. This increased heat can have adverse effects on the soil and, subsequently, the productivity of the site. Higher intensity fires are also more difficult to keep away from improvements landowners and fire fighters wish to protect. Most importantly, they increase the risk to fire fighters.

Four timber fire groups are represented in Cascade County: Dry ponderosa pine, Cool Dry Douglas fir, Moist Douglas fir and cool habitats dominated by lodgepole pine. The following will describe the fire ecology of each type and how fire plays a role.

Warm, Dry Ponderosa Pine

Figure 17

This Group consists of ponderosa pine stands with predominantly grass undergrowth. Dense ponderosa pine understories often develop beneath scattered overstory trees on some Group Two sites. Fires that start in such stands often burn vigorously in the crowns of the under story trees. Consequently, fast spreading, severe fires result despite relatively light down and dead fuel loadings (See Figure 17).

Numerous fire history studies conducted in the ponderosa pine forest types throughout the western states have shown fire to have been a frequent event, occurring at intervals from 5 to 25 years in most locations. These low intensity surface fires maintained a more open stand of trees and removed much of the under story helping to prevent the development of a stand destroying crown fire. Successful fire control during the 20th century has undoubtedly affected some Group Two stands. A primary effect is the increased presence of two-storied stands on some sites where the under story is a dense stand of pole-sized or larger trees. When fire control eventually fails in such stands, large, severe fires often result. An example or representation of this group is timber stands that are present lower elevations along the southern exposes of the Missouri River corridor.

Warm, Moist Ponderosa Pine

Fire Group Three ponderosa pine stands are moister and slightly cooler than those of Group Two. Group Three stands are usually found in ravines or on north slopes. Live fuels in the form of dense dog hair thickets of ponderosa pine saplings create a definite fire hazard in Group Three stands. The tendency toward multistoried stands results in a high probability of crown fires. An example or representation of this group, are those stands within the ravines and north aspect within the area adjacent to the fire group two, but are located in area where moisture from snow or rain tends to collect.

Warm, Dry Douglas-Fir

Group Four consists of Douglas-fir habitat types where ponderosa pine usually occurs as a major seral or climax associate especially at lower elevations. Dense thickets of Douglas-fir regeneration may become established during fire free periods. Overstories become susceptible to stand-destroying crown fire when such situations are allowed to develop in the under story. Historic fire frequency in Group Four habitat types probably was not very different from that of Group Two- that is, 5 to 20 or more years between fires. Successful suppression of surface fires in open, fire-maintained stands over the last few decades has altered the sites toward a more flammable condition that has increased the fire potential. This group is located in the more sheltered ravines and draws in the Coopers Ranch and surrounding area.

Cool Dry Douglas fir

Figure 18

This group exists on dry sites that are generally too dry for lodgepole pine and too cold for ponderosa pine. Rocky Mountain Juniper, limber pine, and sub-alpine fir can be found as minor species within these stands. This fire group includes big sagebrush, common juniper, wax currant, russet buffaloberry, white spirea, and mountain snowberry (See Figure 18).

Downed dead fuel loads for this group average 10 tons/acre. While downed, dead woody fuel loading can, at times, be significant, live fuels are less of a problem, due to the harsh site conditions. This factor plus the usual open nature of these stands results in a low probability of a crown fire. Individual trees will often have branches close to the ground and if sufficient ground fuels are available, torching can occur.

The role of fire in this fire group is not well defined. Fire probably occurred less frequently than in the warmer Douglas fir habitat types. The relatively light fuel load, sparse undergrowth, and generally open nature of the stands would appear to favor a long fire-free interval. However, fire history studies have estimated a fire interval of 35 to 40 years (Arno and Gruell, 1983).

Fire plays an important role in favoring ponderosa pine within this group. Without fire, Douglas fir would slowly replace ponderosa pine. Fire's role in seedbed preparation on most of these fire group sites is confounded by the difficulty of regeneration beyond the seedling stage on these droughty sites because of undergrowth and overstory competition. Where dense regeneration does occur, fire probably played a role as a thinning agent in sapling and pole-sized stands. Ground fire probably maintains many mature stands in an open, park like condition. Many pre-settlement stands were actually scattered groves. Modern fire suppression has allowed these groves to become more dense forest stands.

Opportunities for wildland fire use may be limited in some stands in this group, due to the normally sparse fuels. Where sufficient surface fuels exist, prescribed fire can be used to accomplish timber, range and wildlife management objectives.

Fire can be used following timber harvest activities to prepare the seedbed and to reduce wildland fire hazards from the harvest related slash. Care needs to be taken in managing the fire intensity when prescribed burning in partial-cut stands. The hazard reduction objective in these situations should be only to remove the fine fuels. Burning under moist conditions is recommended.

Figure 19

Moist Douglas fir

This group exists at elevations ranging from 4,800 ft. to 7,200 ft. Douglas fir is both the indicated climax species and a vigorous member of seral communities. It is not uncommon for Douglas fir to dominate all stages of succession on these sites. Lodgepole pine is a major seral component in many stands. Whitebark pine is usually well represented at higher elevations (See Figure 19).

Shrubs and moist forbs dominate the

undergrowth along with pine grass, bear grass, and elk sedge. Common shrubs include ninebark, snowberry, white spirea, oceanspray, blue huckleberry, grouse whortleberry, kinnikinnick, twinflower, and common juniper.

Downed dead fuel loads average 13 tons/acre, but can often be much heavier. Fuel conditions will vary according to stand density and species composition. The most hazardous fuel conditions occur in well-stocked stands with dense Douglas fir understories. These stands are usually characterized by relatively large amounts of downed twigs and small branch wood less than 3 inches in diameter beneath partially fallen and standing dead sapling and small pole-sized stems.

The absence of a dense under story results in a reduced fire hazard. However, the density of overstory trees and the presence of dead branches near ground level, create ladder fuels leading to crown fire potential under severe burning conditions.

Fuel conditions in stands dominated by lodge pole pine tend to be less hazardous than in stands dominated by Douglas fir. Ladder fuels are much less prevalent, so the probability of fire going from the forest floor to the crown is not as great.

The tendency toward overstocking and the subsequent development of dense understories is the main reason for high-hazard fuel conditions in many of these stands. Fuel accumulation due to fire suppression, natural mortality, snow breakage, blow down and insect and disease mortality are at a high level in many stands. Relatively deep duff develops and contains a lot of rotten logs. Fires may often sit and smolder undetected in the duff until burning conditions become favorable for fire spread, resulting in a large acreage being burned.

Historically, fire was important as a thinning agent and as a stand replacement agent. Low to moderate severity fires converted dense pole-sized or larger stands to a fairly open condition. Subsequent light burning maintained stands in park like conditions. Severe fires probably occurred in dense, fuel-heavy stands and resulted in stand replacement. Fire's role as a seedbed-preparing agent is less important in this group than in dry Douglas fir.

Fire has a demonstrable effect on wildlife habitat through its effect on food plants. The combination of opening up stands by killing overstory trees, reducing competition by removing understories, and rejuvenation of sprouting plants through top kill, can significantly increase the availability of palatable browse and forage.

Fire's role as a stand replacement agent becomes more pronounced when the natural fire-free interval is increased through fire suppression, unless corresponding fuel reduction occurs. Stands within this group are quite variable depending on site conditions, stand history, and successional stages. Fire management considerations must, therefore, be attuned to this variation. Protection from unwanted fire may be a major fire management consideration in those stands where combinations of live and dead fuels result in severe fire behavior potential. It may be difficult and impractical to abate the fire hazard in such stands except in conjunction with a timber harvest operation. Pre-attack planning coupled with rapid detection and initial attack may be the only reasonable means to deal with this situation until such time as harvest operations can be scheduled. Examples of this group are located in the Highwood and Little Belt Mountain.

Cool Habitat Types/Lodgepole Pine

Fire group 7 contains two groups of habitat types. The first consists of lodgepole pine climax series habitat types that support essentially pure stands of lodgepole pine (See Figure 20). The second group consists of those Douglas fir, spruce, and subalpine fir habitat types that, regardless of potential climax species, are usually found in nature supporting lodgepole pine dominated stands. These stands seldom reach a near climax condition. Periodic wildfires seem to recycle the stand before a substantial amount of mature lodgepole pine dies out. Subalpine fir, spruce, Douglas fir and Whitebark pine occur in varying amounts with lodgepole pine in most of these habitat types.

Figure 20

Undergrowth in this group often consists of dense mats or layers of grasses or shrubs. The most common graminoid species are pinegrass, bluejoint, and elk sedge. Common shrubs include grouse whortleberry, blue huckleberry, dwarf huckleberry, myrtle whortleberry, twinflower, kinnikinnick, white spirea, bunchberry dogwood, snowberry, common juniper, bitterbrush, buffaloberry, and Oregon grape.

The average downed dead woody fuel load in this group is 15 tons/acre, but maximum loads may greatly exceed this value. This group's fuel load is characterized by relatively large amounts of material 3 inches and larger.

Live fuels in this group can be a problem. The primary live fuel consideration is related to the occurrence of dense patches or entire stands of young lodgepole pine with intermingled crowns and lower branches extending down to the surface fuels. When ignited under favorable burning conditions, such stands are can be destroyed in a few minutes.

Densely stocked, clean-boled trees characterize many mature stands with large amounts of deadfall on the forest floor. An immediate source of deadfall in a young lodgepole pine stand is the snags created by a previous fire.

The role of fire in the seral lodgepole pine forest is almost exclusively as the agent that perpetuates or renews lodgepole pine. Without periodic disturbance, the shade-tolerant species replaces the lodgepole pine because it does not regenerate well on duff or under shaded conditions. Fire interrupts the course of succession and increases the proportion of lodgepole with each burn. Within 50 to 100 years following a severe fire, a lodgepole pine forest will exist even though shrubs and herbaceous cover may become dominant immediately following the burn.

Large stand replacement fires play a definite role in the ecology of lodgepole pine forests. The natural range of fire in seral lodgepole pine stands runs from less than 100 years to about 500 years. The interval between any two fires in one area might be only a few years. Recurring cool fires may thin a stand or otherwise rejuvenate it without doing serious damage. Stands greater than 60 to 80 years old, however, become increasingly flammable due to overcrowding. Eventually an ignition sets off a major conflagration. In certain areas such a stand replacement fire can cover thousands of acres. Vast tracts of lodgepole can develop in this way as the serotinous cones open and shower the burn with seeds.

The exclusive dominance of lodgepole pine in the lodgepole community types is attributed in a large part to fire for the following reasons:

1. Historic repeated wildfires over large areas may eliminate seed sources of potential shade-tolerant competitors.
2. Light ground fires may remove invading shade-tolerant competitors from the under story.
3. Dense stands may prevent regeneration of all conifers for up to 200 years in the absence of disturbance or stand deterioration.
4. Sites may be unfavorable for the establishment of other conifers.

The primary fire management consideration in this group's habitat types is protection from unwanted fire during extended periods of drought and during severe fire weather conditions. Stand replacement fires at such times often crown and become catastrophic, resulting in complete stand mortality.

Opportunities for use of prescribed fire are limited in natural stands because of the low heat resistance of lodgepole pine, spruce and subalpine fir. The other problem is that burning during conditions that would allow for low fire intensities, make it difficult to sustain a prescribed fire in these stands.

Removal of the under story trees and brush and prudent thinning and limbing of the overstory with some prescribed underburning can reduce the fire hazard in all of these Fire Groups in the wildland/urban interface. Fire Ecology of Montana Forest Habitat Types East of the Continental Divide by Fisher and Clayton (1983) suggests management strategies to reduce the wildfire hazard in forested ecosystems. This fuel treatment method could help reduce or modify the expected fire behavior that will result from a wild land fire.

RANGELAND ECOLOGY

Rangeland and the ecology of the plant species that occupy these sites have their own relationship to wildland fire. The grass species can be a contributor to fire behavior, but can easily be modified through agricultural practices, such as grazing (Bunting, Kilgore, Bushey, 1987).

The sagebrush grass range is fairly extensive within the county. Silver Sagebrush is the predominate species and can dominate areas within the county. It is a noted sprouter but apparently can be controlled by fire in some areas of its range. Other authors refer to Silvertip Sagebrush as an occasional re-sprouter following fire. In some instances it re-sprouts vigorously following spring burns, but fall burns result in greater mortality and low vigor of sprouts.

Many species of nature grasses abound within the county. With proper range management practice these grasses provide outstanding grazing opportunities for range animals and wildlife. Areas of grasses that are absent from grazing find that over time they become rank and provide little for forage and present a significant danger from wildfire.

5.5. Hazardous Fuels

As displayed in fire regime condition class map the continuity of heavy fuels, i.e. Douglas fir, ponderosa pine, subalpine, and lodge pole pine is concentrated in the mountains surrounding the Missouri River Corridor, around the Dearborn River, the Highwood and Little Belt Mountains. Scattered stands of ponderosa pine and juniper dominate the wooded coulees interspersed between the agricultural tracts in Cascade County. There are areas of continuous coniferous fuels covering several thousand acres in size and these are the areas that have the greatest potential for supporting large intense fires. Fires may be terrain driven, plume dominated, or wind driven in this fuel type.

Areas of sage and brush species also have potential for large intense fires but they are less likely except under wind driven conditions. There are many thousands of acres of this fuel type in the county.

The most common fuel type in Cascade County is grassland which includes a significant amount of CRP. Some of the CRP land has been enrolled in the program for approximately 20 years. Fires in the grassland type will exhibit significant fire behavior which includes high intensity fire behavior that are not easily controlled. Furthermore, the non grazed heavy concentrations of grass are readily able to burn during any given time of the year. During periods of green up, the fire behavior is reduced, but the heavy dead component will carry a wild land fire.

5.5.1. Fire Regime Condition Class

To best understand hazardous fuels ranking, a definition system called "vegetative condition class" is one approach to define and interpret the importance of fire frequency in the ecosystem. Current "Condition Class" is defined in realms of departure from the historic fire regime, as determined by the number of missed fire return intervals. Fire has always been a part of the wildland, changing and shaping the structure and composition of vegetation in the area. The five natural (historical) fire regimes are classified based on average number of years between fires (fire frequency) combined with the severity (amount of replacement) of the fire on the dominant overstory vegetation.[19] These five regimes are:

I – 0-35 year frequency and low (surface fires most common) to mixed severity (less than 75% of the dominant overstory vegetation replaced);

II – 0-35 year frequency and high (stand replacement) severity (greater than 75% of the dominant overstory vegetation replaced);

III – 35-100+ year frequency and mixed severity (less than 75% of the dominant overstory vegetation replaced);

IV – 35-100+ year frequency and high (stand replacement) severity (greater than 75% of the dominant overstory vegetation replaced);

V – 200+ year frequency and high (stand replacement) severity.

All of the wildland-urban interface areas in the Cascade County were historically maintained by fire. Because of the predominance of fire dependent tree species on these sites, fire helped maintain them. Low intensity surface fires burned, keeping ground vegetation from becoming ladder fuels. As fire became less of a factor (fire suppression) in maintaining the vegetation in these areas, the vegetation changed. As a result, there are more vegetation and ladder and ground fuels (litter mat and down woody material) that contribute to higher intensity fires than occurred historically. This has increased the risk, hazards and threats to people and human resource values within the wildland-urban interface.

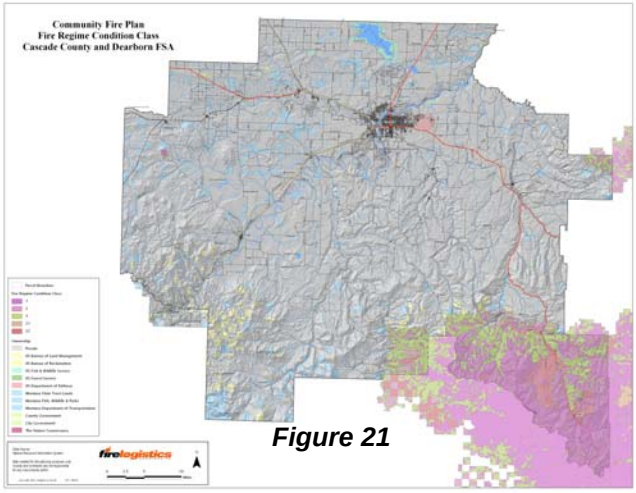


Figure 21

Current "Condition Class" is defined in realms of departure from the historic fire regime, as determined by the number of missed fire return intervals. There are three "Condition Classes" that have been developed to categorize the current condition with respect to each of the historic fire regime groups (See Figure 21).

The following table describes each Condition Class:

[19] Hann, Wendel, Havlina, Doug, Shlisky, Ayn, et al. 2003. Interagency and The Nature Conservancy fire regime condition class website .USDA Forest Service, US Department of the Interior, The Nature Conservancy, and Systems for Environmental Management [frcc.gov].

Fire Regime Condition Class	Description	Potential Risks
FRCC 1	Within the natural (historical) range of variability of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances	Fire behavior, effects, and other associated disturbances are similar to those that occurred prior to fire exclusion (suppression) and other types of management that do not mimic the natural fire regime and associated vegetation and fuel characteristics. Composition and structure of vegetation and fuels are similar to the natural (historical) regime. Risk of loss of key ecosystem components (e.g. native species, large trees, and soil) are low
FRCC 2	Moderate departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances	Fire behavior, effects, and other associated disturbances are moderately departed (more or less severe). Composition and structure of vegetation and fuel are moderately altered. Uncharacteristic conditions range from low to moderate; Risk of loss of key ecosystem components are moderate
FRCC 3	High departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances	Fire behavior, effects, and other associated disturbances are highly departed (more or less severe). Composition and structure of vegetation and fuel are highly altered. Uncharacteristic conditions range from moderate to high. Risk of loss of key ecosystem components are high

The timbered portions of the Cascade County can be considered to fall into Condition Classes 2 and 3. In some instances, the severe nature of the fire has the potential to do severe damage to the burn site.

The areas of grass and brush that are managed for agricultural purposes can be considered class 1. Those areas that are not managed or are held within the CRP programs fall well outside the natural regime for the natural fire cycle and could be considered to fall into Condition Class 2.

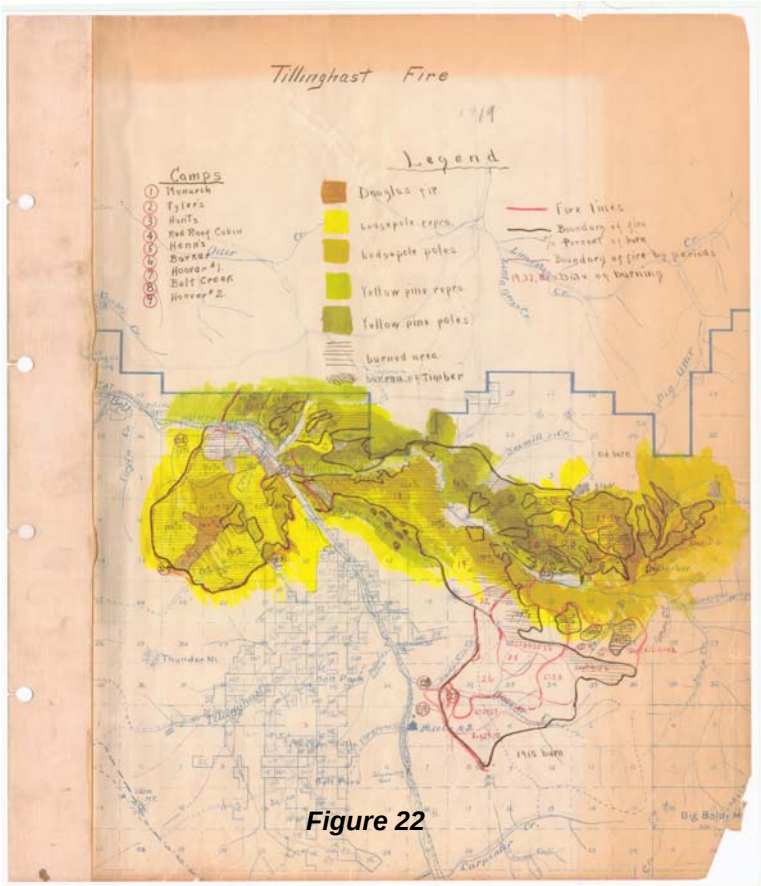


Figure 22

5.5.2. Natural Fire Breaks

Other than the county's transportation system, irrigated agricultural uses, and the Missouri River, the Sun River and the Dearborn River, there are few breaks in the fuels in Cascade County. Grazing is probably one of the best fuel management tools available for rancher and in many cases provides an anchor point to initiate wildland fire suppression activities.

5.6. Fire History

The fire history for Cascade County began long before European settlement advanced into Montana (See Figure 22). Data from the Tenderfoot D area, as well as some from the greater Yellowstone ecosystem indicate that large fires

occurred during severe droughts in the early to mid-1600's.

The Tenderfoot Fire History Study provides some indication of how wildland fire has played its natural role in the lodgepole pine mountainous areas within Cascade County.

Previously, little fire history information existed for lodgepole pine forests in mountainous areas of central Montana, such as in the Little Belt Mountains. In 1992, the Tenderfoot Fire History Study was initiated in cooperation with the USDA Forest Service Intermountain Research Station to determine the fire history of the Tenderfoot Creek Experimental Forest (TCEF), Lewis and Clark National Forest. Primary objectives of the study were to: 1) determine pre-1900 fire frequencies, severities, and burning patterns in the area's lodgepole pine dominated stands, and 2) document and map the forest age class mosaic, reflecting stand replacing fire history at the landscape level of analysis. Secondary objectives were to interpret the possible effects of long-term fire suppression on area forests, and to determine their relative position along the fire regimes continuum for northern Rockies lodgepole pine.

STUDY AREA

The Tenderfoot Creek Experimental Forest (TCEF) encompasses approximately 8,600 acres of the upper Tenderfoot Creek drainage, ranging in elevation from 6,035 to 7,941 feet. The area is primarily a headwaters zone dissected by a primary drainage (Tenderfoot Creek) and 7 sub drainages. Perhaps significant to the fire history, a relatively abrupt change in terrain occurs at about 7000 feet, where the steep narrow canyon drained by Tenderfoot Creek moderates to gentle-or moderately steep slopes approaching main divides. The study area is occupied by single-layer, even-age stands that are dominated by lodgepole pine and occasionally Whitebark pine (P. albicaulis Engelm.), and most stands have very sparse tree understories of shade tolerant subalpine fir (Abies lasiocarpa (Hook.) Nutt.) and Engelmann spruce (Picea engelmannii Parry). Throughout the Little Belt Mountains extensive even age classes of lodgepole pine have regenerated shortly after stand replacing fires that exposed mineral soil seedbeds and promoted seedling establishment (Lieberg 1904, Fischer and Clayton 1983).

RESULTS AND DISCUSSION

Landscape Fire Patterns.

The master fire chronology extends back 412 years, to about 1580, and is composed of primarily stand replacing fires that initiated the current age class mosaic. The increment core-and fire scar data suggested 12 fires between 1580 and 1992, resulting in an mean fire interval (MFI) of 38 years—that is, stand replacing fires of varying size occurred in the 8600 acre study area on an average of every 4 decades. The last fire of any significance occurred in 1947 (~20 acres), and the last major fire occurred 104 years ago, in 1902 (~650 acres).

The master fire chronology contains 5 major fires (600+ ac.), yielding an area MFI of 103 years for large fires. Together, these 5 fires initiated most of today's age class mosaic: 1726, 1765, 1845, 1873, and 1902. Additionally, relatively widespread sample locations indicating the oldest fire suggested a possible major event in about 1580, but subsequent fires destroyed most stands that regenerated shortly after that fire. A insufficiency of fire scar- and age class data between 1580 and 1726 suggested that either a relatively fire-free interval occurred for approximately 150 years after 1580, or that a large amount of fire history evidence was destroyed by post-1700 fires (few snags or ridge top Whitebark pines were found dating to the 1600s). After 2 major fires in the 1700s, nearly a century lapsed before major burning recurred in the mid- to late 1800s. Similarly, 9 decades have now passed since TCEF's last major fire. Thus, the average interval between major fires has been relatively long over the past 400 years but the data suggest a repeating cycle of large burns occurring close in time, followed by comparatively long fire-fee intervals. The chronology also reveals that about 1 out of every 2 fires burned substantial acreage in TCEF. From a landscape perspective, the overall interpretation is that while few ignitions developed into spreading fires. Many fires became important ecological events, often in pulses of activity spanning just a few decades.

Because some major fires after 1726 occurred relatively close in time, age class margins often were indistinct on the aerial photographs. The grouped nature of major fires in the chronology and on the landscape also suggests that portions of fires might have been reburns (e.g., see juxtaposition of 1726-1765 age classes; and 1845-1873-1902 classes. Specifically, severe fires can recur in post-fire fuels, primarily dead trees and dense post-fire regeneration, several decades after an initial event (Brown 1975). Lieberg (1904) first alluded to this fire-fuel interaction in his survey of the early-day Little Belt Mountains Forest Reserve, bordering today's
TCEF:

> "…In this region fires almost invariably destroy the forest, except in thin subalpine stands. The timber is rarely consumed by the first fire. Usually it is killed and left standing, and is later overthrown by wind and destroyed by future fires….." (Lieberg 1904: 24)

The age class mosaic for TCEF is moderately complex, composed of polygons ranging in size from a few tens of acres to an estimated maximum of 700 acres. A few relatively small polygons are 2=aged, a result of mixed severity underburns, but most stands are 1-aged and cover substantial acreage. For example, the 1873 fire apparently initiated the largest number of seral stands, which occupy an estimated 3000-4000 acres in the central to eastern portion of TCEF. However, these 1873-initiated stands often abut stands that regenerated after a substantial fie in 1845, making it impossible to accurately estimate fire sizes. Similarly, some of the area's oldest stands, generally north of Tenderfoot Creek, regenerated after fires in 1726 and 1765 and today comprise an indistinct mosaic that totals an estimated approximately 1500-2000 acres.

In summary of the TCEF forest age class mosaic, most stands regenerated after just 4 fires between 1726 and 1873. Between 75% and 90% of the area is occupied by overmature stands, ranging in age from 120 to 260 years. The oldest stands, dominated by high elevation Whitebark pines or by moist-site spruce and subalpine fir approaching climax, are between 310 and 410 years old and comprise less than 2 percent of the mosaic. Conversely, the area's youngest stands today are between 45 and 90 years old and occupy about 8 percent of the age class mosaic.

Stand Fire Patterns.

Since most mixed severity fires occurred within 50 years of a previous fire, the secondary burns undoubtedly were fueled by dense post-fire regeneration and fire-killed trees. In 2-age stands today, the younger age class usually comprises less than 20% of overstory canopy coverage, suggesting a patchy pattern of underburns that had achieved only light-to moderate severity. One exception would be an intense reburn during severe fire weather; such a fire might totally destroy the immature stand and thus consume all evidence of reburning. Conversely, underburns during later successional stages often were highly patchy because live and dead fuels are very sparse in many overmature stands. Such fires usually scarred few trees and failed to trigger a new seral age class. Overall, however, the predominance of stand replacing fires in TCEF is clearly evident by the age class mosaic, in which less than 5 percent of stands are multi-aged and these areas generally are less than 100 acres each. Absent a reburn, 2 or 3 centuries can pass before drought, ignition, and stand decadence coincide to fuel another stand replacing fire.

In addition to lightning fires, some early-day fires in the Little Belt Mountains are known to have been caused by humans (Lieberg 1904). Before about 1860, Indians frequently ignited fires to improve game forage and for other purposes (Lieberg 1904. Barrett and Arno 1982, Gruell 1985). Lieberg (1904) felt that such fires also helped perpetuate the area's numerous grassland parks. Subsequently, mining and other settlement activities produced heavy timber cutting in the major drainages, and Lieberg (1904) stated that a number of large fires had originated in the residual slash. Regardless of ignition source, however, most fires in TCEF probably burned in natural fuels because early-day logging was negligible in remote drainages.

The fire history data suggest that TCEF stands have experienced nearly the full range of fire patterns previously documented in Northern Rockies lodgepole pine forests. Evidence of non-lethal or mixed severity fires at less than 50 year intervals also has been found on relatively dry, gently sloped terrain on

the Bitterroot National Forest (Arno 1976), in the Bob Marshall Wilderness (Gabriel 1976), in Jasper National Park (Tande 1979), and in Glacier National Park's (USA) North Fork Valley (Barrett et al. 1991). Additionally, the fire patterns that occurred on relatively moist, steep slopes in TCEF were similar to those on comparable terrain elsewhere in the Northern Rockies. For example, underburns were uncommon and intervals between stand replacing fires averaged 150 to 200 years in other lodgepole pine stands in and adjacent to Glacier National Park (USA) (Sneck 1977, Barrett et al. 1991), Kananaski Provincial Park (Hawkes 1979), and in the Absaroka Mountains within Yellowstone National Park (Barrett [in prep]). In contrast, some of the region's longest fire intervals have been found on Yellowstone's subalpine plateau, where highly unproductive sites and very slow fuel accretion has delayed fires for 400 years or more (Romme 1982, Romme and Despain 1989).

Fire Suppression History.

To derive interpretations about the relative effectiveness of modern fire suppression and its possible influence on forest succession, atlas records (on file, Kings Hill Ranger District) were examined for an approximately 16,000 acre area surrounding the 8,600 acre TCEF. Comprehensive records from 1920 to 1992 indicated that 19 fires (14 lightning, 5 person-caused) burned a total of less than 100 acres in the analysis area. There was no record of spreading fires in TCEF, but 2 fires in adjacent drainages had achieved appreciable size before they were suppressed (1966: 40 ac., 1984: 11 ac.). Before about 1950, early detection and travel to backcountry fires apparently was relatively inefficient, because the fire history sampling revealed 2 spreading fires that were not recorded in the atlas. In 1947, an intense stand replacing fire burned about 20 acres in the upper Stringer Creek drainage before expiring (there was no evidence of suppression measures such as fire lines or felled trees). In 1921 a mixed severity underburn, totaling less than 100 acres, occurred in 2 separate locations in TCEF, north and east of Onion Park. King's Hill Ranger District also has archival records dating from 1870 that document the general locations of major fires, but these records fail to list the 1873 and 1902 fires that occurred in TCEF (4000+ acres, 650 acres, respectively).

From this evidence, it is difficult to interpret whether fire suppression has had any substantial effect on forest succession in TCEF. At the stand level, several factors suggest that succession has not yet been influenced to any appreciable degree. First, fire suppression apparently has been effective for, at most, only 40 years. In most stands, unnatural succession would not occur over such a short time span, even if a fire interval had been artificially lengthened in a relatively old stand (Romme and Despain 1989, Barrett et al. 1991, Barrett). However, succession still would have been altered to some degree if fires had been suppressed, for example, in immature stands that were prone to reburns (e.g., 1902 regenerated stands). Since the majority of fire intervals were relatively long, and were comparable to those found in other studies (Arno 1976, Romme and Despain 1989, Barrett et al. 1991, Barrett [in prep]), fire suppression's effect on succession in individual stands presumably has been minimal to date.

At the landscape level, long-term fire suppression might artificially induce mosaic homogeneity in forests that previously contained a heterogeneous mix of fire-initiated age classes (Romme and Despain 1989, Barrett et al. 1991). A potentially serious implication is that mosaics that age uniformly in the absence of fire could be prone to larger insect or disease epidemics, and unnaturally large firs in the future (Barrett et al. 1991). While no large wildfires have occurred in TCEF in this century, other free-ranging wildfires might well have spread into the Tenderfoot Creek drainage and markedly altered the forest mosaic. Nearly 120 years have passed since the last major fire, and the master fire chronology contains other evidence of 1 or 2 relatively long fire-free intervals over the last 4 centuries. Currently, as much as 90% of TCEF is occupied by stands that are now well within the past range of stand replacing fire intervals for this forest type (nearly 30% of these stands clearly are approaching the upper threshold of the interval range). Stand decadence was commonly observed during sampling, and stands in adjacent drainages recently experienced a large amount of mortality form a "red belt" effect (20,000 acres) and blow downs (3000 acres). Consequently, it is reasonable to conclude that the stage is being set for renewed fire activity in the coming decades.

5.7. Expected Fire Behavior

Fire behavior describes the way fires ignite and spread. Topography, fuel conditions, and weather all influence fire behavior and how wildland fires burn in Cascade County. Fuel is the only factor influencing fire behavior that we have the ability to manage. The following fire behavior assessment shows fire intensities and fire spread rates in different fuel types/models that are found in Cascade County. It is important to understand this information to determine what areas contribute to the fire problem in the county.

The following fuel types/models were used for analyzing potential fire behavior:

Fuel Model 1: Grass that dominated by short grass where very little shrubs or timber is present over less than ⅓rd of the area. The fine, porous, and continuous fuels that have cured or are nearly cured govern fire spread.

Fuel Model 2: Grass with open timber overstory that cover ⅓rd to ⅔rd of the area. This model represents the open grass and ponderosa pine and harvested areas where an overstory of timber remains. Fire spread is primarily by a surface fire through the curing or dead grasses with the litter and dead down wood from the open shrub or timber overstory contributing to fire intensity. This fuel model also includes scattered sagebrush within grasslands without ponderosa pine overstory.

Fuel Model #4: (This fuel model has more nearly represented the dense, continuous stands of ponderosa pine and Douglas-fir regeneration in this area). Fire intensity and fast-spreading fires involve the foliage and live and dead fine woody material in the crowns of a nearly continuous under story of ponderosa pine and/or Douglas-fir regeneration. Besides flammable foliage, dead woody material in the stands significantly contributes to the fire intensity. A deep litter layer may also hamper suppression efforts.

Fuel Model #6: This model represents the area around the Bears Paw Mountains. Fires are carried through the shrub layer where foliage is more flammable than fuel model 5, but requires a wind greater than 8 mph. Fire will fall to the ground without a wind and the shrubs are not as tall as described in fuel model #4.

Fuel Model #9: (This fuel model can represent some stands of dense ponderosa pine overstory in our area). Fires run through the surface litter faster than model 8 and have longer flame heights (due to the sometimes dense layer of ponderosa pine needles). Concentrations of dead-down woody material will contribute to possible torching out of trees, spotting, and crowning.

Fire behavior calculations for these fuel models were made using the fuels, weather, and topographic conditions prevalent for Cascade County. One is for normal August fire season conditions, called Average, and one for extreme August fire season conditions, called Extreme. The extreme case also takes into consideration severe drought conditions. These conditions would be present in August and September when all the vegetation has cured and dried.

WEATHER

The weather that led to the extreme burning conditions in 1988 and 2000 started with drought conditions the previous fall. A low snow pack combined with warm, dry springs and hot, dry summers, led to very low fuel moistures and severe fire seasons during these years. The 1990 fire season was characterized by an extended dry fall. High winds associated with the passage of dry frontal systems added to the spread of the large catastrophic fires of 1988, 1990, and 2000. A repeat of these conditions can and will be experienced when similar weather conditions exist.

The following weather parameters were used representing severe August burning conditions in this area.

	Time of Day		
	1400 – 1700 hours	1700 – 2200 hours	2200 – 0200 hours
Air Temperature	80-89	70-79	50-59
Humidity	10 – 14%	15 – 19%	20 – 24%
20 foot wind speed	30 mph*	20 mph*	20 mph*
Mid-flame wind speed	9 mph	6 mph	6 mph

*Wind reduction factor of .3 for partially sheltered stands is used.

Critical level fuel moisture inputs for surface fuel models are:

One hour time lag dead fuel <1/4 inch diameter
Ten hour time lag dead fuel 1/4 to 1 inch dia.
One hundred hour dead fuel 1 in. to 3 in. dia.

Typical Fuel Moisture Inputs for Critical Fire Weather			
	1400 – 1700 hours	1700 – 2200 hours	2200 – 0200 hours
One Hour Fuels	4%	6%	8%
Ten Hour Fuels	6%	6%	7%
Hundred Hour Fuels	8%	8%	8%
Live Woody Fuel Moisture	70%	70%	70%

Other inputs are

Fuel Model 1 = 0-15 % slope — Fuel Shading = 0%
Fuel Model 2 & 4 = 15-30% slope — Fuel Shading = 45%
Fuel Model 9 = 30% slope — Fuel Shading = 85%

Fire behavior calculations were made using the BEHAVE Fire Modeling System, Andrews and Chase, USFS, General Technical Report INT-194, for surface fires, and Predicting Behavior and size of Crown Fires in the Northern Rocky Mountains, Rothermel, USFS, General Technical Report INT-438.

For Crown Fire Calculations, Rothermel's models for Drought Summer and Severe Drought-Late Summer were used. These conditions would be present normally after early August during periods of drought when all the vegetation had cured and dried and was available to be consumed by fire.

FIRE BEHAVIOR PROJECTIONS FOR CRITICAL AUGUST FIRE WEATHER				
	Fuel Model 1	Fuel Model 2	Fuel Model 4	Fuel Model 9
	Rate of Spread			
1400 – 1700	345 chains/hr	149 chains/hr	245 chains/hr	29 chains/hr
	4.3 mph	1.9 mph	3.1 mph	.4 mph
Flame Length	8.6 feet	12.8 feet	35.4 feet	5.4 feet
Fire line Intensity	607	1,444	13,241	219
1700 – 2200	136 chains/hr	66 chains/hr	131 chains/hr	13 chains/hr
	1.7 mph	0.8 mph	1.6 mph	0.2 mph
Flame Length	5.4 feet	8.5 feet	25.7 feet	3.5 feet
Fireline Intensity	225	600	6,660	87
2200 – 0200	117 chains/hr	60 chains/hr	122 chains/hr	11 chains/hr
	1.5 mph	0.75 mph	1.5 mph	0.1 mph
Flame Length	4.9 feet	8.1 feet	24.4 feet	3.2 feet
Fireline Intensity	179	536	5,877	70

* Critical fireline intensity and minimum flame length has been estimated for initiation of crown combustion dependent upon height to live crown. Typical height to the live crown base in the area of concern is approximately 5 to 20 feet. Conditions favorable for initiation of a crown fire are estimated at 59 BTU/ft/s fireline intensity and 2.9 foot flame lengths for a height to live crown of 5 feet. For a 20 foot height to live crown, 174 BTU/ft/s fireline intensity and 7.7 foot flame lengths would be required. This would indicate that crown fires could be initiated in all the timbered Fuel Models under the weather conditions described. Once a crown fire is initiated potential fire behavior can be estimated utilizing Rothermel's crown fire models. When spotting is possible, the Probability of Ignition where the firebrand lands must also be considered. Using the air temperature of 80 - 89 F. and a fine fuel moisture of 4%, the Probability of Ignition in Fuel Model 2 is 75%. This means that there is a 75% chance that a firebrand will start a spot fire if it lands in a receptive fuel bed.

In most case wildland fires ignite and burn under conditions that are not critical in natural and can be suppressed by wildland fire suppression forces. The following charts provide information that relates to fires burning under “normal” circumstances. Normal means the average or typical August climatic and fuel moistures.

These charts are just one of a number of scenarios that can be developed thru the BEHAVE fire behavior modeling process and should only be used as a reference.

The following weather parameters were used representing typical August burning conditions in this area.

	Time of Day		
	1400 – 1700 hours	1700 – 2200 hours	2200 – 0200 hours
Air Temperature	70 – 79	70-79	50 -69
Humidity	25 – 29%	25 – 29%	30 – 34%
20 foot wind speed	5 mph*	5 mph*	Calm
Mid-flame wind speed	1.5 mph	1.5 mph	Calm

*Wind reduction factor of .3 for partially sheltered stands is used.

Live Fuel Moisture Inputs for Typical Fire Weather			
	1400 – 1700 hours	1700 – 2200 hours	2200 – 0200 hours
One Hour Fuels	6%	8%	10%
Ten Hour Fuels	8%	8%	9%
Hundred Hour Fuels	10%	10%	10%
Live Woody Fuel Moisture	100%	100%	100%

The same slope and fuel shading is used as in the critical fire weather simulation.

FIRE BEHAVIOR PROJECTIONS FOR TYPICAL AUGUST FIRE WEATHER				
	Fuel Model 1	Fuel Model 2	Fuel Model 4	Fuel Model 9
	Rate of Spread			
1400 – 1700	12 chains/hr	11 chains/hr	22 chains/hr	3 chains/hr
	0.15 mph	0.14 mph	0.28 mph	0.04 mph
Flame Length	1.8 feet	3.7 feet	11 feet	1.8 feet
Fire line Intensity	19	96	1,035	21
1700 – 2200	10 chains/hr	10 chains/hr	20 chains/hr	3 chains/hr
	0.12 mph	0.12 mph	0.25 mph	0.04 mph
Flame Length	1.6 feet	3.5 feet	10.5 feet	1.6 feet
Fireline Intensity	16	86	944	17
2200 – 0200	3 chains/hr	5 chains/hr	8 chains/hr	2 chains/hr
	0.04 mph	0.06 mph	0.10 mph	0.02 mph
Flame Length	0.7 feet	2.5 feet	6.7 feet	1.3 feet
Fireline Intensity	3	40	358	10

Normal fire behavior under typical conditions for this area will usually result in wildland fires of low to moderate intensities that can be successfully suppressed. Some of these fires may exhibit torching, short crown fire runs, and spotting during the afternoon burning period. However, large, high-intensity fires exhibit some common characteristics. They normally occur during drought conditions when fuels are cured and very dry and there is continuous source of forest fuels. The prevailing wind usually pushes these fires in a northeasterly direction. These winds are associated with frontal passages. They can be quite strong and are from the south, southwest, and west. This direction of primary spread is very evident with all major fires in the Northwest. High intensity crown fires typically cause long range spotting, burn rapidly both up and down slopes, at times both day and night, and are essentially "uncontrollable". **It is this kind of fire that is of most concern to residents and fire fighters in the wildland-urban interface.**

Fire behavior descriptors and interpretations of wildland fires have been compiled for fire suppression strategy, prescribed fire and long range planning. Key fire behavior descriptors are rate-of-spread, flame length, and fireline intensity. Rate-of-spread in chains/hour with one chain equal to 66 feet, 80 chains equal to one mile, is the forward rate of spread at the head of a surface fire. Flame length in feet, is the length of the flame at the head of the fire. Fireline intensity in BTU/ft/sec, is the amount of heat released per second by a foot-wide slice of the flaming front and is indicative of the heat experienced by a person working near the fire. The following table is the fire behavior interpretations that should be used for the fire behavior outputs.

Fire Suppression Interpretations from Flame Length

Flame Length	Fireline Intensity	Interpretations
< 4 feet	< 100 BTU/ft/sec	Fires can generally be attacked at the head or flanks by fire fighters using hand tools. Hand line should hold fire.
4 – 8 feet	100 – 500 BTU/ft/sec	Fires are too intense for direct attack on the head with hand tools. Hand line cannot be relied upon to hold the fire. Bulldozers, engines, and retardant drops can be effective. Indirect line and burn out may be effective in light fuels.[20]
8 – 11 feet	500 – 1000 BTU/ft/sec	Fires may present serious control problems: torching crowning, and spotting. Control efforts at the head will probably be ineffective.
> 11 feet	> 1000 BTU/ft/sec	Crowning, spotting and major fire runs are probable. Control efforts at the head of the fire are ineffective.
> 50 feet	> 4,000 BTU/ft/sec	Major conflagrations are possible. Long range spotting occurs; Tree blow down may occur; flaming zone depths of up to ¼ mile may be possible.[21]

Fires are classified according to the fuels they are burning in; ground fires, surface fires, and crown fires. Each burns with different intensities and spread rates depending on fuel, wind, and topography. The transition from a fire burning in the surface fuels on the forest floor to a fire that burns in the crowns of the trees is determined by the amount of available fuel, the fire intensity or flame length, the presence of ladder fuels to carry the fire into the standing trees, and the wind. A fire may start out torching a single

[20] Personal conversation – Sonny Stiger; April, 2006
[21] ibid.

tree or small group of trees. When a fire becomes established in the tree crowns, the wind will usually carry the fire in the crowns creating fire intensities that cannot be dealt with by fire suppression forces.

Crown fires are normally driven by the wind but the dryness of the fuels and tree crowns can cause what is known as a plume dominated crown fire. Crown fires of this type occur because of dry, explosive, and cumulative drought conditions present in the forest. A plume dominated crown fire does not necessarily need wind to keep it sustained. Because of successful fire suppression efforts for the last 100 years, the increased fuel complex in many areas increases the potential for a plume dominated wildland fire.

Spot fires are caused by burning embers carried aloft by the wind and smoke column and dropped ahead of the main fire front. Spot fires need a dry fuel bed to ignite and it is not uncommon for these fires to start ¼ to ¾ of a mile ahead of the main fire front. These spot fires create serious problems for fire suppression forces trying to protect lives and property well ahead of an advancing fire front. As spot fires start and gain intensity, they can become as active as the main fire front. This was experienced during the Blaine County Fire in 1991. Some fires travel so quickly through a combination of crowning and spotting that there is absolutely no way for fire suppression forces to gain control.

Some of the timber stands in the Highwood's and on the Rocky Boy Indian Reservation would support a crown fire because of the presence of ladder fuels and heavy, down woody debris on the forest floor of the timber stands. This type of stand replacement fire behavior would need to be associated with an extended drought and an ignition moved by extremely high winds.

5.8 FIRE BEHAVIOR MODELING

Two locations were selected for fire behavior modeling. One in located in the southwestern side of the county within the Dearborn Fire Service Area and in the Highwood Mountains.

Fires were simulated using the topography on site, typical fuel models present, and the most probable weather under these severe burning conditions. Slopes immediately downwind range from 0% to 30%.
The values predicted are only approximations, but never the less provide a valuable estimate of fire behavior under comparable conditions. The calculated fire size at 1 hour assumes a continuous fuel bed with constant conditions.

Cascade County has three distinct fire behavior models (a grass model, a brush model and a timber model, each of which can burn at different time of any calendar year. The factors that are similar between the three are a potential to threaten structures and jeopardize the lives of the resident of the county.

Dearborn Fire

Vegetation within the Dearborn Fire Service Area varies from dry grasslands with some sagebrush to scattered ponderosa pine and dry-site Douglas-fir. Dense ponderosa pine stands occur on some wetter north facing slopes. Because of fire exclusion from past suppression efforts and a lack of timber harvesting and prescribed burning, there are many areas of unhealthy forest that have a concentrated build-up of tree regeneration, sick and dying trees as a result of over crowding, insects, and disease. The regeneration can adversely influence fire behavior and suppression efforts in two ways. Primarily the regeneration can act as a "ladder fuel" and carry a fire burning on the surface into the tree canopy. Fires spreading through the tree canopy, crown fires, have historically burned at the rate of 1-3 miles (80-240 chains) per hour. Crown fires typically cause long range spotting (>1/4 mile), burn rapidly both up and down slopes, at times both day and night, and are essentially "uncontrollable". Sick and dying trees present more available fuel to burn, further worsening potential fire behavior.

Secondly, the regeneration itself can cause extreme fire behavior in the form of high rates of spread and flame lengths that prohibit any direct suppression action. Recent examples of such fires in this area are the Canyon Creek and Warm Springs fires of 1988, the Beartooth Fire of 1990 near Craig, and the Cave Gulch, Bucksnort, and Wolf Creek Fires of 2000. This kind of fire is occurring over the entire nation as

evidenced by many other such fires in Montana in 2000, near Bozeman in 2001, and in Colorado, Arizona, New Mexico, and Oregon in 2002.

A site near the Dearborn River was selected to illustrate fire behavior under these conditions. This site is near a well-used road and residences simulating a person caused fire. Person caused fires are of the most concern because they usually occur during dry conditions without the rain and humidity that usually comes with lightning storms and they usually occur at the bottom of drainages near homes, roads, or other locations where people concentrate (See Figure 23 and West Behave Fire Model Map in 10.5).

Fires were simulated using the topography on site, typical fuel models present, and the most probable weather under these severe burning conditions. Slopes immediately downwind range from 0% to 30%. The values predicted are only approximations, but never the less provide a valuable estimate of fire behavior under comparable conditions. The calculated fire size at 1 hour assumes a continuous fuel bed with constant conditions.

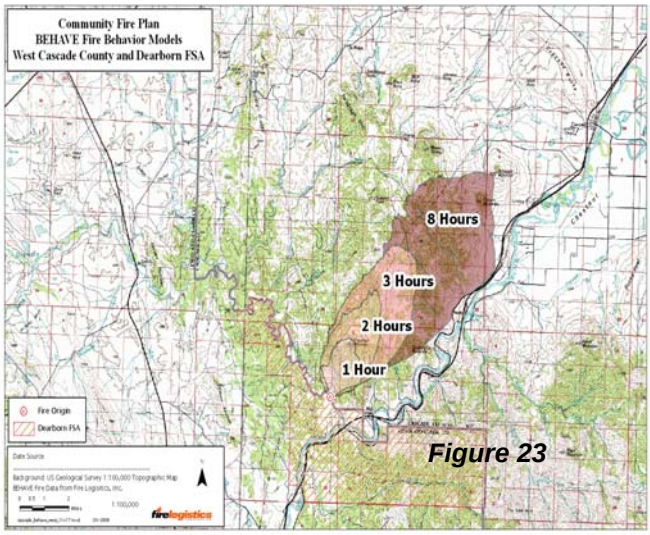


Figure 23

The resulting fire behavior from the calculations is comparable to what actually occurred on the Beartooth Fire near Craig in November of 1990. The Beartooth Fire near Craig in 1990 can be analyzed to portray a similar fire in the Dearborn FSA. Fuels and topography are similar and the weather experienced on the Beartooth Fire occurs frequently in the Dearborn area. The Beartooth Fire started at about 1730 on November 13, 1990. It burned aggressively throughout the first night and next day crowning through areas of dense ponderosa pine (Fuel Model 9). The fire started in grass (Fuel Model 1) and quickly moved into scattered ponderosa pine (Fuel Model 2). According to observers at the scene the fire moved through the scattered pine for 2 &1/2 miles in one hour and fifteen minutes with 40 foot flame lengths. The wind was estimated in excess of 40 miles per hour for most of the night. Fire activity began to diminish at about 0430 the next morning but again burned aggressively with daytime heating on the second day. However, it had made its primary run that first night and only slowed its forward progress when it reached the heavily grazed areas of the Sterling and Sieben ranches. The final size of the Beartooth Fire was 32,968 acres. Its forward spread was nearly eight miles burning in a north east direction pushed by 40 mph winds. If these ranches had not been grazed, the fire would have easily burned onto the Dearborn FSA in the vicinity of Stickney Creek and on to the Interstate Highway and the Missouri River.

The Dearborn FSA and the Beartooth Game Range are quite similar in fuels and topography and experience the same weather patterns.

Once a crown fire is initiated potential fire behavior can be estimated utilizing Rothermel's crown fire models.

When spotting is possible, the Probability of Ignition where the firebrand lands must also be considered. Using the air temperature of 80 - 89 F. and a fine fuel moisture of 4%, the Probability of Ignition in Fuel Model 2 is 75%. This means that there is a 75% chance that a firebrand will start a spot fire if it lands in a receptive fuel bed.

These fire behavior predictions are plotted on maps. All fires assume no effective fire suppression action can be taken and they are burning freely. All winds were projected to be out of the southwest up to 30 mph. This is a conservative projection as winds up to 70 mph have occurred frequently in this area with

the passage of dry cold fronts. All projections were made assuming a fire start at 2pm (1400 hours). This would normally be the warmest and driest part of the day. The first hour assumes a surface fire that escapes initial attack due to the windy, dry conditions.

This fire would differ from the Beartooth Fire in that the Beartooth Fire burned totally up drainage, whereas this fire would burn across several drainages. Under critical fire weather BEHAVE indicates the downhill spread only slightly less than uphill for the modeled fire.

For mapping purposes a ROS of 2 mph for uphill and up drainage is used and 1.8 mph for downhill spread with the wind for the time period 1400 to 1700 hours. For the period 1700 to 2200 hours an average rate of spread of 1 mph is used. An average of two miles per hour was the estimate for the Beartooth Fire starting in Fuel Model 1 at about 1730-1800 hours burning primarily through Fuel Model 1 and 2. By 1915 hours it had run approximately 2.5 miles. Therefore our projection for the Dearborn area is very conservative.

BEHAVE would move the fire in Fuel Model 1 at over 4 mph under these conditions. This appears to overestimate the ROS even though we are simulating a fire start at 1400 hours, i.e., the hottest, driest time of day. For our purposes 2 mph ROS is realistic and conservative and in line with what actually happened on the Beartooth Fire.

Fire Line Intensity and Flame Lengths as calculated with BEHAVE are adequate to initiate a crown fire. Using Rothermel's crown fire spread model under these critical conditions generates a crown fire ROS of 1.8 to 1.9 mph with flame lengths of over 100 feet. This is also in line with the spread observed on the Beartooth Fire as well as flame lengths observed during the crown fire runs in the denser stands of ponderosa pine.

Following this fire spread for 12 hours, similar to the Beartooth Fire, through the evening and nighttime hours, the spread would slow very little by 0200 hours and the fire would continue to be active until around 0500 hours. The fire size would be so enormous, just as on the Beartooth Fire that by the next day successful suppression action would not be very effective.

The Beartooth Fire slowed and allowed suppression forces to get the upper hand when it reached the heavily grazed areas of the Sterling and Sieben ranches. The Dearborn FSA does not appear to have substantial grazing. This fire would continue unchecked for at least eight miles until 0500 hours the next morning. This would carry it beyond Hardy Creek and the Missouri Inn exactly the distance covered by the Beartooth Fire in November with similar wind, temperature and humidity.

For comparative purposes, a fire is simulated starting in the same location on the Dearborn River but under typical weather conditions for August.

Those structures in front of this fire would certainly be in jeopardy without an adequate asset protection zone (defensible space) and most likely could not be protected due to the size and scope of this event. An evacuation would be started by the Cascade County Sheriff's Department.

Highwood Fire

The Highwood Mountain Range is located in the southeastern side of the county. This mountain range juts up from the prairie surrounding it and is predominantly Douglas fir and lodgepole pine habitat types.

In the late 19th century this mountain range burned completely and regenerated to the mixed conifer stands that exist today. The natural fuel loading within the range is quite slight except where some limited burning has been completed by the Forest Service. The prescribed fires conducted by the Forest Service killed a variety of age class and size class trees. Some and eventually all of these trees will come down and contribute to the natural fuel loading within these project areas. Since these prescribed burn projects areas do not encompass large tracts of ground, their influence on sustained fire behavior will be limited.

From forest health perspective, the timber stands are in good shape and these stands will remain healthy until they reach an older age class.

The fire that will be modeled will be one that will burn only during periods of sustained drought. During period of sustained drought, a fire beginning along the southwestern side of the Highwood Mountains at a lower elevation and pushed by winds of 30 to 40 mph can move a fire off the ground and into a crown fire.

The conditions that need to exist that can cause a fire of this nature are:

- Long term drought that will reduce live fuel moisture to the extent that was displayed during the 1988, 2000 and 2003 fire season.
- High sustained winds speeds
- Critical fire weather (single digit relative humidity's and high temperatures)
- An ignition located downwind and on a steep slope.
- A day of very high probability of ignitions
- Very low humidity recovery

A fire starting under these conditions would easily transition from a ground fire to a crown fire. A crown fire initiating along the southwestern side of the Highwood's would move upslope to the northeast. Long distance spotting would cause the fire to move across the entire mountain range. If the critical fire weather continued for a number of days and free burning condition exist, the entire range could be threatened. This could be very similar to the fire the burned most of the range in the late 19th century. If this occurred, this fire would transition from a wind dominated fire to a plume dominated fire that could burn until those conditions cease to exist or the fire runs out of available fuel.

Using a 30 mph wind, the rate of spread will be 29 chains/hour (1,914 feet/hour), at 40 mph wind the rate of spread will be 46 chains/hour (3,036 feet/hour), and at 50 mph the rate of spread will be 67 chains/hour (4,422 feet/hour). A fire, starting under critical fuel moisture condition and driven by a 30-50 miles per hour wind, could move across the Highwood Mountains and onto the prairie. A fire burning under these conditions potentially can reach a size of 11,856 acres in a six hour burning window, with sustained winds (See Figure 24 and Behave Fire Modeling Map in Section 10.5).

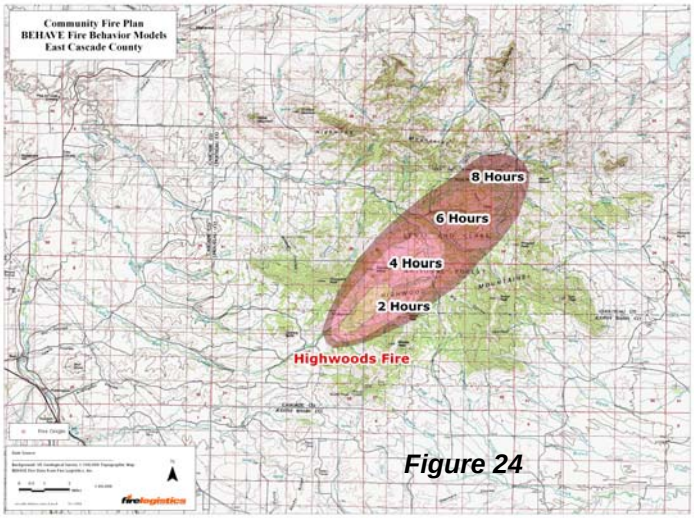


Figure 24

This will not be an easy fire to suppress and one that potentially will threaten lives and structures within its path. The Highwood Mountains do have some natural fuel breaks that will modify this fire's spread, but as occurred in the late 19th century, they were of little value. The opportunity for fuel and climatic conditions to exist that have the potential for this type of event, are limited, but have occurred three times in the past fifteen years. As time passes and the stands age and reach maturity, the risk of this fire event occurring is greater.

The fire events described above are not atypical and should be expected and should be used for planning purposes.

The overall complexity of any ignition that escapes initial attack or a set of weather and fuel conditions, which indicate the potential for large fire growth, could adversely affect public health and safety, property and resources values requires a coordinated public safety effort in Cascade County.

Cascade County has the potential to experience and has experienced large wildland-urban fires similar to that as illustrated by the BEHAVE run. As a result, the County needs to ensure that a coordinated planning, warning, communication and evacuation system is in place. In addition, the Cascade County's Fire Departments staff needs the knowledge, skill and ability to manage a large and complex wildland fire management workload.

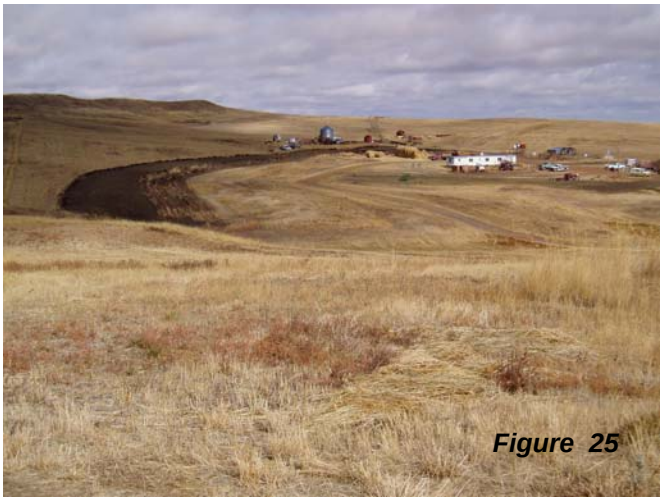


Figure 25

5.9. Fire Effects Assessment

Wildland fires generally have three possible outcomes on forested areas. They can be lethal, non-lethal or mixed. These outcomes are alluded to in 5.1 Fire Regime Condition Class. A broad definition of each follows:

- Lethal – Fire is of high enough intensity and long enough duration to cause mortality in all or most of the trees and shrubs in the burned area. This result is likely in a hardwood ecosystem but the exception in a healthy ponderosa pine ecosystem. It can result, however, from severe burning conditions and/or unnaturally high fuel accumulations in the forest. When a lethal fire occurs it will be evident for decades that the area has been burned.

- Non-lethal – Fire is not of high enough intensity or long enough duration to kill the trees in the burned area. This is a more normal result in a healthy ponderosa pine ecosystem since the trees have adapted to fire by producing a thick bark. This bark protects the tree's cambium from heat. Within two years of a non-lethal burn almost all evidence of the fire has disappeared.

- Mixed – Fire will create significant areas of both lethal and non-lethal effects within the burned area.

Unless a lethal or mixed fire is experienced, any wildland fire burning in Cascade County has a much higher probability of negatively impacting human improvements, livestock and forage then it does creating any long term damage to natural resources. While a wind driven, high intensity fire can certainly occur in the county, most fires are expected to be non-lethal or mixed. They may kill pockets of trees in places like draws and steep slopes but many trees will survive. A ponderosa pine can have over 60% of its crown scorched and it can still produce new needles the following year. The most significant natural resource loss from a non-lethal fire may be the short-term loss of forage for livestock.

Landowners can reduce the exposure of their buildings, structures and themselves to a spreading fire. Asset protection and fuel modification zones, which may include grazed areas, should be in place around sites needing protection (See Figure 25 and the Wildland-Urban Interface Areas Map in Section 10.5). This is particularly effective on the south and west sides or down slope from such areas since most fires will progress to the north and east or upslope. Exceptions to this general rule can occur when a thunderstorm is in the vicinity of the fire and downdrafts from it cause the fire to spread erratically.

It is imperative that any new start be controlled as soon as possible. If a fire goes unattended it will continue to spread making eventual control more labor intensive and probably more difficult as it gets into new fuel sources. It also increases the chances of the fire being exposed to some type of severe weather event that can create a dangerous situation for life and property including those of the fire fighters.

5.10. County Fire Complexities

Cascade County has several distinct issues that not only make the wildland fire program complex, but requires very highly skilled fire managers to provide fire leadership and maintain success.

The fire issues revolve around the semi-arid landscape and poor moisture regime that due to the lack of moisture during any of the four seasons can place the county into a fire season throughout a large share of the year Figure 26. Many counties in Montana go through periods of long term drought, but few have the extremely arid landscape that even on a good year goes for long periods without significant precipitation.

The second issue is the significance of wind that is generated from the Rocky Mountain Front Range, which is a part of living in the county, but one that can turn an ignition into a large wildland fire in a very short period of time.

The third issue is the size and scale of the county and the scattered numbers of outlying fire stations. Tied with this issue is the significant reduction in number of people who are willing to volunteer as fire fighters in the county and in particular the ageing population in Neihart.

The fourth issue is the fuel complex that includes fire behavior grass models, brush models, and timber models. The grass and brush models cover the largest part of Cascade County and are the fuel types that result in the highest number of ignitions. In the grass models, the most challenging fire problem results from the Conservation Reserve Program. This program is an excellent wildlife and soil conservation program, but provides for challenging wildland fire suppression efforts if lands that are enrolled in the CRP program are ignited. These parcels of CRP land are scattered around the county, easily ignited, and could result in extreme fire behavior, especially under windy conditions.

A fifth issue is the very high risk subdivision, i.e., Coopers Ranch and the high potential for suffering loss of life, property and resources from a wildland fire. The only difference from the Derby Fire and Coopers Ranch is that the fire occurred at near Big Timber.

6. Risk Assessment

A fundamental part of any fire plan is identifying what you might lose in a wildland fire, known as assets or values at risk.

6.1. Values at Risk

The primary intent of fire protection is to protect the values at risk and maintain healthy forest and grassland ecosystems. The purpose of a successful fire management program is to reduce the risks associated with values that are important to the county, its citizens, and natural resources. Values at risk will be used to assist fire protection agencies in prioritizing mitigation projects.

Some of the values at risk in Cascade County are:

- Health & Safety – Public & Fire Fighters
- Property, Improvements & Facilities – Private & Public
- Recreation/Community Impacts – Economic & Social
- Forest/Ecosystem Health
- Timber and Grazing
- Cultural Resources
- Aesthetics/Scenery

6.1.2. Health and Safety

Fire fighter safety should never be compromised.

Cascade County needs to maintain the safety of their fire fighters. Thorough situational awareness on the part of the fire fighter and strong incident management by the fire department leadership is critical to the safety of fire fighting personnel. Wildland fires are capable of moving over significant distances in a short period of time. It is possible that fire fighting resources could become trapped during one of these events if they do not maintain a constant situational awareness.

Cascade County has the potential to have a series of multiple wildland fire incidents during any fire season. A fire season of this nature could conceivably last for several months. The county fire agencies should work toward expanding their leadership capability so they can deal with simultaneous complex fire ignitions.

In 1997, the "TriData Study: Wildland Firefighter Safety Awareness Study" was commissioned to find ways to improve firefighter safety. Of the 114 recommendations, the #1 recommendation was to "Implement a large-scale, long-range fuel management program.[22]" Fire protection agencies, county officials, and the public must insist on hazardous fuel reduction efforts on a landscape-basis if they are truly serious about improving safety of not only fire fighters but the public in general.

6.1.3. Property, Improvements & Facilities

Few wildland fires burn where there is not some threat to homes, ranch out-buildings or other structures, fences, power lines, communication sites, or some other type of infrastructure. Fuel treatments (asset protection zones) in the immediate area around structures, designed to reduce wildland fire intensity, can dramatically improve their probability of survival. However, restricting treatments to these areas does little to protect other values-at-risk, some of which may be equally or more important from a neighborhood and/or a community standpoint.

One of the largest problems facing wildland protection agencies in Cascade County is the unwillingness

[22] *Wildland Firefighter Safety Awareness Study*, TriData, 1996

of residents to realistically look at the fire environment in which they live and their failure to correct hazardous fuel situations around their homes and other structures. In lieu of county residents undertaking any kind of hazard abatement actions that would mitigate fire behavior potential, the protection organizations have no choice but to take only such actions that will facilitate orderly evacuation of occupants and will insure the safety of their fire fighters. This may mean writing off some structures where the Incident Commander cannot reasonably expect the apparatus or the fire fighters to safely withstand an oncoming fire front.

6.1.4. Recreation

Opportunities to enjoy outdoor recreation activities can also be severely hampered by wildland fire and fires can have an adverse effect on the economy of Cascade County. Areas can be closed to the public for extended periods of time during high fire danger. Often these closures and restrictions occur in early fall during upland bird and big game hunting seasons when many non-county residents have plans to travel to the area.

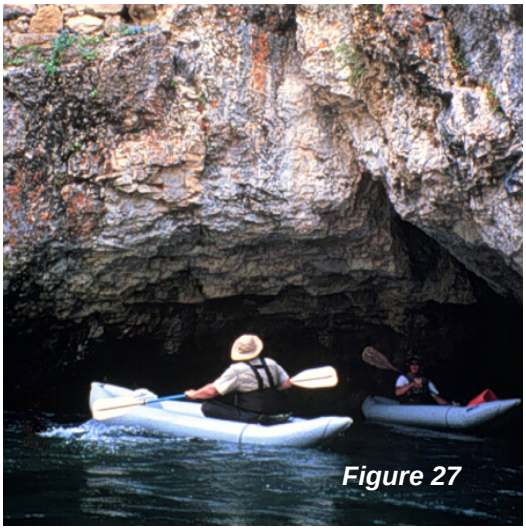


Figure 27

Recreational activities contribute significantly to the economy of the county, but at the same time unattended campfires in the campgrounds cause impacts to the fire protection system (See Figure 27).

6.1.5. Forest/Ecosystem Health

See Section 5.4 Local Fire Ecology.

6.1.6. Grazing and Timber

Agriculture and grazing are two of the primary uses on the private lands in Cascade County. Haying and hay storage are at risk during large wildland fire.

The Bureau of Land Management, Fish and Wildlife Service and State of Montana has scattered land holdings within the county and are tasked with providing rangeland and recreation use on those lands.

There is some potential for timber harvest within the county with some harvests occurring on private ranches.

6.1.7. Cultural Resources

There are cultural resource sites located in Cascade County that need to be protected during fire suppression and fuel reduction activities.

6.1.8. Aesthetics/Scenery

Picturesque long-distance vistas especially in Missouri & Marias River Corridor are a very important component of the landscape. Wildfires impact the aesthetics of an area, which can further impact the economy of the county (See Figure 28).

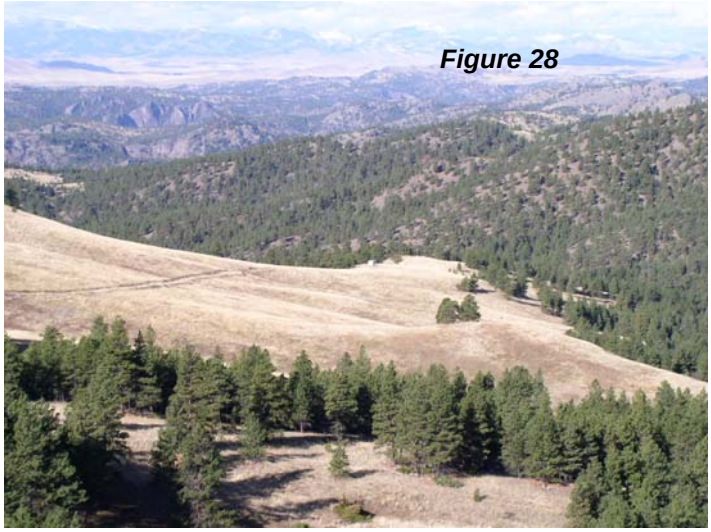


Figure 28

6.2. Risk Estimation

As with the federal agencies, the county's first priority is protection of human life and secondly, personal property.

In order to identify the problem areas in Cascade County a process was developed by Fire Logistics to look at hazard, risk and values in a collective manner (See Figure 29 and Fire Hazard Assessment Model Maps in Map Section 10.5).

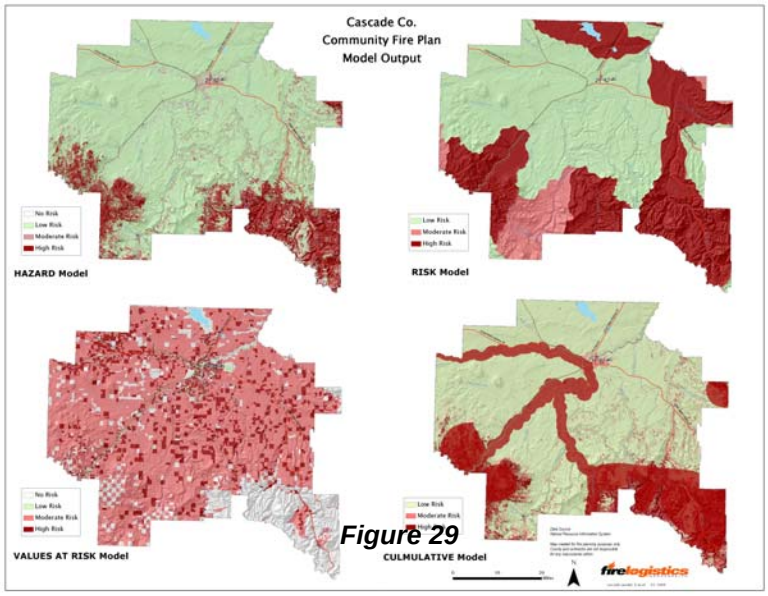


Figure 29

Fire hazard is the interaction of fuels (vegetation, buildings, and other flammables), topography (fires will burn more intensely on south and west slopes, up slopes, in narrow draws, and on upper slopes), and weather (temperature, wind speed and direction, and humidity). The interaction of these factors affects the rate of spread and the intensity of a wildland fire.

Fire risk is the chance that a fire will start in a particular area. Although lightning is an important and leading cause of wildland fires, person caused wildland fire starts are a common source of ignition. The greatest number of human activities with fire starting potential is found close to a home. Common causes of wildland fires include children experimenting with fire, chain saws, grass mowers, debris burning, improper disposal of barbecue coals and ashes, and smoking. Structure fires have the potential to spread into the wildlands. Power lines, agriculture activities, hiking trails, campgrounds, and recreational activities are other activities or uses that are of high fire risk.

Values at risk include life (fire fighters and the public), communities, property, infrastructure, industrial facilities, timber, grazing and natural resources.

The first step was to develop a vegetative layer that placed the prevalent cover types into a high, moderate, low or inflammable category. This was overlain with a map of the historical fire occurrence for the county. This created a good representation of where fires traditionally occur and what their potential for growth would be. The third factor incorporated was the location of structures by parcel. This helped identify where the priorities, in terms of life and property, for protection existed. This composite map gave Fire Logistics a basis for their recommendations to Cascade County for focusing prevention, protection and fuels modification efforts in the areas where they would be of most benefit.

6.2.1. Discussion of Risk

Most working ranches have adequate clearing around them to hypothetically protect them from crown fire or a running surface fire. A problem can occur if there is too much clutter or untended vegetation around their structures however, that would allow for a simple surface fire to ignite those structures.

Subdivision structures are inherently more vulnerable. People who own them often fail to recognize the relationship between the amount of vegetation around their structures and the threat to that structure from a wildfire. Some are even obstinate about that point and they refuse to remove any vegetation even though its continued presence reduces the probability that their home will survive a wildfire to almost

zero. Fire fighters must be very careful to look out for their own welfare first when asked to protect a structure where the owner has refused to do any work to enhance that structure's probability of surviving a wildland fire (See Figure 30).

The following list represents current priorities for fire protection within Cascade County:

Dearborn Area, including the Cooper Ranch and Stickney Creek
Hardy Creek – Missouri River Corridor
Monarch
Neihart
Logging Creek Area
Southwest side of the Highwood Mountains, adjacent to National Forest
Missouri, Sun, & Smith River Corridors

In looking at the GIS layered map of Cascade County and the modeled fires, it is apparent why these priorities have been established. These areas are particularly challenging from a fire protection standpoint because of the lack of some basic amenities such as access, telephone service and a water supply. The response times are also lengthy for wildland fire fighters because of the remoteness of these areas.

History has shown that, when enough continuous fuels are available and when certain weather conditions are present, large scale wildland fires will occur. During one of these events, the actions that have been taken beforehand generally prove to be much more effective than any actions taken during the wildland fire event. When conditions of extreme fire behavior exist little can be accomplished aside from evacuating people from harms way and keeping fire fighters in safe positions. Any fuel modification efforts that have been completed prior to the event will greatly enhance the fire fighter's efforts to safely protect property during the incident.

7. Mitigation Strategy -- The Action Plan

This Chapter provides the steps that are being taken or should be taken in Cascade County to reduce the wildland and structure fire threats to public, fire fighters and other values at risk.

7.1. Mitigation Goals

An overarching principle of this Community Wildfire Protection Plan is that fire fighter and public safety is the highest priority!

The mitigation goals of this Community Wildland Protection Plan are to:

1. Identify, designate, and map areas of wildland-urban interface in the county.

2. Develop and implement a comprehensive emergency response plan.

3. Prevent threats to and destruction of property from wildland fire by adopting subdivision regulations, which include access, water supply, communications, and fire stations.

4. Develop and maintain regulations to ensure asset protections zones are created and maintained around structures and improvements in the county.

5. Identifying equipment and training needs to enhance the capabilities of fire protection entities to suppress and mitigate wildfire risks, with financial assistance through competitive grant programs administered by the MT DNRC.

6. Decrease the chances of a wildland fire spreading from federal lands onto private lands while, correspondingly, decreasing the risk of a wildland fire spreading from private lands onto federal lands within the county and promote healthy forest and rangeland ecosystems by reduction of hazardous fuels.

7. Enhance communications between our community and firefighting agencies.

8. Increase availability of water resources for wildland firefighting by strategic placement of water tanks, ponds, and dry hydrants.

9. Improve training and qualifications of personnel to more effectively interface with incoming Incident Management Teams deployed in the county.

10. Position fire protection agencies, county leaders, rural communities, valley residents, and forest owners and managers to be better prepared to protect the county's residents and its natural resources from the potentially devastating impacts of wildland and wildland-urban interface fires.

11. Identify, inventory, and prioritize the risks associated with developing areas of the county.

12. Evaluate, upgrade, and maintain community wildland and structural fire protection and response facilities, and the training and equipment to deal with multiple ignitions.

13. Educate community members to prepare for and respond to wildland fire and to mitigate wildland fire damage.

14. Promote creation of fuel breaks in appropriate locations in Conservation Reserve Program lands.

15. Work as a partner to identify, coordinate, and implement fuels reduction projects between private landowners, the Lewistown field office of the Bureau of Land Management, and the Lewis & Clark National Forest.

16. Identify economic development opportunities for fuel reduction enterprises.

17. Implement the Cascade County CWPP with ongoing monitoring and evaluation.

Planning priorities of the CWPP in order of importance are:

- Protect human health and life
- Protect critical community infrastructure
- Protect private property
- Protect natural resources

7.2. Existing Mitigation Efforts

The following sections describe the existing mitigation measures that are being utilized in Cascade County to decrease the risks from wildland or wildland-urban interface fires. Cascade County and Cascade County fire agencies should ensure that these efforts are supported and continued.

7.2.1. Fire Protection Response

Long travel distances for fire suppression resources are the norm in Cascade County. The Cascade County Fire Departments have located the engines and water tenders as strategically as they can throughout the county. When a fire is reported the Cascade County fire personnel are notified and they respond on a closest forces concept. They also respond to new ignitions reported on BLM and USFS administered lands.

The federal agencies have developed strict requirements for wildland fire fighters including an annual physical fitness-testing requirement. These are the result of a myriad of reviews and investigations of serious incidents that have occurred in wildland firefighting over the years. All Cascade County FD personnel who are dispatched out of their jurisdiction must meet the same standards as their federal counterparts.

7.3. Coordinated Prevention, Protection Projects, and Response Plan

Future efforts in planning and implementation of prevention, mitigation and response projects should be closely coordinated between Cascade County and their cooperating partners, i.e., BLM, USFS, and the State of Montana. It is likely that some projects would be more effective if implemented on the lands of two or more jurisdictions rather than by a single entity. Cooperation and coordination will also result in avoiding duplicating efforts or overlooking opportunities to protect values at risk.

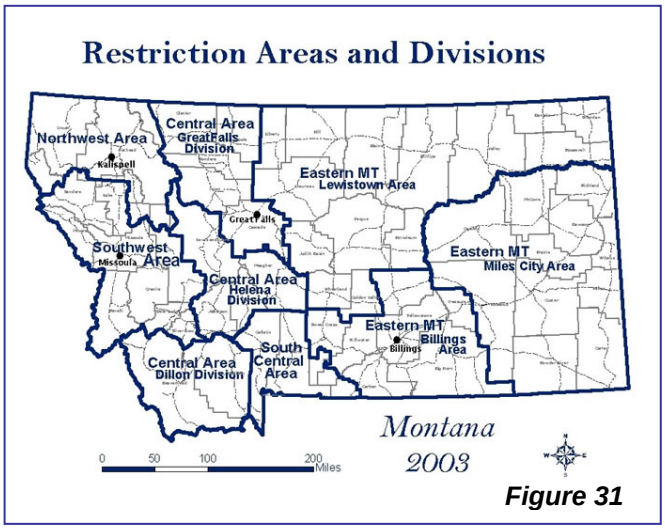


Figure 31

In an effort to reduce new fire starts during periods of very high or extreme fire danger, there is a statewide process for instituting fire restrictions and closures by zone in the Northern Rockies Geographic area (See Figure 31). Cascade County and its cooperators are coordinated in this process through the Great Falls Division – Central Montana Zone, to ensure close communications and common actions occur

during critical periods of fire danger.

7.4. Prioritization Process

Recommended projects have been prioritized based on the risk estimation in Section 6.2. See 7.6 Prioritized Actions.

7.5. Recommended Projects and Programs

This area describes recommended projects and actions that address the mitigation goals of the Cascade County CWPP. The funding mechanism for both the State of Montana and BLM is directed toward projects that show collaboration between private, counties, tribes, state and federal partners.

7.5.1 Wildland-Urban Interface Areas

Recommended Project 7.5.1.1 – The Cascade County Board of County Commissioners should designate the following as wildland-urban interface areas in Cascade County (See Figure 32):

- Dearborn Area, including the Cooper Ranch & Stickney Creek
- Hardy Creek – Missouri River Corridor
- Monarch
- Neihart
- Logging Creek Area
- Southwest side of the Highwood Mountains, adjacent to National Forest
- Missouri, Sun, & Smith River Corridors

Figure 32

Project Coordinator – Cascade County DES Coordinator

7.5.2. Fuel Modification Projects

This section addresses specific actions to reduce fuel loads, whether in forests, brush, or grasslands.

Recommended Project 7.5.2.1 – Form a collaborative planning group (Fire Safe Council) with the BLM, ranchers, Cascade County fire agencies, Cascade County Disaster & Emergency Services, Board of County Commissioners, power companies, BNSF and other cooperators to plan on-going fuel reduction projects on a landscape basis.

Project Coordinator – Cascade County Rural Fire Council

7.5.2.1. Vegetation Management

Sivilcultural treatment of fuels is a technique used to eliminate a portion of the fuels in forested areas. Some of the smaller trees are cut and removed to create more growing space between the larger trees. This basic forestry practice of thinning will usually increase timber values for the landowner by concentrating annual growth in a few larger trees rather than many small trees.

Limbing is another technique accomplished by removing the lower branches of trees and like thinning it reduces the ladder fuels that allow a fire to climb from the ground up into the forest canopy. General litter cleanup is the removal of dead and downed woody debris on the forest floor that can contribute significantly to fire behavior, as these fuels tend to be very dry and readily combustible.

Recommended Project 7.5.2.1.1 – Reduce the vegetation in those areas within the Dearborn Interface Area where the continued presence of the fuels represents a clear potential to generate high fire intensities. Wildland fires burning under high intensities will pose the greatest threat to structures, their inhabitants or fire fighters. The county could start in those areas where fuel modification projects would have the most potential to positively impact the greatest number of people or structures, i.e., ingress-egress routes. Changing crown density and interrupting the ladder fuel continuity should be highest priority. Fuel modification areas need to be a minimum of 50 feet wide and closer to 100 feet whenever possible. Look for areas of active tree or shrub encroachment where the absence of periodic natural fires has allowed vegetation, like juniper or heavy ponderosa pine regeneration, to survive. Eliminating these trees while they are young is relatively inexpensive and over time it will significantly reduce the resistance to control factor for fire fighters when fighting a fire in that area.

Project Coordinator – Dearborn Fire Chief, DNRC and BLM

Recommended Project 7.5.2.1.2 – Develop a joint strategy with the Lewis and Clark NF to construct a system of fuel breaks that would encompass the private and public lands around Monarch and Neihart.

Project Coordinator – Monarch & Neihart Fire Chiefs and Lewis & Clark NF Belt District FMO

Recommended Project 7.5.2.1.3 – Once the fuels in an area have been reduced to an acceptable level it is critical that they not be allowed to return to the condition they were in prior to treatment. Treated areas should be inspected at 5-10 year intervals to determine if they would still be effective during a wildland fire. Most likely they will need some type of follow up maintenance, at that point in time, but this work should require less effort and at a reduced cost from the original treatment. If it is not accomplished periodically the full treatment costs will be required again in 20-30 years.

Project Coordinator – Cascade County Fire Chiefs, DNRC, USFS and BLM

Recommended Project 7.5.2.1.4 – Develop additional fuel reduction projects around the Logging Creek Area.

Project Coordinator – Monarch Fire Chief, USFS, BLM, the Rocky Mountain Elk Foundation

Recommended Project 7.5.2.1.5 – Develop a fuel reduction plan for the Highwood Mountains area.

Project Coordinator – Belt Rural Fire Chief, USFS, BLM and Rocky Mountain Elk Foundation

Recommended Project 7.5.2.1.6 – Identify strategic fuel break locations, throughout the county, along county roads that are either mail routes or school bus routes to break up the continuity of the CRP. The fuel breaks should be constructed as wide as possible along both sides of the county road to provide an opportunity to anchor or suppress a fire in the CRP.

Project Coordinator – Cascade County Fire Council.

Recommended Project 7.5.2.1.7 – Work with owners of cottonwood river bottoms where an early spring or late fall fire in the river bottoms will threaten developments in Gore Hill FSA and Vaughn FSA or other communities to implement a fuel management prescription that would divide the cottonwood stands into 40 acres blocks separated by plowed lines or mowed fire breaks that are at least 15 feet wide.

Project Coordinator – Cascade County Fire Chiefs

Recommended Project 7.5.2.1.8 – Develop a fuel reduction project that is designed to protect the Neihart municipal watershed.

Project Coordinator – Neihart Fire Chief, and the Lewis & Clark NF Belt Creek FMO

7.5.2.2. Prescribed Burning

Prescribed burning—or controlled burning—is a relatively quick and inexpensive way to reduce fuel loads. However, in many situations, especially where there are structures nearby, preparatory work needs to be done to reduce the overall flammability of the site.

The county may wish to explore the opportunities for using prescribed fire on private lands especially on the CRP lands within the county. There are some tangible benefits to local ranchers and when they use low to moderate intensity prescribed fire to increase the quantity and palatability of grass on pastures and CRP. It will also set back the encroachment of ponderosa pine unto grasslands where this is a problem. Forage levels have been increased two to four times the pre-burn levels on many sites in Montana and sage has been reduced to about 10 percent of pre-burn levels. One drawback to prescribed fire is that the area to be burned should not be grazed for one season prior to burning and one season after burning. The reasons are to insure enough fine fuels are present on the site to adequately carry the fire during burning and to allow the new and/or rejuvenated grass plants adequate time to develop healthy root systems the following growing season. Several research publications completed by the Intermountain Research Station discuss the types of results that can be expected.

One of the greatest benefits to prescribed burning is the training opportunity it provides for the fire fighters. On a wildfire they are often forced to be reactive rather than to plan and execute actions in a more orderly fashion. When conducting a prescribed burn they will be able to observe fire behavior in a non-emergency setting. They will also learn how to effectively ignite the area to be burned and how to deploy the holding forces to make the best use of available skills and equipment. All of this can be accomplished while functioning in the serious but more controlled environment of a prescribed fire.

Recommended Project 7.5.2.2.1 – Opportunities may arise from planning efforts to jointly conduct prescribed fire projects. Cascade County fire agencies should participate in these burns when practical to improve their training, qualifications and experience in wildland fire management. Efforts such as these promote better interagency cooperation and working relationships.

Project Coordinator – Cascade County Fire Chiefs, USFS and BLM

Recommended Project 7.5.2.2.2 – Cascade County Weed Department should establish a wash requirement for contractors, local and government apparatus that conduct prescribed burns within the county.

Project Coordinator – Cascade County Weed Department

7.5.2.3. Grazing

Cascade County can expect the continued encroachment of fires off of timbered grounds, such as BLM and USFS lands, onto private ownership.

Recommended Project 7.5.2.3.1 - Landowners should be encouraged to sustain grass ecosystems through grazing and to control tree encroachment in those areas, particularly where they are adjacent to heavily timbered federal lands.

Project Coordinator – Cascade County Conservation District

Recommended Project 7.5.2.3.2 – Encourage landowners with CPR contracts to utilize drought years to modify this fuel type through haying or grazing or a combination of both.

Project Coordinator- Cascade County DES Coordinator

7.5.3. Industrial Resource Management

Recommended Project 7.5.3.1 – Ensure that railroads within the county control the fire hazard along their right-of-way according to Section 69-14-721 MCA. If a fire occurs as a result of an ignition along the railroad right-of-way, the Cascade County Fire Departments should ensure that a fire investigation occurs to document that the cause and origin of the fire was the railroad and then bill the railroad for suppression costs for all railroad fires.

Project Coordinator – Cascade County Fire Chiefs and Cascade County DES Coordinator

7.5.4. Biomass Utilization

Recommended Project 7.5.4.1 – Explore any opportunities to dispose of biomass material on either a profit or break even basis. If there is no market for chips or hog fuel in the area and no possibility of utilization for posts or poles, look at designating a site or sites where material can be safely piled and burned during low fire danger periods.

Project Coordinator – Economic Development Groups in Cascade County

Recommended Project 7.5.4.2 – Explore involving the local RC&D or other economic development agencies within the Cascade County area to develop companies which might utilize the biomass generated from the fuel reduction projects (See Figure 33).

Project Coordinator – Economic Development Groups in Cascade County

Figure 33

7.5.5. Safety Zones

Location of safety zones within some of the subdivisions is probably the best approach to protecting human life during a fast moving fire, especially when residents are faced with the alternative of trying to navigate narrow roads under smoky conditions. Any required clearance work on these identified areas should be accomplished prior to fire season as labor and equipment become available. One important point is to insure that the development of procedures, such as when to occupy them and what should and should not be taken into them, are clearly understood by anyone who may need to use them.

Recommended Project 7.5.5.1 – Identify potential safety zones in the Dearborn & Cooper's Ranch area to utilize if evacuation is not possible due to ingress and egress issues as well as the surrounding fuel type.

Project Coordinator – Dearborn Fire Chief, DNRC, Cascade County Sheriff and Cascade County DES Coordinator

7.5.6. Infrastructure Improvements

Improvements to improve local infrastructure are discussed in this section.

7.5.6.1. Water Supply

Although water supply is not a direct function of the Cascade County fire agencies, water supply unquestionably impacts the structure fire suppression performance of the department. Water supply, or lack of water supply, indirectly affects the whole community through the insurance rates they pay.

Recommended Project 7.5.6.1.1 – Prepare a strategic water source plan for the county, which shows the most efficient sources of water needed to support firefighting efforts. It may be necessary to develop new sources in some isolated dry locations in order to reduce refill times to an acceptable level. Explore opportunities to use dry hydrants and stored water facilities. GPS the location of water supply points to develop a water supply map for Cascade County.

Project Coordinator – Cascade County DES Coordinator and Fire Chiefs

Recommended Project 7.5.6.1.2 – Continue to encourage individuals to develop water sources that can be used by fire protection personnel.

Project Coordinator – Cascade County Fire Chiefs

Recommended Project 7.5.6.1.3 – Develop water supply points in the Monarch FSA in the area of the Lazy Doe, Monarch, and Sun Mountain Road area.

Project Coordinator – Monarch Fire Service Area.

Recommended Project 7.5.6.1.4 – Repair municipal water system leaks to ensure adequate fire flows are available for fire suppression.

Project Coordinator – Neihart Fire Chief & City Council

Recommended Project 7.5.6.1.5 – Begin planning for the long range storage needs of the municipal water system in Neihart.

Project Coordinator – Neihart Fire Chief & City Council

Figure 34

7.5.6.2. Utilities

Recommended Project 7.5.6.2.1 – The Cascade County fire agencies should work with the electric utility companies to ensure that the required clearances are maintained for all electrical transmission lines in the Cascade County (See Figure 34).

Project Coordinator – Cascade County Fire Warden

Recommended Project 7.5.6.2.2 – The Electric Utility Companies that operate in Cascade County should provide power line safety demonstrations to the Cascade County fire agencies and interested subdivision and homeowner associations on a biannual basis.

Project Coordinator – Cascade County Rural Fire Council and Power Company Managers

7.5.6.3. Emergency Response

Emergency response to wildland, wildland-urban interface and structure fires includes the placement of stations, apparatus and personnel to meet the needs of the community.

Recommended Project 7.5.6.3.1 – All the fire departments should develop a capital improvement plans to

up-grade fire apparatus and equipment, within Cascade County.

Project Coordinators – Cascade County Fire Chiefs with assistance of the Board of County Commissioners.

Recommended Project 7.5.6.3.2 – The Cascade County fire agencies should continue to maintain and enhance the interagency cooperation between the all fire departments and MT Department of Natural Resources and Conservation, United States Forest Service and the Bureau of Land Management.

Project Coordinator – Cascade County Fire Chiefs, DNRC Area Manager, L & C NF – Belt Ranger District Fire Management Officer and BLM Fire Management Officer

Recommended Project 7.5.6.3.3 – Develop and provide an educational program that communicates information about the levels of service of the county's fire protection agencies to the public.

Project Coordinator – Cascade County Fire Chiefs

Recommended Project 7.5.6.3.4 – Install mobile repeaters in fire apparatus in those areas where communications with Dispatch and others is problematic, especially in the Dearborn, Monarch and Neihart.

Project Coordinator – Cascade County DES Coordinator

Recommended Project 7.5.6.3.5 – Purchase satellite phones for key rural fire chief officers to ensure communication when on remote incidents in the county.

Project Coordinator – Cascade County DES Coordinator

Recommended Project 7.5.6.3.6 – Install an additional repeater in the southeast portion of the county to facilitate communication with the Monarch and Neihart Fire Departments.

Project Coordinator – Cascade County DES Coordinator.

Recommended Project 7.5.6.3.7 – Cascade County and the City of Great Falls should work together to consolidate the number of individual fire districts that contract with the City to a manageable number.

Project Coordinator – Great Falls Fire/Rescue Chief and the Board of County Commissioners.

7.5.6.3.1. Fire Stations

Recommended Project 7.5.6.3.1.1 – All fire stations should have a well maintained asset protection zone constructed around the fire stations (See Figure 35).

Project Coordinator – Fire Department Fire Chiefs

Recommended Project 7.5.6.3.1.2 – Construct a helipad at the Dearborn Fire Station for use during emergency incidents.

Project Coordinator – Dearborn Fire Chief and DNRC.

Figure 35

7.5.6.3.2. Training, Certification, and Qualification

Recommended Project 7.5.6.3.2.1 – Develop a training program which encompasses County Fire Warden, County Sheriff personnel, Disaster and Emergency Service officials, Mayors, City Councils and Fire Chiefs, and other government officials, to maintain currency with their fire program to include their roles and responsibilities as government officials. This training would provide the skill level to determine the appropriate level of Incident Management Team (IMT) and the ability to write a delegation of authority to the IMT, which would include the management objectives of the local government for the emergency incident.

Project Coordinator – Cascade County Fire Warden in association with MT County Fire Wardens Association

Recommended Project 7.5.6.3.2.2 – Consider adopting the National Wildfire Coordinating Group's 310-1 or National Fire Protection Association Standard 1051 as the minimum training standard for Cascade County Fire personnel as a tool to mitigate liability issues.

Project Coordinator – Cascade County Fire Chiefs.

Recommended Project 7.5.6.3.2.3 – Develop and training fire agency members to ensure that Cascade County has the capability to provide incident management support and staff at the Type 3 and 4 levels.

Project Coordinator – Cascade County Rural Fire Council.

7.5.6.3.3. Operational Procedures & Programs

Recommended Project 7.5.6.3.3.1 – GPS the perimeters of all fires that are 100 acres or larger and develop a fire history database and maps for the county utilizing GIS. Upgrade GSP units so that they are capable of tracks allowing Cascade County Fire personnel to map the perimeter of fires larger than 100 acres so that they interface with the county's GIS program.

Project Coordinator – Cascade County DES Coordinator

Recommended Project 7.5.6.3.3.2 –The Cascade County Weed Plan should be amended to require that fire suppression equipment be washed down prior to fire suppression activities to eliminate weed seeds and other noxious species moving into Cascade County.

Project Coordinator – Cascade County Weed Department with support from the Cascade County DES Coordinator

Recommended Project 7.5.6.3.3.3 – Cascade County should adopt countywide procedures for operating the EOC and responding to Hazmat or Mass Casualty incidents.

Project Coordinator – Cascade County Rural Fire Council & Cascade County DES Coordinator

7.5.6.3.4. Staffing

Recommended Project 7.5.6.3.4.1 – Develop a recruiting and retention program for the Cascade County Fire agencies. A SAFER (Staffing for Adequate Fire & Emergency Response) Grant might be used to fund this project.

Project Coordinator – Cascade County Rural Fire Council

Recommended Project 7.5.6.3.4.2 – Due to the demographics of the town of Neihart, the Fire Department should consider applying for a grant to sprinkle all of the buildings in the Town of Neihart to mitigate the

lack of volunteer fire fighters in the community.

Project Coordinator – Neihart Fire Chief.

7.5.6.4. Access

Recommended Project 7.5.6.4.1 – As road signs are replaced throughout the county, they should be non-combustible reflective road signs that would withstand a wildland fire.

Project Coordinator – Cascade County Road Department and Cascade County Commissioners

Recommended Project 7.5.6.4.2 – Install road name signs that are non-combustible and reflective on all roads that currently do not have signs.

Project Coordinator – Cascade County Road Department

Recommended Project 7.5.6.4.3 – The County should work with the Lewis & Clark NF to re-open Harley Creek Road to provide more efficient access to structures in the area.

Project Coordinator – Monarch Fire Chief, Lewis & Clark NF Belt Ranger District FMO, and Cascade County DES Coordinator.

Figure 36

Recommended Project 7.5.6.4.4 – Identify the bridge GVW capacity for bridges crossing Belt Creek to ensure safe access for fire agencies (See Figure 36).

Project Coordinator – Cascade County DES Coordinator

Recommended Project 7.5.6.4.5 – Fix one of the primary access routes into the Cooper's Ranch and Dearborn River are to ensure adequate fire apparatus access to the area (See Figure 37).

Project Coordinator – Cascade County DES Coordinator, Dearborn Fire Chief, MT DNRC, BLM, Cascade County Road Department, Cascade County Fire Warden, Cascade County Commissioners.

Figure 37

7.5.7. Asset Protection Zone (Defensible Space)

One of the single most important mitigating factors to increase the chances for the home's survival during a wildland-urban interface fire is the creation and maintenance of an asset protection zone (defensible space). An asset protection zone refers to an area around the home where the native vegetation has been modified to reduce the wildland-urban interface fire threat to the home and provides a safe area for fire fighters to work effectively and safely (See Figure 38).

Slope and fuels affect the size of the asset protection zone. Homes near steep slopes and in heavy fuels will need to clear additional vegetation to mitigate the effects of the radiant and convective heat currents and flame lengths. The slopes should be planted to native vegetation that is fire resistant.

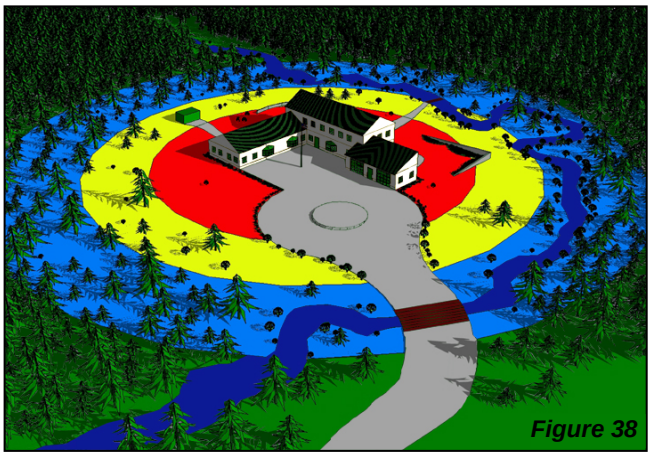


Figure 38

Recommended Project 7.5.7.1 - The National Fire Plan also mandates that local governments develop and adopt local land use plans and ordinances that provide for the maintenance of defensible space and fuel management on municipal and private property.[23] The Cascade County Commissioners need to adopted regulations which would include requirements for asset protection zones (defensible space) and fuel management in designated wildland-urban interface areas (See Asset Protection Zone Guidelines in Resources Section 10.4 of CWPP).

Project Coordinator – Cascade County Rural Fire Council

Recommended Project 7.5.7.2 – The cities of Great Falls, Belt and Neihart should ensure that residences adjacent to wildland areas in these communities are provided with adequate asset protection zones.

Project Coordinator – Fire Department Fire Chiefs

7.5.8. Recommended Building Materials/Fire Wise Construction

A home may be vulnerable to a wildland-urban interface fire because of its design, construction and/or location. There are steps a homeowner or developer can take to reduce the chance of home catching fire, or resist further damage if it does catch fire.

Recommended Project 7.5.8.1 – Recommend the use of Firewise Construction, Design and Materials[24] and Firewise Construction Checklist[25] to developers and homebuilders. See Resources Section 10.4 of CWPP.

Project Coordinator – Cascade County DES Coordinator and Cascade County Fire Chiefs

7.5.9. Fire-Resistant Landscaping

The landscaping plan of the homeowner is an integral component of the defensible space developed by the homeowner. Each lot should be thought of in terms of four zones, with each zone having a different purpose and emphasis in the overall defensible space concept for the property (See Figure 39).

Zone A (Structure Protection Zone) consists of the area from immediately next to the home to a distance of approximately five feet. The primary purpose of this zone is to have the least flammable type of landscaping immediately adjacent to the home to prevent ignition from firebrands and direct flame contact.

[23] *See* www.westgov.org/wga/initiatives/fire/implem_plan.pdf
[24] *Firewise Construction, Design and Materials, Stack, Colorado Forest Service*
[25] *www.firewise.org.*

Zone B (Landscape Zone) lies between six feet and at least 30 feet from the home. This zone provides the critical area where fire fighters can defend the home and where the fuels have been substantially reduced in height and volume.

Zone C (Forest/Wildland Transition Zone) represents the lot from 31 feet to approximately 100 feet from the structure. This area lies outside the formal landscape area and should be modified as described in the asset zone guidelines, which are attached (See Asset Protection Zone Guidelines in Resources Section 10.4 of CWPP).

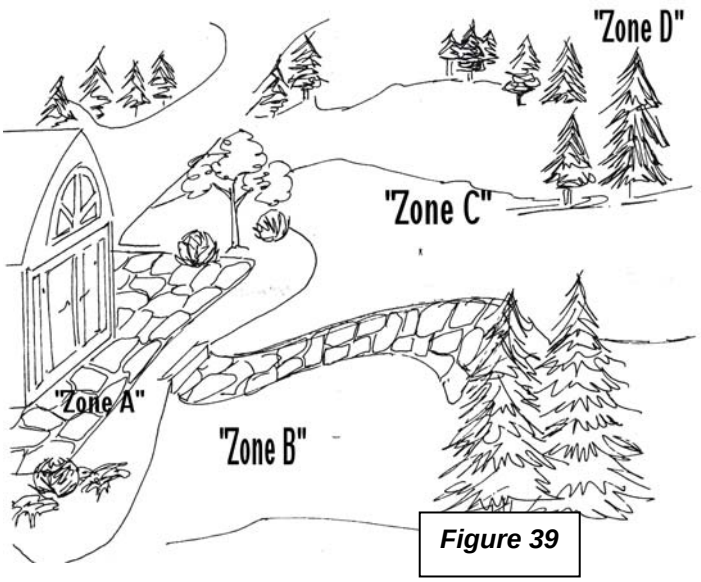


Figure 39

Zone D (Property Perimeter Buffer) is the property perimeter buffer which is 100 feet to the property line for lots 2 ½ acres or less or 100 feet to 200 feet around the perimeter of lots larger than 2.5 acres. This serves as a transition zone where you want to reduce the wildfire rate of spread and intensity, begin bringing the fire from a crown fire into a ground fire so that fire department resources can safely respond.

Provisions should be made as each phase is submitted for review to ensure the landscaping plans are reviewed for their appropriateness as a component of the defensible space requirement for the property. Provisions also need to be made by the developer to ensure long-term continuing maintenance for the defensible space surrounding the homes and businesses in the project (See Asset Protection Zone Guidelines in Resources Section 10.4 of the CWPP).

Recommended Project 7.5.9.1 – Utilize the Firewise Landscaping Checklist[26] and Fire and Your Landscape, Fire Scaping Resources for Montana Homeowners[27] (See Resources Section 10.4 of the CWPP).

Project Coordinator – Cascade County DES Coordinator and Cascade County Fire Chiefs

7.5.10. Evacuation Plan

Getting people out of harms way in a fire is critical. This section addresses specific projects designed to move people quickly, safely, and effectively.

Recommended Project 7.5.10.1 – Annually update evacuation plans for Cooper's Ranch area and conduct a tabletop exercise biannually.

Project Coordinator – Cascade County Sheriff & County Disaster & Emergency Services Coordinator

7.5.11. Public Education

Educating residents about wildland fire issues is one of the most effective ways to reduce fire hazards, whether that be in K-12 schools, or programs designed for adults.

[26] www.firewise.org
[27] *Montana Nursery & Landscape Assoc. 2003*

Recommended Project 7.5.11.1 – Sponsor a Firewise Community Program locally within the county for the public and conduct it biannually. Integrate weed and fire management into any public education that is conducted during the Firewise Community Program.

Project Coordinator – Cascade County DES Coordinator

Recommended Project 7.5.11.2 – Utilize a program such as the "Living with Fire in Montana" developed by Missoula County Fire Protection Association to educate residents, realtors, fire and government officials about living in a wildland fire environment.

Project Coordinator – Cascade County Rural Fire Council

Recommended Project 7.5.11.3 – Continue public education programs, such as the "Annual Clean-Up Day" in Neihart.

Project Coordinator – Cascade County Fire Chiefs

Proposed Project 7.5.11.4 – Develop public education kiosk's in key locations throughout the county with *Firewise* information, fire danger information and public safety messages.

Project Coordinator – Cascade County Rural Fire Council, USFS and BLM

Proposed Project 7.5.11.5 – Locate Fire Danger Rating Signs along primary roadways in the county.

Project Coordinator – Cascade County, USFS and BLM

Proposed Project 7.5.11.6 – Develop a specific Cascade County *Firewise* brochure that details the Cascade County Community Wildfire Protection Plan, asset protection zones (defensible space) guidelines, and fire apparatus ingress and egress requirements.

Project Coordinator – Cascade County Conservation District

Proposed Project 7.5.11.7 – Utilize the Cascade County Conservation District's newsletter to deliver fire safety messages and information about how to prepare for a wildland fire.

Figure 40

Project Coordinator – Cascade County Conservation District

7.5.12. Legal Requirements

Recommended Project 7.5.12.1 – Cascade County needs to resolve the issues with the Cooper's Ranch Subdivision in order to ensure ingress-egress routes are adequate and the public is not endangered (See Figure 40).

Project Coordinator – Dearborn Fire Chief, Cascade County Attorney and Cascade County Board of County Commissioners.

7.5.12.1. Subdivision Regulations

Recommended Project 7.5.12.1.1 – Adopt appropriate subdivision regulations which address the wildland-urban interface (See Model Fire Protection Standards in Resources Section 10.4 of CWPP).

Project Coordinator – Cascade County Rural Fire Council and Board of County Commissioners

Recommended Project 7.5.12.1.2 – The County Fire Chief's need to ensure that fire concerns are addressed in the subdivision review process for any future planned subdivision. The purpose for this input is to avoid creation or perpetuation of any untenable situations, from a fire protection standpoint. Issues such as road systems, water supply, building materials, asset protection zone and covenants covering vegetation management are all of concern to the Fire Chiefs and they can directly affect his/her ability to be effective.

Project Coordinator – Cascade County Planning Board and Cascade County Board of County Commissioners

Recommended Project 7.5.12.1.3 – Develop a mechanism to track new development and structures, which are in the wildland-urban interface areas of the county to enable Cascade County Fire Departments to pre-plan evacuations and fire attack.

Project Coordinator – Cascade County Fire Chiefs

7.5.13. Agreements, MOU's & Operating Plans

Recommended Project 7.5.13.1 – Develop a written mutual aid and/or automatic aid agreements between all of the Cascade County Fire Agencies including Great Falls Fire & Rescue, Malmstrom AFB FD, and the Montana Air National Guard FD.

Project Coordinator – Cascade County DES Coordinator

Recommended Project 7.5.13.2 – Review all agreements and memorandums of understanding with cooperators. Follow up on those that have not yet been up-dated and insure annual operating plans are completed when specified.

Project Coordinator – Cascade County DES Coordinator

Recommended Project 7.5.13.2.2 – Develop materials and training programs to ensure that a delegation of authority is properly executed between the appropriate "Authority Having Jurisdiction" and the Type III, II, or I Incident Commanders when utilized in the County.

Project Coordinator – Cascade County DES Coordinator

7.6. Prioritized Actions, Implementation Timeline

Recommended Project	Short Term (< 1 Year)	Medium Term (1-3 Years)	Long Term (3+ Years)
7.5.1.1	X		
7.5.2.1		X	
7.5.2.1.1	X		
7.5.2.1.2	X		
7.5.2.1.3			X
7.5.2.1.4		X	
7.5.2.1.5		X	
7.5.2.1.6		X	
7.5.2.1.7		X	
7.5.2.1.8		X	
7.5.2.2.1		X	
7.5.2.2.2	X		
7.5.2.3.1		X	
7.5.2.3.2		X	
7.5.3.1		X	
7.5.4.1		X	
7.5.4.2		X	
7.5.5.1	X		
7.5.6.1.1		X	
7.5.6.1.2		X	
7.5.6.1.3	X		
7.5.6.1.4		X	
7.5.6.1.5			X
7.5.6.2.1		X	
7.5.6.2.2		X	
7.5.6.3.1		X	
7.5.6.3.2	X		
7.5.6.3.3			X
7.5.6.3.4	X		
7.5.6.3.5	X		
7.5.6.3.6		X	

Recommended Project Table (continued)

Recommended Project	Short Term (< 1 Year)	Medium Term (1-3 Years)	Long Term (3+ Years)
7.5.6.3.7	X		
7.5.6.3.1.1	X		
7.5.6.3.1.2	X		
7.5.6.3.2.1		X	
7.5.6.3.2.2		X	
7.5.6.3.2.3	X		
7.5.6.3.3.1	X		
7.5.6.3.3.2	X		
7.5.6.3.3.3		X	
7.5.6.3.4.1		X	
7.5.6.3.4.2	X		
7.5.6.4.1	X		
7.5.6.4.2	X		
7.5.6.4.3		X	
7.5.6.4.4	X		
7.5.6.4.5		X	
7.5.7.1		X	
7.5.7.2	X		
7.5.8.1	X		
7.5.9.1	X		
7.5.10.1	X		
7.5.11.1		X	
7.5.11.2		X	
7.5.11.3	X	X	
7.5.11.4		X	
7.5.11.5		X	
7.5.11.6		X	
7.5.11.7		X	
7.5.12.1	X		
7.5.12.1.1	X		
7.5.12.1.2	X		

Recommended Project Table (continued)

Recommended Project	Short Term (< 1 Year)	Medium Term (1-3 Years)	Long Term (3+ Years)
7.5.12.1.3		X	
7.5.13.1	X		
7.5.13.2		X	
7.5.13.3			X

8. Plan Monitoring and Review: How to Keep this Plan Active and Up-to-Date

8.1. Timeline (5 years)

DMA 2000 requires that plans be updated every five years. This does not mean you have to rewrite it or redo this entire process. Rather, you are required to review your mitigation plan.

Recommended projects should be updated as the keeper of the plan becomes aware of new projects that might be implemented to mitigate a wildland fire problem. The prioritized project list should be revised every year based on new data and available dollars. The entire plan should be updated or reviewed on the same cycle as the pre-disaster mitigation plan.

8.2. Incorporation into Local Jurisdictional Plans

This plan should be adopted by local Cascade County and the recommendations be incorporated into their other planning mechanisms, such as a County Growth Policy and Pre-Disaster Mitigation Plan.

9. Summary and Conclusions

9.1. Analysis and Findings

The complexity of the wildland fire program has significantly changed in Cascade County over the last 15 years, due the development of wildland-urban interface, long term drought, and changes in the wildland ecosystems. The leadership and the level of fire preparedness within Cascade County have been able to keep pace with this changing environment through the efforts of the County Fire Warden. The Cascade County Board of Commissioners need to recognize this effort and also need to be supportive of future needs of the County's fire forces to further respond to a changing fire environment and the associated public safety risks.

In the recommended projects and programs section of this report, Section 7.5, significant changes are recommended. Funding for many of these suggested projects and programs can be obtained through the National Fire Plan and FEMA grant programs. The Cascade County Board of Commissioners is strongly encouraged to utilize a grant writer to increase the wildland fire suppression, public education, training and qualifications capability of the Cascade County and Cascade County Fire Departments.