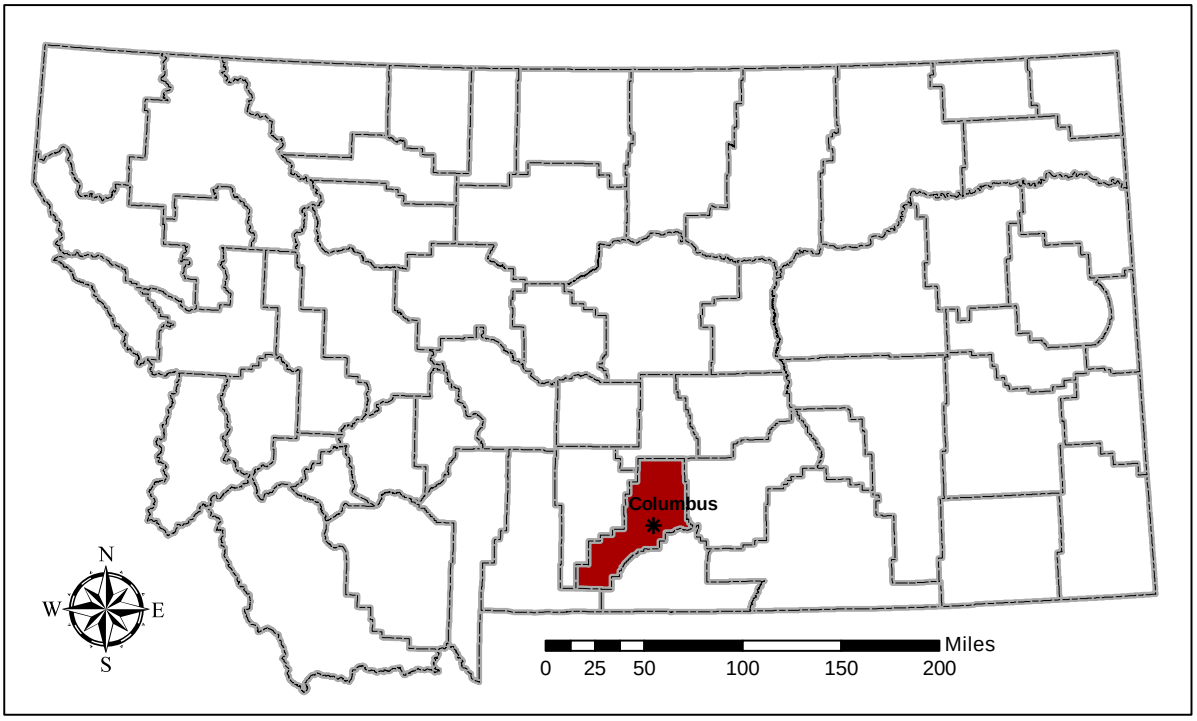
Stillwater County, Montana
Town of Columbus, Montana

Pre-Disaster Mitigation Plan

July 2010



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EXECUTIVE SUMMARY

Disasters can strike at any time in any place. In many cases, actions can be taken before disasters strike to reduce or eliminate the negative impacts. These actions, termed mitigation, often protect life, property, the economy, and other values. The Stillwater County Pre-Disaster Mitigation Plan addresses twelve major hazards with respect to risk and vulnerabilities countywide, including in the Town of Columbus. Through a collaborative planning process, the Stillwater County hazards were identified, researched, and profiled.

The major hazards – dam failure; disease; drought; earthquake; flood; hazardous material release and explosions; landslide and avalanche; severe weather; terrorism and civil unrest; transportation accident; volcanic ashfall; and wildfire – are each profiled in terms of their hazard description, history, probability and magnitude, mapping, vulnerabilities, and data limitations. The vulnerabilities to critical facilities, critical infrastructure, structures, the population, economic, ecologic, historic, and social values, and future development are evaluated for each hazard.

Based on the probability and extent of potential impacts identified in the risk assessment, the prioritizations of hazards within Stillwater County and the Town of Columbus are as follows:

Stillwater County Hazard Prioritizations

Level	Hazard
High Hazard	Wildfire Severe Weather Disease Flood Hazardous Material Release and Explosions
Moderate Hazard	Transportation Accident Dam Failure Drought Terrorism and Civil Unrest
Low Hazard	Earthquake Volcanic Ashfall Landslide and Avalanche

Town of Columbus Hazard Prioritizations

Level	Hazard
High Hazard	Severe Weather Disease Flood Hazardous Material Release and Explosions
Moderate Hazard	Transportation Accident Wildfire Drought Terrorism and Civil Unrest
Low Hazard	Earthquake Volcanic Ashfall Dam Failure

The following goals are outlined in the plan's mitigation strategy, based on the results of the risk assessment:

- *Goal 1: Reduce population and property losses through comprehensive mitigation programs.*
- *Goal 2: Protect the public, firefighters, communities, and property from losses due to wildfire.*
- *Goal 3: Utilize hazard-specific strategies to reduce future losses from particular hazards.*

Associated with each of the goals are objectives and mitigation projects ranging from updating land use regulations to burying electric infrastructure to public education. The mitigation projects are prioritized based on cost, staff time, feasibility, population benefit, property benefit, values benefit, project maintenance, and the probability and impact of the hazards being mitigated. An implementation plan outlines the suggested course of action, given the limited resources available to Stillwater County and the Town of Columbus. Stillwater County Disaster and Emergency Services and the Stillwater County Local Emergency Planning Committee are responsible for the implementation and maintenance of the plan. Other recommended activities, such integrating this plan into a variety of county and town plans, regulations, and documents, will further the goals of hazard mitigation in Stillwater County.

The Stillwater County Pre-Disaster Mitigation Plan exceeds the requirements of a local hazard mitigation plan as outlined in the Interim Final Rule published in the Federal Register on February 26, 2002 at Title 44 of the Code of Federal Regulations, Part 201 as part of the Disaster Mitigation Act of 2000. This plan has been approved by the Federal Emergency Management Agency as a hazard mitigation plan, and therefore, the county and town may be eligible for federal mitigation funds. This plan serves as a guide for understanding the major hazards facing Stillwater County and the Town of Columbus and provides a strategy for preventing or reducing some of the impacts.

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1. INTRODUCTION

1.1 Purpose

Stillwater County, the Town of Columbus, and the unincorporated communities recognize that hazards, both natural and human-caused, threaten their communities. Rather than wait until disaster strikes, the jurisdictions can take proactive measures to prevent losses and lessen the impact from these hazards. Actions taken to reduce or eliminate the long-term risk from hazards are defined as mitigation. Disaster mitigation is an investment that can save lives and money.

The purpose of this Pre-Disaster Mitigation Plan is to:

- Serve as a consolidated, comprehensive source of hazard information.
- Educate the communities, including government leaders and the public, on their vulnerabilities.
- Fulfill federal, state, and local hazard mitigation planning responsibilities.
- Prioritize and promote cost-effective mitigation solutions.
- Support requests for grant funding.
- Encourage long-term community sustainability.

Effective mitigation planning promotes a broader understanding of the hazards threatening the communities and provides a clearer vision and competitive edge for future mitigation grant funding. By integrating mitigation concepts into local thinking, the communities will find many more opportunities for disaster resistance beyond grant funding. For example, the consideration of disaster mitigation when designing new facilities or subdivisions will result in cost-effective solutions and greater disaster resistance, thus saving the communities' money in the long-term and contributing to the communities' sustainabilities.

1.2 Authorities

The Disaster Mitigation Act (DMA) of 2000 amends the Robert T. Stafford Disaster Relief and Emergency Assistance Act by adding a new section, Section 322 – Mitigation Planning. The requirements of such are outlined in the Interim Final Rule published in the Federal Register on February 26, 2002 at 44 CFR Part 201, with some additional amendments. This legislation requires all local governments to have an approved Hazard Mitigation Plan in place by November 1, 2004 to be eligible to receive Hazard Mitigation Grant Program (HMGP) and other types of disaster and mitigation funding.

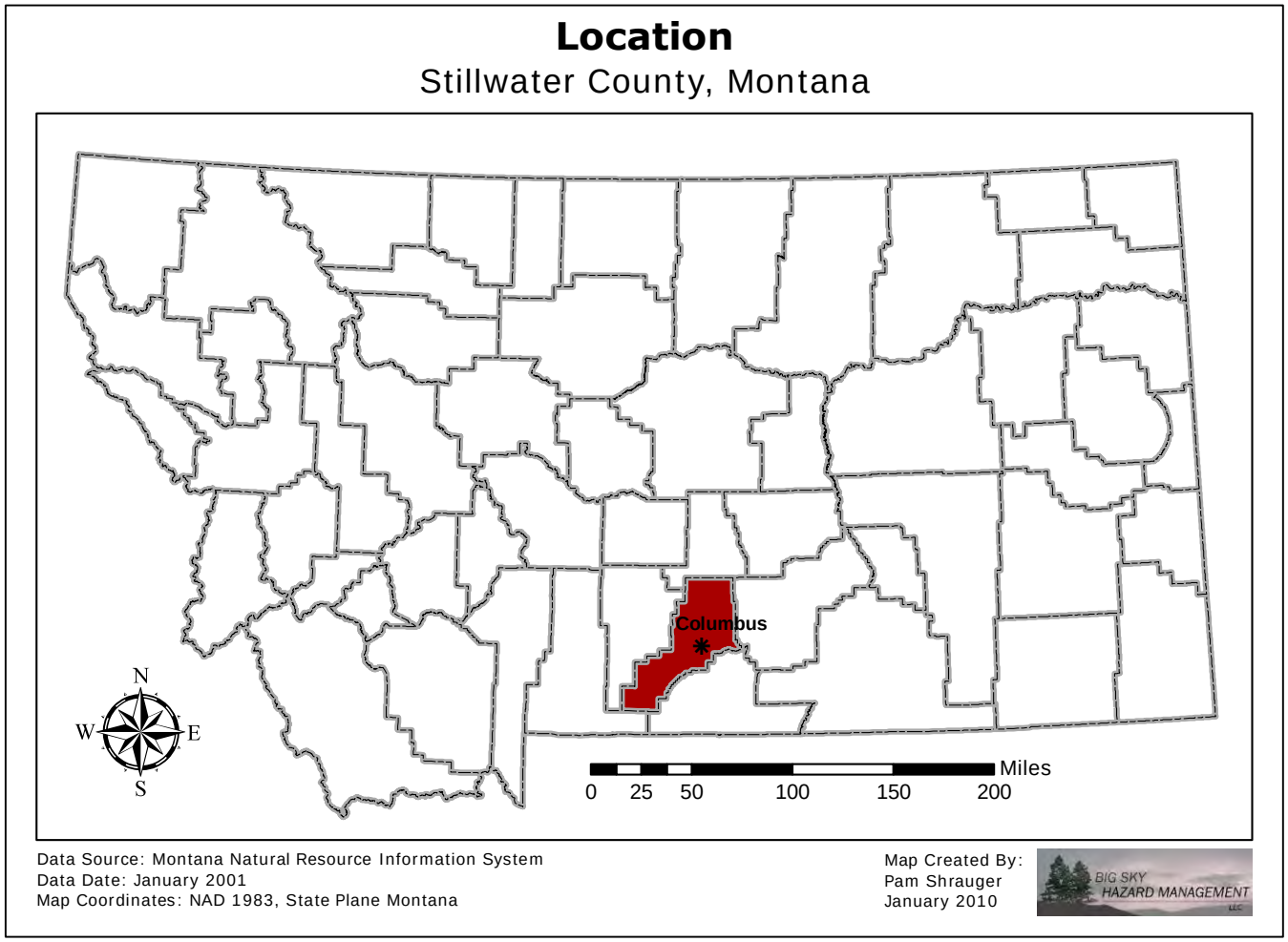
Stillwater County and the Town of Columbus have adopted this Pre-Disaster Mitigation Plan by resolution (see Appendix K for copies of the resolutions). These governing bodies have the authority to promote mitigation activities in their jurisdictions.

1.3 County and Jurisdictional Profile

Stillwater County is located in south central Montana, as shown in Map 1.3A, with an area of approximately 1,795 square miles. Stillwater County is bounded by Golden Valley County on the north,

Yellowstone County on the east, Carbon and Park Counties on the south, and Sweet Grass County on the west. The Town of Columbus is the county seat and the only incorporated community. Unincorporated communities include Absarokee, Fishtail, Molt, Nye, Park City, Rapelje, and Reed Point. Map 1.3B shows the general features in the county. In southeast Stillwater County lies the Beartooth Mountain Range, including Granite Peak, Montana's highest elevation at 12,799 feet above sea level. By contrast, the lowest elevation is only 3,400 feet above sea level in the eastern part of the county. Significant water bodies in the county include the Stillwater and Yellowstone Rivers, Mystic Lake, and the Big Lake Complex.

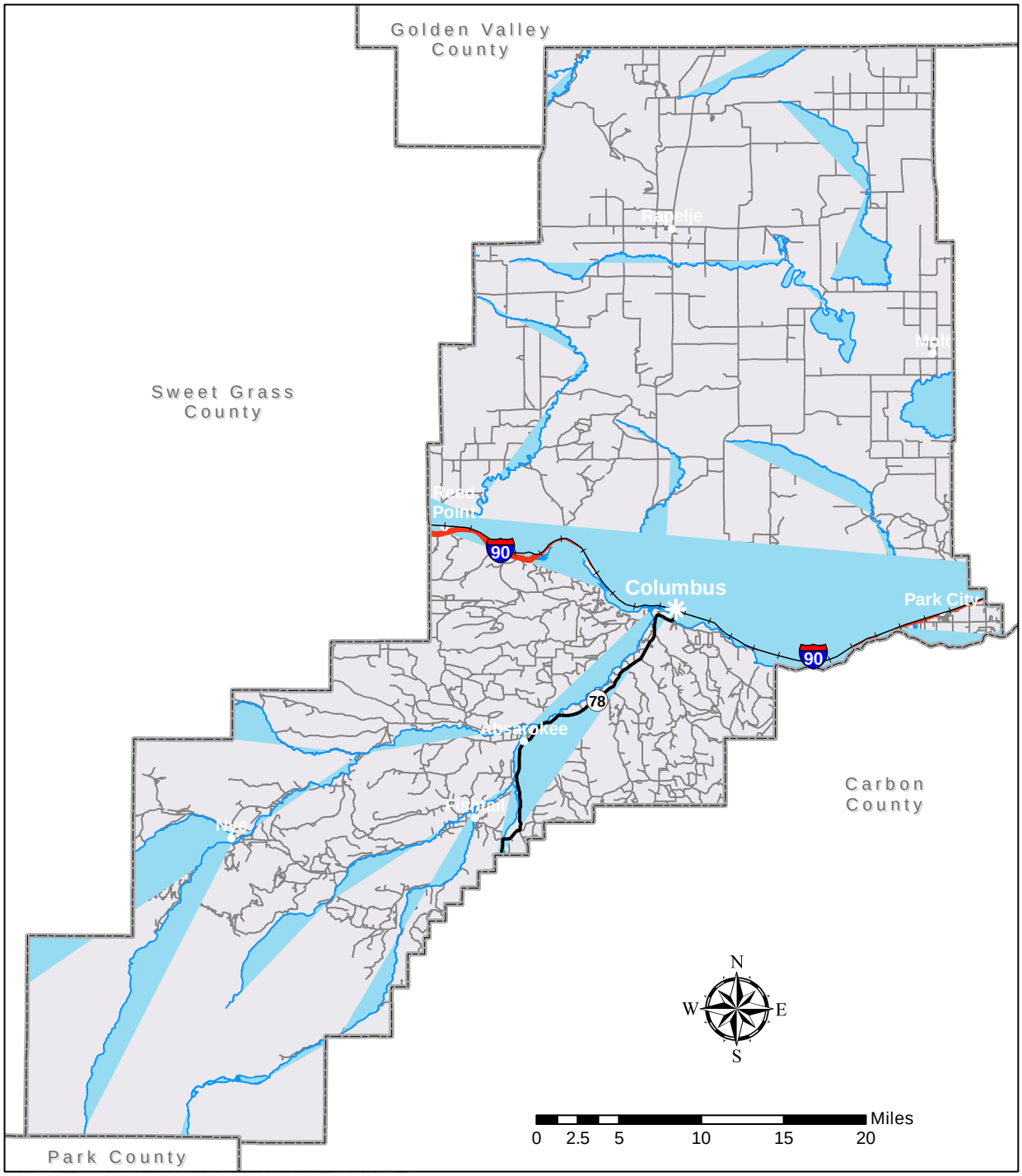
Map 1.3A



Map 1.3B

Features

Stillwater County, Montana



Data Source: Montana Natural Resource Information System
Data Date: Varied
Map Coordinates: NAD 1983, State Plane Montana

Map Created By:
Pam Shrauger
January 2010

BIG SKY HAZARD MANAGEMENT LLC

1.4 Climate Overview

Table 1.4A details the climate statistics recorded by the National Weather Service (NWS) at the Columbus weather station. Climate stations also exist four miles south of Rapelje, at Nye, and at Mystic Lake that capture different elements and show the variations in climate.

Table 1.4A Stillwater County Climate Statistics

	Columbus 1930 - 2009	Rapelje, 4 miles S 1908-2009	Nye 1905-2009	Mystic Lake 1924-2009
Annual Average Maximum Daily Temperature	61.6°F	59.3°F	58.3°F	52.3°F
Annual Average Minimum Daily Temperature	30.9°F	31.4°F	30.9°F	31.9°F
Annual Average Total Precipitation	14.23 inches	14.33 inches	18.34 inches	24.81 inches
Annual Average Total Snowfall	35.3 inches	56.7 inches	86.4 inches	157.7 inches
Highest Temperature Recorded	109°F July 21, 1931	108°F July 8, 1930	104°F July 12, 2002	94°F July 21, 1931
Lowest Temperature Recorded	-45°F February 15, 1936	-45°F February 15, 1936	-40°F December 24, 1983	-38°F February 2, 1989
Annual Average Number of Days Dropping Below Freezing	183.9 days	180.1 days	178.2 days	180.2 days
Annual Average Number of Days Staying Below Freezing	30.4 days	36.4 days	31.3 days	50.3 days
Annual Average Number of Days Reaching 90°F or Higher	33.9 days	28.4 days	14.2 days	0.4 days
Highest Annual Precipitation	26.60 inches 1978	23.69 inches 1975	26.73 inches 1908	33.56 inches 1967
Lowest Annual Precipitation	6.61 inches 1960	8.16 inches 2001	10.51 inches 1954	14.59 inches 2001
1 Day Maximum Precipitation	2.90 inches June 8, 1932	3.50 inches July 6, 1994	3.80 inches May 11, 2005	4.00 inches March 24, 1945
Highest Annual Snowfall	83.7 inches 1950	132.0 inches 1989	172.5 inches 1991	288.5 inches 1996

Source: Western Regional Climate Center, 2010.

1.5 Plan Scope and Organization

The Stillwater County Pre-Disaster Mitigation Plan is organized into sections that describe the planning process (Section 2), assets and community inventory (Section 3), risk assessment/hazard profiles (Section 4), mitigation strategies (Section 5), and plan maintenance (Section 6). Appendices containing supporting information are included at the end of the plan.

This plan, particularly the risk assessment section, outlines each hazard in detail and how it may affect Stillwater County and the Town of Columbus. The mitigation strategy outlines long-term solutions to possibly prevent or reduce future damages. Additional hazards may exist that were not apparent to local government or participants through the development of this plan, and certainly, disasters can

occur in unexpected ways. Although any and all hazards cannot be fully mitigated, hopefully, this plan will help the communities understand the hazards better and become more disaster resistant.

Source: Stillwater County, date unknown.

2. PLANNING PROCESS AND METHODOLOGIES

Mitigation planning is a community effort. It also takes time and expertise. For Stillwater County and the Town of Columbus, an effective hazard mitigation plan requires input from a variety of stakeholders, including elected officials, first responders, emergency management, healthcare providers, public works, road officials, state and federal agencies, businesses, non-profit organizations, schools, and the public. Following a disaster, many of these stakeholders will be overwhelmed with recovery responsibilities. Therefore, planning for mitigation and involving as many stakeholders as possible before a disaster strikes will make mitigation activities easier following a disaster and may even prevent the disaster in the first place!

2.1 Planning Process

Stillwater County began developing this mitigation plan in 2004. A steering committee was formed and a public involvement strategy was developed. Public meetings were held and personal interviews and surveys were conducted. Meetings were held with county departments and the Town of Columbus. Press releases and articles were used to garner public interest. A questionnaire was distributed to over 100 long-time residents to obtain historical information about disasters and hazards in the county. The primary public involvement objectives were:

1. Ensure that all interested parties are aware of and offered the opportunity to participate in the development and review of the Pre-Disaster Mitigation (PDM) and Community Wildfire Protection Plan (CWPP) Mitigation Plan.
2. Effectively utilize the expertise available in the existing Local Emergency Planning Committee (LEPC).
3. Ensure that the final plan reflects the priorities of county residents.

Three public steering committee meetings were held at the onset of the plan's development. At the first meeting, the plan development process was explained, the committee was asked to recall natural disasters in the county and brainstorm potential natural hazards, and the participants then prioritized the hazards. At the second meeting, the steering committee identified critical facilities throughout the county, discussed vulnerabilities and potential losses, and brainstormed mitigation goals. At the third meeting, the steering committee developed mitigation objectives, actions, and/or projects.

In 2006, a draft plan was developed by steering committee members, including a comprehensive Community Wildfire Protection Plan, but federal approval of the Pre-Disaster Mitigation portion was not achieved. After struggling to meet the federal requirements for mitigation plans, Stillwater County hired a consultant to facilitate the continued plan development in 2009 and 2010. Big Sky Hazard Management LLC, based in Bozeman, Montana with experience in hazard mitigation and emergency management, coordinated the planning process. The contract was managed by Stillwater County Disaster and Emergency Services.

The planning process consisted of the following basic steps:

1. Initial review of the existing plan by the contractor.
2. An updated plan outline was developed.
3. A public meeting (advertised through invitations, press releases, and a newspaper ad) was held to collect additional information for the plan, focus more on mitigation, and build upon the work already done.
4. New sections of the plan were built, incorporating information and mapping from the existing plan where applicable.
5. Stakeholders were asked to review the draft plan sections and provide comments.
6. Two public meetings (advertised through invitations, press releases, and a newspaper ad) were held to solicit comments on the latest version of the plan.
7. Following the public comment period, any comments received were incorporated and the final plan was sent to the state and FEMA for review.
8. Stillwater County and the Town of Columbus adopted the updated plan, either before or immediately after state and FEMA conditional approval.

Jurisdiction Participation

This plan includes the following jurisdictions:

- Stillwater County
- Town of Columbus

Note: The jurisdictions listed above are all of the incorporated jurisdictions in Stillwater County. Other communities such as Absarokee, Fishtail, Molt, Nye, Park City, Rapelje, and Reed Point are not incorporated nor do they have governing bodies and are under the jurisdiction of Stillwater County.

Each jurisdiction participated in a variety of ways depending on the resources available in the community. Stillwater County applied for, received, and managed the funding for the plan's development. Representatives from several county offices were active in all aspects of the plan's update. The Town of Columbus participated in the plan's update by sending representatives to plan and public meetings, discussing elements of the plan at their regularly scheduled public meetings, and reviewing the draft plan. Both of the jurisdictions adopted the plan through resolution upon completion as shown in Appendix K.

Public Participation

The public was provided with several opportunities to participate in the plan's update. Public meetings were held in August 2004, October 2009, and July 2010. Each meeting was advertised to the public through press releases and advertisements in the Stillwater County News. Copies of the press releases and advertisements can be found in Appendix B. Announcements were also posted on the Big Sky Hazard Management LLC website. Each press release encouraged participation through meeting attendance or the review of documents on the consultant's website. Appendix A shows the list of specific stakeholders identified and invited to the meetings. Invitations were sent to active participants and those in communities beyond Stillwater County, thus allowing neighboring communities and regional agencies the opportunity to participate. Appendix C contains the sign-in sheets from each

meeting and identifies those that actively participated in the plan's update. Notes from each meeting are included in Appendix D.

In addition to the public meetings, the public was given the opportunity to comment on the plan posted on the Big Sky Hazard Management and Stillwater County websites. The completed draft was posted from June 15, 2010 through July 15, 2010. Comments could be made via the mail, phone, or email. Any comments received were reviewed and integrated where applicable. Comments were readily accepted throughout the planning process.

Since county commission and town council meetings are also open, public meetings, the discussions and subsequent adoption of the plan by the governing bodies were additional opportunities for public comment. The jurisdictions advertised these meetings using their usual public notification procedures, typically by posting meeting agendas and newspaper notices.

Incorporation of Existing Information

Information from existing plans, studies, reports, and technical information related to hazards, mitigation, and community planning was gathered by Big Sky Hazard Management LLC by contacting individuals throughout the planning process and reviewing the plan as it was initially developed. Many national and state plans, reports, and studies provided background information. Table 2.1A lists the existing local plans and documents incorporated into this mitigation plan by integrating information into the appropriate sections. Documentation on these sources, plans, studies, reports, and technical information can be found in Appendix E. Mapping for the plan was done by the Stillwater County GIS Office with additional maps developed by Big Sky Hazard Management LLC, as needed, based on information collected from a wide variety of sources. The information was organized into a clear, usable, and maintainable format that also ensured the federal regulations regarding hazard mitigation plans were met.

Table 2.1A Existing Local Plans and Documents Incorporated

Plan/Report/Study Name	Plan/Document Date
Beartooth RC&D Area Comprehensive Economic Development Strategy	December 2001
PPL Montana Mystic Dam Emergency Action Plan	May 2009
Stillwater County and Town of Columbus Subdivision Regulations	2007
Stillwater County Community Wildfire Protection Plan	July 2007
Stillwater County Growth Policy	March 2007
Stillwater County Homeland Security Strategic Plan	June 2004
Yellowstone River Conservation District Council Channel Migration Zones	February 2009

The Stillwater County Pre-Disaster Mitigation Plan is a living, expandable document that will have new information added and changes made as needed. The plan's purpose is to improve disaster resistance through projects and programs, and therefore, opportunities for changes and public involvement will exist as disasters occur and mitigation continues. Details on the plan's maintenance and continued public involvement are further outlined in Section 6.

2.2 Risk Assessment Methodologies

A key step in preventing disaster losses in Stillwater County and the Town of Columbus is developing a comprehensive understanding of the hazards that pose risks to the communities. The following terms can be found throughout this plan.

Hazard:	a source of danger
Risk:	possibility of loss or injury
Vulnerability:	open to attack or damage

Source: Federal Emergency Management Agency, 2001.

This all-hazard risk assessment and mitigation strategy serves as an initial source of hazard information for those in Stillwater County. Other plans may be referenced and remain vital hazard documents, but each hazard has its own profile in this plan. As more data becomes available and disasters occur, the individual hazard profiles and mitigation strategies can be expanded or new hazards added. This risk assessment identifies and describes the hazards that threaten the communities and determines the values at risk from those hazards. The risk assessment is the cornerstone of the mitigation strategy and provides the basis for many of the mitigation goals, objectives, and potential projects.

The *assets and community inventory* section includes elements such as critical facilities, critical infrastructure, population, structures, economic values, ecologic values, historic values, social values, current land uses, recent development, and future development potential.

Each hazard or group of related hazards has its own *hazard profile*. A stand-alone hazard profile allows for the comprehensive analysis of each hazard from many different aspects. Each hazard profile contains a *description* of the hazard containing information from specific hazard experts and resources and a record of the hazard *history* compiled from a wide variety of databases and sources, including a survey given to 100 long-time residents whose recollections were then cross-referenced with early newspaper accounts in the Stillwater County News and the Museum of the Beartooth archive file of significant events. Note that the data used was more specific and accurate than the data provided by the SHELDUS database recommended by FEMA. Where spatial differences exist, mapping was used for hazard analyses by geographic location. Some hazards can have varying levels of risk based on location (i.e. near the rivers versus far away from the rivers). Other hazards, such as winter storms or drought, cover larger geographic areas and the delineation of hazard areas is not typically available or useful on the county scale.

Using the local historical occurrence, or more specific documentation if available, a *probability and magnitude* was determined for a specific type of event. In most cases, the number of years recorded was divided by the number of occurrences, resulting in a simple past-determined recurrence interval. If the hazard lacked a definitive historical record, the probability was assessed qualitatively based on regional history or other contributing factors. If the past occurrence was not an accurate representation, general knowledge of the hazard was used to approximate the types of impacts that could be expected. The hazard frequency and impact ranges show the differentiation between high frequency, low impact events and low frequency, high impact events. Table 2.2A provides the basic

criteria used to define the "probability of a high impact event." Generally, a "high impact event" is defined as one in which the majority of citizens are affected in some way and state and local resources are exceeded.

Table 2.2A Probability of a High Impact Event Criteria

Probability of a High Impact Event	Description
High	Occurs nearly annually
Moderate-High	Occurs roughly once every 50 years
Moderate	Occurs roughly once every 100 years
Low-Moderate	Regional history but no local history
Low	No regional or local history

Vulnerabilities were assessed based on a variety of different resources and methodologies. Each type of vulnerability (critical facilities, critical infrastructure, structures, population, values, and future development) was assessed based on a probable impact (100-year) event and an extreme impact (500-year) event. Generalizations were made to categorize the types and ranges of impacts that could be seen.

Critical facilities and structures were mapped using data developed by the Stillwater County GIS Office. The mapping of the facilities allowed for the comparison of building locations to the hazard areas where such hazards are spatially recognized. Base maps depicting the critical facility and structure locations were compared to available hazard layers to show the proximity of the buildings to the hazard areas. Given the nature of critical facilities, the functional losses and costs for alternate arrangements typically extend beyond the structural and contents losses. These types of losses can be inferred based on the use and function of the facility.

Critical infrastructure for services such as electricity, heating fuels, telephone, water, sewer, and transportation systems was assessed using history and a general understanding of such systems to determine what infrastructure losses may occur.

Population impacts were qualitatively assessed based on the number of structures estimated to be in the hazard area. Depending on the time of year, population concentrations are likely greater due to non-resident populations. Other factors used in evaluating the population impacts include the ability of people to escape from the incident without casualty and the degree of warning that could be expected for the event. In general, the loss of life and possible injuries are difficult to determine and depend on the time of day, day of the week, time of year, extent of the damage, and other hazard specific conditions.

Qualitative methodologies, such as comparisons to previous disasters, occurrences in nearby communities, and plausible scenarios, helped determine the potential losses to economic, ecologic, historic, and social values. In many cases, a dollar figure cannot be placed on values, particularly those that cannot be replaced.

The assessment on the impact to future development is based on the mechanisms currently in place to limit or regulate development in hazardous areas and the likelihood of development in hazardous areas. Some hazards can be mitigated during development, others cannot.

The impact rating given for each type of vulnerability was generally based on the descriptions shown in Table 2.2B. A vulnerability rating for the hazard was then given based on the sum of the individual impact ratings for each vulnerability type (high = 5, low = 1) as shown in Table 2.2C. Some adjustments were made where special circumstances exist.

Table 2.2B Impact Rating Criteria

Impact Rating	Description
High	Causes damages and losses within nearly every aspect of the vulnerability type; community sustainability may be threatened.
Moderate-High	The majority of citizens are affected in some way due to losses in this vulnerability type; state and local resources are likely exceeded.
Moderate	The damages to the vulnerability type are formidable and require a local response.
Low-Moderate	Either a small segment of the vulnerability type is impacted or damages are sporadic. May require a limited local response.
Low	Impacts to the vulnerability type are negligible or are present in only unique situations.

Table 2.2C Vulnerability Rating Criteria

Vulnerability Rating	Sum of the Impact Ratings (high = 5, low = 1)
High	22-30
Moderate-High	18-21
Moderate	15-17
Low-Moderate	11-14
Low	5-10

Many unknown variables limit the ability to quantitatively assess all aspects of a hazard with high accuracy. Therefore, *data limitations* provide a framework for identifying the missing or variable information. These limitations were determined by hazard through the risk assessment process. In some cases, the limitations may be resolved through research or data collection. If a limitation can be reasonably resolved through a mitigation project, the resolution is included as a potential project in the mitigation strategy.

The *overall hazard rating* of high, moderate, and low was determined based on the combination of the probability of a high impact event and the vulnerability. Table 2.2D shows how the overall hazard rating was determined. These ratings are outlined by jurisdiction in the *risk assessment summary*.

Table 2.2D Overall Hazard Rating Scheme

		Vulnerability				
		High	**Moderate-High**	**Moderate**	**Low-Moderate**	**Low**
Probability of High Impact Event	**High**	High	High	High	High	Moderate
	Moderate-High	High	High	High	Moderate	Moderate
	Moderate	High	High	High	Moderate	Low
	Low-Moderate	High	Moderate	Moderate	Moderate	Low
	Low	Moderate	Moderate	Low	Low	Low

2.3 Hazard Identification

The hazards were identified and assessed based on the following:

- Research of previous disaster declarations and state/local situation reports.
- Review of the existing state hazard mitigation plan.
- Input from the public and Local Emergency Planning Committee members.

Table 2.3A shows the hazards, jurisdictions, and how and why they were identified. The level of detail for each hazard correlates to the relative risk of each hazard and is limited by the amount of data available. As new hazards are identified, they can be added to the hazard list, profiled, and mitigated.

Table 2.3A Stillwater County Hazards

Hazard Profile	Jurisdiction	How Identified	Why Identified
Dam Failure	Stillwater County Town of Columbus	▪ PPL Montana Mystic Lake Dam Emergency Action Plan ▪ Federal Emergency Management Agency ▪ Stillwater County GIS data	▪ Potential for a large loss of life and property from a dam failure at Mystic Lake
Disease (including human and animal diseases)	Stillwater County Town of Columbus	▪ Centers for Disease Control and Prevention ▪ Pandemic studies ▪ Montana Department of Livestock ▪ US Department of Agriculture ▪ World Health Organization	▪ Global disease threat ▪ History of pandemics ▪ Dependence on agricultural economy
Drought	Stillwater County Town of Columbus	▪ National Drought Mitigation Center ▪ National Climatic Data Center ▪ US Department of Agriculture	▪ History of droughts ▪ Importance of agriculture to the local economy ▪ Several USDA disaster declarations

Table 2.3A Stillwater County Hazards (continued)

Hazard Profile	Jurisdiction	How Identified	Why Identified
Earthquake	Stillwater County Town of Columbus	▪ US Geological Survey ▪ Montana Bureau of Mines and Geology ▪ HAZUS-MH ▪ National Earthquake Hazards Reduction Program	▪ History of earthquake shaking ▪ Proximity to active earthquake areas
Flood (including riverine, ice jam, and flash floods)	Stillwater County Town of Columbus	▪ National Climatic Data Center ▪ HAZUS-MH ▪ Federal Emergency Management Agency ▪ Yellowstone River Conservation District Council ▪ Stillwater County GIS data	▪ History of riverine, ice jam, and flash floods
Hazardous Material Release and Explosions (including fixed, mobile, and pipeline releases)	Stillwater County Town of Columbus	▪ US Department of Transportation Emergency Response Guidebook ▪ National Response Center ▪ Environmental Protection Agency ▪ Stillwater County GIS data	▪ Regular truck traffic and railroad transport goods through the county ▪ Several facilities house hazardous materials
Landslide and Avalanche	Stillwater County	▪ US Geological Survey ▪ Montana Disaster and Emergency Services	▪ Potential for landslides and avalanches due to varied terrain
Severe Weather (including tornadoes, hail, downbursts, lightning, strong winds, blizzards, winter storms, heavy snow, ice storms, and extreme cold)	Stillwater County Town of Columbus	▪ National Climatic Data Center ▪ Storm Prediction Center ▪ National Weather Service	▪ History of tornadoes, severe thunderstorms, and strong winds, including damages ▪ History of severe winter storms
Terrorism and Civil Unrest	Stillwater County Town of Columbus	▪ Memorial for the Prevention of Terrorism ▪ Southern Poverty Law Center	▪ National indications and foreign threats of future terrorist attacks ▪ Potential for school violence and other domestic attacks
Transportation Accident (including vehicular, railroad, and aircraft accidents)	Stillwater County Town of Columbus	▪ Montana Highway Patrol ▪ National Transportation Safety Board ▪ Federal Railroad Administration	▪ History of small transportation accidents ▪ Potential for larger transportation accidents causing mass casualties
Volcanic Ashfall	Stillwater County Town of Columbus	▪ US Geological Survey ▪ Cascades Volcano Observatory	▪ History of volcanic ashfall ▪ Proximity to active geologic areas

Table 2.3A Stillwater County Hazards (continued)

Hazard Profile	Jurisdiction	How Identified	Why Identified
Wildfire	Stillwater County Town of Columbus	▪ Stillwater County Community Wildfire Protection Plan ▪ Montana Department of Natural Resources and Conservation ▪ US Forest Service ▪ Stillwater County GIS data	▪ Local history of large wildfires ▪ Large areas of government lands within the county ▪ Numerous areas of wildland urban interface

3. ASSETS AND COMMUNITY INVENTORY

In addition to identifying and understanding the hazards of the area, an important aspect of mitigation planning is contemplating the effects such hazards may have on the communities. To thoroughly consider the effects, the assets and values at risk must be first identified. Examples of community assets include the population, critical facilities, businesses, residences, critical infrastructure, natural resources, historic places, and the economy. The following sections identify the specific assets and community inventory in Stillwater County and the Town of Columbus.

3.1 Critical Facilities and Infrastructure

Critical facilities and infrastructure protect the safety of the population, the continuity of government, or the values of the community. In many cases, critical facilities fulfill important public safety, emergency response, and/or disaster recovery functions. In other cases, the critical facility may protect a vulnerable population, such as a school or elder care facility. Examples of critical facilities include: 911 emergency call centers, emergency operations centers, police and fire stations, public works facilities, sewer and water facilities, hospitals, jails, schools, essential businesses, shelters, and public services buildings.

Utilities such as electricity, heating fuel, telephone, water, and sewer rely on established infrastructure to provide services. The providers of these services use a variety of systems to ensure consistent service in the county. Each of these services is important to daily life in Stillwater County, and in some cases, is critical to the protection of life and property. The transportation network is another example of important infrastructure and relies on bridges and road/rail segments.

Critical Facilities

Table 3.1A Stillwater County and Town of Columbus Critical Facilities

Name	Address	Replacement Value, if available ($)
Absarokee Fire Station	105 West B Street, Absarokee	
Absarokee Medical Clinic	55 North Montana Avenue, Absarokee	
Absarokee Schools	327 South Woodard Avenue, Absarokee	
Absarokee Water and Sewer System	9 North Montana Avenue, Absarokee	
Beartooth Manor	350 West Pike, Columbus	
Billings Clinic Columbus	407 North A Street, Columbus	
Cobblestone School Community Center	242 South Woodard Avenue, Absarokee	
Columbus Airport	1655 1st Avenue S, Columbus	

Table 3.1A Stillwater County and Town of Columbus Critical Facilities (continued)

Name	Address	Replacement Value, if available ($)
Columbus Elementary School	218 East 1st Avenue N, Columbus	
Columbus Fire Station	944 East Pike Avenue, Columbus	
Columbus High School	433 North 3rd Street, Columbus	
Columbus Middle School	415 North 3rd Street, Columbus	
Columbus Public Works	301 Clough Avenue, Columbus	
Columbus Solid Waste Site	200 Lagoon Road, Columbus	
Columbus Town Hall	408 East 1st Avenue N, Columbus	
Fishtail School	119 Easton Avenue, Fishtail	
Molt Fire Station	115 3rd Street, Molt	
Molt School	214 Lake Avenue, Molt	
Montana Department of Transportation	10 Lehman Road, Columbus	
Mystic Lake Dam and Facilities	2065 West Rosebud Road, Fishtail	
Nye Fire Station	2033 Nye Road, Nye	
Nye School	Nye Road, Nye	
Park City Ambulance Station	110 2nd Street SW, Park City	
Park City Fire Station	21 1st Avenue SW, Park City	
Park City Schools	10 2nd Avenue SW, Park City	
Park City Sewer System	120 1st Avenue SW, Park City	
Rapelje Schools	714 Main Street, Rapelje	
Rapelje Water System	Rapelje	
Reed Point Elementary School	105 Central Avenue, Reed Point	
Reed Point Fire Station	1 West 2nd Avenue N, Reed Point	
Reed Point High School	308 Central Avenue, Reed Point	
Reed Point Sewer System	Reed Point	
Stillwater Community Hospital	44 West 4th Avenue N, Columbus	$7,047,325 buildings $2,904,000 contents
Stillwater County Attorney's Office	544 North Diamond, Columbus	$164,000 building $36,360 contents
Stillwater County Courthouse	400 East 3rd Avenue N, Columbus	$5,905,925 buildings $760,000 contents

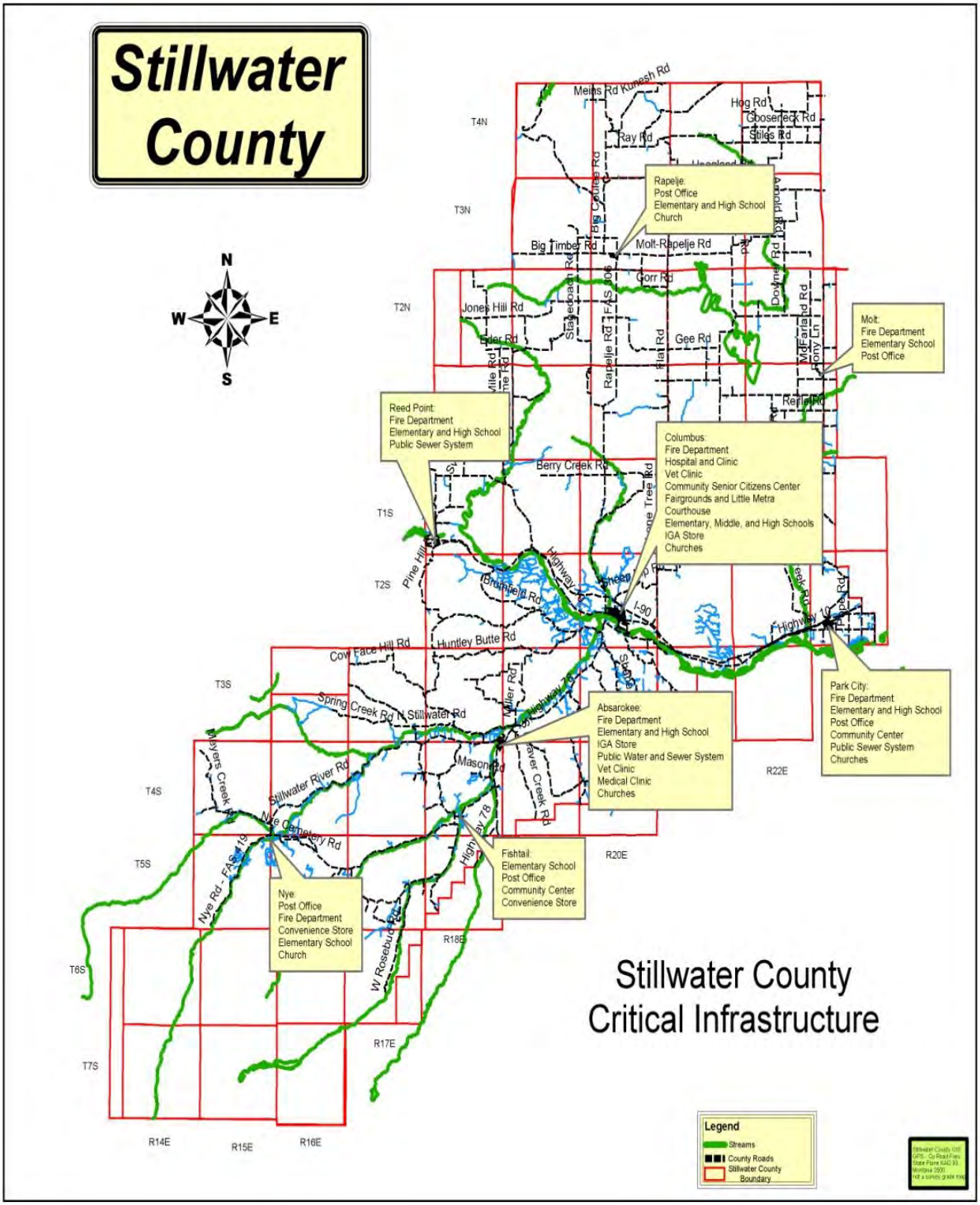
Stillwater County Fairgrounds and Pavilion	328 East 5th Avenue N, Columbus	$239,425 buildings $7,500 contents
Stillwater County Library	31 North 4th Street, Columbus	$395,775 building $563,000 contents
Stillwater County Offices	809 East 4th Avenue N, Columbus	$93,640 contents
Stillwater County Repeater Building	Shane Ridge, Columbus	$4,000 building

Table 3.1A Stillwater County and Town of Columbus Critical Facilities (continued)

Name	Address	Replacement Value, if available ($)
Stillwater County Search and Rescue	34 East Pike Avenue, Columbus	$110,160 building $10,100 contents
Stillwater County Shops and Solid Waste Site, Columbus	865 Highway 10 W, Columbus	$997,580 buildings $273,310 contents
Stillwater County Shop, Fishtail	202 Main Street E, Fishtail	$61,600 building $17,170 contents
Stillwater County Shop, Molt	25 Pony Lane, Molt	$52,530 building $17,170 contents
Stillwater County Shop, Rapelje	724 Christenson Street, Rapelje	$63,760 buildings $19,300 contents
Stillwater County Shop, Reed Point	64 West Central, Reed Point	$85,830 building $17,170 contents
Stillwater County Solid Waste Site, Absarokee	2 Miles South of Absarokee	$1,850 building $500 contents
Stillwater County Solid Waste Site, Nye	1 Mile North of Nye	$3,825 building $500 contents
Stillwater County Solid Waste Site, Park City	2 Miles West of Park City	$1,800 building $500 contents
Stillwater County Solid Waste Site, Rapelje	1 Mile East of Rapelje	$3,980 building $500 contents
Stillwater Mine	2562 Nye Road, Nye	
Stillwater Smelter and Refinery/Lab	1891 East 1st Avenue S, Columbus	
USDA Service Center	334 North 9th Avenue, Columbus	

Sources: Montana Office of Public Instruction, 2010; Stillwater County, 2007a; Stillwater County, 2010a; Stillwater County, 2010b.

Map 3.1B



Source: Stillwater County GIS, date unknown.

Critical Infrastructure

Electricity

Electricity runs lights, computers, medical equipment, water pumps, heating system fans, refrigerators, freezers, televisions, and many other types of equipment. Electric providers in Stillwater County include Beartooth Electric Cooperative, headquartered in Red Lodge, Montana, Yellowstone Valley Electric Cooperative, headquartered in Huntley, Montana, Fergus Electric Cooperative, headquartered in Lewistown, Montana, and NorthWestern Energy, headquartered in Sioux Falls, South Dakota. Much of the electric service is run through overhead lines. These lines are supported by poles and have key components such as transformers and substations. Substations are located west of Columbus and south of Absarokee. Large transmission lines (500 kV) also pass through northern Stillwater County. Mystic Lake in southern Stillwater County has a power generating plant. (Stillwater County, 2007a)

Heating Fuel

During the cold winter months, the heating of homes and businesses is a necessity. The primary heating fuel used in Stillwater County is natural gas provided through underground pipeline infrastructure by NorthWestern Energy and Montana Dakota Utilities. Overall, a variety of fuels are used as shown in Table 3.1C. Most systems ultimately require electricity to run their thermostats and blowers. Locations using propane or fuel oil often have a tank that is regularly filled by a local vendor via truck transportation.

Table 3.1C US Census Housing Data on House Heating Fuel

	Stillwater County (total)	Town of Columbus	Stillwater County (excluding Columbus)
Utility Gas	1,728	627	1,101
Bottled, Tank, or LP Gas	741	2	739
Electricity	371	65	306
Fuel Oil, Kerosene, etc.	57	2	55
Coal or Coke	37	4	33
Wood	264	2	262
Solar Energy	0	0	0
Other Fuel	20	0	20
No Fuel Used	16	5	11

Source: Montana Census and Economic Information Center, 2010.

Pipelines

Pipelines passing through Stillwater County include high pressure natural gas transmission lines and petroleum/crude oil pipelines. The high pressure natural gas transmission lines are operated by NorthWestern Energy and Montana Dakota Utilities. The crude oil pipeline across northern Stillwater County is operated by Express Pipeline. (Stillwater County, 2007a)

Telephone

Local telephone services in the county are provided by Triangle Communications, Qwest Communications, and Nemont Telephone Cooperative. Similar to electric infrastructure, telephone can be run through overhead or underground lines. Much of the telephone infrastructure in Stillwater County lies within the road right-of-ways. Several large fiber optic cables pass through the county.

Water and Sewer

Municipal water systems exist in Absarokee, Columbus, and Rapelje. These systems are supplied with water by wells and springs and the water is then stored in tanks and cisterns. Residents are served by underground water lines. Community sewer systems are in place in Absarokee, Columbus, Park City, and Reed Point. These systems generally use wastewater treatment plant and lagoon treatment systems and some discharge into area waterways. Similar to water, sewer services are provided through underground pipelines and lift stations. (Stillwater County, 2007a) County residents outside of the water and sewer districts rely on individual well and septic systems.

Transportation

The transportation infrastructure within Stillwater County includes the road, rail, and air networks. The primary road transportation routes are Interstate 90 and Montana Highway 78. Numerous secondary roads connect to the outlying communities.

Montana Rail Link operates a railroad main line through the county, generally along Interstate 90. The railroad transports goods and raw materials along this line several times per day. This main line passes through many other cities throughout western Montana and connects with Burlington Northern Santa Fe just to the east at Laurel, Montana. Part of the Burlington Northern Santa Fe system is within close proximity to northeastern Stillwater County.

Stillwater County has a small airport serving primarily single-engine aircraft located just south of Columbus (6S3). The closest commercial service airport is in Billings.

3.2 Population and Structures

The citizens, visitors, and their property are at all risk from various disasters. In essentially all incidents, the top priority is the protection of life and property.

Table 3.2A Population Statistics

Location	July 1, 2008 Estimated Population	Change Since 2000 Census
Stillwater County (total)	8,687	+492
Town of Columbus	1,959	+211
Stillwater County (excluding Columbus)	6,731	+281

Source: Montana Census and Economic Information Center, 2010.

Like critical facilities, structures such as residences and businesses are also vulnerable to hazards. Tables 3.2B and 3.2C detail some of the housing statistics. Geographic information system (GIS) data developed and maintained by Stillwater County had a total of 4,861 completed and addressed structures as of January 2010. (Stillwater County, 2010a) Map 3.2D shows the general locations of the structures in the county.

Table 3.2B Housing and Business Census Data

	Stillwater County (total)	Town of Columbus	Stillwater County (excluding Columbus)
Number of Housing Units	3,947	762	3,185
Median Value of Specified Owner-Occupied Housing Units	$102,200	$91,300	About $104,800
Number of Mobile Homes	763	134	629

Source: Montana Census and Economic Information Center, 2010.

Table 3.2C Structure Ages Based on US Census Data

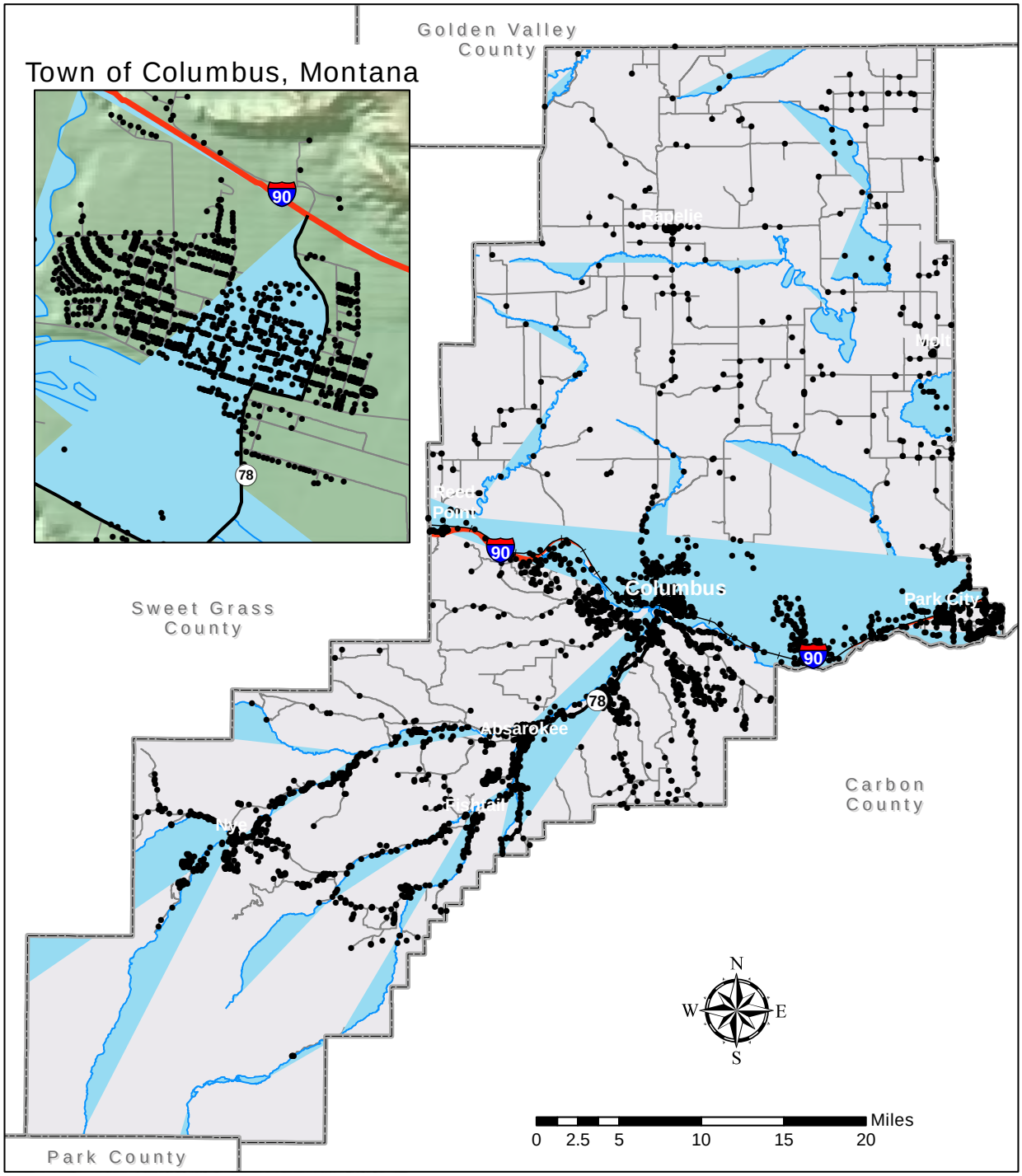
Years	Stillwater County (total)	Town of Columbus	Stillwater County (excluding Columbus)
1999 to March 2000	149	31	118
1995 to 1998	463	78	385
1990 to 1994	270	25	245
1980 to 1989	587	75	512
1970 to 1979	723	121	602
1960 to 1969	326	69	257
1940 to 1959	720	180	540
1939 or earlier	729	183	546

Source: Montana Census and Economic Information Center, 2010.

Map 3.2D

Structures

Stillwater County, Montana



Data Source: Stillwater County
Data Date: 2010
Map Coordinates: NAD 1983, State Plane Montana

Map Created By:
Pam Shrauger
January 2010

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The total value of residential structures in Stillwater County can be estimated as shown in Table 3.2D. Census values were estimated by multiplying the number of housing units by the median unit value. Data from the Montana Department of Revenue Computer Assisted Mass Appraisal System (CAMA) can be also used to show the estimated building value. This database lists for each parcel of land the associated taxable land and building market values. The CAMA data for Stillwater County has 4,213 parcels listed with a building value greater than zero, including 790 parcels within the Town of Columbus. Table 3.2D contains the sum of the building values listed in the CAMA data. In comparison, the Federal Emergency Management Agency's HAZUS-MH loss estimation software gives the residential building stock in Stillwater County a replacement value of about $522 million for 3,762 homes.

Table 3.2D Estimated Value of Residential Structures

Jurisdiction	Census Estimated Value	CAMA Estimated Building Value	HAZUS-MH Residential Building Replacement Value
Stillwater County (total)	$403,383,400	$548,027,858	$521,704,000
Town of Columbus	$69,570,600	$105,790,522	not applicable
Stillwater County (excluding Columbus)	$333,788,000	$537,448,806	not applicable

Sources: Montana Census and Economic Information Center, 2010; Montana Department of Revenue, 2010; Federal Emergency Management Agency, 2006.

3.3 Economic, Ecologic, Historic, and Social Values

The economy of Stillwater County is driven primarily by agriculture, mining, and tourism. The Town of Columbus is a shipping center for surrounding farm and ranchlands with numerous livestock feedlots nearby. Stillwater County and Columbus are home to the Stillwater Mining Company, one of the world's leading producers of platinum group metals and the only significant producer of palladium in the United States, with two rural mine sites and a smelter in the Town of Columbus. Major manufacturing facilities include a laminated wooden beam company and a large jewelry production operation, both in the Town of Columbus. Additionally, abundant outdoor recreational opportunities attract tourists to the area including the Absaroka-Beartooth Wilderness Area, the Stillwater and Yellowstone Rivers, and the Hailstone and Halfbreed National Wildlife Refuges. (Montana Census and Economic Information Center, 2009)

Disasters of any magnitude can threaten the fragile economies and well-being of residents. Some basic economic statistics follow:

- Median household income (2007): $51,722
- Persons below poverty (2007): 9.7%
- Total number of companies/firms (2002): 911 firms

Source: US Census Bureau, 2010.

The ten top private employers (excluding railroad and government) in the county based on third quarter 2008 data include:

- Stillwater Mining Company
- McDonald's
- Montana Silversmiths
- Beartooth Manor
- Columbus IGA Plus
- Stillwater Community Hospital
- Town Pump
- Cleary Building Corporation
- Special K Ranch
- Timberweld Manufacturing

Source: Montana Census and Economic Information Center, 2009.

Based on data from the US Census of Agriculture in 2007, Stillwater County had:

- Number of farms: 635 farms
- Acres in farmland: 857,474 acres
- Total market value of agricultural products sold: $43,435,000
- Market value of livestock, poultry, and their products sold: $34,355,000
- Number of cattle and calves: 51,946 cattle and calves
- Number of poultry: 1,089 poultry
- Number of horses and ponies: 1,866 horses and ponies
- Number of sheep and lambs: 6,719 sheep and lambs
- Number of goats: 280 goats

- Market value of crops sold: $9,079,000
- Primary crops (based on number of farms): Forage, Wheat, and Barley

Source: US Department of Agriculture, 2007.

The ecologic, historic, and social values of Stillwater County each tie into the quality of life for residents and visitors. Without these values, lives and property may not be threatened, but the way of life and connections to history and the environment could be disrupted. These values can have deep emotional meaning and investment.

Ecologic values represent the relationship between organisms and their environment. For humans, these values include clean air, clean water, a sustainable way of life, and a healthy, natural environment, including a diversity of species. Natural hazards, such as floods and wildfires, are usually part of a healthy ecosystem, but often, human-caused hazards damage ecologic values. Ecologic values in Stillwater County include the Absaroka-Beartooth Wilderness, Custer National Forest, Stillwater and Yellowstone Rivers, and Hailstone and Halfbreed National Wildlife Refuges. The black-footed ferret is the only known listed endangered species in Stillwater County. Listed threatened species in Stillwater County include the Canada lynx and the grizzly bear. (US Fish and Wildlife Service, 2009)

Historic values capture a piece of history and maintain a point in time. Historic values can include sites, buildings, documents, and other pieces that preserve times past and have value to people. Stillwater County has 9 resources listed in the National Register of Historic Places. (National Park Service, 2010)

Social values often cannot be quantified but are an important aspect of quality of life and interpersonal relationships. Examples of social values in Stillwater County may include gatherings to promote community building, personal achievement, freedom from tyranny, the ability to communicate with others, pride in making the world a better place, and friendships. The realm of social values is only limited by the human imagination and usually relates to how a person feels. Disasters, both natural and human-caused, can disrupt important social activities and sometimes have lasting effects on society.

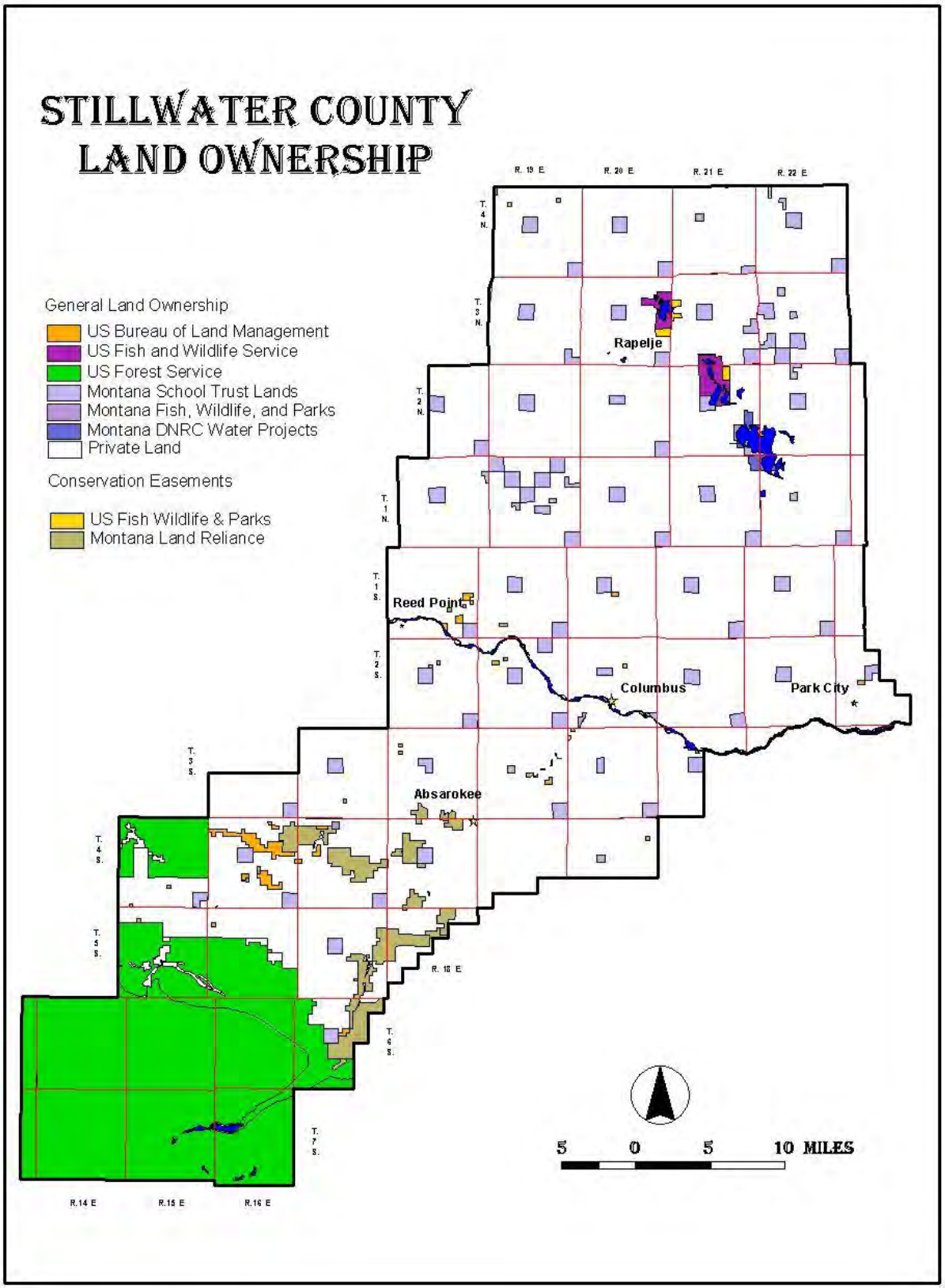
3.4 Current Land Use

Stillwater County has varied land use but is primarily rural with most of the land use devoted to agriculture, undeveloped areas, and government ownership. Approximately 79% of land in the county is in private ownership and the remaining 21% is publicly owned. Approximately 69% of the land area within the county has been classified agricultural and another 6% has been classified as private timberland. Federal lands include 17% of the land area within the county and state owned lands account for another 4%. The remaining 4% of the land area includes tract land, commercial tracts, town sites, exempt properties, and other unclassified lands. Map 3.4A shows the location of general ownership and conservation easements.

Significant government land holders include the US Forest Service, State of Montana, US Bureau of Land Management, and the US Fish and Wildlife Service. These lands are primarily situated in the higher elevation Beartooth Mountains on the south side of the county. Public lands are undeveloped with the exception of mineral production, recreational facilities, and dispersed range improvements.

Residential development has been concentrated primarily in and around the Town of Columbus and along the Yellowstone and Stillwater Rivers, but largely outside of the 100-year floodplains. Commercial uses in the county are generally located within the communities.

Map 3.4A



Source: Stillwater County GIS, date unknown.

3.5 Recent Development

In recent years, Stillwater County has experienced substantial growth, primarily in the form of residential subdivisions. The Park City area has had the most subdivision activity. Since 2008, the rate of growth has decreased with the slowed economy, however, some development has continued. (Stillwater County, 2010c) Table 3.5A outlines the creation of new lots through subdivision. Since Stillwater County does not have a building permit system, the extent of development on the new lots approved though the subdivision process cannot be quantified as easily. Table 3.5B lists some of the larger subdivisions that have occurred in Stillwater County since 2005.

Table 3.5A Recent Subdivision Activity

Year	Number of Subdivisions	Total Acreage	Number of Lots
2005	11 subdivisions	433.2 acres	43 lots
2006	13 subdivisions	591.9 acres	60 lots
2007	11 subdivisions	518.2 acres	35 lots
2008	16 subdivisions	426.0 acres	51 lots
2009	5 subdivisions	235.0 acres	17 lots

Source: Stillwater County, 2010c.

Table 3.5B Subdivisions of 10 Lots or Larger, 2005-2009

Name	Number of Lots	Location
A Bar B Estates Subdivision, Phase III	11 lots	North of Columbus
Elwood Subdivision	12 lots	East of Park City
Panorama Ranch	10 lots	Fishtail
Winding River Estates	18 lots	South of Columbus
Yellowstone Gardens Subdivision	30 lots	Southeast of Park City

Source: Stillwater County, 2010c.

3.6 Future Development

The amount of private (79%) versus public (21%) land ownership is projected to stay relatively the same in the near future, however, trends in the conversion of agriculture and some timberland to residential tract land through subdivision is expected to continue, albeit tempered by economic conditions. Commercial, industrial, and other higher density developments will likely remain concentrated in existing town sites. (Stillwater County, 2007a)

Existing land uses and the review processes and regulations for new development play important roles in disaster mitigation. Often, smart development is an inexpensive and effective way to reduce the impact of future disasters on the community. The following mechanisms are used by the jurisdictions to guide future development.

Note that these regulations are believed to have mitigated the disaster potential to recent developments, however, surveys filed prior to the 1973 Subdivision and Platting Act with lots over 20 acres were exempt from subdivision review and may be at greater risk from hazards. (Stillwater County, 2010c)

In 2010, subdivision activity is expected to continue, especially in the Park City area, and the Stillwater County Planning Department anticipates at least 80 new lots will be filed through the subdivision process in 2010. Currently, a large, 113 lot subdivision is proposed just northeast of Columbus with conditional approval of its master plan as an addition to the Town of Columbus. (Stillwater County, 2010c)

<u>Stillwater County Growth Policy, March 2007</u>

- Based on Montana law, growth policies are now used instead of master or comprehensive plans. Growth policies are not regulatory documents but rather set the community goals and provide guidance for local officials. The policy is intended to be updated every five to ten years.
- Public involvement was used extensively in the plan's development from surveys to public meetings.
- Public surveys in 2002 demonstrated a strong desire from citizens to have managed growth.
- An important goal listed in the policy is: "Encourage a policy of utilizing mitigation measures to minimize impacts of subdivision development."
- Neighborhood plans intended to achieve community goals and objectives can be developed and included as an addendum to the growth policy.

<u>Stillwater County and Town of Columbus Subdivision Regulations, 2007</u>

- The Subdivision Regulations apply to all divisions of land in which one or more parcels are 160 acres or less, with some exemptions.
- Purposes of the regulations include, among others:
  - To promote the public health, safety, and general welfare by regulating the subdivision of land.

  - The avoidance of danger or injury by reason of natural hazard or the lack of water, drainage, access, transportation, or other public services.
- Subdivision application requirements include, among others:
  - A complete grading and drainage plan with all drainage structures to accommodate the 100-year runoff event.
  - A subdivision improvements agreement that becomes a covenant running with the land and outlines elements such as potable water facilities and water facilities for fire fighting.
  - A fire prevention and control plan for proposed subdivisions in "high" to "extreme" fire hazard areas as determined by the fire protection authority having jurisdiction.
- Lands that may be considered unsuitable for subdivision include areas of potential hazard such as flooding, snow avalanches, rock falls, landslides, unstable soils, steep slopes in excess of 25% grade, high water table, inadequate, polluted, or non-potable water supply, high voltage lines, high pressure gas lines, air or vehicular traffic hazards or congestion, inadequate access, and lands placing unreasonable burdens on the general public such as requirements for the excessive expenditure of public funds or environmental degradation.
- The design and improvement standards include provisions such as:
  - Floodplain review and compliance with flood ordinances.
  - Possible setbacks from rivers, streams, ponds, or lakes.
  - Two access roads for subdivisions with ten or more lots.
  - Proper drainage design for at least the 10 year, 6 hour storm event.
  - Minimizing of fire risk through structure placement, water supplies, dry hydrants, road standards, park lands, and fuel reductions.

Stillwater County and Town of Columbus Zoning

The Town of Columbus does have zoning regulations. These regulations generally guide land use for the town and includes designations for areas such as agricultural, residential, commercial, and floodplains. Stillwater County has one citizen petitioned planning and zoning district, the West Fork Stillwater Planning and Zoning District. (Stillwater County, 2007a)

4. RISK ASSESSMENT / HAZARD PROFILES

4.1 Dam Failure

Table 4.1A Hazard Summary for Stillwater County

Overall Hazard Rating	Moderate	
Probability of High Impact Event	Low	No local history and regular dam maintenance make the probability of a failure somewhat low.
Vulnerability	High	Impacts from a dam failure could include significant losses to critical infrastructure, structures, economic values, and the population.

Table 4.1B Hazard Summary for the Town of Columbus

Overall Hazard Rating	Low	
Probability of High Impact Event	Low	No local history and regular dam maintenance make the probability of a failure somewhat low.
Vulnerability	Low-Moderate	Impacts from a dam failure would minimally impact the Town of Columbus directly.

Table 4.1C Federal Major Disaster and Emergency Declarations

Declaration	Year	Additional Information	Casualties	Damages/Assistance
None				

4.1.1 Description

Dams, generally defined as barriers created with the purpose of retaining water, have been placed in strategic locations across the county, state, and nation for a wide variety of uses including flood control, hydroelectricity generation, irrigation, public water supplies, and recreation. Dams exist in number of different shapes, sizes, and materials.

Should a dam fail, the consequences can be devastating or minimal depending on the dam's characteristics and regional attributes. Although not particularly likely, seismic activity, poor maintenance, overwhelming flow conditions, and terrorist activities can all lead to the catastrophic failure of a dam. The result is the rush of water contained by the dam downstream at a rapid pace. The structural integrity of a dam depends on its design, maintenance, and ambient conditions.

Most dams are classified based on the potential hazard to life and property should the dam suddenly fail. Note the hazard rating is not an indicator of the condition of the dam or its probability of failure. Definitions, as accepted by the Interagency Committee on Dam Safety, are as follows:

- 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, environment 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.

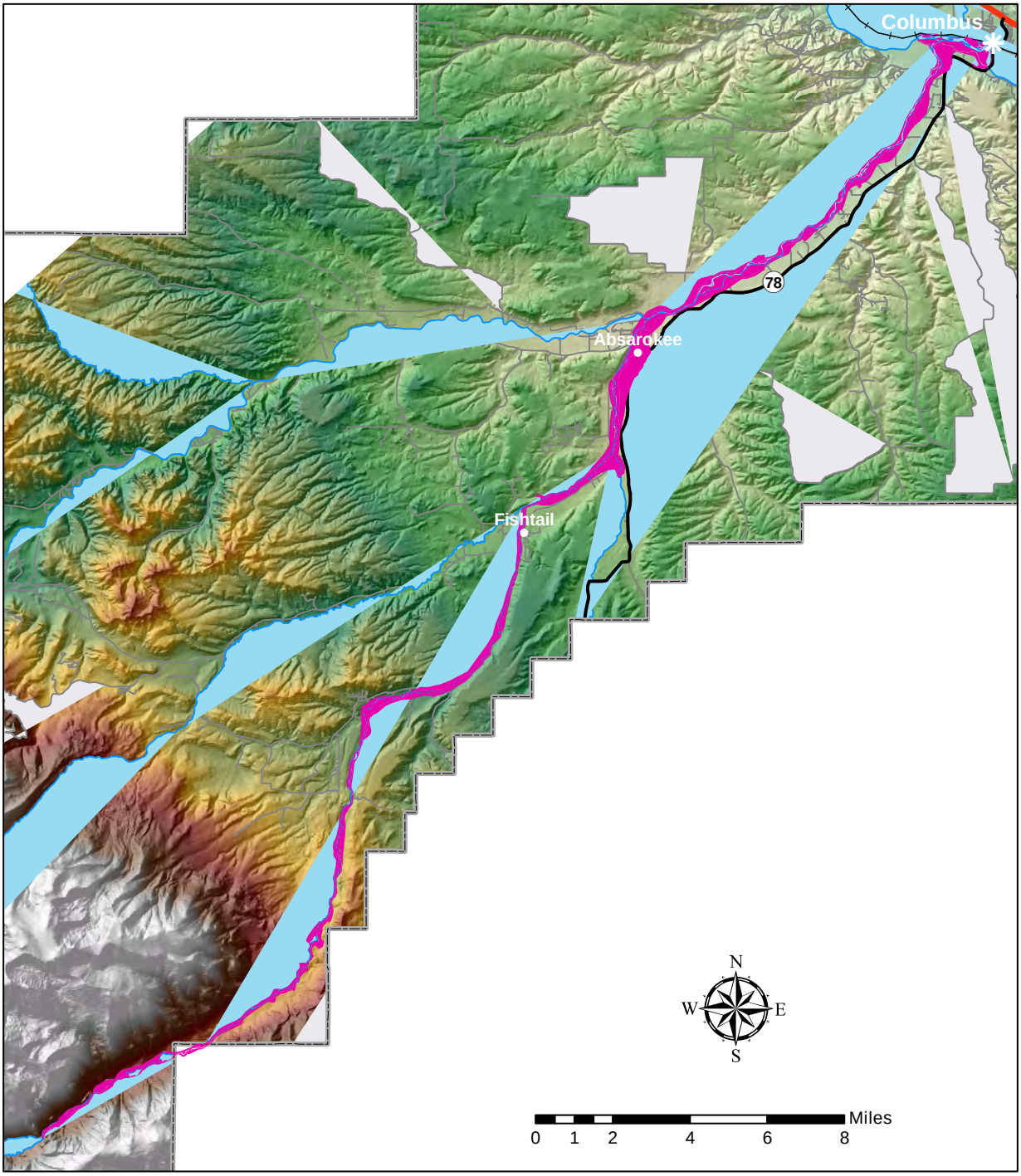
Source: Federal Emergency Management Agency, 2004a

The dam of primary concern and only high hazard dam in Stillwater County is the Mystic Lake Dam. This dam is operated by PPL Montana with the purpose of hydroelectric power generation. The Mystic Lake Dam is located on West Rosebud Creek in the Beartooth Mountains, has two operating units, and can generate up to 12 megawatts of electricity. (PPL Montana, 2010) Map 4.1.1A shows the inundation areas of Stillwater County from the Mystic Lake Dam.

Map 4.1.1A

Mystic Lake Dam Inundation Area

Stillwater County, Montana



Data Source: Stillwater County
Data Date: 2010
Map Coordinates: NAD 1983, State Plane Montana

Map Created By:
Pam Shrauger
February 2010

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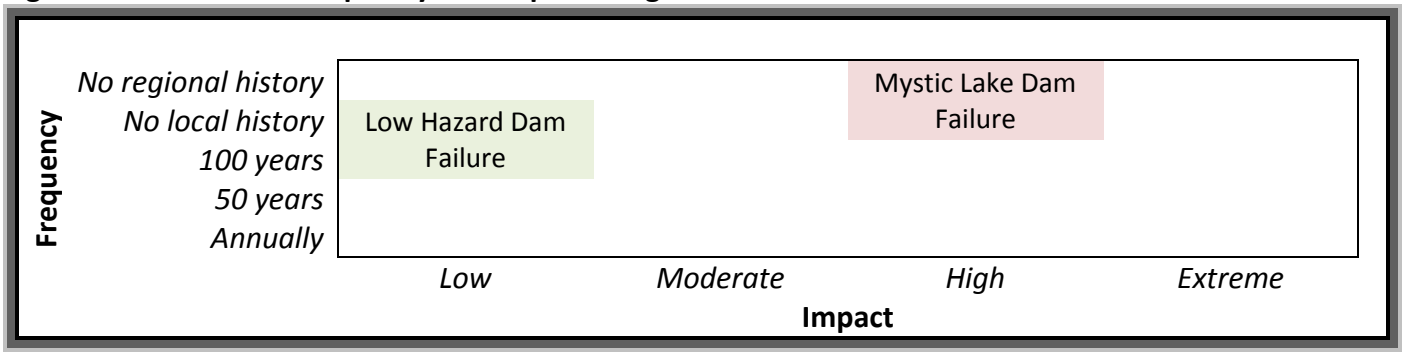
4.1.2 History

Significant dam failures have not been noted in Stillwater County's history. According to local residents, during June 2010, higher than usual releases were observed from the Mystic Lake Dam causing road and fishing access infrastructure damages in the Fishtail area until PPL Montana officials were notified and corrective action was taken.

4.1.3 Probability and Magnitude

Figure 4.1.3A Hazard Frequency and Impact Ranges



4.1.4 Vulnerabilities

A dam break on the Mystic Lake Dam system would have the greatest impact on the Stillwater County community (unincorporated) of Absarokee and other rural county areas, including the west part of Fishtail. The Town of Columbus is close to the inundation area, but is unlikely to experience significant direct impacts. Access to the southern part of the county would likely be cut off from Columbus. For the purposes of this plan, the probable (100-year) impacts are what would result from a low hazard dam break and the additional extreme (500-year) impacts are estimated based on a Mystic Lake Dam break.

Table 4.1.4A Hazard Vulnerabilities and Impacts

Jurisdiction(s)	Type	Probable (100-year) Impact	Extreme (500-year) Impact*	Rating
Stillwater County	Critical Facilities		• Structural losses • Contents losses • Critical functional losses • Critical data losses	Moderate
Stillwater County	Critical Infrastructure	• Physical losses • Road closures	• Service disruptions • Loss of electricity • Loss of utility gas • Loss of potable water • Loss of sanitary sewers • Loss of telephone service • Loss of internet service	Moderate-High

Table 4.1.4A Hazard Vulnerabilities and Impacts (continued)

Jurisdiction(s)	Type	Probable (100-year) Impact	Extreme (500-year) Impact*	Rating
Stillwater County	Structures	• Clean-up/debris removal costs	• $33,981,500 estimated losses • Structural losses • Contents losses • Displacement/functional losses	High
Stillwater County	Population		• 1,190 people at enhanced risk • Injuries • Fatalities	Moderate-High
Stillwater County	Values	• Agricultural losses	• Business disruption losses • Habitat damages • Reduced water quality • Historic structure losses • Historic site losses • Historic item losses • Emotional impacts • Cancellation of activities • Restrictions on activities • Aesthetic value losses	Moderate-High
Stillwater County	Future Development		• Somewhat likely to occur in hazard areas	Moderate

* in addition to probable (100-year) impacts

Critical Facilities

Critical facilities threatened by failure of the Mystic Lake Dam include the following: Absarokee Fire Station, Absarokee Medical Clinic, Absarokee Schools, Absarokee Water and Sewer System, and the Cobblestone School Community Center.

Critical Infrastructure

Critical infrastructure threatened by failure of the Mystic Lake Dam include portions of Montana Highway 78, many county roads along West Rosebud Creek, the water and sewer systems in Absarokee, and approximately thirteen bridges.

Table 4.1.4B Critical Infrastructure Damages

Type	Likelihood of Damages
Electric	Possible
Gasoline/Propane/Oil	Possible
Natural/Utility Gas	Possible
Sewer	Highly Likely

Type	Likelihood of Damages
Telephone/Internet	Possible
Transportation	Highly Likely
Water	Highly Likely

Structures

Comparing the inundation area of a Mystic Lake Dam failure to the county's GIS data, an estimated 665 structures are at risk. Using the median housing unit value of $102,200 and a general estimate of 50% damage to those structures, a total structure loss is estimated at $33,981,500.

Population

Population warning of a failure of Mystic Lake Dam will depend on a number of variables including when local officials receive notification, the time of day the break occurs, and the methods used to inform the public. Locations such as the Emerald Lake Campground and the Pine Grove Campground would have less than an hour from the time the dam breaks until the water rises two feet during a major flood dam failure. Fishtail would have just less than 3 hours and Absarokee about 3.5 hours. (PPL Montana, 2009) Using an estimate of 665 structures at risk and an estimate of 1.79 people per structure, approximately 1,190 people are at enhanced risk.

4.1.5 Data Limitations

Data limitations include:

- Difficulties in quantifying the probability of a dam failure given no local history of such.
- Uncertainties regarding the lake and river levels at the time of a break.
- Uncertainties regarding the warning time and capabilities that would be involved with a break.

4.2 Disease

including human and animal diseases

Table 4.2A Hazard Summary for Stillwater County and the Town of Columbus

Overall Hazard Rating	High	
Probability of High Impact Event	Moderate	Frequency is approximately once every 100-500 years.
Vulnerability	Moderate	Significant impacts could include major losses to the population and economic and social values.

Table 4.2B Federal Major Disaster and Emergency Declarations

Declaration	Year	Additional Information	Casualties	Damages/Assistance
None				

4.2.1 Description

Diseases affect humans and animals continuously. Each species has its own natural immune system to ward off most diseases. The causes and significance of diseases vary. Of significance in the disaster mitigation realm are communicable diseases with the potential for high infection rates in humans or those which might necessitate the destruction of livestock. Such diseases can devastate human populations and the economy.

Disease transmission may occur naturally or intentionally, as in the case of bioterrorism, and infect populations rapidly with little notice. New diseases regularly emerge or mutate. Known diseases, such as influenza, can be particularly severe in any given season. Terrorism experts also theorize the possibility of attacks using biological agents.

Human Disease

Human epidemics may lead to quarantines, large-scale medical needs, and mass fatalities. Typically, the elderly, young children, and those with suppressed immune systems are at greatest risk from communicable diseases. The following biologic agents are considered the highest bioterrorism threats (Category A) due to their ease of dissemination or person-to-person transmission, high mortality rate with potential for major public health impacts, potential for public panic and social disruption, and the necessity for special public health preparedness:

- Anthrax
- Botulism
- Plague
- Smallpox
- Tularemia
- Viral Hemorrhagic Fevers

Source: Centers for Disease Control and Prevention, 2010.

In addition to global disease and bioterrorism concerns, naturally occurring diseases can threaten communities. Natural illnesses of particular concern, among others, include:

- Food-borne illnesses, such as E. coli and Salmonella
- Influenza
- Meningitis
- Pertussis/Whooping Cough
- Measles
- Norwalk Virus
- Severe Acute Respiratory Syndrome (SARS)

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

Medical advances over the past fifty years have prevented many disease outbreaks, yet the potential still remains. Much of the county is in a rural setting, and therefore, is somewhat isolated from the rapid spread of global diseases, however, frequent air travel by many citizens has made the transfer of disease easier to rural communities. The school and assisted living settings are also prime situations for the rapid spread of disease.

Animal Disease

Stillwater County is an agricultural and ranching community. Animal diseases, particularly those that infect livestock, can distress the agricultural community. Such diseases could lead to food shortages and negative economic impacts, depending on the types of animals infected and the geographic extent of the disease. Stillwater County has numerous feedlots, and therefore, is subject to extreme rates of livestock disease spread and mortality due to close proximity of a large number of animals.

Figure 4.2.1A Cattle operation east of Columbus, April 2006. Source: Stillwater County.

Montana has numerous reportable and quarantineable animal diseases. Some of the more commonly known diseases include bovine spongiform encephalopathy (mad cow disease), brucellosis, foot and mouth disease, anthrax, plague, rabies, and West Nile virus. (Montana Department of Livestock, 2010) Most global livestock diseases have been confined to specific countries due to strict import regulations.

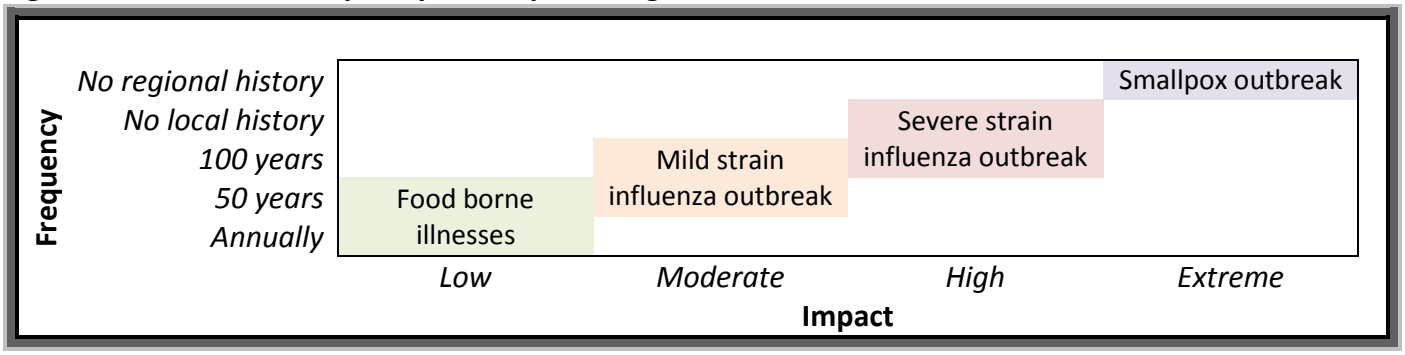
Stillwater County is home to a variety of wildlife species. Many residents in the county fish and hunt big game and birds, and some individuals trap fur-bearing animals. Residents of other counties in Montana and other states visit Stillwater County to view and hunt the wildlife. In addition to the diseases that one can come into contact with in the out of doors, such as Hanta virus, West Nile Virus, and giardia, close contact with wildlife can expose individuals to rabies, plague, and tularemia. Residents and visitors to the county could be exposed to these diseases in any part of the county. (Stillwater County, date unknown)

4.2.2 History

Stillwater County has not experienced any significant disease outbreaks within its population in recent years. Approximately three human influenza pandemics have occurred over the past 100 years, one severely affecting the United States. Following World War I, the Spanish influenza pandemic of 1918 killed 20-40 million people worldwide, including 675,000 Americans. (Billings, 1997) In the State of Montana, the Spanish influenza caused 9.9 deaths per 1,000 people from 1918-1919. (Brainerd, 2003) The local impacts of the 2009 H1N1 influenza pandemic were not significant.

4.2.3 Probability and Magnitude

Figure 4.2.3A Hazard Frequency and Impact Ranges



4.2.4 Vulnerabilities

Table 4.2.4A Hazard Vulnerabilities and Impacts

Jurisdiction(s)	Type	Probable (100-year) Impact	Extreme (500-year) Impact*	Rating
All	Critical Facilities		• Critical functional losses • Clean-up costs	Low
All	Critical Infrastructure		• Service disruptions	Low-Moderate
All	Structures		• Clean-up costs	Low
All	Population	• Hundreds of cases • Some fatalities	• 2,606 estimated cases • 65 estimated fatalities	High
All	Values	• Agricultural losses • Emotional impacts • Cancellation of activities • Restrictions on activities	• Business disruption losses • Service industry losses • Biodiversity losses	Moderate-High
All	Future Development	• Increases the total hazard exposure		Low-Moderate

* in addition to probable (100-year) impacts

Critical Facilities

Should a building become contaminated by some disease agent, clean up costs and the loss of use of the buildings could result. Such costs could be significant. For example, the cleanup of anthrax in several congressional offices on Capitol Hill in September and October of 2001 cost the Environmental Protection Agency about $27 million. (US General Accounting Office, 2003) For this reason, all critical facilities are assumed to be at some risk from disease.

Critical Infrastructure

Should an epidemic necessitate a quarantine or incapacitate a significant portion of the population, support of and physical repairs to infrastructure may be delayed, and services may be disrupted for a time due to limitations in getting affected employees to work.

Table 4.2.4B Critical Infrastructure Damages

Type	Likelihood of Damages
Electric	Possible
Gasoline/Propane/Oil	Possible
Natural/Utility Gas	Possible
Sewer	Possible

Type	Likelihood of Damages
Telephone/Internet	Possible
Transportation	Unlikely
Water	Possible

Population

The entire county population of 8,687 plus non-residents is at risk for contracting a communicable disease. The number of infections and fatalities in the communities would depend on the transmission and mortality rates. Using a general estimate of 30% for the infection rate and a conservative mortality rate (once infected) of 2.5%, as can be the case in an influenza pandemic, approximately 2,606 residents of Stillwater County would be infected with about 65 fatal infections. (World Health Organization, 2010)

As with any disease, age and other health conditions can be a contributing factor. The ability to control the spread of disease depends on the virulence of the disease, the time lapse before the onset of symptoms, the movement of the population, and the warning time involved. Vaccinations, anti-virals, quarantines, and other protective measures may also prevent the spread and impact of the disease. Besides human diseases, animal diseases could negatively affect agriculture and limit food supplies.

Economic, Ecologic, Historic, and Social Values

Estimating potential losses for disease incidents is extremely difficult due to the variability of potential situations. For example, a small number of cases of a human disease may have minor economic impact while a large number of cases of a human or domestic animal disease could have a large economic impact especially if the county were to be quarantined for any length of time. Stillwater County, with tens of thousands of cattle and calves, thousands of sheep and lambs, hundreds of poultry, horses, and goats, is particularly economically vulnerable to diseases affecting animals and livestock. In 2007, the

market value of livestock, poultry, and their products totaled $34,355,000. (US Department of Agriculture, 2007) If an outbreak occurred in a big game species, economic impacts would be felt in the recreation sector. Costs associated with disease are for both morbidity (sickness) and mortality (death). Lost lives, whether human, domestic stock, or wildlife, can be costly.

For the purposes of estimating economic losses for this plan, a scenario of one hundred cases of influenza diagnosed in Stillwater County over a four-month period is analyzed in Table 4.2.4C.

Table 4.2.4C Economic Loss Estimate from a Human Disease Incident (100 Cases of Influenza)

Impact	Units	Cost Per Unit	Total Cost
Employee Absenteeism: 50 employees for 5 days each	250 days	$200/day	$50,000
Hospitalizations: 10 people for 2 days each	20 days	$1,500/day	$30,000
Emergency Room Visits	15 cases	$750/case	$11,250
Clinic Visits	150 visits	$50/visit	$7,500
Prescription Medications	75 doses	$75/dose	$5,625
Ambulance Runs (rural)	2 runs	$1,200/run	$2,400
Ambulance Runs (local)	4 runs	$500/run	$2,000
Daycare Absenteeism: 10 children for 5 days each	50 days	$25/day	$1,250
Over-the-counter Medications	50 families	$20/family	$1,000
TOTAL COST			**$111,025**

4.2.5 Data Limitations

Data limitations include:

- Uncertainties related to how and when a disease will spread through a population
- The emergence of new, unstudied diseases

4.3 Drought

Table 4.3A Hazard Summary for Stillwater County and the Town of Columbus

Overall Hazard Rating	Moderate	
Probability of High Impact Event	Low-Moderate	Local history does not indicate droughts to the level of rationing public water supplies.
Vulnerability	Low-Moderate	Significant impacts include substantial losses to economic and ecologic values.

Table 4.3B Federal Major Disaster and Emergency Declarations

Declaration	Year	Additional Information	Casualties	Damages/Assistance
None				

Note: The Federal Emergency Management Agency's ability to utilize the President's Disaster Fund for drought relief to state and local interests is very limited in scope; however, the US Department of Agriculture frequently declares agricultural disasters because of drought.

4.3.1 Description

A drought is an extended period of unusually dry weather. The following is an excerpt from the National Drought Mitigation Center: *"Drought is an insidious hazard of nature. Although it has scores of definitions, it originates from a deficiency of precipitation over an extended period of time, usually a season or more. This deficiency results in a water shortage for some activity, group, or environmental sector. Drought should be considered relative to some long-term average condition of balance between precipitation and evapotranspiration (i.e., evaporation + transpiration) in a particular area, a condition often perceived as "normal". It is also related to the timing (i.e., principal season of occurrence, delays in the start of the rainy season, occurrence of rains in relation to principal crop growth stages) and the effectiveness (i.e., rainfall intensity, number of rainfall events) of the rains. Other climatic factors such as high temperature, high wind, and low relative humidity are often associated with it in many regions of the world and can significantly aggravate its severity."* (National Drought Mitigation Center, 2010)

Droughts can range from minor to severe, short-term to long-term with a variety of determining factors such as precipitation, soil moisture, and river levels. A minor, short-term drought can slip by unnoticed while a long-term severe drought can impact the agricultural economy, natural resources, and even public water supplies. Drought is a unique hazard in that it does not strike suddenly, but rather, slowly impacts lives and property without a clear beginning or end, and the impacts tend to persist over long periods of time. Often the question of whether or not an extended dry spell is, in fact, a drought causes considerable debate among meteorologists, farmers, public officials, and other agriculture experts. The amount, duration, and extent of moisture deficiency necessary to establish a drought threshold vary considerably.

For the purposes of this plan, drought is a condition of climatic dryness which is severe enough to reduce soil moisture and water below the minimum necessary for sustaining plant, animal, and human life systems. In addition to severe damage to vegetation, soil in a drought area can become dry and

crumble. Often, topsoil is blown away by hot, dry winds. Streams, ponds, and wells can also dry up during a drought, thus wildlife and livestock may suffer and even die. Although agriculture production is the most obvious recipient of drought losses, this hazard can impact communities by reducing domestic water supplies and increasing the fire danger. Water problems caused by drought can range from reduced recreation opportunities to reduction in quantity and quality of municipal water supplies. Losses do not usually include direct structural damage or traumatic loss of human life.

Annual precipitation varies greatly across Stillwater County for any given year averaging greater than 54 inches in the southern part of the county to less than 15 inches in the northeastern portion. The county has an extensive system of irrigation ditches that deliver water from the higher elevations across the benches to the valley bottoms and within the tilled valley bottoms.

Monitoring of drought conditions occurs nationally, and various indices, such as the Palmer Index, indicate the level of drought. Mapping of the current drought status is published by the US Drought Monitor each Thursday at http://drought.unl.edu/dm.

4.3.2 History

Paleoclimate studies show extreme periods of drought hundreds of years ago in the northern Great Plains including 200-370 A.D., 700-850 A.D., and 1000-1200 A.D. Compared to these periods over the past 2,000 years, the droughts since 1200 A.D. have been relatively wet and minor. (Laird et al, 1996) Droughts cannot be defined with certainty as extremely dry periods often alternate with wetter than normal periods.

1930s – The 1930s Dust Bowl remains the most highly publicized of past droughts in Montana. This nationwide drought produced erosion problems in the creation of dust storms throughout Montana. (Montana Disaster and Emergency Services, 2001)

1950s – Montana, especially eastern and central portions, had an extended period of reduced rainfall that impacted agricultural and local economies. (Montana Disaster and Emergency Services, 2001)

1960s - Montana saw another significant drought period beginning in 1961. By the end of June 1961, 17 counties had requested federal disaster designations due to a lack of moisture, higher than normal temperatures, and grasshopper infestation. Small grain crops died before maturing, and range grass and dryland hay crops were deteriorating rapidly. Livestock water supplies were at critical levels. In July of 1961, the State's Crop and Livestock Reporting Service called it the worst drought since the 1930s. In 1966, the entire state experienced another episode of drought. (Montana Disaster and Emergency Services, 2001)

1970s – Over 250,000 acres of Montana farmland was damaged by winds in the western and southern part of state over a 7-month period in 1977. Excessive tillage and inadequate crop cover during years of little moisture caused exaggerated soil damage. In June of 1977, Montana officials worked with officials from Washington, Idaho, and Oregon on the Northwest Utility Coordination Committee to lessen the

potential for hydroelectricity shortages. On June 23, Governor Judge ordered a 10% electric use reduction in state and county governments. (Montana Disaster and Emergency Services, 2001)

1980s - Drought-related economic losses in Montana in 1980 were estimated to be $380 million. Drought continued to plague the state in 1985, and all 56 counties received agricultural disaster declarations. The continued lack of moisture in 1985 resulted in a wheat crop that was the smallest in 45 years. Grain farmers received more in government deficiency payments and insurance money than they did for their crops. For a typical 2,500 acre Montana farm/ranch, the operator lost more than $100,000 in equity over the course of that year. The state's agriculture industry lost nearly $3 billion in equity. The extended effects of this drought included the loss of thousands of off-farm jobs and the closing of many implement dealerships and Production Credit Associations. (Montana Disaster and Emergency Services, 2001)

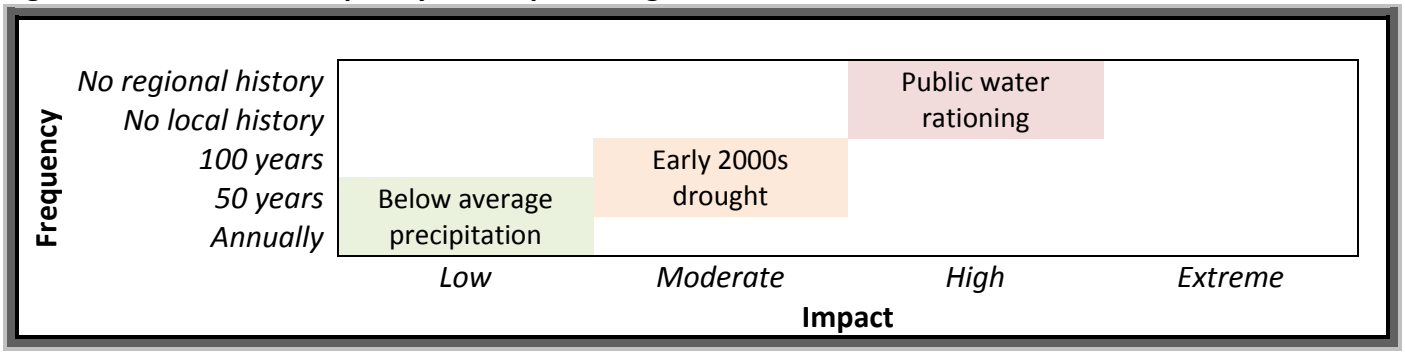
1990s – Drought emergencies were declared in a number of Montana counties with 83% of the state reported under drought conditions by mid-August 1994. Impacts included stress to stream fisheries (low water levels, high temperatures), reduced crop yields, and wildfires. (Montana Disaster and Emergency Services, 2001)

2000s – Severe drought and persistent heat caused significant losses to agriculture and related industries. The U.S. Department of Agriculture issued Natural Disaster Determinations for drought for the entire state of Montana for the years 2000, 2001, 2002, and 2003. This designation entitled counties to low interest loans for producers, small business administration loans, and an Internal Revenue Service provision deferring capital gains. February 2005 was a particularly dry month; it was the driest February on record across the State of Montana. (Montana Disaster and Emergency Services, 2001)

According to the Stillwater County Extension Agent, the drought period of 1988-2007 was especially significant due to the economic and social impacts. The northern half of the county suffered serious impacts to rangeland due to drought in the early 2000s. The tree covered hills and mountains in central and southern Stillwater County were also affected through heightened wildland fire danger. (Stillwater County, date unknown)

4.3.3 Probability and Magnitude

Figure 4.3.3A Hazard Frequency and Impact Ranges



The National Oceanic and Atmospheric Administration Paleoclimatology Program studies drought by analyzing records from tree rings, lake and dune sediments, archaeological remains, historical documents, and other environmental indicators to obtain a broader picture of the frequency of droughts in the United States. According to their research, "…paleoclimatic data suggest that droughts as severe as the 1950s drought have occurred in central North America several times a century over the past 300-400 years, and thus we should expect (and plan for) similar droughts in the future. The paleoclimatic record also indicates that droughts of a much greater duration than any in the 20th century have occurred in parts of North America as recently as 500 years ago." Based on this research, the 1950s drought situation could be expected approximately once every 50 years or a 20% chance every ten years. An extreme drought, worse than the 1930s "Dust Bowl," has an approximate probability of occurring once every 500 years or a 2% chance of occurring each decade. (National Oceanic and Atmospheric Administration, 2003)

4.3.4 Vulnerabilities

Table 4.3.4A Hazard Vulnerabilities and Impacts

Jurisdiction(s)	Type	Probable (100-year) Impact	Extreme (500-year) Impact*	Rating
All	Critical Facilities		・ Critical functional losses	Low
All	Critical Infrastructure		・ Loss of potable water	Low-Moderate
All	Structures			Low
All	Population		・ Increased illness	Low
All	Values	・ Agricultural losses ・ Biodiversity losses ・ Habitat damages ・ Reduced water quality ・ Aesthetic value losses	・ Emotional impacts ・ Cancellation of activities ・ Restrictions on activities	High
All	Future Development		・ Increases the total hazard exposure	Low-Moderate

* in addition to probable (100-year) impacts

Economic, Ecologic, Historic, and Social Values

In 2007, Stillwater County had 635 farms covering 857,474 acres. The total market value of agricultural products sold in 2007 was $34,355,000 for livestock, poultry, and their products and $9,079,000 for crops. (US Department of Agriculture, 2007) The agriculture industry can be severely threatened by drought due to a loss of forage, feed, and water supplies. Crops may not even reach maturity or provide minimal yields in significant droughts. Given the dependence of the local economy on agriculture, the impacts can extend to other industries.

Recreation, another important aspect of the Stillwater County economy can also be impacted. Fish, waterfowl, and other wildlife can be threatened by low water levels and high temperatures. Water rationing and conservation may lead to less than ideal lawns and limitations in water-related recreation such as fishing.

Future Development

Future development's greatest impact on the drought hazard would possibly be to ground water resources. New water and sewer systems or significant well and septic sites could use up more of the water available, particularly during periods of drought. Fortunately, public water systems are monitored by the Montana Department of Environmental Quality, but individual wells and septic systems are not as strictly regulated. Therefore, future development could have an impact on the drought vulnerabilities.

4.3.5 Data Limitations

Data limitations include:

- Difficulties in pinpointing the start and end of drought periods
- Limitations in quantifying economic losses from drought
- Lack of a publicly available database listing historical/archived US Department of Agriculture (USDA) Secretarial disaster declarations and the associated losses

4.4 Earthquake

Table 4.4A Hazard Summary for Stillwater County and the Town of Columbus

Overall Hazard Rating	Low	
Probability of High Impact Event	Low	Probability of a damaging earthquake in Stillwater County is low.
Vulnerability	Moderate	Significant damages are possible to structures and critical infrastructure during a 500-year event.

Table 4.4B Federal Major Disaster and Emergency Declarations

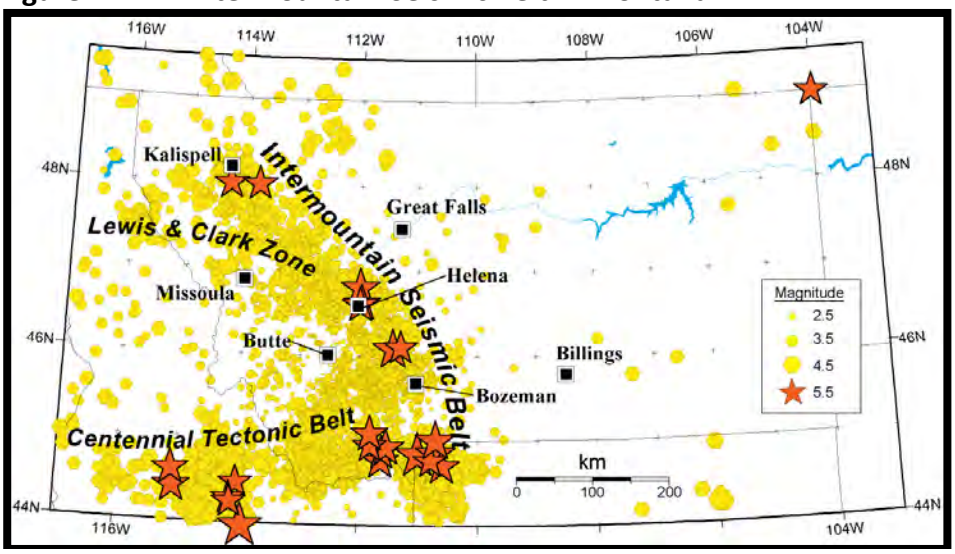
Declaration	Year	Additional Information	Casualties	Damages/Assistance
None				

4.4.1 Description

One of the most frightening and destructive phenomena of nature is a severe earthquake and its terrible aftereffects. An earthquake is the sudden movement of the Earth, caused by the abrupt release of strain that has accumulated over a long time. For hundreds of millions of years, the forces of plate tectonics have shaped the Earth's surface. Huge plates slowly move over, under, and past each other. Sometimes the movement is gradual. At other times, the plates are locked together, unable to release the accumulating energy. When the accumulated energy grows strong enough, the plates break free, thus, producing an earthquake. (US Geological Survey, 1997)

Most of the earthquake activity in Montana occurs along the Intermountain Seismic and Centennial Tectonic Belts in western Montana as shown in Figure 4.4.1A. Stillwater County lies to the east of some of the most active areas.

Figure 4.4.1A Intermountain Seismic Belt in Montana



Source: Montana Bureau of Mines and Geology, 2010.

Geologists primarily measure earthquake severity in two ways: by magnitude and by intensity. Magnitude is based on the area of the fault plane and the amount of slip. The intensity is based on how strong the shock is felt and the degree of damage at a given location. The most commonly used scales are the Richter magnitude scale, moment magnitude scale, and modified Mercalli intensity scale. (National Earthquake Hazards Reduction Program, 2010)

4.4.2 History

Stillwater County has not been the location of any significant earthquakes of record, nor have any earthquake damages been noted in the county. Table 4.4.2A lists some of the earthquakes likely felt in Stillwater County.

Table 4.4.2A Earthquakes Likely Felt in Stillwater County

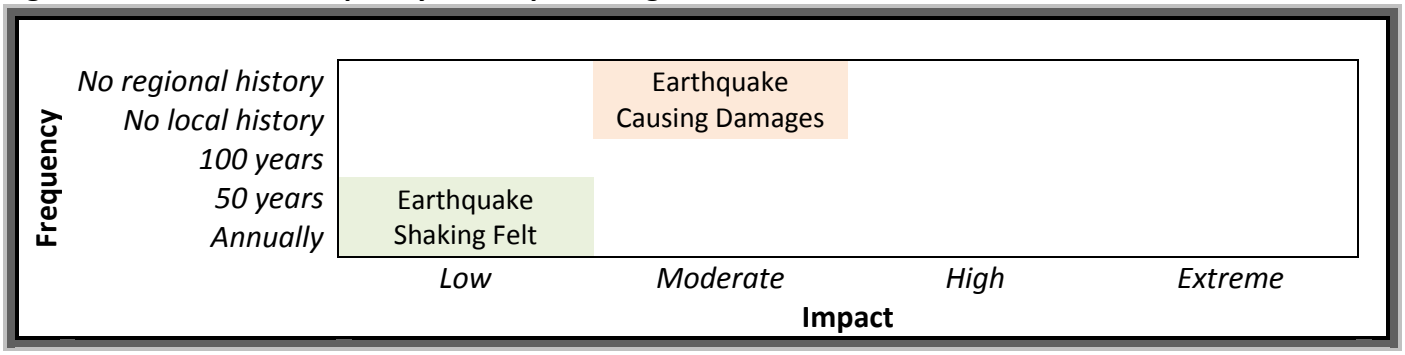
Date	Name/Location	Location	Magnitude
June 27, 1925	Clarkston Valley Earthquake	8 miles north of Three Forks	Richter magnitude 6.6
October 12-31, 1935	Helena Earthquakes	15 miles north of Helena	Richter magnitude 6.3
November 23, 1947	Virginia City Earthquake	25 miles west-northwest of West Yellowstone	Richter magnitude 6.3
August 17, 1959	Hebgen Lake Earthquake	15 miles north of West Yellowstone	Richter magnitude 7.5
June 30, 1975	Yellowstone Earthquake	5 miles east-northeast of Norris Junction, WY	Richter magnitude 6.1
October 28, 1983	Borah Peak Earthquake	15 miles west of Mackay, ID	Richter magnitude 7.3
July 25, 2005	Dillon Earthquake	10 miles north of Dillon	Richter magnitude 5.6

Sources: US Geological Survey, 2010; University of Utah, 2010.

4.4.3 Probability and Magnitude

Earthquake experts use probabilities when determining the seismicity of an area. Peak horizontal acceleration is the maximum horizontal acceleration experienced by a particle during the course of the earthquake motion. When acceleration acts on a physical body, the body experiences the acceleration as a force. Gravity is a commonly known force of nature, and therefore, the units of acceleration are measured in terms of g, the acceleration due to gravity. The peak ground acceleration with a 2% probability of exceedance in 50 years in Stillwater County is generally less than 10%g. (US Geological Survey, 2008) To make sense of these values, at 9.2%g-18%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. (Qamar, 2008)

Figure 4.4.3A Hazard Frequency and Impact Ranges



4.4.4 Vulnerabilities

According to Earthquake Studies Specialist Mike Stickney at the Montana Bureau of Mines and Geology, Stillwater County is located east of the main fault line in Montana. The chances of having a major earthquake centered in Stillwater County are very small. Stillwater County is most likely to feel shaking as a result of an earthquake centered elsewhere if any shaking is felt at all. Damage from an earthquake although unlikely, could conceivably occur in Stillwater County if a large magnitude earthquake occurred elsewhere and shook while the ground was saturated. Infrastructure and structures across the entire county would be at risk if an earthquake did occur. Impacts to structures could include structural damage, cracked foundations, and/or even collapse.

General losses from earthquakes can be estimated using HAZUS-MH, a loss estimation model developed by the Federal Emergency Management Agency. This model uses national datasets and hazard information to estimate the earthquake losses from a particular event at the census tract or county level. Although the default data and methods provided with the model contain many generalizations that could lead to inaccuracies, the model provides a ballpark estimate of what earthquake losses may occur and the magnitude of such. A structural engineer can make specific determinations on individual structures. One scenario was run through the model. The model used a 500-year probabilistic hazard with a 6.0 moment magnitude. Details on the results follow.

Table 4.4.4A Hazard Vulnerabilities and Impacts

Jurisdiction(s)	Type	Probable (100-year) Impact	Extreme (500-year) Impact*	Rating
All	Critical Facilities		▪ Clean-up/debris removal costs	Low-Moderate
All	Critical Infrastructure		▪ $1,580,000 estimated losses ▪ Physical losses ▪ Road closures	Moderate
All	Structures	▪ Clean-up/debris removal costs	▪ $5,160,000 estimated losses ▪ Structural losses ▪ Contents losses ▪ Displacement/functional losses	Moderate-High

Table 4.4.4A Hazard Vulnerabilities and Impacts (continued)

Jurisdiction(s)	Type	Probable (100-year) Impact	Extreme (500-year) Impact*	Rating
All	Population		· Injuries	Low-Moderate
All	Values		· Business disruption losses · Historic structure losses · Aesthetic value losses	Low-Moderate
All	Future Development		· Increases the total hazard exposure	Low-Moderate

* in addition to probable (100-year) impacts

Critical Facilities

Certainly, all critical facilities identified in this plan are not included in the national databases used by HAZUS-MH, however, most critical facilities had very low probabilities of any damage. The Nye School had the highest probability with a 15% estimate of at least slight damage during a 500-year event.

Critical Infrastructure

The HAZUS database contains 69 miles of highway, 100 bridges, and 3,789 miles of pipeline valued at over $689 million in Stillwater County. Infrastructure, as quantified in the default HAZUS-MH database, suffers some damages during the 500-year, 6.0 moment magnitude earthquake as shown in Table 4.4.4B.

Table 4.4.4B HAZUS-MH Estimated Infrastructure Losses

Infrastructure System	Economic Losses	Damages
Highway	$200,000	
Airport	$400,000	
Potable Water	$370,000	81 leaks 20 breaks
Waste Water	$290,000	64 leaks 16 breaks
Natural Gas	$320,000	69 leaks 17 breaks

Table 4.4.4C Critical Infrastructure Damages

Type	Likelihood of Damages
Electric	Unlikely
Gasoline/Propane/Oil	Unlikely
Natural/Utility Gas	Possible
Sewer	Possible

Type	Likelihood of Damages
Telephone/Internet	Unlikely
Transportation	Possible
Water	Possible

Structures

HAZUS-MH estimated that 1 structure would have complete damage, 10 structures would have extensive damage, 103 structures would have moderate damage, 350 structures would have slight damage, and 3,293 structures would have no damage during the 6.0 moment magnitude, 500-year probabilistic event. HAZUS-MH estimated the building-related economic losses countywide would be $5.16 million. As with any loss estimate, large errors may be present and estimations should only be used for planning purposes.

Population

Assuming the 500-year, 6.0 moment magnitude probabilistic earthquake occurred at 2pm, 2 injuries requiring medical attention but not hospitalization were estimated by HAZUS-MH.

Future Development

Stillwater County and the Town of Columbus do not have residential building codes, except for electric and plumbing codes required by the state; however, most new construction is generally of decent quality. Structures built to current codes have a lower chance of suffering damages in a strong earthquake. Without code adoption and enforcement, future development is at risk from earthquake damages.

4.4.5 Data Limitations

Data limitations include:

- Estimating the probability and possible damages associated with this low frequency, high impact hazard
- Lack of improved digital data for use in the HAZUS module
- Lack of individual facility assessments by a structural engineer

4.5 Flood

including riverine, flash, and ice jam floods

Table 4.5A Hazard Summary for Stillwater County and the Town of Columbus

Overall Hazard Rating	High	
Probability of High Impact Event	Moderate	The 100-year flood (considered a moderate probability) could cause significant damages.
Vulnerability	Moderate	The greatest impacts would be to critical infrastructure, structures, the population, and values.

Table 4.5B Federal Major Disaster and Emergency Declarations

Declaration	Year	Additional Information	Casualties	Damages/Assistance
FDAA-558-DR-MT	1978	Location: Stillwater County, Town of Columbus, and 13 other jurisdictions	Unknown	$3,838,126 federal share for PA* $465,015 federal share for IFG* $155,005 state share for IFG*

* figures are statewide

4.5.1 Description

A flood is a natural event for rivers and streams and occurs when a normally dry area is inundated with water. Excess water from snowmelt and rainfall accumulates and overflows onto the banks and adjacent floodplains. Floodplains are lowlands, adjacent to rivers and streams that are subject to recurring floods. Flash floods, usually resulting from heavy rains or rapid snowmelt, can flood areas not typically subject to flooding, including urban areas. Extreme cold temperatures can cause streams and rivers to freeze, causing ice jams and creating flood conditions.

Hundreds of significant floods occur in the United States each year and kill an average of about 100 people annually. Flooding is one of the most deadly hazards nationwide and in Montana. Most injuries and deaths occur when people are swept away by flood currents, and most property damage results from inundation by sediment-laden water. Fast-moving water 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.

Riverine Flood

Riverine flooding originates from a body of water, typically a river, creek, or stream, as water levels rise onto normally dry land. Flooding on the rivers generally occurs during the spring and early summer when snow rapidly melts in the higher elevations. Smaller streams are more susceptible to flooding in the summer with peak flows resulting from thunderstorms.

Identification and Mapping

The riverine hazard areas may be mapped as part of the National Flood Insurance Program (NFIP). Under this program, an area is broken into zones to depict the level of flood hazard. Most commonly, the areas within the 100-year floodplain are considered the greatest risk. The 100-year floodplain has a 1% chance of exceedance in any given year. Over a 30-year period, a flood of this magnitude or greater has a 26% chance of occurring, compared to a 9% chance of fire for buildings in high-risk flood areas. (Federal Emergency Management Agency, 2009) Locations outside the 100-year floodplain may also experience flood conditions during greater magnitude floods, localized events, or along unmapped creeks, streams, and ditches.

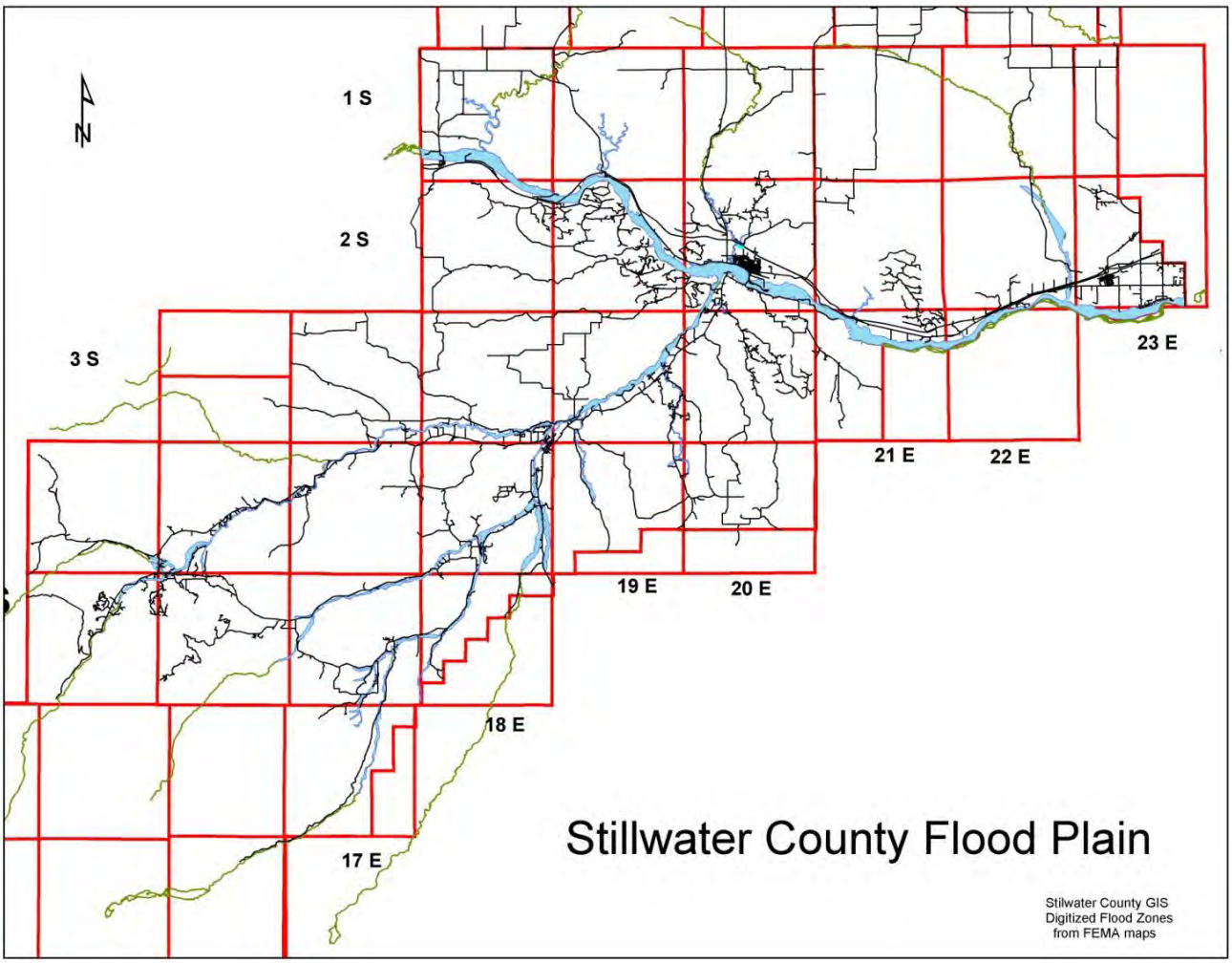
The Flood Insurance Rate Maps (FIRMs) depicting flood-prone areas of Stillwater County and a Flood Insurance Study were last updated on February 4, 1987. The Town of Columbus does not have an identified flood hazard area through the National Flood Insurance Program.

Figure 4.5.1A Yellowstone River Flooding East of Columbus. Source: Stillwater County, 2007a.

Stillwater County has two primary waterways, the Yellowstone and Stillwater Rivers. These two river valleys are also the location of the most residential and commercial development in the county, and contain the majority of the public and private infrastructure as well. Flooding along either of these rivers would create the most damage. Stretches of the 100-year floodplain have been mapped for both the Yellowstone and Stillwater Rivers. Map 4.5.1B shows the designated 100-year floodplain areas of Stillwater County.

In 2009, a Channel Migration study was completed on the Yellowstone River by the Yellowstone River Conservation District Council. The Channel Migration Zone maps depict the current and historic river channel locations and the potential for migration into other areas. The maps are intended to be a basic screening tool for guiding management decisions and are not regulatory. (Yellowstone River Conservation District Council, 2009)

Map 4.5.1B



Source: Stillwater County, date unknown.

Floodplain Management

The floodplain in Stillwater County is managed through floodplain ordinances, and the county participates in the National Flood Insurance Program (NFIP). A designated floodplain administrator issues and reviews permits for development in the floodplain. The Town of Columbus is not a participating community in the NFIP, as it has not been mapped.

Flood Insurance

Residents of Stillwater County and the Town of Columbus have the opportunity to purchase flood insurance through the National Flood Insurance Program. As of December 31, 2009, 71 policies were in force in Stillwater County and 1 policy was in the Town of Columbus. (Federal Emergency Management Agency, 2010) Stillwater County and the Town of Columbus do not have any National Flood Insurance Program repetitive loss properties as of January 31, 2010.

Flash Flood

Flash floods can occur anywhere when a large volume of water falls or melts over a short time period, usually from slow moving thunderstorms or rapid snowmelt. Because of the localized nature of flash floods, clear definitions of hazard areas do not exist. These types of floods often occur rapidly with significant impacts. Rapidly moving water, only a few inches deep, can lift people off their feet, and only a depth of a foot or two, is needed to sweep cars away. Most flood deaths result from flash floods. Many areas of Stillwater County contain mountainous and hilly terrain, and therefore, are more prone to flash flooding.

Ice Jam Flood

An ice jam is a stationary accumulation of ice that restricts flow. Ice jams can cause considerable increases in upstream water levels, while at the same time downstream water levels may drop. Types of ice jams include freezeup jams, breakup jams, or combinations of both. When an ice jam releases, the effects downstream can be similar to that of a flash flood or dam failure. In Stillwater County, ice jams seemingly occur at random locations with no predictable pattern during winter and early spring.

4.5.2 History

Table 4.5.2A Flood Events in Stillwater County

Date	Type	Impacts
1911	Riverine	
1921	Riverine	
1923	Riverine	
1937	Riverine	
1943	Riverine	
July 1944	Riverine	Stillwater River near Absarokee reached 6.44 feet.
July 1948	Riverine	Stillwater River near Absarokee reached 6.63 feet.
1962	Riverine	
June 1967	Riverine	Stillwater River near Absarokee reached 70-year flood levels (7.17 feet/12,000 cfs). Widespread damage to residences, farm buildings, bridges, and summer homes.
June 1970	Riverine	Stillwater River near Absarokee reached 6.69 feet.
June 1974	Riverine	Yellowstone River in Stillwater County reached about 40-year flood levels. Stillwater River near Absarokee reached 50-year flood levels (7.14 feet/11,600 cfs). Widespread damage to residences, farm buildings, bridges, and summer homes.
July 1975	Riverine	Stillwater River near Absarokee reached 45-year flood levels (6.97 feet/11,300 cfs). Widespread damage to residences, farm buildings, bridges, and summer homes.
June 1996	Riverine	A state disaster was declared for four counties along the Yellowstone River, including Stillwater County. Disaster costs for the Stillwater County totaled $27,876 in state funds and $38,454 in local funds.
01/01/1997	Ice Jam	An ice jam break 2 miles southwest of Columbus on the Stillwater River flooded a ranch stranding two people that were then rescued by emergency personnel.

Table 4.5.2A Flood Events in Stillwater County (continued)

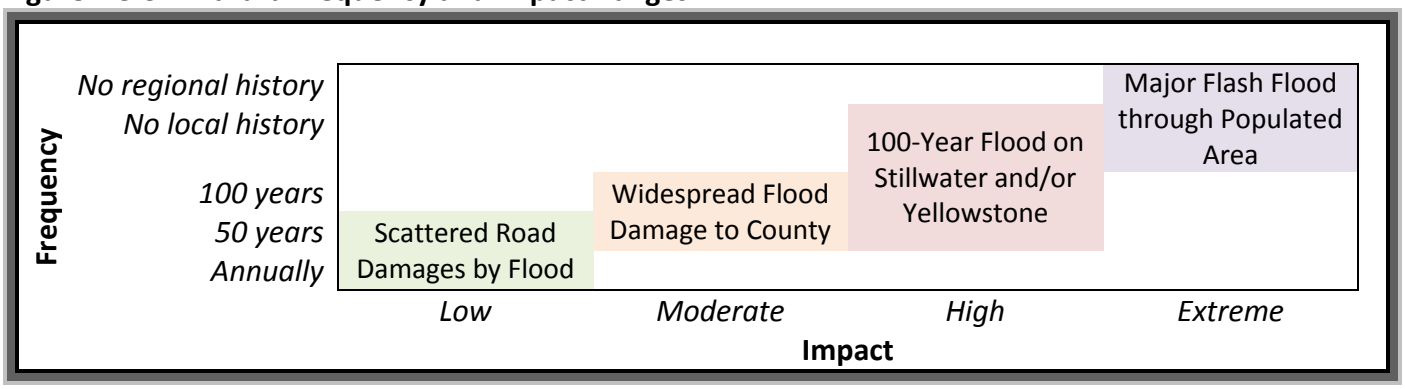
Date	Type	Impacts
01/08/1997	Ice Jam	An ice jam break caused quick rises of 3-4 feet on the Yellowstone River 3 miles southeast of Columbus. A house and farm equipment were damaged.
June 1997	Riverine	Classified as a "moderate" flood on the Yellowstone River at Billings. Water covered the streets in downtown Park City.

Sources: Federal Emergency Management Agency, 1987; Montana Disaster and Emergency Services, 2008; National Weather Service, 2010a; Stillwater County, 2007a; Western Regional Climate Center, 2010.

Most of the riverine flood damage in Stillwater County is the result of encroachment on the floodplain by residential construction, farm buildings and fences, irrigation diversions, dikes, and roads. (Federal Emergency Management Agency, 1987)

4.5.3 Probability and Magnitude

Figure 4.5.3A Hazard Frequency and Impact Ranges



4.5.4 Vulnerabilities

Table 4.5.4A Hazard Vulnerabilities and Impacts

Jurisdiction(s)	Type	Probable (100-year) Impact	Extreme (500-year) Impact*	Rating
Stillwater County	Critical Facilities		• Structural losses • Contents losses • Critical functional losses • Critical data losses • Clean-up/debris removal costs	Low
Town of Columbus	Critical Facilities		• Structural losses • Contents losses • Critical functional losses • Critical data losses • Clean-up/debris removal costs	Low-Moderate

Table 4.5.4A Hazard Vulnerabilities and Impacts (continued)

Jurisdiction(s)	Type	Probable (100-year) Impact	Extreme (500-year) Impact*	Rating
All	Critical Infrastructure	▪ Road closures	▪ Service disruptions ▪ Physical losses ▪ Loss of potable water ▪ Loss of sanitary sewers	Moderate
All	Structures	▪ Contents losses ▪ Displacement/functional losses ▪ Clean-up/debris removal costs	▪ $5-6 million in losses ▪ Structural losses	Moderate
All	Population		▪ Injuries ▪ Fatalities	Moderate
All	Values	▪ Agricultural losses ▪ Reduced water quality ▪ Restrictions on activities ▪ Aesthetic value losses	▪ Business disruption losses ▪ Service industry losses ▪ Historic structure losses ▪ Historic site losses ▪ Historic item losses	Moderate
Stillwater County	Future Development	▪ Somewhat likely to occur in hazard areas		Moderate
Town of Columbus	Future Development	▪ Increases the total hazard exposure		Low-Moderate

* in addition to probable (100-year) impacts

Critical Facilities

The 500-year flood hazard was modeled along the Yellowstone and Stillwater Rivers using FEMA's HAZUS-MH flood module. Data included with HAZUS-MH has a few of the critical facilities, but certainly not all of them. Model runs showed no losses to critical facilities during floods up to the 500-year event. While this estimate is encouraging, comparing the more detailed database of critical facilities to the HAZUS-MH generated 500-year flood hazard area, the Columbus Fire Station and Columbus Public Works are potentially vulnerable to the 500-year flood. Losses from flash floods are always possible to essentially any facility.

Figure 4.5.4B Yellowstone River with ice jams and melting mountain snow, April 2006. Source: Stillwater County.

Critical Infrastructure

Critical infrastructure is often threatened by floods. The most common losses are to roads, bridges, culverts, water systems, and sewer systems.

Table 4.5.4C Critical Infrastructure Damages

Type	Likelihood of Damages
Electric	Unlikely
Gasoline/Propane/Oil	Unlikely
Natural/Utility Gas	Unlikely
Sewer	Possible

Type	Likelihood of Damages
Telephone/Internet	Unlikely
Transportation	Highly Likely
Water	Possible

Structures

The type of property damage caused by flood events depends on the depth and velocity of the floodwaters. Flooding can wash away supporting fill, infiltrate basements, damage contents, and in worst cases, wash structures off their foundations. The primary structures at risk from floods in the county are residences. Extensive damage can be caused by basement flooding. Most flood damage is caused by water saturating materials susceptible to loss such as wood, insulation, wallboard, fabric, furnishings, floor coverings, and appliances.

Structure data for Stillwater County was compared to the various flood hazard areas. Table 4.5.4D shows the results generated by HAZUS-MH. HAZUS-MH runs were used to estimate damages to structures for 500-year floods along the Yellowstone and Stillwater Rivers using census block data.

Table 4.5.4D HAZUS-MH Flood Module Estimated 500-Year Building-Related Economic Losses

Study Area	Estimated Building Damage	Building-Related Economic Loss
Yellowstone River (500-year)	1 substantially damaged building 7 moderately damaged buildings 19 slightly damaged buildings	$6,110,000
Stillwater River (500-year)	6 moderately damaged buildings 37 slightly damaged buildings	$5,150,000

Similarly, the structure database provided by the Stillwater County GIS Office was compared to the HAZUS-MH calculated 500-year flood hazard areas. Table 4.5.4E shows the estimated number of structures within the hazard areas and their associated building values ($102,200 per structure based on census data). Potential losses were estimated by using a damage factor of 30%.

Table 4.5.4E Estimated 500-Year Flood Exposure

Study Area	Estimated Number of Structures in the Flood Hazard Area	Estimated Total Building Value	Estimated Losses
Yellowstone River (500-year)	170 structures	$17,374,000	$5,212,200
Stillwater River (500-year)	203 structures	$20,746,600	$6,223,980

With only 71 flood insurance policies in force in Stillwater County and 1 policy in the Town of Columbus as of December 31, 2009, many property owners will not have many options for financial recovery from floods since most homeowners' insurance policies do not cover flood damages. (Federal Emergency Management Agency, 2010) Note that Stillwater County does not have any repetitive loss properties through the National Flood Insurance Program. A repetitive loss property is defined as "any insurable building for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978." (Federal Emergency Management Agency, 2009)

Table 4.5.4F National Flood Insurance Program Statistics

Location	Policies	Insurance In-Force	Total Loss Payments 1978 - 2009
Stillwater County, unincorporated areas	71	$14,762,000	$22,006
Town of Columbus	1	$280,000	$0

Source: Federal Emergency Management Agency, 2010.

FEMA's Benefit-Cost Analysis Module determines damage percentages for various building types. Table 4.5.4G shows the estimated percentages of building and contents losses from flooding at depths of one foot, three feet, and six feet.

Table 4.5.4G Flood Building and Contents Loss Estimation Percentages

	Flood Depth		
Structure Type	**1 foot**	**3 feet**	**6 feet**
One Story No Basement	14% Building Damage 21% Contents Damage	27% Building Damage 40.5% Contents Damage	40% Building Damage 60% Contents Damage
Two Story No Basement	9% Building Damage 13.5% Contents Damage	18% Building Damage 27% Contents Damage	24% Building Damage 36% Contents Damage
One or Two Story with Basement	15% Building Damage 22.5% Contents Damage	23% Building Damage 34.5% Contents Damage	38% Building Damage 57% Contents Damage
Manufactured Unit	44% Building Damage 66% Contents Damage	73% Building Damage 90% Contents Damage	81% Building Damage 90% Contents Damage

Source: Federal Emergency Management Agency, 2001.

Future Development

Stillwater County participates in the National Flood Insurance Program and has a floodplain ordinance that regulates development in and around floodplain areas. The Town of Columbus is not mapped. New development in unmapped areas could potentially occur in areas prone to flooding and increase vulnerabilities and potential losses, however, most of the current land use regulations require the consideration of flood hazards during the development review process.

4.5.5 Data Limitations

Data limitations include:

- Quantifying all of the losses that occur during major floods, especially when some are covered by insurance and government assistance and others are not
- Lack of floodplain mapping in some areas
- Lack of readily available digital floodplain mapping

4.6 Hazardous Material Release and Explosions

including fixed, mobile, and pipeline releases

Table 4.6A Hazard Summary for Stillwater County and the Town of Columbus

Overall Hazard Rating	High	
Probability of High Impact Event	Moderate	Significant potential exists due to interstate, railroad, and pipelines, but only a limited history of releases
Vulnerability	Moderate	Significant damages possible to the population and values. Some damages to structures possible.

Table 4.6B Federal Major Disaster and Emergency Declarations

Declaration	Year	Additional Information	Casualties	Damages/Assistance
None				

4.6.1 Description

A hazardous material release is the contamination of the environment (i.e. air, water, soil) by any material that because of its quantity, concentration, physical characteristics, or chemical characteristics threatens human, animal, or plant health, the environment, or property. An accidental or intentional release of materials could produce a health hazard to those in the area, downwind, and/or downstream with immediate, prolonged, and/or delayed effects. The spread of the material may additionally be defined by weather conditions and topography of the area. A hazardous material release can come from a fixed facility, via its transportation, or intentionally in the case of terrorism.

Fixed facilities housing hazardous substances in Stillwater County include the usual facilities within communities such as water treatment plants, swimming pools, gas stations, and supply stores containing substances such as fuel, farm and weed chemicals, propane, fuel oil, paint, and small amounts of chlorine and low level nuclear wastes. Industrial facilities, particularly those related to the mining industry, exist throughout Stillwater County.

Large petroleum pipelines also traverse the county to Billings area refineries. These pipelines access production areas, provide local service, and provide long distance transport. The effects of a pipeline breach are dependent on the specific material in the line at the time. Chemical contamination of a water supply or the environment or a subsequent fire can be a costly consequence of a leak or break.

A hazardous material release may also occur due to a transportation accident. The most likely locations for a transportation-related hazardous material release are along the interstate, highways, and the railroad. The major roadways in Stillwater County include Interstate 90, Montana Highway 78, and Secondary Routes 306, 419, and 420. The railroad is operated by Montana Rail Link. Hazardous materials and wastes are continually present on these corridors.

Figure 4.6.1A Trains run daily through the middle of Stillwater County, April 2006.
Source: Stillwater County.

A hazardous material release can occur anywhere, however, buffer zones around the primary hazardous materials transportation routes show the areas that would most likely be affected by a transportation-related hazardous material incident. Table 4.6.1B shows the evacuation radii for a few common hazardous materials. This list is generalized for planning purposes and is certainly not all-inclusive. Emergency responders should rely on other sources for more detailed information. Over 18,000 materials are covered under the US Department of Transportation regulations.

Table 4.6.1B Evacuation Radii for Hazardous Material Releases

Material	Potential Hazard	Initial Isolation	Evacuation
Diesel Fuel/Gasoline	Highly Flammable	150 feet	Up to ½ mile
Ammonium Nitrate Fertilizers	Oxidizer	150 feet	Up to ½ mile
Propane	Extremely Flammable	330 feet	Up to 1 mile
Anhydrous Ammonia	Toxic by Inhalation	500 feet	Up to 1.4 miles
Chlorine	Toxic by Inhalation	2,000 feet	Up to 5 miles

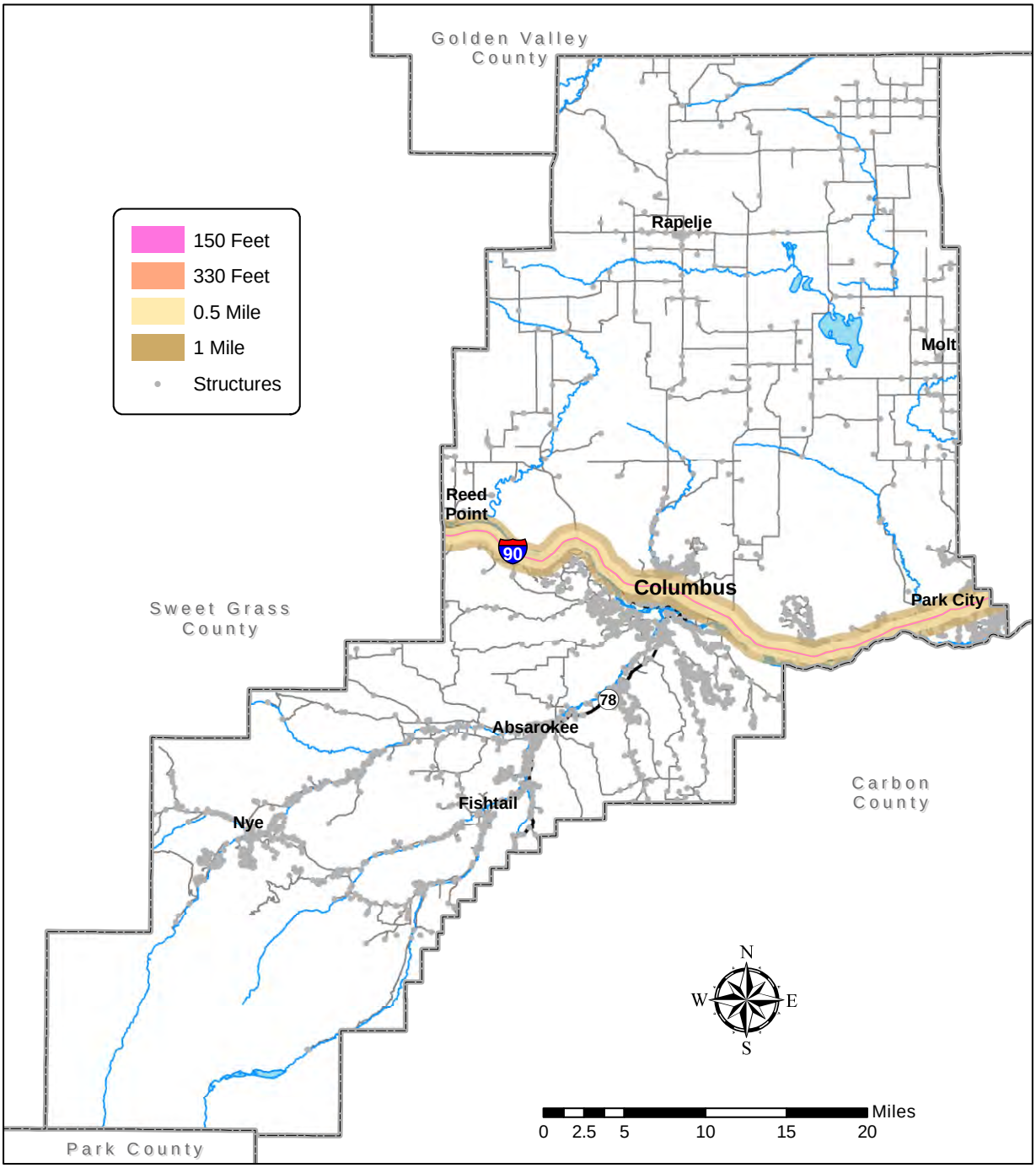
Source: US Department of Transportation, 2008.

The buffers around the interstate, railroad, and pipelines shown in Maps 4.6.1C, 4.6.1D, 4.6.1E, respectively, represent those areas with an enhanced risk from a hazardous materials release based on their proximity to regular hazardous materials transportation routes and infrastructure. Along the interstate, buffer zones of 150 feet, 330 feet, ½ mile, and 1 mile were established based on the initial isolation and evacuation radii for diesel fuel/gasoline and propane releases, as shown in Table 4.6.1B. For the railroad, the buffers were 500 feet and 1.4 miles for anhydrous ammonia and 2,000 feet and 5 miles for chlorine. Note that the actual evacuation zones are highly dependent on factors such as wind speed, wind direction, material released, and quantity released. Like most other hazards, in an actual event, the entire risk area likely won't be affected, but a small section surrounding the spill location may. Along the pipelines, buffers of 500 feet and ½ mile were used for petroleum products such as fuels.

Map 4.6.1C

Enhanced Hazardous Material Release Risk from Interstate 90

Stillwater County, Montana



Data Source: Stillwater County
Data Date: 2010
Map Coordinates: NAD 1983, State Plane Montana

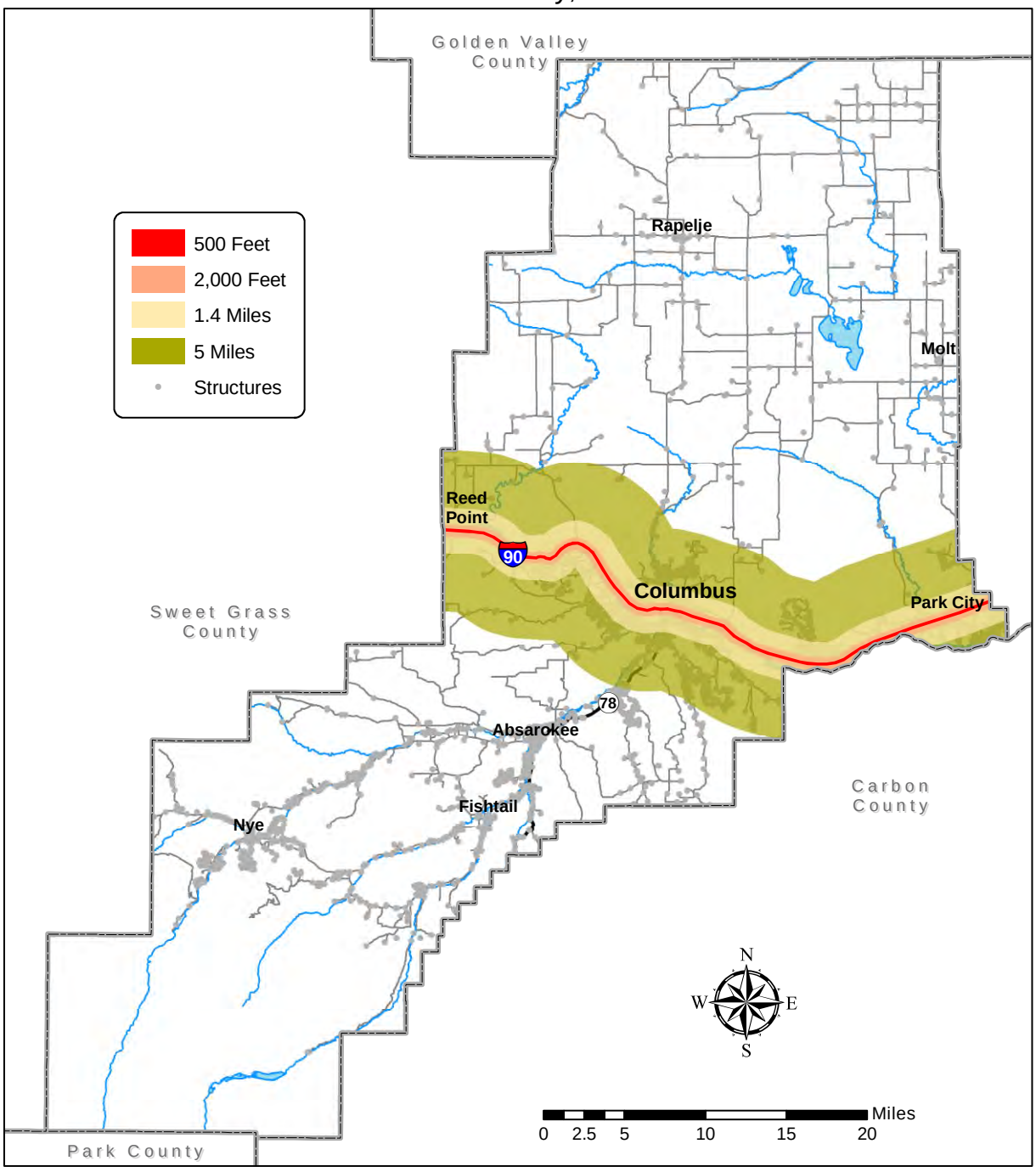
Map Created By:
Pam Shrauger
March 2010

BIG SKY HAZARD MANAGEMENT LLC

Map 4.6.1D

Enhanced Hazardous Material Release Risk from Railroad

Stillwater County, Montana



Data Source: Stillwater County
Data Date: 2010
Map Coordinates: NAD 1983, State Plane Montana

Map Created By:
Pam Shrauger
March 2010

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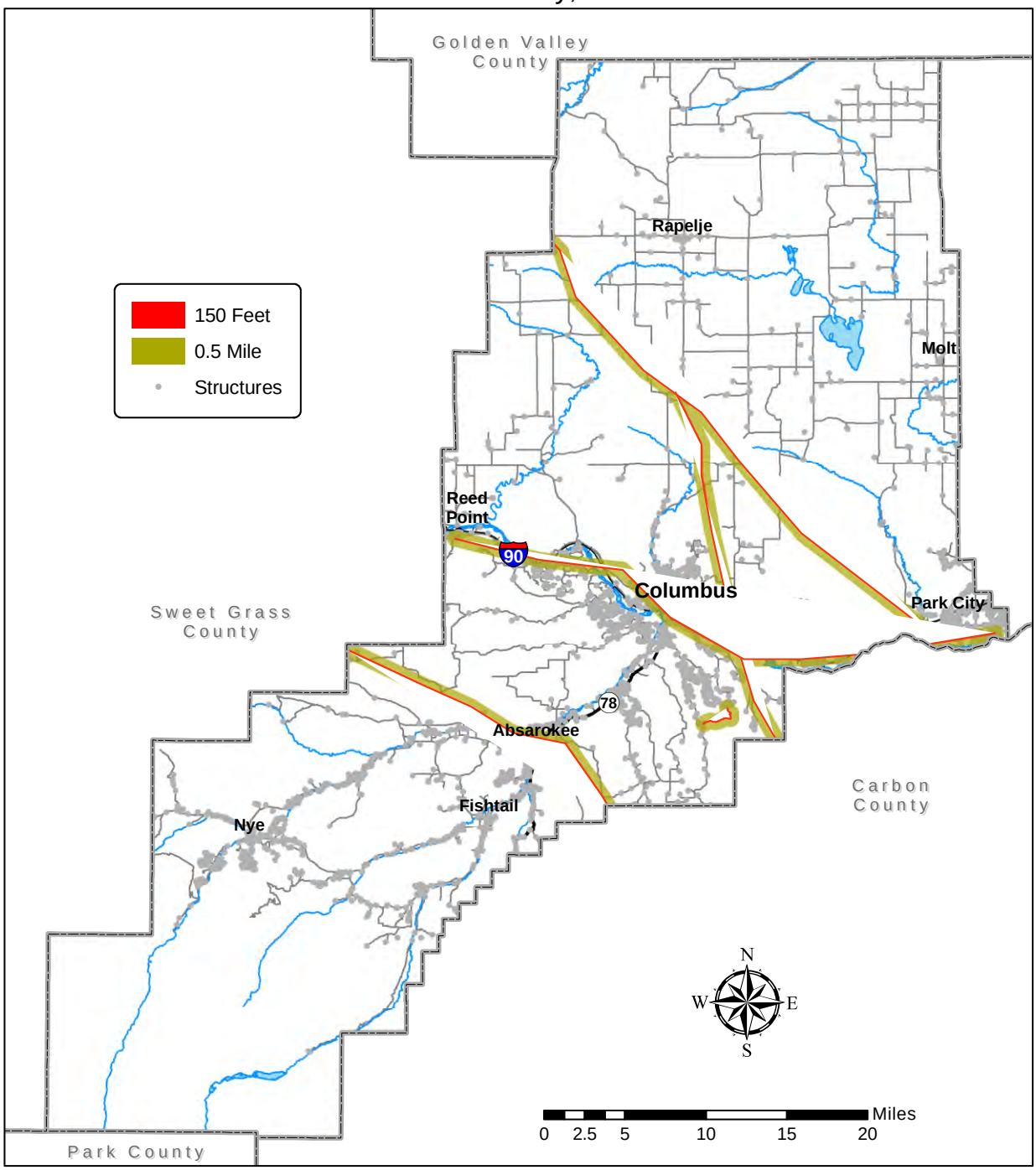
Map 4.6.1E

Enhanced Hazardous Material Release Risk from Pipelines

Stillwater County, Montana



Data Source: Stillwater County
Data Date: 2010
Map Coordinates: NAD 1983, State Plane Montana

Map Created By:
Pam Shrauger
March 2010

BIG SKY HAZARD MANAGEMENT LLC

4.6.2 History

Based on information from the National Response Center database, Table 4.6.2A lists the hazardous material incidents for Stillwater County. Note this database likely does not contain all incidents.

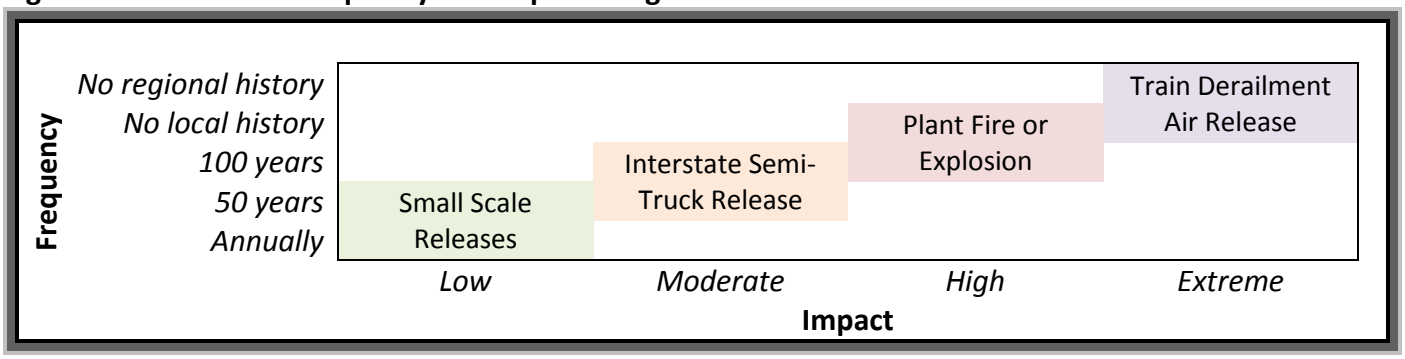
Table 4.6.2A Hazardous Material Releases from 1993-2009

Date	Location	Material	Cause/Impacts
Mar. 30, 1993	Stillwater Mine, Nye	Diesel, 500 gallons	Fuel tank leak.
May 30, 1994	Midnight Canyon Creek	Unknown Oil	Sheen sighted on water.
Feb. 10, 1997	9 miles North of Molt	Ethylene Glycol, 40 gallons	Injection line failed.
Mar. 31, 1997	Highway 301, Molt	Diesel, 150 gallons	Semi-truck was overfilled.
Jul. 4, 2000	Stillwater Mine, Nye	Polychlorinated Biphenyls (PCB), 3 gallons	Electric compressor fell off a barrel and the glass nozzle broke.
Jul. 21, 2001	Davidson and Grove Streets, Absarokee	Natural Gas Explosion	A gas leak under a garage foundation led to an ignition and loss of the garage to fire. Estimated $80,000 in damages.
Jan. 14, 2002	Stillwater Mine, Nye	Copper Sulfate, 688 pounds	Forklift ran into the side of the tote.
Oct. 30, 2004	Stillwater Mine, Nye	Waste Oil, 130 gallons	Tote fell off a forklift.
Sep. 16, 2005	3 miles East of Columbus	Tire Fire	

Source: National Response Center, 2010.

4.6.3 Probability and Magnitude

Figure 4.6.3A Hazard Frequency and Impact Ranges



4.6.4 Vulnerabilities

Table 4.6.4A Hazard Vulnerabilities and Impacts

Jurisdiction(s)	Type	Probable (100-year) Impact	Extreme (500-year) Impact*	Rating
All	Critical Facilities	・ Critical functional losses	・ Structural losses ・ Contents losses ・ Critical data losses ・ Clean-up/debris removal costs	Low-Moderate
All	Critical Infrastructure	・ Road closures	・ Service disruptions ・ Physical losses ・ Loss of electricity ・ Loss of utility gas ・ Loss of potable water	Low-Moderate
All	Structures	・ Displacement/functional losses	・ Structural losses ・ Contents losses ・ Clean-up/debris removal costs	Low-Moderate
All	Population	・ Increased illness ・ Injuries ・ Fatalities		High
All	Values	・ Business disruption losses ・ Reduced air quality ・ Reduced water quality ・ Soil contamination ・ Cancellation of activities ・ Restrictions on activities	・ Service industry losses ・ Agricultural losses ・ Biodiversity losses ・ Habitat damages ・ Historic structure losses ・ Historic item losses ・ Emotional impacts ・ Aesthetic value losses	Moderate-High
All	Future Development	・ Somewhat likely to occur in hazard areas ・ Increases the total hazard exposure		Low-Moderate

* in addition to probable (100-year) impacts

A feasible railroad hazardous material release scenario includes a train derailment and subsequent spill into the Yellowstone River. For estimation purposes, a 20-car train derailment is postulated, evacuation for 24 hours is required, and no hazardous material reaches the Yellowstone River. Table 4.6.4B lists the cost estimates.

Table 4.6.4B Direct Cost Estimate for a Railroad Hazardous Material Release

Impact	Description	Cost
Hazardous material cleanup	Hazmat Team for containment and clean-up: - Hazmat vehicle @ $150/hour x 48 hours - 6-person Pod @ $300/hour x 48 hours - Suits @ $1,000/suit x 6 people - Fuel	$30,000
Security, evacuations, and traffic control	The fire department and county law enforcement are involved in initial assessment, barricading and securing the area, diverting traffic, and conducting evacuations: 10 employees for 48 hours @ $25/hour, plus fuel	$15,000
Sheltering	200 people for 24 hours	$7,075
Medical	2 people treated for skin irritations 4 people checked for respiratory exposure	$1,000
	Total Estimated Cost	**$53,075**

Sources: Stillwater County Sheriff, Billings Police Department, and American Red Cross

Critical Facilities

Based on the estimated buffer zones, the highest risk critical facilities can be identified. Should a hazardous material release affect one of the critical facilities, the level of emergency services available could be reduced. A release near a special needs facility may present unique evacuation challenges. Structural and contents losses may only be seen if an explosion and/or fire are present. Table 4.6.4C shows the critical facility exposure to the various hazardous material risk areas.

Table 4.6.4C Hazardous Material Incident Exposure to Critical Facilities

Within Buffer Zone	Exposure	Specific Facilities
150 feet of Interstate 90	None	
330 feet of Interstate 90	None	
½ mile of Interstate 90	16 critical facilities	
1 mile of Interstate 90	28 critical facilities	
500 feet of the Railroad	7 critical facilities	Columbus Airport Columbus Fire Station Columbus Public Works Park City Fire Station Park City Sewer System Stillwater County Library Stillwater County Search and Rescue
2,000 feet of the Railroad	25 critical facilities	
1.4 miles of the Railroad	28 critical facilities	
5 miles of the Railroad	29 critical facilities	
150 feet of a Pipeline	None	
½ mile of a Pipeline	8 critical facilities	

Critical Infrastructure

Table 4.6.4D Critical Infrastructure Damages

Type	Likelihood of Damages
Electric	Possible
Gasoline/Propane/Oil	Possible
Natural/Utility Gas	Unlikely
Sewer	Unlikely

Type	Likelihood of Damages
Telephone/Internet	Unlikely
Transportation	Likely
Water	Possible

Structures

Comparing the structure database provided by Stillwater County GIS to the buffer zones, Tables 4.6.4E shows the estimated number of structures within the enhanced hazard areas. Fortunately, unless an explosion is present with the release, structures are typically not damaged in a hazardous materials release. Structure losses in an explosion would likely total in the millions of dollars.

Table 4.6.4E Structure Vulnerabilities to Hazardous Material Releases

Within Buffer Zone	Estimated Number of Structures
150 feet of Interstate 90	10 structures
330 feet of Interstate 90	43 structures
½ mile of Interstate 90	951 structures
1 mile of Interstate 90	1,873 structures
500 feet of the Railroad	221 structures
2,000 feet of the Railroad	1,289 structures
1.4 miles of the Railroad	2,090 structures
5 miles of the Railroad	2,760 structures
150 feet of a Pipeline	34 structures
½ mile of a Pipeline	845 structures

Population

Table 4.6.4F shows the estimated population within each of the buffer zones. These estimates are based on 1.79 people per structure. Greater population concentrations may be found in communities, special needs facilities, and businesses. Generally, an incident will affect only a subset of the total population at risk. In a hazardous material release, those in the immediate isolation area would have little to no warning, whereas, the population further away in the dispersion path may have some time to evacuate, depending on the weather conditions, material released, and public notification.

Table 4.6.4F Population Vulnerabilities to Hazardous Material Releases

Within Buffer Zone	Estimated Number of Structures	Estimated Population
150 feet of Interstate 90	10 structures	18 people
330 feet of Interstate 90	43 structures	77 people
½ mile of Interstate 90	951 structures	1,702 people
1 mile of Interstate 90	1,873 structures	3,353 people
500 feet of the Railroad	221 structures	396 people
2,000 feet of the Railroad	1,289 structures	2,307 people
1.4 miles of the Railroad	2,090 structures	3,741 people
5 miles of the Railroad	2,760 structures	4,940 people
150 feet of a Pipeline	34 structures	61 people
½ mile of a Pipeline	845 structures	1,513 people

4.6.5 Data Limitations

Data limitations include:

- Estimating what substances and the quantity that may be released in any given location
- Lack of a study with the numbers and types of hazardous materials being hauled on the interstate and railroad in the county

4.7 Landslide and Avalanche

Table 4.7A Hazard Summary for Stillwater County

Overall Hazard Rating	Low	
Probability of High Impact Event	Low	No local or regional record of landslides or avalanches affecting the majority of citizens.
Vulnerability	Low	Most losses are limited to small stretches of roadways or very limited injuries or deaths.

Table 4.7B Federal Major Disaster and Emergency Declarations

Declaration	Year	Additional Information	Casualties	Damages/Assistance
None				

4.7.1 Description

Landslides and avalanches are similar in nature such that both occur when a material on the surface of the earth cannot be supported any longer and gives way to gravity. In the case of an avalanche, the substance is snow, and for a landslide, the substance is mud, rock, or other geologic material. Both can occur rapidly with little warning. Due to the conditions needed for landslides and avalanches, only the Stillwater County jurisdiction, and not the Town of Columbus, is vulnerable to these hazards.

Landslide

A landslide is the movement of rock, soil, artificial fill, or a combination thereof on a slope in a downward or outward direction. The primary causes of landslides are slope saturation by water from intense rainfall, snowmelt, or changes in ground-water levels on primarily steep slopes, earthen dams, and the banks of lakes, reservoirs, canals, and rivers. (US Geological Survey, 2004) Other causative factors include steepening of slopes by erosion or construction, alternate freezing or thawing, earthquake shaking, volcanic eruptions, and the loss of vegetation from construction or wildfires. The saturation or destabilization of a slope allows the material to succumb to the forces of gravity or ground movement.

Many different types of landslides exist: slides, falls, topples, flows, and lateral spreads. Slides involve the mass movement of material from a distinct zone of weakness separating the slide material from the more stable underlying material. The primary types of slides are rotational slides and translational slides. Falls occur when materials, mostly rocks and boulders, fall abruptly from a steep slope or cliff. Falls are strongly influenced by gravity, mechanical weathering, and the presence of interstitial water. Topples are similar to falls, yet they pivot around a connection point at the base of the material and are most often caused by gravity or fluids in the cracks of the rocks. Flows typically have a higher percentage of water material embedded in them and behave more like a liquid than other types of landslides. The five primary categories of flows are: debris flows, debris avalanches, earthflows, mudflows, and creeps. Lateral spreads usually occur on gentle slope or flat surfaces when liquefaction

occurs and leads to fractures on the surface. Complex landslides involve any combination of these types. (US Geological Survey, 2004)

Earth movement, including not only landslides but also slumping and subsidence, is possible in Stillwater County. Slope, vegetative cover, soil properties, past human activities such as mining, road construction, and irrigation canal operation, and snowmelt/precipitation all affect the likelihood of earth movement. The US Department of Agriculture has mapped the soils in Stillwater County; this map, however, is too detailed for useful inclusion in this plan. Soil suitability is considered by the Stillwater County Planning Board during subdivision review on proposed developments.

Landslides are typically associated with mountainous regions, but they can also occur in areas of low relief. In these areas, the landslides are often the result of cut-and-fill failures (from roadway and building excavations), river bluff failures, lateral spreading, or mine collapse. (US Geological Survey, 2004)

A drive around the benches and foothills of Stillwater County shows ample visual evidence of past localized slumping. Slumping occurs when soils prone to movement are located on slopes, which then become saturated. The saturation can occur as a result of snowmelt with or without rain, heavy rain events, and/or seepage from irrigation facilities. Soils with high clay content hold the most moisture and thus become the heaviest and most prone to sliding. Specifically, roads known to have a history of landslides in Stillwater County are:

- Big Coulee Road
- Stillwater River Road between Nye and Absarokee
- Three locations in Midnight Canyon
- Madison grade
- Countryman Creek Road at Mexican Joe Hill
- The road to Woodbine Campground
- Mystic Lake Road
- West Rosebud Road
- Fiddler Creek Road
- Pine Hill Road near Reed Point

Source: Stillwater County, date unknown.

The platinum mines in Stillwater County are regulated by the US Occupational Safety and Health Administration and the Montana Bureau of Mines and Geology. Because these facilities are highly regulated for safety, and because the general public has limited access to the underground locations, mine cave-ins are not included in this evaluation.

Avalanche

When snow accumulations on a slope cannot be supported any longer, the snow support structure may break and fall creating an avalanche. The subsequent rush of unsupported snow can bury and move things in its path. The majority of avalanches do not cause any damage; occasionally however, people and property may fall in their paths.

According to the Montana Disaster and Emergency Services website, "If it is assumed that an accumulation of snow is possible anywhere in Montana, then we can evaluate the potential for hazard solely on the basis of terrain characteristics. The most important factor by far is terrain steepness. Wet snow avalanches can start on slopes of 20 degrees or less, but the optimum slope angle for avalanche starting zones is 25-45 degrees. Slopes steeper than 45 degrees will not normally retain enough snow to generate large avalanches, but they may produce small sluffs that trigger major avalanches on the slopes below. Therefore, all slopes of 20 degrees and greater should be considered as potential avalanche sites." (Montana Disaster and Emergency Services, 2010a)

In order for an avalanche to occur, factors such as slope, snow cover, a weak layer in the snow, and a trigger must be present. Avalanche danger increases with major snowstorms and periods of thaw. Approximately 90% of avalanches start on slopes of 30-45 degrees, most often on slopes above the timberline facing away from prevailing winds. Most avalanches occur in the backcountry. (Colorado Avalanche Information Center, date unknown)

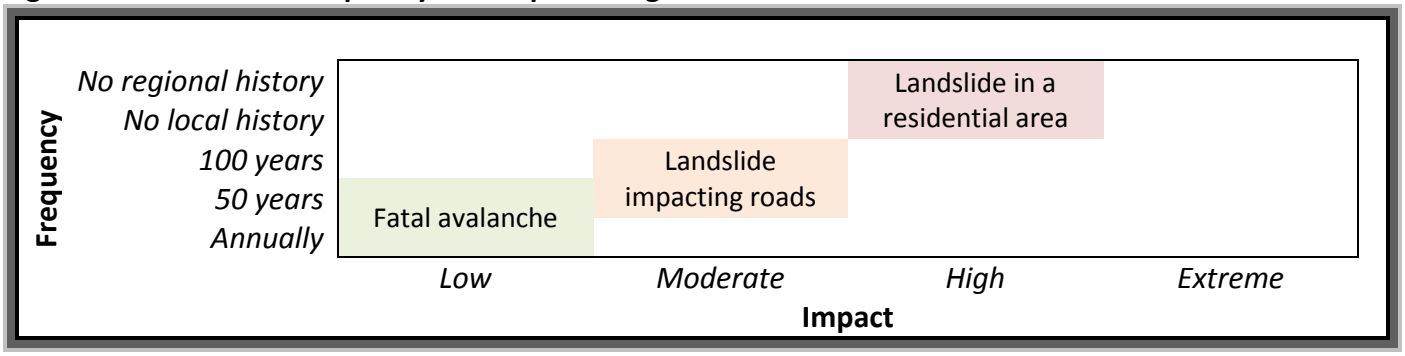
Stillwater County is vulnerable to avalanches, however, during most winters, the vulnerability is limited to several areas of the county, specifically the higher elevation public lands in the southern area of the county. During the winter and spring months, individual and small groups of recreational skiers and snowmobile riders are exposed to avalanche danger primarily on forest service lands. Montana Department of Transportation employees who clear snow from the road in the spring are also exposed to avalanche danger. Most of the avalanches that release in the county do not affect people and none of the communities in the county are situated in avalanche paths.

4.7.2 History

Landslides and avalanches occur seasonally in Stillwater County. None have made enough of an impact to result in a disaster declaration. Landslides have damaged road infrastructure and have required debris removal and road repairs by transportation crews. Avalanches have not led to large-scale losses, however, significant search and rescue resources are often needed for backcountry rescues and recoveries. A search of the Avalanche.org website does not show any major avalanches occurring in Stillwater County since 1999.

4.7.3 Probability and Magnitude

Figure 4.7.3A Hazard Frequency and Impact Ranges



4.7.4 Vulnerabilities

Table 4.7.4A Hazard Vulnerabilities and Impacts

Jurisdiction(s)	Type	Probable (100-year) Impact	Extreme (500-year) Impact*	Rating
Stillwater County	Critical Facilities			Low
Stillwater County	Critical Infrastructure	• Road closures		Low-Moderate
Stillwater County	Structures		• Structural losses • Contents losses • Displacement/functional losses • Clean-up/debris removal costs	Low-Moderate
Stillwater County	Population	• Injuries • Fatalities		Low-Moderate
Stillwater County	Values		• Aesthetic value losses	Low
Stillwater County	Future Development	• Unlikely to occur in hazard areas		Low-Moderate

* in addition to probable (100-year) impacts

Population

The primary threats to the population from landslides and avalanches are while driving and recreating. Landslide and avalanches can quickly bury and destroy road infrastructure, endangering those on the roadways. Most often, avalanches threaten those in the hazard areas such as snowmobilers, skiers, snowboarders, and climbers.

Future Development

New development generally occurs outside landslide and avalanche prone areas; soil type and stability is considered during the Stillwater County subdivision review process.

4.7.5 Data Limitations

Data limitations include:

- Limited studies of the landslide and avalanche hazards in Stillwater County
- Difficulties quantifying vulnerabilities due to site-specific nature of landslides and avalanches

4.8 Severe Weather

including tornadoes, hail, downbursts, lightning, strong winds, blizzards, heavy snow, ice storms, and extreme cold

Table 4.8A Hazard Summary for Stillwater County and the Town of Columbus

Overall Hazard Rating	High	
Probability of High Impact Event	Moderate	Frequency is approximately once every 100 years. Low impact events occur more frequently.
Vulnerability	Moderate-High	Critical infrastructure, agriculture, structures, and the population are at greatest risk.

Table 4.8B Federal Major Disaster and Emergency Declarations

Declaration	Year	Additional Information	Casualties	Damages/Assistance
None				

4.8.1 Description

Extreme weather conditions can exist during any season in Montana. Thunderstorms, strong winds, and winter weather can all be hazardous under the right conditions and locations. Strong winds and tornadoes can take down trees, damage structures, tip high profile vehicles, and create high velocity flying debris. Large hail can damage crops, dent vehicles, break windows, and injure or kill livestock, pets, and people. Winter storms can cause hazardous driving conditions, power outages, and community isolation.

Tornadoes

Tornadoes form when the right amount of shear is present in the atmosphere and causes the updraft and downdraft of a thunderstorm to rotate. A funnel cloud is the rotating column of air extending out of a cloud base, but not yet touching the ground. The funnel cloud does not become a tornado until it touches the ground. Once in contact with the surface, it can create great damage over a small area. In 1971, Dr. Theodore Fujita developed the Fujita tornado damage scale to categorize various levels of tornado damage. In 2006, enhancements to this scale resulted in more accurate categorizations of damage and the associated wind speeds. Both scales are shown in Table 4.8.1A.

Table 4.8.1A Tornado Scales

Fujita Scale		Enhanced Fujita Scale	
Scale	**Estimated Wind Speed**	**Scale**	**Estimated Wind Speed**
F0	<73 mph	EF0	65-85 mph
F1	73-112 mph	EF1	86-110 mph
F2	113-157 mph	EF2	111-135 mph
F3	158-206 mph	EF3	136-165 mph
F4	207-260 mph	EF4	166-200 mph
F5	261-318 mph	EF5	>200 mph

Source: Storm Prediction Center, 2010.

Hail

Hail develops when a supercooled droplet collects a layer of ice and continues to grow, sustained by the updraft. Once the hail stone cannot be held up any longer by the updraft, it falls to the ground. Hail one inch or greater in diameter is considered "severe" by the National Weather Service. Hail up to two inches in diameter, larger than a golf ball, has been reported in Stillwater County. Nationally, hailstorms cause nearly $1 billion in property and crop damage annually, as peak activity coincides with peak agricultural seasons. Major hailstorms also cause considerable damage to buildings and automobiles, but rarely result in loss of life.

Downbursts

Downburst winds, which can cause more widespread damage than a tornado, occur when air is carried into a storm's updraft, cools rapidly, and comes rushing to the ground. Cold air is denser than warm air, and therefore, wants to fall to the surface. On warm summer days, when the cold air can no longer be supported up by the storm's updraft, or an exceptional downdraft develops, the air crashes to the ground in the form of strong winds. These winds are forced horizontally when they reach the ground and can cause significant damage. These types of strong winds can also be referred to as straight-line winds. Thunderstorm winds of 58 miles per hour (mph) or greater are considered "severe" by the National Weather Service. Downbursts with a diameter of less than 2.5 miles are called microbursts and those with a diameter of 2.5 miles or greater are called macrobursts. A derecho, or bow echo, is a series of downbursts associated with a line of thunderstorms. This type of phenomenon can extend for hundreds of miles and contain wind speeds in excess of 100 mph.

Lightning

Although not considered severe by National Weather Service definition, lightning and heavy rain can also accompany thunderstorms. Lightning develops when ice particles in a cloud move around, colliding with other particles. These collisions cause a separation of electrical charges. Positively charged ice particles rise to the top of the cloud and negatively charged ones fall to the middle and lower sections of the cloud. The negative charges at the base of the cloud attract positive charges at the surface of the Earth. Invisible to the human eye, the negatively charged area of the cloud sends a charge called a stepped leader toward the ground. Once it gets close enough, a channel develops between the cloud

and the ground. Lightning is the electrical transfer through this channel. The channel rapidly heats to 50,000 degrees Fahrenheit and contains approximately 100 million electrical volts. The rapid expansion of the heated air causes thunder. (National Weather Service, 2010b)

Strong Winds

Strong winds are a common theme with many severe weather events, however, they can also occur outside of tornadoes, severe thunderstorms, and winter storms. These winds typically develop with strong pressure gradients and gusty frontal passages. The closer and stronger two systems (one high pressure, one low pressure) are, the stronger the pressure gradient, and therefore, the stronger the winds are. These types of winds frequently occur throughout Montana and have been known to cause damages.

Blizzards

Blizzards, as defined by the National Weather Service, are a combination of sustained winds or frequent gusts of 35 mph or greater and visibilities of less than a quarter mile from falling or blowing snow for three hours or more. A blizzard, by definition, does not indicate heavy amounts of snow, although they can happen together. The falling or blowing snow usually creates large drifts from the strong winds. The reduced visibilities make travel, even on foot, particularly treacherous. The strong winds may also support dangerous wind chills.

Heavy Snow

Large quantities of snow may fall during winter storms. In general, six inches or more in 12 hours or eight inches or more in 24 hours constitutes conditions that may significantly hamper travel or create hazardous conditions. Smaller amounts can also make travel hazardous, but in most cases, only results in minor inconveniences. Heavy wet snow before the leaves fall from the trees in the fall or after the trees have leafed out in the spring may cause problems with broken tree branches and power outages. These types of storms often cause the most winter storm related damages in Stillwater County.

Ice Storms

Ice storms develop when a layer of warm (above freezing), moist air aloft coincides with a shallow cold (below freezing) pool of air at the surface. As snow falls into the warm layer of air, it melts to rain, and then freezes on contact when hitting the frozen ground or cold objects at the surface, creating a smooth layer of ice. This phenomenon is called freezing rain. Similarly, sleet occurs when the rain in the warm layer subsequently freezes into pellets while falling through a cold layer of air at or near the Earth's surface. Extended periods of freezing rain can lead to accumulations of ice on roadways, walkways, power lines, trees, and buildings. Almost any accumulation can make driving and walking hazardous. Thick accumulations can bring down trees and power lines.

Extreme Cold

Extended periods of cold temperatures frequently occur throughout the winter months in Stillwater County. Heating systems compensate for the cold outside. Most people limit their time outside during extreme cold conditions, but common complaints usually include pipes freezing and cars refusing to start. When cold temperatures and wind combine, dangerous wind chills can develop.

Wind chill is how cold it "feels" and is based on the rate of heat loss on exposed skin from wind and cold. As the wind increases, it draws heat from the body, driving down skin temperature, and eventually, internal body temperature. Therefore, the wind makes it feel much colder than the actual temperature. For example, if the temperature is 0°F and the wind is blowing at 15 mph, the wind chill is -19°F. At this wind chill, exposed skin can freeze in 30 minutes. Wind chill does not affect inanimate objects. (National Weather Service, 2010c)

4.8.2 History

Severe weather reports are collected from weather observing stations and trained spotters by the National Weather Service (NWS) office in Billings. These records are archived by the National Climatic Data Center. Since official records can only indicate events that have been reported to the National Weather Service, events are often underreported in rural areas and areas lacking trained spotters.

Tornadoes

Since 1950, only one tornado has been reported in Stillwater County. The tornado occurred on August 11, 2005 at about 7:27 p.m. and traveled from six miles west of Molt to 1 mile southeast of Molt. The tornado was an F0 on the Fujita scale. No damage was reported. (National Climatic Data Center, 2010)

Hail

Since 1950, 48 severe hail reports (1 inch or greater) have been recorded in Stillwater County with an annual average of 0.8 severe hail events per year. Using only data from 2000-2009 since severe weather reporting and documentation has improved over time, 28 severe hail reports (1 inch or greater) have been recorded in Stillwater County with an annual average of 2.8 severe hail events per year. Table 4.8.2A lists the severe hail events of 1.50 inches in diameter or greater or causing damages.

Table 4.8.2A Severe Hail Reports of 1.50 Inches or Greater or Causing Damages

Location	Date	Size	Impacts
Stillwater County	06/07/1958	2.00 inches	
Stillwater County	06/18/1958	1.75 inches	
Stillwater County	07/05/1987	1.75 inches	
Stillwater County	05/20/1991	1.75 inches	
Stillwater County	07/08/1992	1.50 inches	
Park City	06/16/1994	1.75 inches	$5,000 estimated property damage.
Reed Point, 5 miles SW	06/16/1995	1.75 inches	

Table 4.8.2A Severe Hail Reports of 1.50 Inches or Greater or Causing Damages (continued)

Location	Date	Size	Impacts
Molt, 8 miles N	06/26/1996	1.75 inches	
Molt	07/20/1997	1.75 inches	
Park City	06/26/2001	1.00 inches	Windows were broken on homes.
Rapelje, 15 miles N	07/19/2001	1.75 inches	
Reed Point, 7 miles N	06/22/2004	1.75 inches	
Columbus, 6 miles W	06/22/2004	1.75 inches	
Columbus	06/22/2004	1.75 inches	
Columbus, 1 mile W	06/22/2004	1.75 inches	
Molt, 1 mile W	08/11/2005	1.75 inches	
Rapelje, 4 miles SSE	05/13/2007	1.75 inches	Numerous windows were broken.
Park City, 1 mile ENE	05/13/2007	1.75 inches	
Reed Point, 5 miles N	07/14/2007	1.75 inches	
Absarokee	06/16/2010	1.75 inches	Significant damages to building exteriors and windows.

Source: National Climatic Data Center, 2010; local citizens.

Downbursts

Since 1950, 33 severe thunderstorm wind reports (58 mph or greater) have been recorded in Stillwater County with an annual average of 0.55 severe thunderstorm wind events per year. Using only data from 2000-2009 since severe weather reporting and documentation has improved over time, 23 severe thunderstorm wind reports (58 mph or greater) have been recorded in Stillwater County with an annual average of 2.3 severe thunderstorm wind events per year. Table 4.8.2B lists the severe thunderstorm wind events of 75 mph or greater or causing damages.

Table 4.8.2B Severe Thunderstorm Wind Reports of 75 mph or Greater or Causing Damages

Location	Date	Speed	Impacts
Park City	06/29/1994	60 mph	$5,000 estimated property damage.
Absarokee	07/29/1995	64 mph	Trees knocked down.
Absarokee	07/13/1998	Unknown	Trees knocked onto power lines. Considerable crop damage. Minor damage to homes and businesses. $25,000 estimated property damage. $500,000 estimated crop damage.
Rapelje, 4 miles S	07/23/2000	Unknown	Roof blown off. Trees knocked down. $20,000 estimated property damage.
Molt, 6 miles SW	07/27/2001	70 mph	Trees knocked down.
Absarokee	06/21/2005	81 mph	Awning blown off house. Trees knocked down.
Absarokee, 7 miles S	08/09/2005	75 mph	Heavy lawn furniture tossed from deck.
Park City, 1 mile SE	07/12/2006	81 mph	Roof shingle damage.
Rapelje, 4 miles SSE	05/13/2007	76 mph	Numerous windows broken. Numerous tree branches knocked down.
Columbus, 7 miles NE	07/01/2008	70 mph	Tree knocked onto a power line and building.
Columbus, 7 miles E	06/30/2009	70 mph	Trees knocked down.

Source: National Climatic Data Center, 2010.

Strong Winds

Since 1950, 27 strong non-thunderstorm wind reports (58 mph or greater) have been recorded in Stillwater County with an annual average of 0.45 severe thunderstorm wind events per year. Using only data from 2000-2009 since severe weather reporting and documentation has improved over time, 18 strong non-thunderstorm wind reports (58 mph or greater) have been recorded in Stillwater County with an annual average of 1.8 strong non-thunderstorm wind events per year. Table 4.8.2C lists the strong non-thunderstorm wind events of 75 mph or greater or causing damages.

Table 4.8.2C Strong Non-Thunderstorm Wind Reports of 75 mph or Greater or Causing Damages

Location	Date	Speed	Impacts
Fishtail	11/20-22/1998	75 mph	
Stillwater County	12/28/1998	Unknown	Power was knocked out to the Absarokee area for one hour.
Nye	02/03/1999	91 mph	
Nye	02/01/2006	81 mph	
Nye, 2 miles S	11/13/2006	79 mph	
Nye	01/02/2007	76 mph	
Nye, 2 miles S	01/07/2007	93 mph	
Fishtail, 3 miles W	02/16/2007	81 mph	

Source: National Climatic Data Center, 2010.

Winter Weather

Snow and cold are normal occurrences in Stillwater County throughout the late fall, winter, and early spring months. Summaries of the more significant events due to their extreme conditions or damages are shown in Table 4.8.2D. The National Climatic Data Center also lists several other lower impact types of common winter weather events.

Table 4.8.2D Winter Weather Events

Date	Type	Impacts
1978		The Winter of 1978 was noted by meeting attendees to have been especially severe.
12/25/1996	Heavy Snow	18 inches of snow at Mystic Lake.
10/24/1997	Heavy Snow	18 inches of snow at Mystic Lake.
12/03-04/1998	Blizzard	18 inches of snow at Nye. Visibilities near zero. Interstate 90 was closed between Columbus and Bozeman after numerous accidents were reported.
12/29-30/1998	Ice Storm	Portions of Interstate 90 were closed.
04/01/1999	Heavy Snow	14 inches of snow at Nye.
04/29/1999	Heavy Snow	10 inches of snow at Nye.
01/10-12/2000	Heavy Snow	14 inches of snow at Nye.
03/07-18/2000	Heavy Snow	14 inches of snow at Nye and 12 inches at Columbus.
04/21/2001	Heavy Snow	10 inches of snow at Nye.
06/14/2001	Heavy Snow	12 inches of snow at Mystic Lake.
01/27/2002	Heavy Snow	12 inches of snow at Nye.

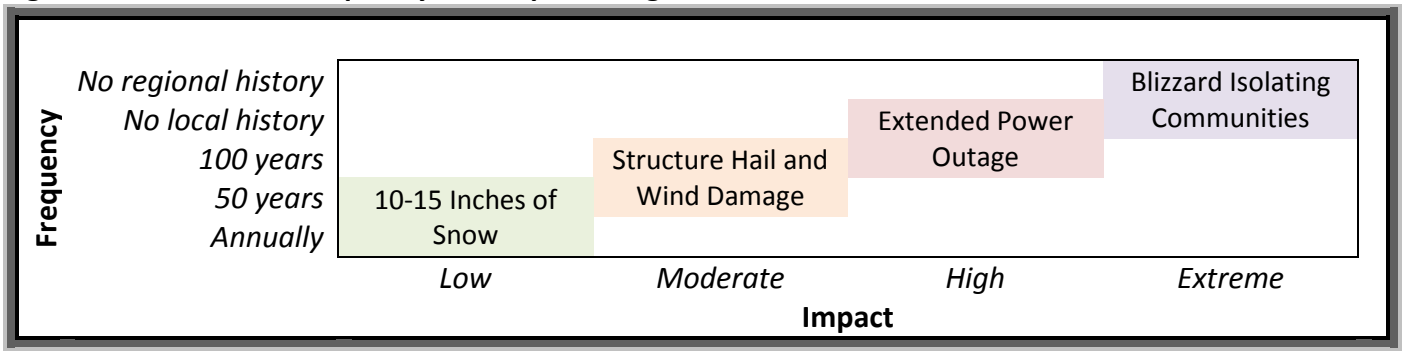
Table 4.8.2D Winter Weather Events (continued)

Date	Type	Impacts
04/18/2002	Heavy Snow	10 inches of snow at Dean.
10/30/2002	Heavy Snow	10 inches of snow at 3 miles SW of Nye.
02/02/2003	Heavy Snow	14 inches of snow at Nye.
03/09/2003	Heavy Snow	13 inches of snow at Mystic Lake and 10 inches at Columbus.
03/18/2003	Heavy Snow	10 inches of snow at Mystic Lake.
03/27/2003	Heavy Snow	20 inches of snow at Mystic Lake and 13 inches at Nye.
10/31/2003	Heavy Snow	10 inches of snow at Nye.
02/29/2004	Heavy Snow	32 inches of snow at 15 miles S of Nye, 29 inches at 2 miles S of Nye, 22 inches at Nye, 15 inches at 4 miles S of Columbus, and 12 inches at 6 miles SW of Columbus.
10/23-24/2004	Heavy Snow	10 inches of snow at 18 miles SW of Fishtail.
03/24/2005	Heavy Snow	10 inches of snow at Rapelje.
10/05/2005	Heavy Snow	4 inches of snow at 1 mile west of Columbus with many tree branches down and power outages.
10/09/2006	Heavy Snow	12 inches of snow at 6 miles SW of Nye.
03/30/2007	Winter Storm	5-8 inches of snow at 2 miles SE of Park City with 2-3 foot drifts across many roads.
01/19-20/2008	Heavy Snow	10 inches of snow at 10 miles N of Absarokee.
10/09-12/2008	Heavy Snow	44 inches of snow at Mystic Lake, 35 inches at 7 miles SW of Fishtail, 32 inches at 7 miles S of Absarokee, 31 inches at Nye, 24 inches at 15 miles NW of Columbus, 19 inches at Columbus, 17 inches at Absarokee, and 14 inches at 2 miles SE of Park City.
03/29-30/2009	Winter Storm	Heavy snow combined with strong winds of 25-35 mph with gusts at 30-40 mph to produce visibilities of less than a ¼ mile. Snowfall exceeded 12 inches in Stillwater County.

Other events with less than 10 inches of snow are common, but no impacts were listed.
Source: National Climatic Data Center, 2010.

4.8.3 Probability and Magnitude

Figure 4.8.3A Hazard Frequency and Impact Ranges



4.8.4 Vulnerabilities

Table 4.8.4A Hazard Vulnerabilities and Impacts

Jurisdiction(s)	Type	Probable (100-year) Impact	Extreme (500-year) Impact*	Rating
All	Critical Facilities	▪ Clean-up/debris removal costs	▪ Structural losses ▪ Contents losses ▪ Critical functional losses ▪ Critical data losses	Low-Moderate
All	Critical Infrastructure	▪ Service disruptions ▪ Physical losses ▪ Loss of electricity ▪ Road closures	▪ Loss of potable water ▪ Loss of sanitary sewers ▪ Loss of telephone service ▪ Loss of internet service ▪ Fuel/energy shortages	Moderate-High
All	Structures	▪ Clean-up/debris removal costs	▪ Structural losses ▪ Contents losses ▪ Displacement/functional losses	Moderate
All	Population	▪ Injuries	▪ Fatalities	Moderate
All	Values	▪ Agricultural losses ▪ Habitat damages ▪ Cancellation of activities ▪ Aesthetic value losses	▪ Business disruption losses ▪ Historic structure losses ▪ Historic item losses ▪ Emotional impacts	Moderate-High
All	Future Development		▪ Somewhat likely to occur in hazard areas ▪ Increases the total hazard exposure	Moderate

* in addition to probable (100-year) impacts

Table 4.8.4B Loss Estimate for a Wind Event (40 mph sustained, gusts to 75 mph for 24 hours)

Impact	Description	Cost
Partial residential roof damage	Some shingles lost: 25 homes @ $2,500 each	$62,500
Complete residential roof loss	Roof replacement: 5 homes @$5,000 each	$25,000
Damage to transmission lines	Scattered 6 to 8 hour outages Wire breaks, tree clearing, circuit re-closure, small number of pole replacements	$50,000
Damage to vegetation	Prep and removal of 5 acres of timber blown down on National Forest property Removal and replacement of residential vegetation damaged	$25,000
Personal injury	Injuries caused by flying debris and strains from clean-up: 5 people @ $150/person	$750
	Total Estimated Cost	**$163,250**

Winter Storm Scenario: A late winter storm with heavy snowfall occurs across the southern half of the county. Snowfall reaches over six feet in the southern-most mountains, three feet in the foothills and at Absarokee, tapers to one foot at Columbus, and is six inches or less across the rest of the county. Due to the lateness in the season, the snow has high moisture content. The snow is accompanied by moderate winds. Temperatures are only slightly below freezing so that ice also forms on power lines and some pavement underneath the snow. The storm lasts for two days. Storms similar to this occurred in April 2003 and May 2005. Many of the costs estimated in Table 4.8.4C are based upon the 2003 storm experience. Additional losses could result from retail business interruption.

Table 4.8.4C Loss Estimate for a Late Winter Storm

Impact	Description	Cost
Damage to utility lines	Dispatch and crews (based on 2003 storm)	$500,000
Lost business in Absarokee	Blocked roads for 2 days with no skiers: 2,000 skier-days @ $30/skier-day	$60,000
Structure damage	Roof damage: 5 structures @$7,500 each	$37,500
Snow removal and sanding on federal and state highways	Personnel ($25/hour), equipment ($15/hour), sand ($12/yard), and de-icer ($1/gallon)	$11,000
Snow removal and sanding on county roads	Personnel, equipment, and fuel: 2 days @ $10,000/day	$20,000
Snow removal and sanding in Columbus	Personnel, equipment, and fuel	$3,000
Snow removal and sanding in Absarokee	Personnel, equipment, sand, and fuel (staffed equipment at $95/hour)	$15,000
Snow removal on private property	700 accounts @ 0.75 hours each and $60/hour	$31,500
Vehicle accidents	Fender benders: 5 accidents with 10 vehicles total @ $2,500/vehicle	$25,000
Local ambulance runs	Strains and falls: 3 runs @ $500/run	$1,500
Hospital overnights	Broken hip: 5 nights @ $1,500/night	$7,500
Hospital emergency room visits with x-ray and blood work	Slips, falls, and strains: 4 visits @ $750/visit	$3,000
Doctor visits	Strains, sprains, slips, and falls: 10 visits @ $50/visit	$500
Law enforcement calls	Personnel time: 30 calls @ 3 hours each and $25/hour	$2,250
Vegetative damage	Broken limbs: 20 locations @$250/tree	$5,000
	Total Estimated Cost	**$722,750**

Critical Facilities

Many of the critical facilities, although adequate for most events, may not be able to withstand 160 mph winds, as recommended by the Federal Emergency Management Agency. (Federal Emergency Management Agency, 2004b) Most structures should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Heavy snow loads on roofs, particularly large span roofs, can cause roofs to leak or even collapse, depending on their construction. Extremely cold temperatures may cause pipes to freeze and subsequently burst, causing water damage. Probably the greatest issue for critical facilities during significant winter weather is the inaccessibility of such facilities due to poor roadways, utility outages, or dangerous wind chills. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out.

The Storm Prediction Center has developed damage indicators to be used with the Enhanced Fujita Scale for different types of buildings. Table 4.8.4D shows the indicators for institutional buildings.

Table 4.8.4D Institutional Buildings

Damage Description	**Wind Speed Range** (expected in parentheses)
Threshold of visible damage	59-88 mph (72 mph)
Loss of roof covering (<20%)	72-109 mph (86 mph)
Damage to penthouse roof and walls, loss of rooftop HVAC equipment	75-111 mph (92 mph)
Broken glass in windows or doors	78-115 mph (95 mph)
Uplift of lightweight roof deck and insulation, significant loss of roofing material (>20%)	95-136 mph (114 mph)
Façade components torn from structure	97-140 mph (118 mph)
Damage to curtain walls or other wall cladding	110-152 mph (131 mph)
Uplift of pre-cast concrete roof slabs	119-163 mph (142 mph)
Uplift of metal deck with concrete fill slab	118-170 mph (146 mph)
Collapse of some top story exterior walls	127-172 mph (148 mph)
Significant damage to building envelope	178-268 mph (210 mph)

Source: Storm Prediction Center, 2010.

Critical Infrastructure

Above ground infrastructure, namely overhead power lines, communications towers and lines, and structures, are very susceptible to severe weather. High winds and falling trees can damage this type of infrastructure and disrupt services. Table 4.8.4E shows the Enhanced Fujita Scale Damage Indicators for electric transmission lines.

Table 4.8.4E Electrical Transmission Lines

Damage Description	**Wind Speed Range** (expected in parentheses)
Threshold of visible damage	70-98 mph (83 mph)
Broken wood cross member	80-114 mph (99 mph)
Wood poles leaning	85-130 mph (108 mph)
Broken wood poles	98-142 mph (118 mph)
Broken or bent steel or concrete poles	115-149 mph (138 mph)
Collapsed metal truss towers	116-165 mph (141 mph)

Source: Storm Prediction Center, 2010.

The most difficult network to maintain during winter weather is the road infrastructure. During periods of heavy snow, ice, or blizzards, roads can quickly become impassable, stranding motorists and isolating communities.

Table 4.8.4F Critical Infrastructure Damages

Type	**Likelihood of Damages**
Electric	Highly Likely
Gasoline/Propane/Oil	Possible
Natural/Utility Gas	Unlikely
Sewer	Possible

Type	**Likelihood of Damages**
Telephone/Internet	Possible
Transportation	Highly Likely
Water	Possible

Structures

With the entire county at risk from severe weather, estimates of damages are hard to determine. Realistically, an event involving a tornado or severe thunderstorm would most likely affect a small area. If that area were in a developed part of the county, roughly 10-20 homes could be damaged. Fifteen homes at a damage factor of 30% would result in roughly $459,900 in damages (15 homes x $102,200/home x 30% damage). Tables 4.8.4G and 4.8.4H show the damage indicators for various types of residential and ranch structures. In Stillwater County, 763 residences are mobile homes, including 134 in Columbus. (Montana Census and Economic Information Center, 2010) Snow load ratings for roofs range from 30 pounds per cubic foot in Columbus, Reed Point, Park City and the northern part of the county, 35 pounds per cubic foot for the Absarokee area, and 85 pounds per cubic foot for southern Stillwater County. (Stillwater County, 2007a)

Table 4.8.4G One and Two Family Residences

Damage Description	**Wind Speed Range** (expected in parentheses)
Threshold of visible damage	53-80 mph (65 mph)
Loss of roof covering material (<20%), gutters, and/or awning; loss of vinyl or metal siding	63-97 mph (79 mph)
Broken glass in doors and windows	79-114 mph (96 mph)
Uplift of roof deck and loss of significant roof covering material (>20%); collapse of chimney; garage doors collapse inward; failure of porch or carport	81-116 mph (97 mph)
Entire house shifts off foundation	103-141 mph (121 mph)
Large sections of roof structure removed, most walls remain standing	104-142 mph (122 mph)
Top floor exterior walls collapsed	113-153 mph (132 mph)
Most interior walls of top story collapsed	128-173 mph (148 mph)
Most walls collapsed in bottom floor, except small interior rooms	127-178 mph (152 mph)
Total destruction of entire building	142-198 mph (170 mph)

Source: Storm Prediction Center, 2010.

Table 4.8.4H Single Wide Manufactured Homes

Damage Description	**Wind Speed Range** (expected in parentheses)
Threshold of visible damage	51-76 mph (61 mph)
Loss of shingles or partial uplift of one-piece metal roof covering	61-92 mph (74 mph)
Unit slides off block piers but remains upright	72-103 mph (87 mph)
Complete uplift of roof, most walls remain standing	73-112 mph (89 mph)
Unit rolls on its side or upside down, remains essentially intact	84-114 mph (98 mph)
Destruction of roof and walls leaving floor and undercarriage in place	87-123 mph (105 mph)
Unit rolls or vaults, roof and walls separate from floor and undercarriage	96-128 mph (109 mph)
Undercarriage separates from unit, rolls, tumbles, and is badly bent	101-136 mph (118 mph)
Complete destruction of unit, debris blown away	110-148 mph (127 mph)

Source: Storm Prediction Center, 2010.

Population

Since structures are vulnerable to severe weather, those inside them are also at risk. The National Weather Service in Billings warns for tornadoes, severe thunderstorms, high winds, and winter storms for Stillwater County. Meteorologists use a variety of tools such as Doppler radar and weather spotters to predict these hazardous events and issue warnings that are broadcast over NOAA Weather Radio and other media. NOAA weather radio transmitters are located in Billings and Ryegate, covering parts of the county, and those with specially built receivers can be automatically alerted to weather hazards.

Mobile homes, even if tied down, and automobiles are not safe places to be during a tornado. With 763 mobile homes in Stillwater County, approximately 1,585 people are at enhanced risk from tornadoes and strong winds. Besides structure failure, wind-driven projectiles and shattered glass can injure or kill occupants. Lightning strikes can occur with little to no warning, causing injury or death to those in the area. Transportation accidents are more common during poor road and visibility conditions and may result in injuries or death.

An extended power outage during winter may make many homes and offices unbearably cold. Additionally, during extended winter-time power outages, people often make the mistake of bringing portable generators inside or not venting them properly, leading to carbon monoxide poisoning. With poor road conditions, sheltering residents may present significant logistical challenges with getting people to heated facilities, feeding, and providing medical care. Rural subdivisions can quickly become isolated. These situations, accompanied by stranded motorists that need to be rescued, represent significant threats to the population.

Future Development

The severe weather risk is assumed to be uniform countywide. Therefore, the location of development does not increase or reduce the risk necessarily. Stillwater County and the Town of Columbus lack building codes, and therefore, new development might not be built to current standards for wind resistance or heavy snow loads. Additionally, as homes go up in more remote parts of the county, accessing those rural residents may become impossible should sheltering or emergency services be needed in an extreme event.

4.8.5 Data Limitations

Data limitations include:

- Severe weather events are only recorded if observed and reported to the National Weather Service; the rural nature of the area leaves many areas without weather spotters.
- Only a limited number of weather observing stations are located in the county.
- Lack of a countywide, multi-agency, historic winter weather database containing information on the winter weather conditions (snow depth, temperature, wind, snowfall rates, water content, and duration) and the associated problems (number of accidents, conditions of roadways, and services needed).

4.9 Terrorism and Civil Unrest

Table 4.9A Hazard Summary for Stillwater County and the Town of Columbus

Overall Hazard Rating	Moderate	
Probability of High Impact Event	Low	Not considered a high risk area.
Vulnerability	Moderate-High	Impacts could span across all aspects of life in the county, depending on the incident.

Table 4.9B Federal Major Disaster and Emergency Declarations

Declaration	Year	Additional Information	Casualties	Damages/Assistance
None				

4.9.1 Description

Terrorism and civil unrest are examples of human-caused hazards that are intentional and often planned. Terrorism, both domestic and international, is a violent act done to try and influence government or the population of some political or social objective. Terrorist acts can come in many recognized forms or may be more subtle using untraditional methods. The primary recognized forms of terrorism are chemical, explosive, biological, radiological, nuclear, and cyber; however, terrorism's only limitation is the human imagination.

Chemical terrorism is the use of chemical agents to poison, kill, or incapacitate the population or animals, destroy crops or natural resources, or deny access to certain areas. Chemical agents can be broken into five different categories: nerve agents, vesicants, cyanide, pulmonary agents, and incapacitating agents.

Terrorism using *explosive and incendiary* devices includes bombs and any other technique that creates an explosive, destructive effect. Bombs can take many forms from a car bomb to a mail bomb. They can be remotely detonated using a variety of devices or directly detonated in the case of a suicide bomb.

Bioterrorism is the use of *biological* agents, such as Anthrax, Ricin, and Smallpox, to infect the population, plants, or animals with disease.

Radiological terrorism involves the use of radiological dispersal devices or nuclear facilities to attack the population. Exposure to radiation can cause radiation sickness, long-term illness, and even death. Terrorism experts fear the use of explosive and radiological devices in the form of a "dirty bomb" to attack the population. A "dirty bomb" is a low-tech, easily assembled and transported device made up of simple explosives combined with a suitable radioactive agent.

Nuclear weapons have the potential for causing catastrophic damage through an explosion and subsequent radiation exposure. Many countries have nuclear capabilities. Such weapons at the control of terrorists could cause significant devastation, particularly in an urban area. Most nuclear threats have been related to international unrest.

Cyberterrorism is the attack or hijack of the information technology infrastructure that is critical to the US economy through financial networks, government systems, mass media, or other systems. Any cyber attack that creates national unrest or instability would be considered cyberterrorism.

Civil unrest and violence typically occur on a smaller scale than terrorism when large groups, organizations, or distraught individuals take action with potentially disastrous or disruptive results. Civil unrest can result following a disaster that creates panic in the community. Civil unrest is generally defined as "any conduct of more than one person that destroys or menaces the public order and tranquility." Forms of civil unrest can range from groups blocking sidewalks, roadways, and buildings to mobs rioting and looting. Civil unrest may be spontaneous, as when a mob erupts into violence, or they may be planned, as when a demonstration or protest intentionally interferes with another individual's or group's lawful business.

Most times, terrorist acts, both domestic and international, are driven by a group or hate organization. Occasionally, individuals, as was the case in the Oklahoma City bombing, perform independent acts. Usually, the perpetrators have an underlying belief that drives the act. Table 4.9.1A lists several, but not all, types of organizations existing in the United States that could initiate a terrorist incident.

Table 4.9.1A Types of Domestic Hate and Terrorist Organizations and Movements

Type	Description
Anti-Gay	These groups go beyond mere disagreement with homosexuality by subjecting gays and lesbians to campaigns of personal vilification.
Anti-Immigrant	These groups generally attack immigrants as individuals, rather than merely disagreeing with immigration policy. Some have close ties to white supremacist ideas, groups, and individuals.
Black Separatists	They typically oppose integration and racial intermarriage, and they want separate institutions, or even a separate nation, for blacks. Most forms of black separatism are strongly anti-white and anti-Semitic.
Christian Identity	This religion asserts that whites, not Jews, are the true Israelites favored by God in the Bible. For decades, Identity has been one of the most influential ideologies for the white supremacist movement.
Ecoterrorism	These groups aim to end the exploitation of animals and the destruction of the environment, typically by causing damage to the operations of companies in related industries or terrorizing executives and employees of these and associated companies.
General Hate	These groups espouse a variety of hateful doctrines, and this type generally captures those groups not included in another category.
Holocaust Denial	These groups insist that Nazi Germany did not engage in a conscious attempt to commit genocide against European Jews.

Table 4.9.1A Types of Domestic Hate and Terrorist Organizations and Movements (continued)

Type	Description
Ku Klux Klan	This organization, with its long history of violence, is the most infamous, and oldest, American hate group. Although black Americans have typically been the Klan's primary target, it has also attacked Jews, immigrants, homosexuals, and, until recently, Catholics.
Militia	This movement consists of right-wing extremist, armed, paramilitary groups with an anti-government, conspiracy-oriented ideology, often with a prominent focus on firearms.
Neo-Confederate	Many groups celebrate traditional Southern culture and the Civil War's dramatic conflict between the Union and the Confederacy, but some groups go further and embrace racist attitudes towards blacks, and in some cases, white separatism.
Neo-Nazi	These groups share a hatred for Jews and a love for Adolf Hitler and Nazi Germany. While they also hate other minorities, homosexuals, and even sometimes Christians, they perceive "the Jew" as their cardinal enemy, and trace social problems to a Jewish conspiracy that supposedly controls governments, financial institutions, and the media.
Racist Music	These groups are typically white power music labels that record, publish, and distribute racist music in a variety of genres.
Racist Skinhead	These groups form a particularly violent element of the white supremacist movement. Racist Skinheads often operate in small "crews" that move from city to city with some regularity.
Racist Traditionalist Catholic	These organizations embrace anti-Semitism and the theology is typically rejected by the Vatican and mainstream Catholics in general.
Sovereign Citizen	These groups embrace anti-government ideologies and some have white supremacist elements. They often believe that all existing government in the United States is illegitimate and seek to restore an idealized, minimalist government that never actually existed.
Tax Protest	These anti-government groups believe that income taxes are illegitimate and often engage in tax evasion activities and sometimes violence.
White Nationalist	These groups espouse white supremacist or white separatist ideologies, often focusing on the alleged inferiority of non-whites.

Sources: Southern Poverty Law Center, 2010; Anti-Defamation League, 2010.

According to the Southern Poverty Law Center Intelligence Project, Christian Identity, Neo-Confederate, and Neo-Nazi groups exist in Montana, but none are listed in Stillwater County. (Southern Poverty Law Center, 2010)

4.9.2 History

Fortunately, Stillwater County has not been the location of a modern terrorism or civil unrest incident. Significant terrorist incidents occurring in the United States are shown in Table 4.9.2A.

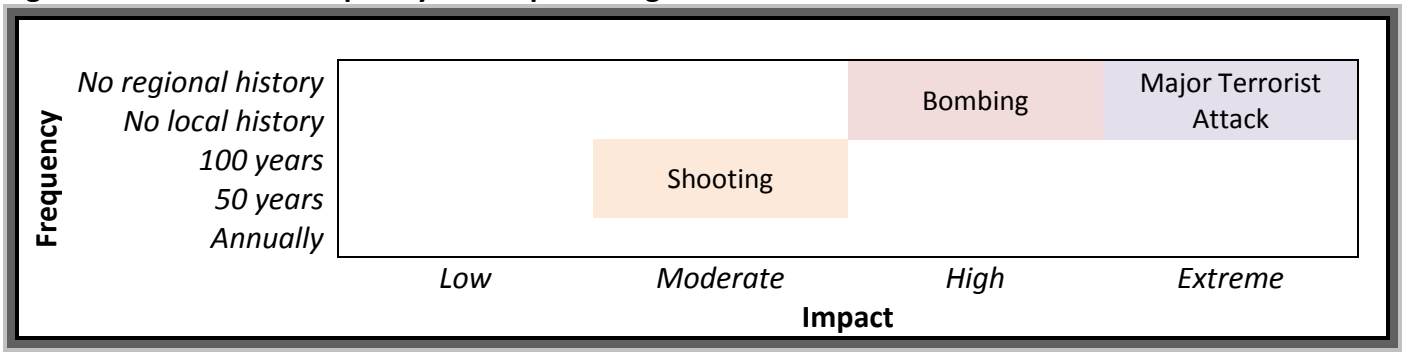
Table 4.9.2A Significant Modern US Terrorist Incidents

Incident	Date	Description
World Trade Center Bombing	02/29/1993	A bombing in the parking area of the World Trade Center killed 6 and wounded about 1,000. The bombing was organized by the foreign terrorist organization, Al Qaeda.
Oklahoma City Bombing	04/19/1995	Domestic terrorist Timothy McVeigh blew up the Alfred P. Murrah Federal Building in Oklahoma City, killing 168 people and injuring hundreds more.
September 11th Attacks	09/11/2001	Four commercial planes hijacked by 19 members of the Al Qaeda terrorist organization were intentionally crashed into buildings; two planes hit the World Trade Center buildings in New York City, one into the Pentagon outside Washington, DC, and one into a field in Pennsylvania after passengers stormed the cockpit. Nearly 3,000 people were killed.

Source: Memorial Institute for the Prevention of Terrorism, 2010.

4.9.3 Probability and Magnitude

Figure 4.9.3A Hazard Frequency and Impact Ranges



4.9.4 Vulnerabilities

Table 4.9.4A Hazard Vulnerabilities and Impacts

Jurisdiction(s)	Type	Probable (100-year) Impact	Extreme (500-year) Impact*	Rating
All	Critical Facilities	・ Critical functional losses ・ Clean-up/debris removal costs	・ Structural losses ・ Contents losses ・ Critical data losses	Moderate-High
All	Critical Infrastructure	・ Road closures	・ Service disruptions ・ Physical losses ・ Loss of electricity ・ Loss of utility gas ・ Loss of potable water ・ Loss of sanitary sewers ・ Loss of telephone service ・ Loss of internet service ・ Fuel/energy shortages	Moderate-High
All	Structures	・ Displacement/functional losses ・ Clean-up/debris removal costs	・ Structural losses ・ Contents losses	Low-Moderate
All	Population	・ Increased illness ・ Injuries ・ Fatalities		High
All	Values	・ Business disruption losses ・ Emotional impacts ・ Cancellation of activities ・ Restrictions on activities	・ Service industry losses ・ Agricultural losses ・ Reduced air quality ・ Reduced water quality ・ Soil contamination ・ Historic structure losses ・ Historic site losses ・ Historic item losses ・ Aesthetic value losses	Moderate-High
All	Future Development	・ Increases the total hazard exposure		Low-Moderate

* in addition to probable (100-year) impacts

Critical Facilities

Critical facilities play prominent roles in Stillwater County. Often, terrorists target facilities that are highly important for government services and community stability. Threat data is not specific enough to identify what facilities are most vulnerable, therefore, all critical facilities are considered to have the same risk countywide.

Critical Infrastructure

Critical infrastructure often relies on complex and interdependent systems. A major system failure usually has widespread consequences.

Table 4.9.4B Critical Infrastructure Damages

Type	Likelihood of Damages
Electric	Possible
Gasoline/Propane/Oil	Possible
Natural/Utility Gas	Possible
Sewer	Possible

Type	Likelihood of Damages
Telephone/Internet	Possible
Transportation	Possible
Water	Possible

Population

The effects of terrorist and civil unrest incidents are usually felt by the population. During times of unrest, the greatest risk is to human lives. Terrorists typically try to make a dramatic statement that will generate media interest. Attacking the population through a large loss of life is a common tactic. Depending on the type of attack, casualties could be light or involve much of the Stillwater County population.

Economic, Ecologic, Historic, and Social Values

Depending on the type and location of the incident, economic losses could range from general national economic slowdowns to the destruction of local businesses. Livestock and the environment are additionally at risk from biological, chemical, and radiological attacks.

4.9.5 Data Limitations

Data limitations include:

- Inability to quantify the probability and magnitude of a terrorist or civil unrest incident.
- General uncertainties related to how and when future terrorist and civil unrest incidents may occur.

4.10 Transportation Accident

including vehicular, railroad, and aircraft accidents

Table 4.10A Hazard Summary for Stillwater County and the Town of Columbus

Overall Hazard Rating	Moderate	
Probability of High Impact Event	Moderate	Very limited history, but the interstate and railroad increase the probability.
Vulnerability	Low-Moderate	Greatest impacts would likely be to the population.

Table 4.10B Federal Major Disaster and Emergency Declarations

Declaration	Year	Additional Information	Casualties	Damages/Assistance
None				

4.10.1 Description

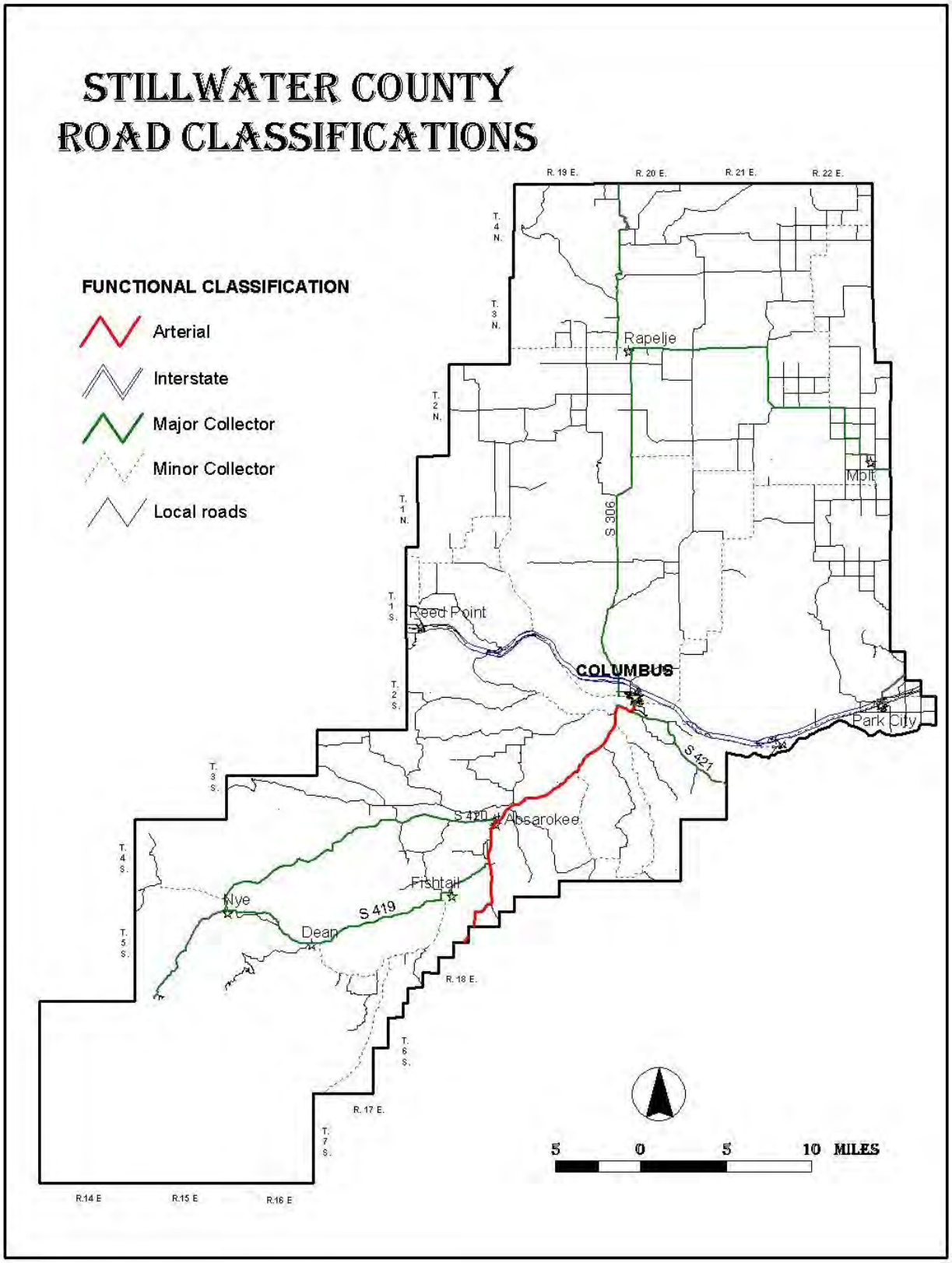
A transportation accident, for the purposes of this plan, is any large-scale vehicular, railroad, or aircraft accident involving mass casualties. Mass casualties can be defined as an incident resulting in a large number of deaths and/or injuries that reaches a magnitude that overwhelms the ability of local resources to adequately respond.

Hazards areas for Stillwater County include federal, state, and local highways and roads, a railroad, and a small airport. Interstate 90 and Montana Highway 78 are the most significant roadways in the county. Buses and other mass transportation vehicles regularly travel these roadways. Average daily traffic on Interstate 90 ranges from under 7,000 vehicles near Reed Point to almost 10,000 vehicles near Park City. Approximately 20% of the traffic is commercial truck traffic. Highway 78, between Columbus and Red Lodge, is a primary highway maintained by Montana Department of Transportation. This paved two lane road serves as the arterial north-south route in southern Stillwater County. This highway also serves as the main street for the Absarokee business district. Average daily traffic on Highway 78 ranges from under 800 vehicles south of Absarokee to over 3,000 vehicles near Columbus. Less than 5% of the traffic is commercial truck traffic. (Stillwater County, 2007a) Map 4.10.1A shows the roads and their classifications in Stillwater County.

Goods, including hazardous materials, are transported by Montana Rail Link via the rail network. Stillwater County has a small airport serving primarily single-engine aircraft located just south of Columbus (6S3).

Transportation accidents are often related to weather, either obscuring the vision or hindering control of the vehicle. Wildlife collisions, particularly deer and elk, are another common cause of transportation accidents in the county. The magnitude of transportation accidents can vary from single vehicle crashes to large commercial aircraft crashes. Stillwater County does not have any scour critical bridge according to state transportation officials. (Montana Department of Transportation, 2009)

Map 4.10.1A



Source: Stillwater County, 2007a.

4.10.2 History

The history of transportation accidents in Stillwater County consists primarily of small magnitude incidents, some with fatalities, but most with very little effect on the entire community. Traffic accidents along the roadways occur regularly, usually inconveniencing travelers, overwhelming local emergency resources, and occasionally causing delays. Table 4.10.2A shows the traffic fatalities in Stillwater County from 1980-2008. Stillwater County has not had any railroad accidents/incidents in the past 10 years. (Federal Railroad Administration, 2010) Table 4.10.2B has data on the fatal aircraft accidents in the county since 1962.

Table 4.10.2A Traffic Fatalities

Year	Number of Fatalities	Year	Number of Fatalities	Year	Number of Fatalities
1980	4	1990	2	2000	3
1981	5	1991	0	2001	2
1982	3	1992	2	2002	5
1983	2	1993	4	2003	4
1984	3	1994	5	2004	6
1985	1	1995	5	2005	3
1986	4	1996	2	2006	1
1987	3	1997	2	2007	4
1988	1	1998	5	2008	1
1989	4	1999	11		
Annual Average	3.0	Annual Average	3.8	Annual Average	3.2

Source: Montana Highway Patrol, 2009.

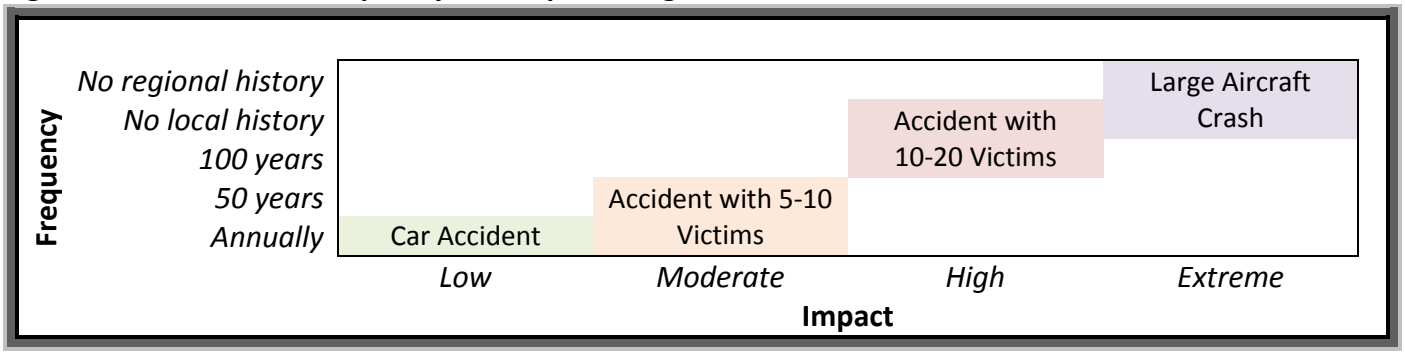
Table 4.10.2B Fatal Aircraft Accidents

Date	Location	Fatalities	Additional Information
05/22/1967	Absarokee	1 fatality	A crop sprayer stalled while turning around.
07/31/1981	Park City	1 fatality	A crop sprayer pilot crashed, likely because of a heart attack.
07/12/1985	Columbus	2 fatalities	After a low pass, the aircraft was pulled up too abruptly and stalled. The altitude was too low for a recovery.
02/07/1988	Red Lodge	3 fatalities	A plane going from Billings to Twin Falls, ID crashed into terrain (locals recall it was Granite Peak) in poor visibility and weather conditions.
06/01/1989	Rapelje	4 fatalities	A medical evacuation helicopter crashed shortly after picking up a patient. Pilot was not familiar with the area and had not had recent instrument flight experience.
10/18/1991	Columbus	3 fatalities	The plane struck power lines when flying low over the Yellowstone River.
05/28/2007	Columbus	1 fatality	A helicopter crashed when engine power was lost and a forced landing was attempted. Two people survived with serious injuries. The crew was conducting power line inspections.

Source: National Transportation Safety Board, 2010.

4.10.3 Probability and Magnitude

Figure 4.10.3A Hazard Frequency and Impact Ranges



4.10.4 Vulnerabilities

Table 4.10.4A Hazard Vulnerabilities and Impacts

Jurisdiction(s)	Type	Probable (100-year) Impact	Extreme (500-year) Impact*	Rating
All	Critical Facilities		・ Structural losses ・ Contents losses ・ Critical functional losses ・ Critical data losses ・ Clean-up/debris removal costs	Low-Moderate
All	Critical Infrastructure	・ Road closures	・ Service disruptions ・ Physical losses ・ Loss of electricity ・ Loss of telephone service ・ Loss of internet service	Low-Moderate
All	Structures		・ Structural losses ・ Contents losses ・ Displacement/functional losses ・ Clean-up/debris removal costs	Low-Moderate
All	Population	・ Injuries ・ Fatalities		Moderate-High
All	Values	・ Emotional impacts	・ Business disruption losses ・ Service industry losses ・ Agricultural losses ・ Habitat damages ・ Reduced water quality ・ Soil contamination ・ Historic structure losses ・ Historic site losses ・ Historic item losses ・ Aesthetic value losses	Low-Moderate

Table 4.10.4A Hazard Vulnerabilities and Impacts (continued)

Jurisdiction(s)	Type	Probable (100-year) Impact	Extreme (500-year) Impact*	Rating
All	Future Development	・ Somewhat likely to occur in hazard areas ・ Increases the total hazard exposure		Low-Moderate

* in addition to probable (100-year) impacts

Critical Infrastructure

Table 4.10.4B Critical Infrastructure Damages

Type	Likelihood of Damages
Electric	Possible
Gasoline/Propane/Oil	Possible
Natural/Utility Gas	Unlikely
Sewer	Unlikely

Type	Likelihood of Damages
Telephone/Internet	Possible
Transportation	Highly Likely
Water	Unlikely

4.10.5 Data Limitations

Data limitations include:

- Difficulties in predicting the location and magnitude of future accidents.

4.11 Volcanic Ashfall

Table 4.11A Hazard Summary for Stillwater County and the Town of Columbus

Overall Hazard Rating	Low	
Probability of High Impact Event	Low	Extremely low probability of an eruption causing high impacts.
Vulnerability	Moderate	The greatest impacts would likely be to the population through health problems and the economy due to travel restrictions and problems for agriculture.

Table 4.11B Federal Major Disaster and Emergency Declarations

Declaration	Year	Additional Information	Casualties	Damages/Assistance
None				

4.11.1 Description

Stillwater County does not have any known active volcanoes, however, the Yellowstone Caldera within Yellowstone National Park is only about 30 miles away from southwestern Stillwater County, and dense volcanic ash can travel hundreds of miles. The last non-hydrothermal eruption in the Yellowstone Caldera was thousands of years ago. Currently, the most active region in the continental United States is the Cascade Range to the west in Washington and Oregon, about 500 miles away. This region includes the volcanoes at Mount St. Helens, Mount Rainer, and Mount Hood. Stillwater County lies within reasonable range of ashfall from these volcanoes under normal upper atmospheric wind and stability conditions. In addition to ashfall and other effects, large eruptions have been known to change weather patterns globally.

The Yellowstone Caldera, one of the world's largest active volcanic systems, has produced several giant volcanic eruptions in the past few million years, as well as many smaller eruptions and steam explosions. Although no eruptions of lava or volcanic ash have occurred for many thousands of years, future eruptions are likely. Over the next few hundred years, hazards will most likely be limited to ongoing geyser and hot-spring activity, occasional steam explosions, and moderate to large earthquakes. To better understand Yellowstone's volcano and earthquake hazards and to help protect the public, the US Geological Survey, the University of Utah, and Yellowstone National Park formed the Yellowstone Volcano Observatory, which continuously monitors activity in the region. (US Geological Survey, 2005)

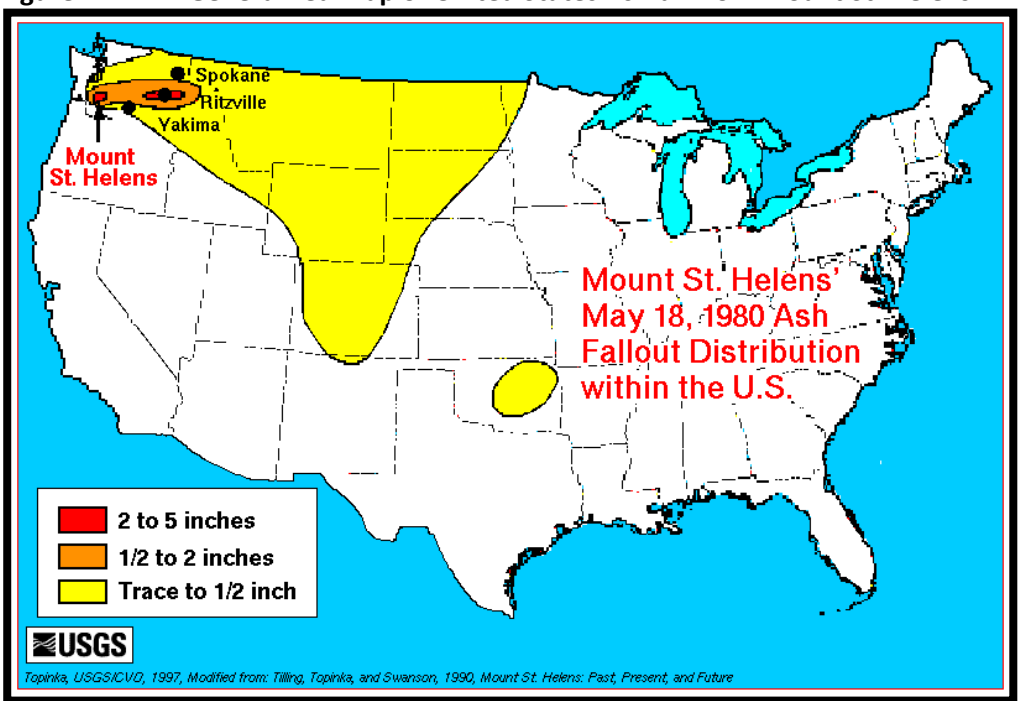
If a large caldera-forming eruption were to occur at Yellowstone, its effects would be felt worldwide. Thick ash deposits would bury vast areas of the United States, and the injection of huge volumes of volcanic gases into the atmosphere could drastically affect global climate. Fortunately, the Yellowstone volcanic system shows no signs that it is headed toward such an eruption. The probability of a large caldera-forming eruption within the next few thousand years is exceedingly low. Any renewed volcanic activity at Yellowstone would most likely take the form of non-explosive lava eruptions. (US Geological Survey, 2005)

The Cascade Region does not have the same caldera-forming potential as Yellowstone, but has been much more active in recent years. The volcanoes in this region can drop and have dropped measurable ash over Montana. Volcanic ashfall may not sound harmful hundreds of miles away, but depending on the volume of ash that falls, it can create problems. Ash in the air can affect those with respiratory sensitivities, reduce visibilities, and clog air intakes. Its corrosive properties can damage vehicles and other machinery. When wet, the ash becomes glue-like and hard to remove. Even relatively small amounts of airborne ash can disrupt air travel.

4.11.2 History

On May 18, 1980, Mount St. Helens in the Cascade Range of Washington erupted, sending ash high into the atmosphere. Over the course of several days, the ash fell from the sky, primarily over eleven states, including Montana. Less than a half inch fell over Stillwater County, as shown in Figure 4.11.2A. The Montana Governor asked businesses to close and individuals with breathing problems to stay indoors until the threat was assessed. No reports of structure damage were received, and the health concerns lasted for a three day period.

Figure 4.11.2A Generalized Map of United States Ashfall from Mount St. Helens



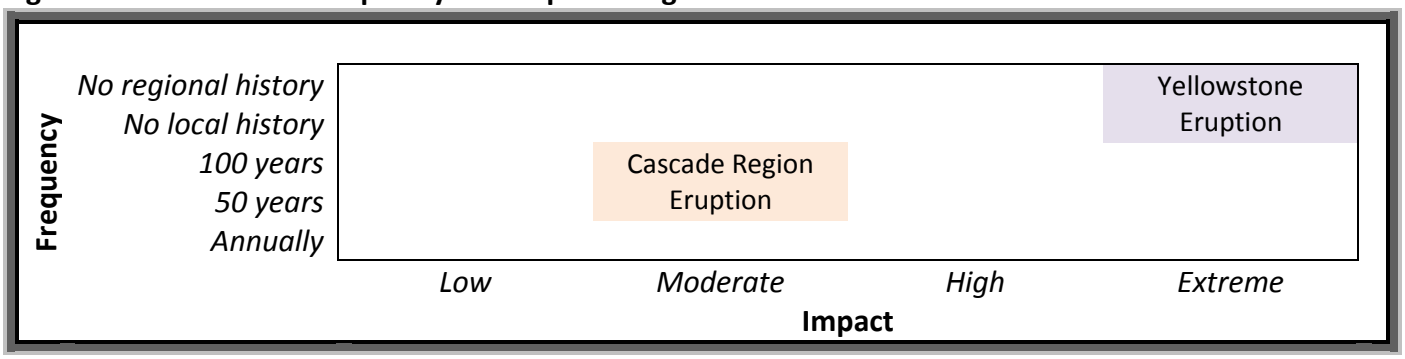
Source: Cascades Volcano Observatory, 2010.

The Yellowstone region has produced three exceedingly large volcanic eruptions in the past 2.1 million years. In each of these cataclysmic events, enormous volumes of magma erupted at the surface and into the atmosphere as mixtures of red-hot pumice, volcanic ash (small, jagged fragments of volcanic glass and rock), and gas that spread as pyroclastic ("fire-broken") flows in all directions. Rapid withdrawal of such large volumes of magma from the subsurface then caused the ground to collapse,

swallowing overlying mountains and creating broad cauldron-shaped volcanic depressions called "calderas." (US Geological Survey, 2005) Studies have shown that ash from each of these eruptions fell where Stillwater County now sits.

4.11.3 Probability and Magnitude

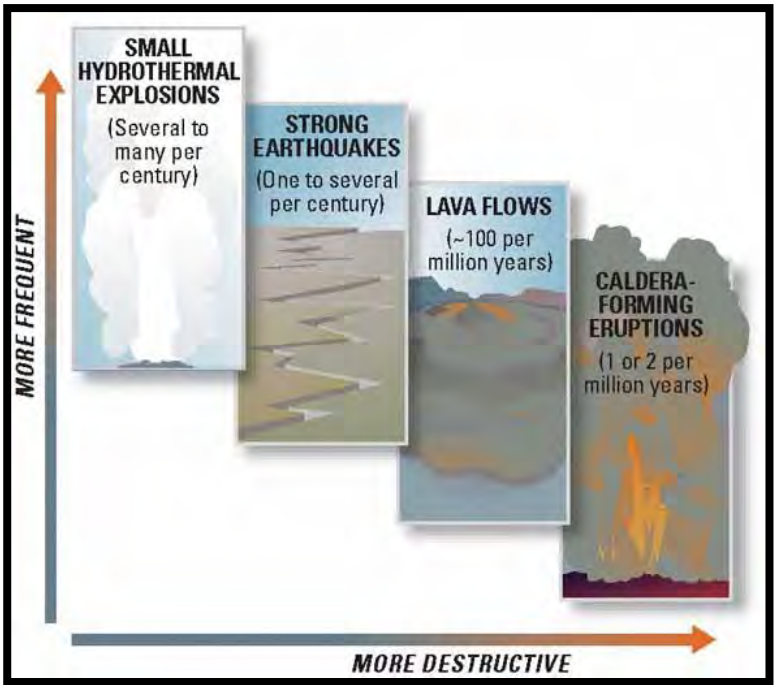
Figure 4.11.3A Hazard Frequency and Impact Ranges



Volcanic eruptions are rare events when compared to other hazards. Scientists evaluate natural hazards by combining their knowledge of the frequency and the severity of hazardous events. In the Yellowstone region, damaging hydrothermal explosions and earthquakes can occur several times a century. Lava flows and small volcanic eruptions occur only rarely - none in the past 70,000 years. Massive caldera-forming eruptions, the most potentially devastating of Yellowstone's hazards, are extremely rare - only three have occurred in the past several million years. U.S. Geological Survey, University of Utah, and National Park Service scientists with the Yellowstone Volcano Observatory (YVO) see no evidence that another such cataclysmic eruption will occur at Yellowstone in the foreseeable future. Recurrence intervals of these events are neither regular nor predictable. (US Geological Survey, 2005) Figure 4.11.3B shows the probability of the various events that can occur in Yellowstone National Park.

The Cascade region, being more active, has a higher probability of eruptions over the next 100 years. Based on eruptions in the Cascade region over the past 4,000 years, the probability of an eruption is about 1.25% in any given year or approximately 1-2 eruptions per 100 years within the Cascade Range.

Figure 4.11.3B Recurrence Intervals for Geological Events in Yellowstone National Park



Source: US Geological Survey, 2005.

4.11.4 Vulnerabilities

Table 4.11.4A Hazard Vulnerabilities and Impacts

Jurisdiction(s)	Type	Probable (100-year) Impact	Extreme (500-year) Impact*	Rating
All	Critical Facilities	• Critical functional losses • Clean-up/debris removal costs	• Structural losses • Contents losses • Critical data losses	Low-Moderate
All	Critical Infrastructure		• Service disruptions • Physical losses • Loss of electricity • Loss of potable water • Loss of telephone service • Loss of internet service • Road closures	Low-Moderate
All	Structures	• Clean-up/debris removal costs	• Structural losses • Contents losses • Displacement/functional losses	Low-Moderate
All	Population	• Increased illness	• Injuries • Fatalities	Moderate

Table 4.11.4A Hazard Vulnerabilities and Impacts (continued)

Jurisdiction(s)	Type	Probable (100-year) Impact	Extreme (500-year) Impact*	Rating
All	Values	・ Agricultural losses ・ Habitat damages ・ Reduced air quality ・ Reduced water quality ・ Soil contamination Restrictions on activities ・ Aesthetic value losses	・ Business disruption losses ・ Service industry losses ・ Biodiversity losses ・ Historic structure losses ・ Historic site losses ・ Historic item losses ・ Emotional impacts ・ Cancellation of activities	Moderate-High
All	Future Development		・ Increases the total hazard exposure	Low-Moderate

* in addition to probable (100-year) impacts

Critical Infrastructure

Table 4.11.4B Critical Infrastructure Damages

Type	Likelihood of Damages
Electric	Possible
Gasoline/Propane/Oil	Unlikely
Natural/Utility Gas	Unlikely
Sewer	Possible

Type	Likelihood of Damages
Telephone/Internet	Possible
Transportation	Possible
Water	Possible

4.11.5 Data Limitations

Data limitations include:

- Difficulties in predicting future volcanic activity and the associated impacts due to the low frequency of eruptions.

4.12 Wildfire

Note: Information for this hazard profile was summarized from the Stillwater County Community Wildfire Protection Plan dated July 2007. The Stillwater County Community Wildfire Protection Plan remains an important stand-alone document and provides additional detail regarding the wildfire hazard and response capabilities in the county.

Table 4.12A Hazard Summary for Stillwater County

Overall Hazard Rating	High	
Probability of High Impact Event	Moderate-High	Given an extensive history of wildfires destroying structures and an abundance of fuels, the probability of future significant wildfires continues.
Vulnerability	Moderate-High	Greatest threats are to values, structures, critical infrastructure, the population, and future development.

Table 4.12B Hazard Summary for the Town of Columbus

Overall Hazard Rating	Moderate	
Probability of High Impact Event	Low-Moderate	The town is buffered somewhat by development and is protected by a local fire department, thus the probability of a high impact wildfire to the town itself is limited.
Vulnerability	Moderate	Greatest threats are to values and the population.

Table 4.12C Federal Major Disaster and Emergency Declarations

Declaration	Year	Additional Information	Casualties	Damages/Assistance
FEMA-1340-DR-MT	2000	Location: Stillwater County, plus 47 other counties and 6 reservations	None	None listed for Stillwater County
FEMA-2488-FM-MT	2003	Hobble Fire (primarily in Sweet Grass County)	None	$9,497 in local funds
FEMA-2652-FM-MT	2006	Saunders Fire	None	$644,522 in FEMA funds $205,053 in state funds $9,788 in local funds
FEMA-2671-FM-MT	2006	Derby Fire	None	$6,243,072 in FEMA funds* $2,049,006 in state funds* $3,176 in local funds
FEMA-2837-FM-MT	2009	Eagle Mount Fire	None	To be determined

* figures include Sweet Grass County

Sources: Montana Disaster and Emergency Services, 2008; Montana Disaster and Emergency Services 2010b.

4.12.1 Description

A wildfire is an uncontrolled fire in a vegetated area. Wildfires are a natural part of the ecosystem. They have a purpose in nature, and following years of fire suppression, many areas have built up fuels that can lead to larger, more intense fires. In Stillwater County, timber, shrubs, and grasses make up the primary fuel sources. These fuels burn rapidly and readily when cured. These types of fires have the potential to destroy structures and natural resources while producing heavy amounts of smoke, particularly when spread by strong winds.

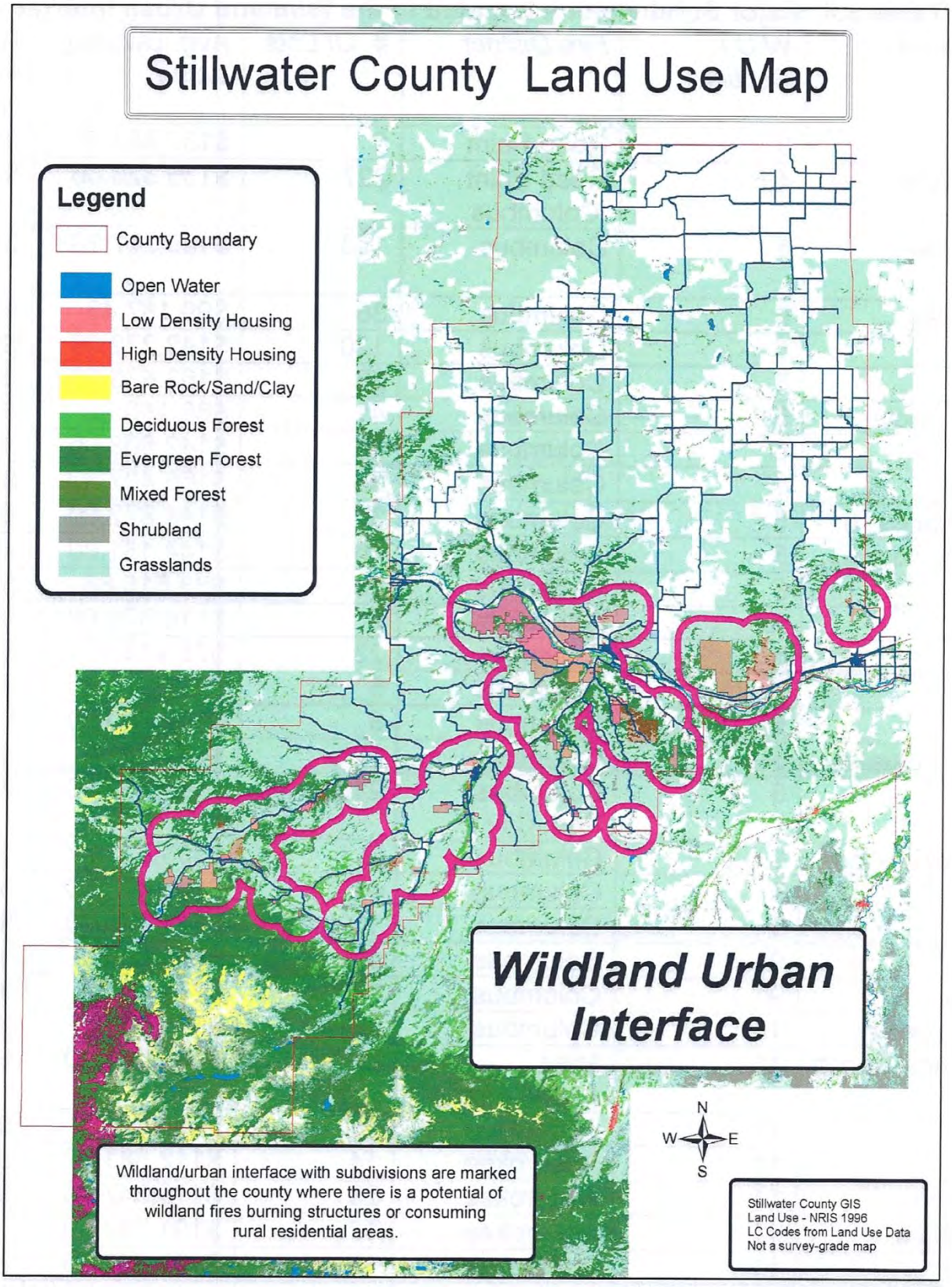
Any flame source can trigger a wildfire, but they are most often triggered by lightning, recreational activity, activity at rural residences, vehicles, power lines, equipment, debris and prescribed burning, and the railroad. Once ignited, ambient conditions dictate whether the fire will spread or not. Moist, cool, and calm conditions or a lack of fuels will suppress the fire, whereas, dry, warm, and windy conditions and dry fuels will contribute to fire spread. The terrain, accessibility, and capabilities of the fire agencies are also factors in the fire's growth potential. Problems with wildfire occur when combined with the human environment. People and structures near wildfires can be threatened unless adequately protected through evacuation, mitigation, or suppression.

Wildfire occurrence is weather dependent and highly variable from year to year. Fire season generally runs from March through November but wildfires can occur at any time of year. The light, flashy fuels and the heavy, fire-sustaining timber present in the region are capable of producing large, fast moving wildfires. The Custer National Forest, Absaroka-Beartooth Wilderness, and other state and federal lands regularly experience wildfires, and the mixed fuels and rugged terrain of those areas make firefighting especially difficult. The privately owned timber, shrub, native grass, and non-irrigated lands in the remainder of the county also present significant wildfire hazards.

Stillwater County has large areas of government owned lands. The Custer National Forest is managed by the US Forest Service. The Hailstone and Halfbreed National Wildlife Refuges are managed by the US Fish and Wildlife Service. Scattered across the county are large tracts of land managed by the US Bureau of Land Management and state government. This scattering of government and private ownership can present unique firefighting challenges and opportunities. Map 3.4A in the Current Land Use section shows the government land ownership in the county.

Fuel types vary from grasses to sagebrush to scattered timber to dense timber, depending on aspect and elevation. The county has tremendous variety in fuel types and fuel loading. The most extreme situation with respect to fuel conditions and values at risk occurs in rural subdivisions where numerous high-value individual homes and subdivisions are located in the wildland urban interface area in close proximity to the National Forest boundary. Map 4.12.1A shows the wildland urban interface. (Stillwater County, 2007b)

Map 4.12.1A



Source: Stillwater County, 2007b.

4.12.2 History

Stillwater County has a long history of wildfires ranging from small to large. Some have caused damages and others have not. The extent of damages often depends on the fire spread rate, the effectiveness of suppression and mitigation measures, and the property and infrastructure in the fire's path. The history of wildfires can be difficult to compile because of the various firefighting entities involved and a variety of recordkeeping measures over the years. Table 4.12.2A lists some of the more significant wildfires in Stillwater County.

Table 4.12.2A Historic Wildfires (greater than 500 acres)

Name	Date	Size	Additional Information
Storm Creek	06/19-09/11 1988	56,856 acres*	Southwest Stillwater County $8,000,000 in damage costs
Sand Dunes	08/07/1990	910 acres	Southern Stillwater County $100,000 in damage costs
Allen Creek	08/10-08/11 1999	1,231 acres	West of Park City $10,000 estimated suppression costs
Svenson Ranch	05/05-05/07 2001	1,528 acres	North of Reed Point $55,000 estimated property damage
Cow Creek	09/06-09/08 2002	5,495 acres	Southwest of Columbus $223,000 estimated suppression costs 2 structures destroyed
Cathedral Peak Complex	08/14-09/09 2003	2,830 acres	Southwest Stillwater County Made up of the Cathedral Peak, Oliver, and Salderbalm Fires $5,800,000 estimated suppression costs 1 structure destroyed Threatened the Stillwater Mine Complex
Hobble	08/10-08/20 2003	38,365 acres*	Northern Stillwater County (but primarily in Sweet Grass County) $3,000,000 estimated suppression costs* 15 structures were lost in nearby Sweet Grass County
Pine Hill	09/01-09/04 2004	2,022 acres	Near Reed Point $60,000 estimated suppression costs
Cottonwood Creek	08/28-08/31 2005	3,485 acres	Northeast of Columbus $340,000 estimated suppression costs
Park City Complex	07/07-07/10 2006	1,845 acres	North of Park City Made up of the Coal Creek and Benedict Gulch Fires $381,000 estimated suppression costs

Table 4.12.2A Historic Wildfires (greater than 500 acres) (continued)

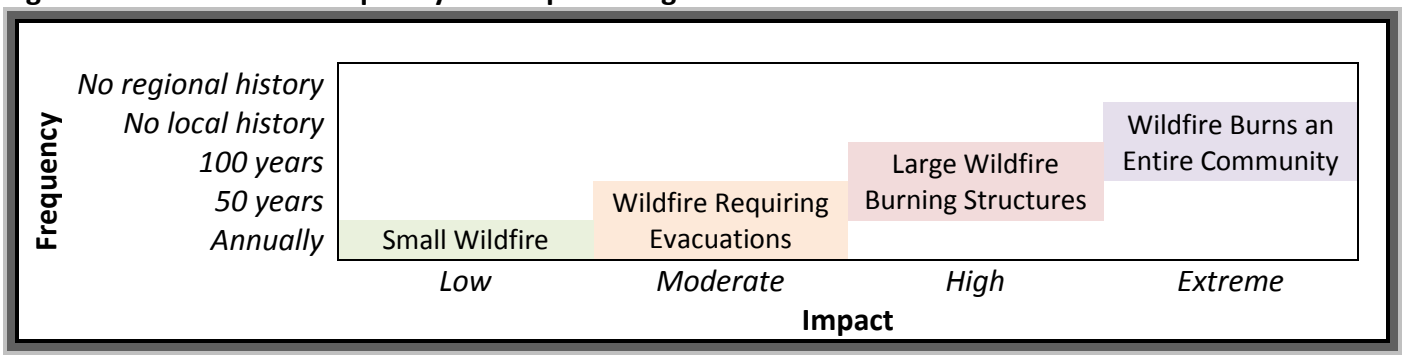
Name	Date	Size	Additional Information
Saunders	07/11-07/15 2006	3,175 acres	Central Stillwater County, West of Columbus $1,000,000 estimated suppression costs Destroyed 6 homes in the Yellowstone River Ranch Estates subdivision 106 residences evacuated
Derby	08/24-10/04 2006	207,304 acres*	Southern Stillwater County and Sweet Grass County $22,500,000 estimated suppression costs* 26 homes destroyed along Stillwater River Road and Spring Creek 840 residences evacuated
Iron Bridge	04/29-04/30 2008	1,261 acres	North of Park City
Eagle Mount	09/03-09/08 2009	1,220 acres	West of Columbus 3 structures destroyed (none residential) 275 residences evacuated

* includes fire areas outside Stillwater County

Sources: Stillwater County, 2007b; Montana Department of Natural Resources and Conservation, 2009; National Climatic Data Center, 2010; Center for International Disaster Information, 2010.

4.12.3 Probability and Magnitude

Figure 4.12.3A Hazard Frequency and Impact Ranges



4.12.4 Vulnerabilities

Table 4.12.4A Hazard Vulnerabilities and Impacts

Jurisdiction(s)	Type	Probable (100-year) Impact	Extreme (500-year) Impact*	Rating
All	Critical Facilities		・ Structural losses ・ Contents losses ・ Critical functional losses ・ Critical data losses	Low-Moderate
Stillwater County	Critical Infrastructure	・ Service disruptions ・ Road closures	・ Physical losses ・ Loss of electricity ・ Loss of potable water ・ Loss of sanitary sewers ・ Loss of telephone service ・ Loss of internet service	Moderate
Columbus	Critical Infrastructure		・ Service disruptions ・ Physical losses ・ Loss of electricity ・ Loss of potable water ・ Loss of sanitary sewers ・ Loss of telephone service ・ Loss of internet service ・ Road closures	Low-Moderate
Stillwater County	Structures	・ Structural losses ・ Contents losses ・ Displacement/functional losses		Moderate-High
Columbus	Structures	・ Displacement/functional losses	・ Structural losses ・ Contents losses	Low-Moderate
All	Population	・ Increased illness	・ Injuries ・ Fatalities	Moderate
All	Values	・ Business disruption losses ・ Agricultural losses ・ Habitat damages ・ Reduced air quality ・ Reduced water quality ・ Restrictions on activities ・ Aesthetic value losses	・ Biodiversity losses ・ Historic structure losses ・ Historic site losses ・ Historic item losses ・ Emotional impacts ・ Cancellation of activities	High
Stillwater County	Future Development	・ Somewhat likely to occur in hazard areas		Moderate
Columbus	Future Development	・ Increases the total hazard exposure		Low-Moderate

* in addition to probable (100-year) impacts

Critical Facilities

Critical facilities in close proximity to forested areas or constructed with especially flammable materials are more likely to suffer losses from a wildfire. Since a wildfire is possible in essentially all areas of Stillwater County, all critical facilities are assumed to have some risk. Those critical facilities outside the Town of Columbus in more rural areas are at greater risk due to increased distances from fire suppression assets and closer proximity to wildland areas. The highest risk areas include those facilities in and near Absarokee, Fishtail, and Nye and in the areas outside Columbus and north of Park City, as shown on the wildland urban interface map.

Critical Infrastructure

Similar to critical facilities, infrastructure in the areas of Absarokee, Fishtail, and Nye and in the rural areas outside Columbus and north of Park City are more susceptible to wildfire damages. Often, regional electric infrastructure passes through wildland and non-irrigated agricultural areas. In particular, the electric substations, transmission lines, and telephone lines are usually buffered by or overhang natural fuels. A wildfire could disrupt electricity or communications should this infrastructure be damaged. Propane tanks also become hazardous infrastructure when a wildfire threatens a structure.

Table 4.12.4B Critical Infrastructure Damages

Type	Likelihood of Damages
Electric	Possible
Gasoline/Propane/Oil	Possible
Natural/Utility Gas	Unlikely
Sewer	Possible

Type	Likelihood of Damages
Telephone/Internet	Possible
Transportation	Highly Likely
Water	Possible

Structures

Major subdivisions in the wildland urban interface are particularly vulnerable to large wildfire losses. An analysis conducted for the Stillwater County Community Wildfire Protection Plan by the Stillwater County GIS Office in 2006 estimated the number of lots, dwelling values, and potential disaster losses by major subdivision. Based on this analysis, the number of major subdivision lots in the wildland urban interface of Stillwater County totaled 1,559 lots with average dwelling values ranging from $37,839 to $188,532. The subdivisions in the wildland urban interface with over $10,000,000 in estimated building stock include:

- Pinecrest
- Yellowstone River Ranch
- Countryman Creek Ranch
- Bear Paw
- Spreading Winge Ranch

Note: The analysis used an estimated number of lots based upon certificates of survey that could be located. Some lots may have been subsequently divided. Additionally, the GIS Office does not track how many of the lots have constructed assets and not all lots have structures (Stillwater County, 2007b)

Based on historical occurrence, a wildfire that destroys 20 homes could result in roughly $2,044,000 in residential structure losses alone. History has shown that personal property losses can be much greater than just that of residences. Outbuildings, fences, equipment, livestock, pastures, and crops are often additional losses. Suppression costs, particularly due to the efforts needed for structure protection, can easily total in the millions of dollars.

Future Development

Behavior and development issues related to the wildfire hazard vary across the county. Growth and development are occurring in treed areas along river valleys and among hills and buttes in the central and southern parts of the county. The challenges presented by development differ depending on the fuel types, terrain, access, and response times. (Stillwater County, 2007b)

Generally, the development of most concern in the county from the standpoint of fire protection is occurring along the wildland urban interface area. Previously subdivided lots continue to be built upon and new subdivisions continue to be proposed. Even without additional subdivision, a large number of lots are already available to be built upon. (Stillwater County, 2007b)

New rural residences are typically wood frame construction or in the interface areas, log construction. Many of the subdivisions' covenants require rustic construction materials that fit in visually with the natural landscape. Fortunately, most new homes in interface areas are being constructed with metal or composition shingle, rather wooden shake roofs. (Stillwater County, 2007b)

In some cases, subdivisions have not been built out in the way they were approved. Checks do not exist to ensure the development occurs as per the requirements of the county in their approval. Enforceable codes for such things as maintenance of roads and fire protection systems are not in place. In some cases, the problems associated with lack of proper construction and maintenance of roads and fire protection systems may not become evident until the call comes in and responders are forced to do their best in a less than desirable situation. Losses could exceed those that would have occurred had the systems and roads been constructed to standard and properly maintained. In the worst case, firefighters' and residents' lives could be put at additional risk. (Stillwater County, 2007b)

4.12.5 Data Limitations

Data limitations include:

- Lack of a comprehensive, multi-agency, historic wildfire digital database containing information on start location, cause, area burned, suppression costs, and damages.

4.13 Risk Assessment Summary

The risk assessment represents an approximate history and estimated vulnerabilities to Stillwater County and the Town of Columbus from the hazards identified. As with any assessment involving natural or human-caused hazards, all potential events may not be represented here and an actual incident may occur in a vastly different way than described. This assessment, however, will be used, where possible, to minimize damages from these events in the future.

Every type of event is different, ranging from population to property to economic impacts. Incidents also have different probabilities and magnitudes even within hazards. For example, a light snowstorm will be different than a blizzard and a moderate flood will be different from both of those. Some hazards have estimates of dollar losses and population impacts whereas others are more qualitatively assessed based on the information available during the risk assessment process.

The hazards are prioritized using the best possible information on risks and vulnerabilities to provide guidance when selecting mitigation strategies. Generally, an evaluation of a specific mitigation activity will capture the benefits of such actions, including considering the probability of the hazard occurring and the disaster losses to be mitigated.

The following factors were considered when prioritizing the hazards:

- Probability of a "Disastrous"/High Impact Event
- Vulnerability (considers probable impacts to critical facilities, critical infrastructure, structures, the population, economic, ecologic, historic, and social values, and future development)

For more information on these determinations, see the individual hazard profiles.

Table 4.13A shows the hazard prioritizations for Stillwater County and Table 4.13B is specific to the Town of Columbus.

Table 4.13A Stillwater County Hazard Ratings

Hazard	Probability of High Impact Event	Vulnerability	Overall Hazard Rating
Wildfire	Moderate-High	Moderate-High	High
Severe Weather	Moderate	Moderate-High	High
Disease	Moderate	Moderate	High
Flood	Moderate	Moderate	High
Hazardous Material Release and Explosions	Moderate	Moderate	High
Transportation Accident	Moderate	Low-Moderate	Moderate
Dam Failure	Low	High	Moderate
Drought	Low-Moderate	Low-Moderate	Moderate
Terrorism and Civil Unrest	Low	Moderate-High	Moderate
Earthquake	Low	Moderate	Low
Volcanic Ashfall	Low	Moderate	Low
Landslide and Avalanche	Low	Low	Low

Table 4.13B Town of Columbus Hazard Ratings

Hazard	Probability of High Impact Event	Vulnerability	Overall Hazard Rating
Severe Weather	Moderate	Moderate-High	High
Disease	Moderate	Moderate	High
Flood	Moderate	Moderate	High
Hazardous Material Release and Explosions	Moderate	Moderate	High
Transportation Accident	Moderate	Low-Moderate	Moderate
Wildfire	Low-Moderate	Moderate	Moderate
Drought	Low-Moderate	Low-Moderate	Moderate
Terrorism and Civil Unrest	Low	Moderate-High	Moderate
Earthquake	Low	Moderate	Low
Volcanic Ashfall	Low	Moderate	Low
Dam Failure	Low	Low-Moderate	Low
Landslide and Avalanche	Not applicable	Not applicable	Not applicable

5. 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. Studies on hazard mitigation show that for each dollar spent on mitigation, society saves an average of four dollars in avoided future losses. (Multihazard Mitigation Council, 2005) Mitigation can take many different forms from construction projects to public education.

The development of a mitigation strategy allows Stillwater County and the Town of Columbus to create a vision for preventing future disasters, establish a common set of mitigation goals, prioritize projects, and evaluate the success of such projects. The mitigation strategy is based on the results of the risk assessment and recommendations by stakeholders and the public. The goals are broad, visionary, forward-looking statements that outline in general terms what the county and town would like to accomplish. Goals are usually not measurable or fully attainable but rather ideals to which the county and town should strive for as they develop and implement mitigation projects.

Rather than wait until a disaster occurs, Stillwater County and the Town of Columbus have developed this strategy to move in a more proactive direction for disaster prevention. All losses cannot be entirely mitigated, however, some actions can be taken, as funding and opportunities arise, that may reduce the impacts of disasters, thus, saving lives and property.

In 2009 and 2010, mitigation goals and objectives were reviewed by the public, refined in public meetings during which suggestions from the attendees were incorporated, and also took into account recommendations from existing policies, plans, and studies. The projects were then prioritized. Initial goals, objectives, and projects were developed by the Stillwater County Mitigation Steering Committee when developing early versions of this plan. Wildfire projects were incorporated from the Stillwater County Community Wildfire Protection Plan; those project ideas were developed by the Columbus Rural Fire Council with representation from all of the fire departments in the county, the county fire warden, the Montana Department of Natural Resources and Conservation, the US Bureau of Land Management, and the Custer National Forest.

5.1 Goals, Objectives, and Proposed Projects

The mitigation goals, objectives, and proposed projects for Stillwater County and the Town of Columbus follow. Each of the projects specifies the jurisdiction or jurisdictions involved, the type of project, its priority, the responsible agencies and partners, resources needed, and the goal timeframe for initiation.

For clarification and prioritization purposes, each project is categorized by type. The types of projects include:

- Supportive: Usually supportive projects are important components of all types of mitigation activities. For example, a coordinator or staff position is often critical to applying for and implementing mitigation grants.
- Educational/Informational: These projects typically do not mitigate a hazard directly, however, by educating the public or others, those individuals may then take their own mitigation actions. These types of projects may also be used by governing bodies and other authorities to make decisions or develop new policies or projects.
- Policy/Regulatory: Policies and regulations created, updated, or enforced by government entities can have powerful hazard mitigation impacts. Their benefits can often be difficult to measure. Conservation easements are an example of a land use change mechanism enforced by regulatory authorities.
- Property Protection: These projects often directly reduce future property losses through physical changes. Such changes can reduce or eliminate the threat to property.
- Infrastructure Protection: These projects often physically reduce losses to critical infrastructure. Hardening or improvements to infrastructure can reduce the likelihood of losses to important lifeline systems from the various hazards.
- Population Protection: Generally, population protection measures reduce the loss of life and injury by physically changing a threat to people or by prompting a person to take immediate action. For example, warning systems may alert people to imminent hazards.
- Financial Protection: These measures typically protect the financial well-being of the public, such as insurance coverage.

Additional information on the priorities and goal timeframes can be found in the sections that follow.

Goal 1: Reduce population and property losses through comprehensive mitigation programs.

Objective 1.1: Provide the public, businesses, and local officials with ample educational opportunities regarding hazard mitigation.

Project 1.1.1: Public Education

- Develop a comprehensive public education program that highlights a variety of mitigation topics including, but not limited to:
  - Developing an education campaign on wildfire hazard reductions and seasonal fire danger.
  - Targeting rural property owners through fire prevention and mitigation messages in property tax notices.
  - Distributing winter weather information in welcome packets to new residents.
  - Running media spots on winter weather survival.
  - Developing brochures on building practices and materials to avoid wind and/or wildfire damage. Make the brochures available at insurance offices, lumber yards, utility offices, etc.
  - Publishing information regarding the importance of electric utility right-of-way maintenance and clearing and notification of downed trees on power lines.
  - Targeting potentially affected citizens with information about the dam failure warning system.
  - Publishing information about building in the floodplain.
  - Developing public health education campaigns on topics such as immunizations, personal protection from infectious diseases, and proper disposal of individual animal carcasses.

Jurisdiction(s): Stillwater County, Town of Columbus
Project Type: Educational/Informational
Responsible Agencies and Partners: Stillwater County Disaster and Emergency Services Coordinator and the relevant subject matter experts: Stillwater County Fire Warden, Fire Chiefs/Departments, National Weather Service Warning Coordination Meteorologist, Montana Disaster and Emergency Services, Electric Companies, Stillwater County Floodplain Manager, Stillwater County Public Health Director and Nurse
Resources Needed: Staff time and expertise, funding for implementation (less than $500 for materials)
Potential Funding Sources: FEMA; USFS, BLM, and/or DNRC (for wildfire); Electric companies (for electric infrastructure protection); DNRC (for flooding); DPHHS (for disease)
Goal Timeframe: Ongoing: Already initiated and continuing
Priority: Medium

Project 1.1.2: Hazard Mitigation Workshops

- Develop workshops and educational programs focused on hazard mitigation, including, but not limited to:
  - Defensible space and FireWise workshops targeting county planning staff, county planning board, architects, engineers, and realtors (that would qualify for continuing education credits)
  - FireWise workshops for rural subdivisions
  - National Weather Service presentations on flooding and winter weather for the public and school children
  - Animal disease and disease prevention training for producers and ranchers (through sponsorship of local veterinarians)

Jurisdiction(s): Stillwater County, Town of Columbus
Project Type: Educational/Informational
Responsible Agencies and Partners: Stillwater County Disaster and Emergency Services Coordinator and the relevant subject matter experts: Stillwater County Fire Warden, Fire Chiefs/Departments, National Weather Service Warning Coordination Meteorologist, State Veterinarian
Resources Needed: Staff time and expertise, funding for implementation ($1,000-$5,000 for workshop development, materials, and presentation)
Potential Funding Sources: USFS, BLM, and/or DNRC (for wildfire); Montana Department of Livestock (for animal disease)
Goal Timeframe: Ongoing: Already initiated and continuing
Priority: High

Objective 1.2: Increase the situational awareness and warning of imminent or occurring hazards.

Project 1.2.1: Emergency Alert System

- Work with the local media and Yellowstone County to continue broadcasting weather warnings over the Emergency Alert System.
- Look into adding Red Flag Warnings to the suite of products broadcast over the Emergency Alert System.

Jurisdiction(s): Stillwater County, Town of Columbus
Project Type: Population Protection
Responsible Agencies and Partners: Stillwater County Disaster and Emergency Services Coordinator, National Weather Service Warning Coordination Meteorologist, Stillwater County Fire Warden
Resources Needed: Staff time and expertise
Potential Funding Sources: None needed
Goal Timeframe: Near Term: Initiated within 0-3 years
Priority: High

Project 1.2.2: Warning Sirens

- Design and implement a warning system for the siren in Columbus and educate residents on its use.
- Expand the warning system for failure of Mystic Lake Dam to areas further downstream.

Jurisdiction(s): Stillwater County, Town of Columbus
Project Type: Population Protection
Responsible Agencies and Partners: Stillwater County Disaster and Emergency Services Coordinator, Columbus Town Council, PPL Montana
Resources Needed: Staff time and expertise, funding for implementation (about $10,000-$20,000 per project)
Potential Funding Sources: Unknown
Goal Timeframe: Mid Term: Initiated within 3-6 years
Priority: Medium

Project 1.2.3: NOAA Weather Radios

- Make a bulk purchase of weather radios for households and critical facilities.
- Continue to broadcast warning information through dispatch.

Jurisdiction(s): Stillwater County, Town of Columbus
Project Type: Population Protection
Responsible Agencies and Partners: Stillwater County Disaster and Emergency Services Coordinator, National Weather Service Warning Coordination Meteorologist, Stillwater County Dispatch Supervisor
Resources Needed: Staff time and expertise, funding for implementation ($30 per weather radio)
Potential Funding Sources: Unknown
Goal Timeframe: Mid Term: Initiated within 3-6 years
Priority: Medium

Project 1.2.4: Weather Spotter Networks

- Host National Weather Service spotter training sessions throughout the county.
- Maintain a network of flood observers to monitor build up, runoff, and precipitation events.

Jurisdiction(s): Stillwater County, Town of Columbus
Project Type: Educational/Informational
Responsible Agencies and Partners: Stillwater County Disaster and Emergency Services Coordinator, National Weather Service Warning Coordination Meteorologist
Resources Needed: Staff time and expertise, volunteers
Potential Funding Sources: None needed
Goal Timeframe: Ongoing: Already initiated and continuing
Priority: Medium

Objective 1.3: Protect critical infrastructure and facilities to reduce future losses and ensure continued delivery of essential services.

Project 1.3.1: Generators

- Purchase and install generators at critical facilities and potential shelter locations.

Jurisdiction(s): Stillwater County, Town of Columbus
Project Type: Population Protection
Responsible Agencies and Partners: Stillwater County Disaster and Emergency Services, American Red Cross Disaster Coordinator
Resources Needed: Staff time and expertise, funding for implementation (about $5,000 - $15,000 per site)
Potential Funding Sources: Unknown
Goal Timeframe: Ongoing: Already initiated and continuing
Priority: High

Project 1.3.2: Electric and Communications Infrastructure Burying

- Bury electric and communications lines in hazardous areas (wildland urban interface, near trees, etc.).

Jurisdiction(s): Stillwater County, Town of Columbus
Project Type: Infrastructure Protection
Responsible Agencies and Partners: Electric Companies, Communications Companies, Stillwater County Disaster and Emergency Services Coordinator, Stillwater County Fire Warden
Resources Needed: Staff time and expertise, funding for implementation (about $1 million per mile)
Potential Funding Sources: FEMA
Goal Timeframe: Near Term: Initiated within 0-3 years
Priority: High

Project 1.3.3: Tree Maintenance

- Maintain trees in the utility right-of-ways and near critical facilities.

Jurisdiction(s): Stillwater County, Town of Columbus
Project Type: Infrastructure Protection
Responsible Agencies and Partners: Electric Companies, Critical Facility Managers
Resources Needed: Staff time and expertise, funding for implementation ($50-$1,000 per tree, depending on size)
Potential Funding Sources: Unknown
Goal Timeframe: Near Term: Initiated within 0-3 years
Priority: High

Objective 1.4: Mitigate the impact of hazards on future development through land use and building regulations.

Project 1.4.1: Building Codes

- Adopt and become certified to enforce building codes in Columbus.
- Educate local architects, engineers, and contractors on smart building practices and codes.

Jurisdiction(s): Stillwater County, Town of Columbus
Project Type: Policy/Regulatory
Responsible Agencies and Partners: Columbus Town Council, Stillwater County Planner
Resources Needed: Staff time and expertise
Potential Funding Sources: Local Budgets
Goal Timeframe: Near Term: Initiated within 0-3 years
Priority: High

Project 1.4.2: Subdivision Regulations

- Continue to make improvements to the county subdivision regulations for disaster resistance.
- Have the county attorney provide a training session for the fire chiefs on providing input to the subdivision review process.
- Develop a regulatory mechanism to ensure that subdivisions are built as approved and fire protection systems are initially and periodically certified.

Jurisdiction(s): Stillwater County
Project Type: Policy/Regulatory
Responsible Agencies and Partners: Stillwater County Attorney, Stillwater County Fire Warden, Fire Chiefs/Departments, Stillwater County Commissioners, Stillwater County Planner
Resources Needed: Staff time and expertise
Potential Funding Sources: None needed
Goal Timeframe: Near Term: Initiated within 0-3 years
Priority: High

Project 1.4.3: Growth Policy

- Update the countywide and town growth policies to encourage growth in low hazard areas and allow for the consideration of high hazard areas during subdivision reviews.

Jurisdiction(s): Stillwater County, Town of Columbus
Project Type: Policy/Regulatory
Responsible Agencies and Partners: Stillwater County Commissioners, Stillwater County Planner, Columbus Town Council
Resources Needed: Staff time and expertise
Potential Funding Sources: None needed
Goal Timeframe: Mid Term: Initiated within 3-6 years
Priority: Medium

Project 1.4.4: Conservation Easements

- Use conservation easements in high hazard areas such as flood and wildfire areas to serve a dual purpose, to keep development from high hazard areas and to conserve natural, ecologically important areas.

Jurisdiction(s): Stillwater County, Town of Columbus
Project Type: Policy/Regulatory
Responsible Agencies and Partners: Stillwater County Commissioners, Stillwater County Planner, Columbus Town Council, Private Conservation Groups
Resources Needed: Staff time and expertise, funding (amount depends on the market and size of purchase) for implementation
Potential Funding Sources: FEMA, Private Conservation Groups
Goal Timeframe: Mid Term: Initiated within 3-6 years
Priority: Medium

Goal 2: Protect the public, firefighters, communities, and property from losses due to wildfire.

Objective 2.1: Decrease the probability of structure ignitions in the wildland urban interface.

Project 2.1.1: Fuel Reductions

- Pursue wildland urban interface fuel reduction projects in high-risk areas around the county, including near structures, road right-of-ways, utility right-of ways, and along federal and state lands.

Jurisdiction(s): Stillwater County
Project Type: Property Protection
Responsible Agencies and Partners: Stillwater County Fire Warden, Fire Chiefs/Departments, Subdivision/Homeowners' Associations, US Forest Service, US Bureau of Land Management, Montana DNRC
Resources Needed: Staff time and expertise, funding (about $100-$200 per acre) for implementation
Potential Funding Sources: US Forest Service, US Bureau of Land Management, Montana DNRC, FEMA
Goal Timeframe: Ongoing: Already initiated and continuing
Priority: High

Project 2.1.2: Roof Replacements

- Replace wood roofs with metal roofs in the wildland urban interface.

Jurisdiction(s): Stillwater County
Project Type: Property Protection
Responsible Agencies and Partners: Stillwater County Fire Warden, Fire Chiefs/Departments, Subdivision/Homeowners' Associations, US Forest Service, US Bureau of Land Management, Montana DNRC
Resources Needed: Staff time and expertise, funding (about $5,000-$15,000 per house, depending on size) for implementation
Potential Funding Sources: US Forest Service, US Bureau of Land Management, Montana DNRC, FEMA
Goal Timeframe: Near Term: Initiated within 0-3 years
Priority: High

Objective 2.2: Improve local understanding of the wildfire hazard.

Project 2.2.1: Fuels Mapping

- Develop digital maps of wildfire hazard areas, such as fuels and condition classes.
- Use the mapping for land management and project development.

Jurisdiction(s): Stillwater County
Project Type: Educational/Informational
Responsible Agencies and Partners: Stillwater County GIS Office, Stillwater County Fire Warden, Fire Chiefs/Departments, US Forest Service, US Bureau of Land Management, Montana DNRC
Resources Needed: Staff time and expertise, funding (about $10,000-$50,000 for mapping services) for implementation
Potential Funding Sources: US Forest Service, US Bureau of Land Management, Montana DNRC, FEMA
Goal Timeframe: Mid Term: Initiated within 3-6 years
Priority: Medium

Project 2.2.2: Firewise Home Audits and Education

- Conduct individual home audits of residences in the wildland urban interface.
- Educate owners on Firewise standards and opportunities to perform wildfire mitigation.

Jurisdiction(s): Stillwater County
Project Type: Educational/Informational
Responsible Agencies and Partners: Stillwater County Fire Warden, Fire Chiefs/Departments, US Forest Service, US Bureau of Land Management, Montana DNRC
Resources Needed: Staff time and expertise
Potential Funding Sources: US Forest Service, US Bureau of Land Management, Montana DNRC, FEMA
Goal Timeframe: Ongoing: Already initiated and continuing
Priority: High

Goal 3: Utilize hazard-specific strategies to reduce future losses from particular hazards.

Objective 3.1: Determine vulnerability to future hazardous material spills.

Project 3.1.1: Hazardous Material Study

- Conduct an assessment of past hazardous material spills and analyze the type, location, and cause.
- Request a list of the top 25 hazardous materials being transported through the county on the railroad from Burlington Northern Santa Fe.
- Conducted a field study of hazardous materials being transported through the county on the interstate and highways.

Jurisdiction(s): Stillwater County, Town of Columbus
Project Type: Educational/Informational
Responsible Agencies and Partners: Stillwater County Disaster and Emergency Services Coordinator, Fire Chiefs/Departments, Burlington Northern Santa Fe Managers
Resources Needed: Staff time and expertise
Potential Funding Sources: None needed
Goal Timeframe: Near Term: Initiated within 0-3 years
Priority: High

Objective 3.2: Minimize physical and financial losses from flood.

Project 3.2.1: Storm Drainage

- Develop a storm drainage plan for Columbus.
- Address the drainage issue at Montana Silversmiths

Jurisdiction(s): Town of Columbus
Project Type: Property Protection
Responsible Agencies and Partners: Columbus Public Works Director, Columbus Town Council, Stillwater County Disaster and Emergency Services Coordinator
Resources Needed: Staff time and expertise, funding (amount is highly dependent on solution selected) for implementation
Potential Funding Sources: FEMA
Goal Timeframe: Mid Term: Initiated within 3-6 years
Priority: Medium

Project 3.2.2: National Flood Insurance Program

- Continue compliance with the National Flood Insurance Program and the Stillwater County flood ordinance.
- Consider joining the Community Rating System volunteer incentive program.

Jurisdiction(s): Stillwater County
Project Type: Policy/Regulatory
Responsible Agencies and Partners: Stillwater County Floodplain Manager
Resources Needed: Staff time and expertise
Potential Funding Sources: None needed
Goal Timeframe: Ongoing: Already initiated and continuing
Priority: Low

Project 3.2.3: Bridge, Culvert, and Road Improvements

- Upgrade bridges, culverts, and roads to allow sufficient passage of floodwaters.
- Install culverts in areas prone to washouts or drainage problems.

Jurisdiction(s): Stillwater County, Town of Columbus
Project Type: Infrastructure Protection
Responsible Agencies and Partners: Stillwater County Road Superintendent, Columbus Public Works Director, Stillwater County Disaster and Emergency Services Coordinator
Resources Needed: Staff time and expertise, funding (amount highly variable depending on the project) for implementation
Potential Funding Sources: FEMA
Goal Timeframe: Mid Term: Initiated within 3-6 years
Priority: Medium

Objective 3.3: Reduce and minimize the morbidity, mortality, and economic impacts of human and animal diseases.

Project 3.3.1: Epidemiology Team

- Form a local epidemiology team that meets quarterly (or as needed) to monitor disease within the human and animal populations in the county.

Jurisdiction(s): Stillwater County, Town of Columbus
Project Type: Educational/Informational
Responsible Agencies and Partners: Stillwater County Public Health Director and Nurse, Stillwater County Sanitarian, Stillwater Community Hospital Infectious Disease Expert, Stillwater County Health Officer, Local Veterinarians
Resources Needed: Staff time and expertise
Potential Funding Sources: None needed
Goal Timeframe: Mid Term: Initiated within 3-6 years
Priority: Medium

Project 3.3.2: Mosquito Control

- Control mosquito populations in wet areas.

Jurisdiction(s): Stillwater County, Town of Columbus
Project Type: Population Protection
Responsible Agencies and Partners: Stillwater County Public Health Director and Nurse, Stillwater County Sanitarian, Columbus Town Council
Resources Needed: Staff time and expertise, funding (amount depends on method selected) for implementation
Potential Funding Sources: Local Budgets
Goal Timeframe: Ongoing: Already initiated and continuing
Priority: Medium

Objective 3.4: Reduce the impacts to the agricultural community from drought.

Project 3.4.1: Range and Agriculture Management Tools

- Develop and distribute range and agriculture management tools for the local producers using weather and soil monitoring, planning, and education.

Jurisdiction(s): Stillwater County, Town of Columbus
Project Type: Educational/Informational
Responsible Agencies and Partners: Montana State University Extension Agent
Resources Needed: Staff time and expertise
Potential Funding Sources: None needed
Goal Timeframe: Long Term: Initiated within 7-10 years
Priority: Low

Objective 3.5: Minimize structural and population losses from earthquakes.

Project 3.5.1: Earthquake Retrofits

- Conduct earthquake risk assessments at critical facilities and other important or at-risk structures.
- Perform simple mitigation activities such as filming windows and securing equipment.
- Implement structural measures, as warranted.

Jurisdiction(s): Stillwater County, Town of Columbus
Project Type: Property Protection
Responsible Agencies and Partners: Stillwater County Disaster and Emergency Services Coordinator, Fire Chiefs/Departments, Facility Managers
Resources Needed: Staff time and expertise, funding (amount depends on activity pursued) for implementation
Potential Funding Sources: FEMA
Goal Timeframe: Long Term: Initiated within 7-10 years
Priority: Low

Objective 3.6: Reduce the chances of a mass casualty transportation accident due to large game in the roadways.

Project 3.6.1: Large Game Fencing/Management

- Install large game fencing or other corridor components such as culverts in key locations of major area roadways.

Jurisdiction(s): Stillwater County
Project Type: Population Protection
Responsible Agencies and Partners: Montana Department of Transportation Planners, Stillwater County Disaster and Emergency Services Coordinator
Resources Needed: Staff time and expertise, funding (amount depends on activity pursued) for implementation
Potential Funding Sources: Montana Department of Transportation
Goal Timeframe: Long Term: Initiated within 7-10 years
Priority: Low

5.2 Project Prioritization

Each of the proposed projects has value, however, time and financial constraints do not permit all of the proposed actions to be implemented immediately. By prioritizing the actions, the most critical, cost effective projects can be achieved in the short term. The prioritization of the projects serves as a guide for choosing and funding projects, however, depending on the funding sources, some actions may be best achieved outside the priorities established here.

To ensure that community goals and other factors are taken into account when prioritizing projects, a prioritization model that uses the following factors has been developed: cost, staff time, feasibility, population benefit, property benefit, values benefit, maintenance, and hazard rating. *Cost* considers the direct expenses associated with the project such as material and contractor expenses. *Staff time* evaluates the amount of time needed by a local government employee to complete or coordinate the project. *Feasibility* assesses the political, social, and/or environmental ramifications of the project and the likelihood such a project would proceed through permitting, public review processes, and/or private business implementation. The feasibility factor is essentially a summarization of FEMA's Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLEE) evaluation criteria as shown in Table 5.2A. *Population benefit* considers the possible prevention of deaths and injuries through the project's implementation. *Property benefit* estimates the reduction of property losses, including structures and infrastructure, from the hazard being mitigated. *Values benefit* considers the economic, ecologic, historic, and social benefits of the project. *Maintenance* rates the amount of work required to keep the mitigation measure effective and useful. The *hazard rating* is based on the results of the risk assessment and is a measure of the history, probability, magnitude, and vulnerabilities of the hazard.

Table 5.2A FEMA's STAPLEE Criteria

Criteria	Considerations
Social	Community Acceptance Effects on Segment of Population
Technical	Technical Feasibility Long-Term Solution Secondary Impacts
Administrative	Staffing Funding Allocated Maintenance/Operations
Political	Political Support Local Champion or Proponent Public Support
Legal	State Authority Local Authority Subjectivity to Legal Challenges

Table 5.2A FEMA's STAPLEE Criteria (continued)

Criteria	Considerations
Economic	Benefit of Action Cost of Action Contribution to Economic Goals Outside Funding Requirement
Environmental	Effects on Land/Water Bodies Effects on Endangered Species Effects on Hazardous Material and Waste Sites Consistency with Community Environmental Goals Consistency with Federal Laws

Source: Federal Emergency Management Agency, 2003.

Each factor was ranked qualitatively for each of the projects. The methods used to assign a category and the associated score can be generally defined as shown in Table 5.2B. The highest possible score is 30 for projects in which all factors are applicable. Some factors have a greater range than others, thus indicating a higher weighting. These weightings allow for appropriate prioritization of the project. More specifically, 11 of 30 points account for benefits (population benefit, property benefit, and values benefit), 11 of 30 points account for direct and indirect costs (cost, staff time, and maintenance), 5 of 30 points account for the hazard rating (incorporates hazard probability and impacts; see Section 4.13), and 3 of 30 points account for project feasibility.

The projects were prioritized by comparing the scores of projects of similar type. This method allows for more even prioritization of a variety of projects. When evaluating projects for grant applications, established cost-benefit analyses requiring detailed project-specific data should be used.

Note that all projects listed in the strategy have value and are worthy of inclusion in this plan. A low priority does not mean the project is not important, rather, compared to the other projects, its score using the described methodology was lower. Even low priority projects are encouraged immediately should funding, resources, and opportunities allow.

Table 5.2B Prioritization Criteria

Factor	Threshold	Rating	Score
Cost *Range: 1-5*	Little to no direct expenses	Low	5
	Less than $5,000	Low-Moderate	4
	$5,000-$25,000	Moderate	3
	$25,001-$100,000	Moderate-High	2
	Greater than $100,000	High	1
Staff Time *Range: 1-3*	Less than 10 hours of staff time	Low	3
	10-40 hours of staff time	Moderate	2
	Greater than 40 hours of staff time	High	1
Feasibility *Range: 1-3*	Positive support for the project	High	3
	Neutral support for the project	Moderate	2
	Negative support for the project	Low	1
Population Benefit *Range: 1-4*	Potential to reduce more than 20 casualties	Very High	4
	Potential to reduce 6-20 casualties	High	3
	Potential to reduce 1-5 casualties	Moderate	2
	No potential to reduce casualties	Low	1
Property Benefit *Range: 1-4*	Potential to reduce losses to more than 20 buildings or severe damages to infrastructure	Very High	4
	Potential to reduce losses to 6-20 buildings or substantial damages to infrastructure	High	3
	Potential to reduce losses to 1-5 buildings or slight damages to infrastructure	Moderate	2
	No potential to reduce property losses	Low	1
Values Benefit *Range: 1-3*	Provides significant benefits to economic, ecologic, historic, or social values	High	3
	Provides some benefits to economic, ecologic, historic, or social values	Moderate	2
	No or very little benefit to economic, ecologic, historic, or social values	Low	1
Maintenance *Range: 1-3*	Requires very little or no maintenance	Low	3
	Requires less than 10 hours per year	Moderate	2
	Requires more than 10 hours per year	High	1
Hazard Rating *Range: 1-5*	see Section 4.13	High	5
	see Section 4.13	Moderate	3
	see Section 4.13	Low	1

Table 5.2C Hazards and Development Mitigated by Each Proposed Project

	Dam Failure	Disease	Drought	Earthquake	Flood	Hazardous Material Release	Landslide and Avalanche	Severe Weather	Terrorism and Civil Unrest	Transportation Accident	Volcanic Ashfall	Wildfire	Existing Development	Future Development
Project 1.1.1: Public Education	X	X			X			X				X	X	X
Project 1.1.2: Hazard Mitigation Workshops		X			X			X				X	X	X
Project 1.2.1: Emergency Alert System	X				X	X	X	X			X	X		
Project 1.2.2: Warning Sirens	X				X	X		X			X	X		
Project 1.2.3: NOAA Weather Radios	X				X	X	X	X			X	X		
Project 1.2.4: Weather Spotter Networks	X				X		X	X						
Project 1.3.1: Generators				X				X	X					
Project 1.3.2: Electric and Communications Infrastructure Burying								X	X	X	X	X	X	
Project 1.3.3: Tree Maintenance								X			X		X	
Project 1.4.1: Building Codes				X				X	X		X			X
Project 1.4.2: Subdivision Regulations			X		X		X	X		X		X		X
Project 1.4.3: Growth Policy			X		X		X	X		X		X		X
Project 1.4.4: Conservation Easements			X		X		X					X		X
Project 2.1.1: Fuel Reductions												X	X	
Project 2.1.2: Roof Replacements												X	X	
Project 2.2.1: Fuels Mapping												X		
Project 2.2.2: Firewise Home Audits and Education												X	X	
Project 3.1.1: Hazardous Material Study						X			X	X				
Project 3.2.1: Storm Drainage	X				X								X	
Project 3.2.2: National Flood Insurance Program					X									X
Project 3.2.3: Bridge, Culvert, and Road Improvements	X				X	X				X			X	
Project 3.3.1: Epidemiology Team		X												
Project 3.3.2: Mosquito Control		X												
Project 3.4.1: Range and Agriculture Management Tools			X											
Project 3.5.1: Earthquake Retrofits				X									X	
Project 3.6.1: Large Game Fencing/Management						X				X				

Table 5.2D Mitigation Prioritization Scores

	Cost	Staff Time	Feasibility	Population Benefit	Property Benefit	Values Benefit	Maintenance	Hazard Rating	TOTAL SCORE
Educational/Informational									
Project 1.1.1: Public Education	4	1	2	3	3	2	1	5	21
Project 1.1.2: Hazard Mitigation Workshops	4	1	2	3	3	2	2	5	22
Project 1.2.4: Weather Spotter Networks	5	2	2	2	1	2	2	5	21
Project 2.2.1: Fuels Mapping	3	1	3	3	3	2	1	5	21
Project 2.2.2: Firewise Home Audits and Education	5	1	2	3	4	2	1	5	23
Project 3.1.1: Hazardous Material Study	5	1	3	3	1	1	3	5	22
Project 3.3.1: Epidemiology Team	5	1	2	4	1	2	1	5	21
Project 3.4.1: Range and Agriculture Management Tools	5	1	2	2	1	3	1	3	18
Policy/Regulatory									
Project 1.4.1: Building Codes	4	1	2	4	4	2	1	5	23
Project 1.4.2: Subdivision Regulations	5	1	2	3	4	2	1	5	23
Project 1.4.3: Growth Policy	5	1	2	2	3	2	1	5	21
Project 1.4.4: Conservation Easements	1	1	2	3	4	3	3	5	22
Project 3.2.2: National Flood Insurance Program	5	1	2	2	2	2	1	5	20
Property Protection									
Project 2.1.1: Fuel Reductions	2	1	2	3	4	2	1	5	20
Project 2.1.2: Roof Replacements	2	1	2	2	3	1	3	5	19
Project 3.2.1: Storm Drainage	1	1	2	2	3	2	2	5	18
Project 3.3.2: Mosquito Control	2	1	2	4	1	2	1	5	18
Project 3.5.1: Earthquake Retrofits	2	1	3	3	2	2	3	1	17
Infrastructure Protection									
Project 1.3.2: Electric and Communications Infrastructure Burying	1	2	3	2	4	2	3	5	22
Project 1.3.3: Tree Maintenance	3	3	3	2	3	2	1	5	22
Project 3.2.3: Bridge, Culvert, and Road Improvements	3	2	2	2	3	2	2	5	21
Population Protection									
Project 1.2.1: Emergency Alert System	5	2	3	3	1	2	2	5	23
Project 1.2.2: Warning Sirens	3	2	2	3	1	2	2	5	20
Project 1.2.3: NOAA Weather Radios	4	2	2	2	1	2	2	5	20
Project 1.3.1: Generators	3	2	3	3	2	1	2	5	21
Project 3.6.1: Large Game Fencing/Management	2	1	2	3	1	3	3	3	18

5.3 Project Implementation

A critical component of any mitigation program is the implementation of the mitigation projects. Maintenance of this Pre-Disaster Mitigation Plan is the responsibility of Stillwater County Disaster and Emergency Services (DES) in coordination with other appropriate agencies. Once a mitigation project is identified, however, DES generally steps back from the leadership role and assumes the role of team participant. The lead role in project development should then shift to the department or agency responsible for the project management.

Each proposed project was given a high, medium, or low prioritization based on the score received in Section 5.2 within each project type. The proposed and prioritized projects are shown in Table 5.3A with the associated goal timeframes for the actions. The timeframes are defined as follows and are generally based on the nature of the project and its priority:

- Near Term: Initiated within 0-3 years
- Mid Term: Initiated within 3-6 years
- Long Term: Initiated within 7-10 years
- Ongoing: Already initiated and continuing

Some projects may be best achieved outside of the goal timeframes depending on the funding and staff resources available. Others may not be feasible in the goal timeframe due to financial, staff, or political limitations. This prioritized list, however, allows the county and town to focus on the types of projects with the greatest benefits.

Table 5.3A Implementation Scheme for Mitigation Projects

Proposed Action	Jurisdiction(s)	Priority	Goal Timeframe
Educational/Informational			
Project 2.2.2: Firewise Home Audits and Education	Stillwater County	High	Ongoing
Project 1.1.2: Hazard Mitigation Workshops	All	High	Ongoing
Project 3.1.1: Hazardous Material Study	All	High	Near Term
Project 1.1.1: Public Education	All	Medium	Ongoing
Project 1.2.4: Weather Spotter Networks	All	Medium	Ongoing
Project 2.2.1: Fuels Mapping	Stillwater County	Medium	Mid Term
Project 3.3.1: Epidemiology Team	All	Medium	Mid Term
Project 3.4.1: Range and Agriculture Management Tools	All	Low	Long Term
Policy/Regulatory			
Project 1.4.1: Building Codes	All	High	Near Term
Project 1.4.2: Subdivision Regulations	Stillwater County	High	Near Term
Project 1.4.4: Conservation Easements	All	Medium	Mid Term
Project 1.4.3: Growth Policy	All	Medium	Mid Term
Project 3.2.2: National Flood Insurance Program	Stillwater County	Low	Ongoing

Table 5.3A Implementation Scheme for Mitigation Projects (continued)

Proposed Action	Jurisdiction(s)	Priority	Goal Timeframe
Property Protection			
Project 2.1.1: Fuel Reductions	Stillwater County	High	Ongoing
Project 2.1.2: Roof Replacements	Stillwater County	High	Near Term
Project 3.2.1: Storm Drainage	Town of Columbus	Medium	Mid Term
Project 3.3.2: Mosquito Control	All	Medium	Ongoing
Project 3.5.1: Earthquake Retrofits	All	Low	Long Term
Infrastructure Protection			
Project 1.3.2: Electric and Communications Infrastructure Burying	All	High	Near Term
Project 1.3.3: Tree Maintenance	All	High	Near Term
Project 3.2.3: Bridge, Culvert, and Road Improvements	All	Medium	Mid Term
Population Protection			
Project 1.2.1: Emergency Alert System	All	High	Near Term
Project 1.3.1: Generators	All	High	Ongoing
Project 1.2.2: Warning Sirens	All	Medium	Mid Term
Project 1.2.3: NOAA Weather Radios	All	Medium	Mid Term
Project 3.6.1: Large Game Fencing/Management	Stillwater County	Low	Long Term

5.4 Funding Sources

Funding for mitigation projects exists from a multitude of sources. Some sources may be specifically designed for disaster mitigation activities, while others may have another overarching purpose that certain mitigation activities may qualify for. Most mitigation funding sources are recurring through legislation or government support. Some, however, may be from an isolated instance of financial support. Whenever possible, creative financing is encouraged. Often, additional funding sources are found through working with other agencies and businesses to identify common or complementary goals and objectives. Table 5.4A shows the programs that may be available to Stillwater County and the Town of Columbus. The traditional mitigation programs that are especially relevant for the county and town are shown in bold. Note that many of the grant programs have a cash or in-kind match requirement.

This list of potential funding sources is certainly not all inclusive. Many opportunities for mitigation funding exist both in the public and private sectors such as businesses, foundations, and philanthropic organizations.

Table 5.4A Mitigation Funding Sources

Name	Description	Managing Agencies
AmeriCorps	Provides funding for volunteers to serve communities, including disaster prevention.	▪ Corporation for National & Community Service
Assistance to Firefighters Grants	Provides funding for fire prevention and safety activities and firefighting equipment.	▪ US Department of Homeland Security
Clean Water Act Section 319 Grants	Provides grants for a wide variety of activities related to non-point source pollution runoff mitigation.	▪ US Environmental Protection Agency
Community Development Block Grant (CDBG)	Provides funding for sustainable community development, including disaster mitigation projects.	▪ US Housing and Urban Development
Conservation District “HB 223” Grants	Provides funding for projects sponsored by conservation districts	▪ Montana Department of Natural Resources and Conservation
Economic Development Administration (EDA) Grants and Investments	Invests and provides grants for community construction projects, including mitigation activities.	▪ US Economic Development Administration
Education Mini-Grants	Provides grants to conservation districts for projects that focus on water and other natural resources	▪ Montana Department of Natural Resources and Conservation

Table 5.4A Mitigation Funding Sources (continued)

Name	Description	Managing Agencies
Emergency Watershed Protection	Provides funding and technical assistance for emergency measures such as floodplain easements in impaired watersheds.	▪ US Natural Resources Conservation Service
Environmental Quality Incentives Program	Provides funding and technical assistance to farmers and ranchers to promote agricultural production and environmental quality as compatible goals.	▪ US Natural Resources Conservation Service
Flood Mitigation Assistance Program (FMA)	Provides pre-disaster flood mitigation funding (with priority for repetitive flood loss properties under the National Flood Insurance Program).	▪ Montana Department of Natural Resources and Conservation ▪ FEMA – Region VIII
Hazard Mitigation Grant Program (HMGP)	Provides post-disaster mitigation funding.	▪ Montana Disaster & Emergency Services ▪ FEMA – Region VIII
Hazardous Fuels Mitigation Program	Provides funding for the reduction of hazardous wildfire fuels.	▪ US Bureau of Land Management
Hazardous Materials Planning and Training Grants	Provides funding for planning and training for hazardous materials releases.	▪ Montana Disaster & Emergency Services
Homeland Security Grants	Through multiple grants, provides funding for homeland security activities. Some projects can be considered mitigation.	▪ Montana Disaster & Emergency Services ▪ US Department of Justice ▪ US Department of Homeland Security
Housing and Urban Development (HUD) Grants	Provides a number of grants related to safe housing initiatives.	▪ US Housing and Urban Development
Individual Assistance (IA)	Following a disaster, funds can mitigate hazards when repairing individual and family homes.	▪ Montana Disaster & Emergency Services ▪ FEMA – Region VIII
Jumpstart Grants	Provides grants for forest stewardship and fuel reduction projects	▪ Montana Department of Natural Resources and Conservation
Law Enforcement Support Office 1033 Program	Provides surplus military property to local law enforcement agencies.	▪ Montana Public Safety Service Bureau

Table 5.4A Mitigation Funding Sources (continued)

Name	Description	Managing Agencies
Map Modernization Program	Provides funding to establish or update floodplain mapping.	▪ Montana Department of Natural Resources and Conservation ▪ FEMA – Region VIII
National Wildlife Wetland Refuge System	Provides funding for the acquisition of lands into the federal wildlife refuge system.	▪ US Fish and Wildlife Service
North American Wetland Conservation Fund	Provides funding for wetland conservation projects.	▪ US Fish and Wildlife Service
NRCS Conservation Programs	Provides funding through a number of programs for the conservation of natural resources.	▪ US Natural Resources Conservation Service
Partners for Fish and Wildlife	Provides financial and technical assistance to landowners for wetland restoration projects in "Focus Areas" of the state.	▪ US Fish and Wildlife Service
PPL Montana Community Fund	Provides grants to Montana organizations in the areas of education, environment, and economic development.	▪ PPL Montana
Pre-Disaster Mitigation (PDM) Grants	Provides grants through a competitive process for specific mitigation projects, including planning.	▪ Montana Disaster & Emergency Services ▪ FEMA – Region VIII
Public Assistance (PA)	Following a disaster, funds can be used to mitigate hazards when repairing damages to public structures or infrastructure.	▪ Montana Disaster & Emergency Services ▪ FEMA – Region VIII
Reclamation and Development Grants Program	Provides funding from the interest income of the Resource Indemnity Trust Fund to local governments for dam safety and other water related projects.	▪ Montana Department of Natural Resources and Conservation
Renewable Resource Development Grant	Provides funding to protect, conserve, or develop renewable resources, including water.	▪ Montana Department of Natural Resources and Conservation

Table 5.4A Mitigation Funding Sources (continued)

Name	Description	Managing Agencies
Repetitive Flood Claims (RFC) Grant	Provides funding to reduce flood damages to insured properties that have had one or more claims to the NFIP.	▪ Montana Department of Natural Resources and Conservation ▪ FEMA – Region VIII
Rural Development Grants	Provides grants and loans for infrastructure and public safety development and enhancement in rural areas.	▪ US Department of Agriculture, Rural Development
Rural Fire Assistance (RFA) Grant	Funds fire mitigation activities in rural communities.	▪ National Interagency Fire Center
SBA Pre-Disaster Mitigation Loan Program	Provides low-interest loans to small businesses for mitigation projects.	▪ US Small Business Administration (SBA)
Severe Repetitive Loss (SRL) Grant	Provides funding to reduce flood damages to residential insured properties that have had at least four claims to the NFIP.	▪ Montana Department of Natural Resources and Conservation ▪ FEMA – Region VIII
Small Flood Control Projects	Authority of USACE to construct small flood control projects.	▪ US Army Corps of Engineers (USACE)
Streambank & Shoreline Protection	Authority of USACE to construct streambank stabilization projects.	▪ US Army Corps of Engineers (USACE)
Volunteer Fire Assistance (VFA) Grants	Provides funding for wildfire prevention and suppression projects	▪ Montana Department of Natural Resources and Conservation
Watershed Planning Assistance	Provides funding for watershed planning activities through conservation districts	▪ Montana Department of Natural Resources and Conservation
Western States Wildland Urban Interface Grant	Provides funding for pre-disaster wildfire mitigation.	▪ Montana Department of Natural Resources and Conservation
Wetland Program Development Grants (WPDGs)	Provides funding for studies related to water pollution prevention.	▪ US Environmental Protection Agency
Woody Biomass Utilization and Fuels for Schools and Beyond Programs	Facilitates and promotes the beneficial use of woody biomass created by forest management treatments	▪ Montana Department of Natural Resources and Conservation

5.5 Existing Planning Mechanisms and Capabilities

Implementing mitigation projects requires cooperation and coordination between a variety of agencies, organizations, and the public. Most mitigation projects are time consuming and may require the attention of local officials with many other priorities. Incorporating mitigation ideas and information into existing planning mechanisms and programs is one way to use existing resources to achieve mitigation objectives.

Recent economic slowdowns may have tempered growth in the county and town but this slowdown also provides the opportunity to look at existing policies and regulations so that future development may be better protected as economic conditions improve.

Stillwater County primarily consists of rural areas and has a relatively small tax base that limits the number of resources and amount of time that can be devoted to mitigation, or even planning and emergency management for that matter. Similarly, the Town of Columbus, although more developed, is a relatively small community with just under 2,000 residents. These jurisdictions may require additional assistance and support in order to perform the most basic mitigation activities such as grant applications or community outreach.

In general, the county and town have only a few planning mechanisms through which mitigation concepts can be integrated. Table 5.5A lists the existing local plans and development mechanisms.

Table 5.5A Existing Local Plans and Development Mechanisms

Plan Name	Date
Beartooth RC&D Area Comprehensive Economic Development Strategy	December 2001
Stillwater County and Town of Columbus Subdivision Regulations	2007
Stillwater County and Town of Columbus Zoning Regulations	Varied
Stillwater County Community Wildfire Protection Plan	July 2007
Stillwater County Growth Policy	March 2007
Stillwater County Homeland Security Strategic Plan	June 2004
Town of Columbus Municipal Codes	Varied

As the jurisdictions develop new plans and existing plans are updated, the new plans and updates will utilize the hazard information and actions identified in this mitigation plan for consideration and inclusion. Given that limited planning mechanisms exist in the county and town, the information in this mitigation plan will be valuable for future planning efforts. Most of the integration of mitigation into existing plans will be done by the local planning departments, however, for more comprehensive integration, local officials and other departments will also need to consider mitigation when making decisions and updating codes, regulations, policies, and plans. Table 5.5B shows examples of how mitigation can be incorporated into existing and future planning documents. Note that some proposed mechanisms may not be feasible at this time or any time in the near future due to the staff, technical expertise, political, and financial resources needed to implement the program.

Table 5.5B Incorporation into Existing and Future Plans

Existing or Anticipated Plan	Mitigation Strategies
Building Codes	▪ Adopt and enforce the state building code. This activity will reduce the risks to future development from hazards such as earthquakes, explosions, tornadoes, strong winds, heavy snow, terrorism, and volcanic ashfall.
Capital Improvement Plans	▪ When developed or updated, consider and include projects related to hazard mitigation, such as transportation and public utility infrastructure improvements, in the capital improvements schedule.
Community Wildfire Protection Plan	▪ When updated, continue to emphasize mitigation activities in the strategy portion of the plan.
Economic Development Strategies	▪ When developed or updated, include elements of the risk assessment and mitigation strategy into the strategy, considering sustainability and disaster resistance a top priority since disasters often lead to economic problems.
Emergency Operations Plans	▪ Integrate the operational, response, training, and preparedness needs that are not directly tied to mitigation into the county's emergency operation plan.
Growth Policies	▪ When developed or updated, include elements of the risk assessment and mitigation strategy into the growth policy, considering sustainability and disaster resistance a top priority.
Homeland Security Strategic Plan	▪ When updated, add elements related to terrorism mitigation.
Subdivision Regulations	▪ When updated, incorporate elements of the risk assessment and mitigation strategy into the subdivision regulations, considering sustainability and disaster resistance a top priority.
Zoning / Ordinances / Municipal Codes	▪ Adopt ordinances that create disaster resistance such as fire reduction ordinances, flood ordinances, and open space zoning in hazard areas.

Note: Some activities such as building codes and land use regulations are more easily implemented by some communities than others because of the community, planning, and enforcement resources available.

6. PLAN MAINTENANCE

An important aspect of any useable plan is the maintenance and upkeep of the document. The Stillwater County Commissioners and the Columbus Town Council are ultimately responsible for ensuring this plan is kept up to date. To facilitate and ensure the plan will remain viable for Stillwater County and the Town of Columbus for many years, the plan maintenance responsibilities are delegated to the Stillwater County Disaster and Emergency Services (DES) Coordinator and the Local Emergency Planning Committee (LEPC) Chairperson as co-leads. The LEPC meets regularly and is responsible for coordinating emergency planning issues for the county and communities. Given the broad representation of agencies and jurisdictions, this committee is a good fit, has many members that participated in the plan development, and eliminates the need for an additional committee. All Local Emergency Planning Committee meetings are open to the public.

6.1 Plan Monitoring

The plan will be monitored by the Stillwater County DES Coordinator and the Stillwater County LEPC and mitigation progress will be discussed at each LEPC meeting, usually monthly. The status of projects will be reported on and new projects will be initiated during this time. Annually, a "Mitigation Year in Review" meeting will be conducted in January. At this meeting, a list of projects completed during the previous calendar year will be documented and put in Appendix J.

The Stillwater County DES Coordinator and the Stillwater County LEPC will review the goals, objectives, and projects to determine if the actions for which funding exist are proceeding as planned. The DES Coordinator and LEPC will review any new risk information and modify the plan as indicated by the emergence of new vulnerabilities. Review of ongoing projects will be conducted to determine their status, their practicality, and which actions should be revised. If needed, site visits will be conducted. Also, land use, comprehensive, and strategic plans will be monitored as related to the Pre-Disaster Mitigation Plan.

6.2 Plan Evaluation

The evaluation of the plan will be conducted by the Stillwater County DES Coordinator and the Stillwater County LEPC annually at the January "Mitigation Year in Review" LEPC meeting. At this meeting, the methods of implementing and maintaining the plan will be evaluated for successes and improvements. Changes to the implementation schedule or plan maintenance will be made as needed to ensure hazard mitigation activities continue. The evaluation will consider the following:

- changes in land development,
- if the nature or magnitude of risks has changed,
- if the goals and objectives address current and expected conditions,
- the effectiveness of the programs,
- if outcomes have occurred as expected,
- if other agencies and partners have participated as originally planned,
- if current resources are adequate for implementing the plan,

- if other programs exist that may affect mitigation priorities.

New stakeholders and interested parties will be identified and invited to participate in the implementation process. The Stillwater County DES Coordinator and the Stillwater County LEPC maintain a contact list of mitigation stakeholders. Should a hazard event have occurred during the previous year in which a mitigation project was a factor, either positive or negative, a summary report, including avoided losses, will be written and included in Appendix J.

6.3 Plan Updates

As disasters occur, projects are completed, and hazard information is improved, the Stillwater County Pre-Disaster Mitigation Plan will need to be updated. To remain an active and approved plan, an updated plan must be submitted to Montana Disaster and Emergency Services (DES) and the Federal Emergency Management Agency (FEMA) every five years. The next formal submission is required in 2015. To provide enough time for a full update before this plan expires, the following schedule is recommended:

- Pre-Disaster Mitigation Planning Grant Application Preparations: late 2013
- Pre-Disaster Mitigation Planning Grant Application: early 2014
- Contracting for Professional or Technical Services (if needed): May-June 2014
- Plan Reviews and Modifications: July 2014 –March 2015
- Montana DES and FEMA Reviews: April-May 2015
- Final Revisions and Adoption: June 2015
- Final Plan Approval: July 2015

To facilitate the update process, annual updates to the plan are recommended. Table 6.3A shows the schedule of plan updates.

Table 6.3A Schedule of Plan Updates

Plan Section	Post-Disaster	Annually	Every 5 Years
Introduction			X
Planning Process and Methodologies	X	X	X
Critical Facilities and Infrastructure			X
Population and Structures			X
Economic, Ecologic, Historic, and Social Values			X
Current Land Use			X
Recent Development		X	X
Future Development			X
Hazard Profiles	X		X
Risk Assessment Summary			X
Goals, Objectives, and Proposed Projects	X	X	X
Project Prioritization	X	X	X
Project Implementation	X	X	X

Table 6.3A Schedule of Plan Updates (continued)

Plan Section	Post-Disaster	Annually	Every 5 Years
Funding Sources			X
Existing Planning Mechanisms and Capabilities	X		X
Plan Maintenance			X
Appendices	X	X	X

6.4 Public Involvement

Stillwater County and the Town of Columbus are dedicated to involving the public directly in the review and updates of the Pre-Disaster Mitigation Plan. A copy of the Pre-Disaster Mitigation Plan will be available for review at the Stillwater County Disaster and Emergency Services Office, the Stillwater County Commissioners Office, and the Town of Columbus Office. The public is also invited to attend all Local Emergency Planning Committee meetings and the annual January "Mitigation Year in Review" meeting to provide input and feedback. In an effort to solicit involvement, appropriate public notices will be distributed prior to public meetings, encouraging the public to attend and provide comment. Year round, written comments may also be submitted to Stillwater County Local Emergency Planning Committee at:

Stillwater County LEPC
c/o Stillwater County Disaster and Emergency Services
PO Box 1287
Columbus, MT 59019

Received comments will be reviewed and integrated where applicable during the annual and five-year plan updates.

Appendix A. INVITED STAKEHOLDERS

Table A1. Invited Stakeholders

Name	Organization
Wayne Pearson	Absarokee Sewer District
Thad Moseman*	Beartooth Electric Cooperative
Carla Lawrence	Beartooth Resource Conservation and Development
Dick Rath	Beartooth Resource Conservation and Development
Barron Crawford	Charles M. Russell National Wildlife Refuge
Vicki Wilson*	Columbus Ambulance*
Rich Cowger	Columbus Fire Rescue
Al Nordahl*	Columbus Fire Rescue
Gary Woltermann	Columbus Mayor
Bill Pronovost	Columbus Police Department
Mori Woods	Columbus Police Department
Dennis Holten	Columbus Public Works
Gary Anderson	Columbus Town Council
Jon Brown	Columbus Town Council
Paul Edwards	Columbus Town Council
Terry Nystul	Columbus Town Council
Patty Sundberg	Columbus Town Council
Scott Sweeney	Fergus Electric Cooperative
Pete Masse	HAM Radio
Jeff Bollman	Montana Department of Natural Resources and Conservation
Steve Wilkins	Montana Department of Natural Resources and Conservation
Chris Rasmussen	Montana Department of Transportation
Randy Roth	Montana Department of Transportation
Kent Atwood	Montana Disaster and Emergency Services
Charlie Hanson	Montana Disaster and Emergency Services
Sheri Lanz	Montana Disaster and Emergency Services
Pete O'Loughlin*	Montana Highway Patrol
	Montana Rail Link
Lee Schmelzer	Montana State University Extension
Tom Frieders	National Weather Service
	Northwestern Energy
Timothy Russell	Stillwater Community Hospital
	Stillwater Conservation District
	Stillwater County Chamber of Commerce
Pauline Mishler	Stillwater County Clerk and Recorder
Maureen Davey	Stillwater County Commission
Chuck Egan*	Stillwater County Commission
Dennis Hoyem	Stillwater County Commission

Table A1. Invited Stakeholders (continued)

Name	Organization
Dennis Shupak	Stillwater County Commission
Eric Frank	Stillwater County Disaster and Emergency Services
Ken Mesch*	Stillwater County Disaster and Emergency Services
Melissa Kramer	Stillwater County Economic Development
Keith Bell	Stillwater County Environmental Health
Dana Strobel	Stillwater County Environmental Health
Stephanie Moodry	Stillwater County Environmental Health
Joe Morse	Stillwater County Finance and Human Resources
George Bokma	Stillwater County Fire Warden
Carol Arkell	Stillwater County Geographic Information Systems
Jim Larson*	Stillwater County Geographic Information Systems
Jennifer Ries	Stillwater County News
Cal Cumin	Stillwater County Planning Office
Forrest Mandeville	Stillwater County Planning Office
Jill Grim	Stillwater County Public Health
Kelly Shumway	Stillwater County Public Health
Calvin Clark	Stillwater County Road and Bridge Department
Ken Kissler	Stillwater County Road and Bridge Department
Jack Knorr	Stillwater County Road and Bridge Department
Judy Martin	Stillwater County Schools
Cliff Brophy	Stillwater County Sheriff
Scott Waltner	Stillwater County Solid Waste Department
Bev McCurry	Stillwater County Treasurer
Nick Hauer*	Stillwater Mining Company
David Johnson	Stillwater Mining Company
Ryan Morris	Stillwater Mining Company
Mike Dannenberg	US Bureau of Land Management
Drew Brown	US Forest Service, Custer National Forest
Traute Parrie	US Forest Service, Custer National Forest
Philip Sandoval	US Natural Resources Conservation Service
Nicole McClain	Yellowstone River Conservation District Council
	Yellowstone Valley Electric Cooperative
Lisa Davis	
Chris Fleck	
Dot Gallager	
Cathy Glassen	
Linda Halstead-Acharya	
Woody Hover	
John Zinne	

* former stakeholder

Appendix B. PUBLIC INFORMATION DOCUMENTATION

Sent to the Stillwater County News, September 30, 2009

Planning to Prevent Disasters

Ever wonder what types of disasters are possible here? Are we doing all we can to mitigate future disaster losses? Residents of Stillwater County now have the opportunity to explore possible disaster scenarios and take part in minimizing the impacts, before the disaster occurs. The countywide Pre-Disaster Mitigation Plan, including the Town of Columbus, and the unincorporated communities, does just that. This plan identifies the major hazards threatening the communities and the values at risk. Based on the plan's risk assessment, projects ranging from education programs to infrastructure retrofits to land use regulations are identified as possible solutions to reduce future losses. Once the plan is adopted and approved, the jurisdictions may be eligible for future grant funds and additional assistance before and following a disaster.

"We can't do this without the help of the residents," says Pam Shrauger of Big Sky Hazard Management LLC, an emergency management planning firm based in Bozeman hired to coordinate the plan's update. "We want a plan that is locally driven and useful, not something to stick on a shelf."

A meeting, designed to involve the public and local officials in the plan update process, is scheduled for Thursday, October 22nd from 6:00 to 7:00 p.m. in the Columbus Fire Hall Meeting Room located at 944 East Pike Avenue, Columbus. If you cannot attend the meeting, but would still like to be involved, please contact Pam Shrauger at 406-581-4512.

##

Stillwater County News, October 15, 2009, Page 2

Stillwater County
Pre-Disaster Mitigation Plan

Any interested citizens may join us:

Thursday, October 22nd

6:00 to 7:00 p.m.

Columbus Fire Hall Meeting Room

944 East Pike Avenue, Columbus

Stillwater County ▪ Town of Columbus
Pre-Disaster Mitigation Plan
…preventing disasters in our hometowns…

For more information, please call 406-581-4512.
www.bigskyhazards.com

Stillwater County News, July 1, 2010, Page 3

Countywide Mitigation Plan Nearly Complete

Floods, earthquakes, hail storms, wildfires, and winter storms - just to name few; these are all hazards profiled in the Stillwater County Pre-Disaster Mitigation Plan. The concept of this plan is to identify potential hazards and mitigate losses, before the disasters occur.

"National studies have shown that for every dollar spent on mitigation, four dollars in future disaster losses are saved. So, it's not just about doing the right thing, it's also financially important," advises Pam Shrauger, the consultant working on the plan.

The plan, developed over the past several years, identifies twelve major hazards and details each, including information on historical occurrence, probability, and impacts to critical facilities and the population. Mitigation strategies for Stillwater County and the Town of Columbus address some of the potential losses. Examples include reducing wildfire fuels around structures, upgrading bridges and culvert for floodwaters, and updating growth regulations to encourage smart development in hazardous areas. An approved mitigation plan is a federal requirement for hazard mitigation funding both before and immediately following a disaster.

Draft sections of the plan can be read and downloaded from the internet at: http://www.bigskyhazards.com/draftplans.asp. Comments are due by July 15, 2010 and can be submitted to Big Sky Hazard Management, 4855 South Third Avenue, Bozeman, MT 59715 or by calling 406-581-4512.

The public is also invited to get more information or provide comments at the following free, public meetings:

Tuesday, July 6, 2010 at 1:30pm
Stillwater County Commission Chambers, 2nd Floor, Stillwater County Courthouse, 400 Third Avenue North, Columbus

Wednesday, July 7, 2010 at 7:30am
1st Floor Meeting Room/Emergency Operations Center, Stillwater County Courthouse, 400 Third Avenue North, Columbus

"We encourage the public to be involved every step of the way," says Shrauger. "These are your communities being protected, and anyone with an interest has a spot at the table."

##

Stillwater County News, July 1, 2010

Stillwater County
Pre-Disaster Mitigation Plan

The public is invited to comment on the Pre-Disaster Mitigation Plan designed to minimize future disaster losses in Stillwater County and Columbus.

Please join us:

Tuesday, July 6

1:30pm – Stillwater County Commission Chambers
Courthouse, 2nd Floor, 400 3rd Ave. N, Columbus

Wednesday, July 7

7:30am – Emergency Operations Center/Meeting Room
Courthouse, 1st Floor, 400 3rd Ave. N, Columbus

Or review the draft plan at:

www.bigskyhazards.com/draftplans.asp

For more information, please call 406-581-4512.

Appendix C. MEETING ATTENDANCE RECORDS

Pre-Disaster Mitigation Advisory Meeting. 8/31/04

NAME.	Address.	Phone #	% to Fed
Tom Kelly	33 Centennial Rd	322-8943	50%
Chuck Sweeney	Box 185 Columbus	322-4579	
Brianna Griffith	Box 149 Columbus	322-8029	100%
Joe Morse	Box 795 Columbus	322-8014	
Geo Bokma	Box 1193 "	321-0204	0
Maureen Davey	51 L.E. Peterson Rd	322582[illegible]	
Chuck Sand	Box 970, Columbus	322-8010	0
Karen Tyra	PO Box 807, Columbus	322-8035	
Lee Schmitz	PO Box 807	" "	
Jon Larson	P.O Box 149, Columbus	322-8029.	0
Cliff Bale	Box-970 Columbus	322-8010	0

8/31/04 - Mitigation Planning Meeting -

Jeff Ruffatto	322 4971
Larry Stehlin	322 4394
Michael J. Kleven	322-5118
Allan Sykes	321-0311
Ron Watters	322 9937
Jim Kinney	322-5316

Kiwanis agenda item. -

advertised by E-mail to members.

½ hour. -

Stillwater County Pre-Disaster Mitigation Plan Meeting, Columbus

October 22, 2009, 6:00-7:00 p.m.

Name	Title(s) & Organization(s)	E-mail or Mailing Address	Salary-Federally Funded? Round Trip Miles Traveled
Thad Moseman	Engineering Manager Beartooth Electric Coop	tmoseman@starband.net	Yes or ~~No~~ (circle one) 90 miles
DREW BROWN	ASSISTANT FIRE MANAGEMENT OFFICER BEARTOOTH R.D., CUSTER N.F., USFS	dbrown@fs.fed.us	(Yes) or No (circle one) 100 miles
Dennis Shupak	Stillwater Co. Commissioner	dshupak stillwater co. mt.gov	Yes or (No) (circle one) 15 miles
Jennifer Ross	SCN editor	editor@stillwatercounty news.com	Yes or (No) (circle one) 0 miles
[illegible]	Stillwater Extension - PIO	[illegible]@montana.[illegible]	Yes or No (circle one) 5 miles
Eric Frank	Stillwater County DES	efrank@stillwater.mt.gov	(Yes) or No (circle one) 40 miles
Jill Grim	Public Health Nurse Stillwater County	jgrim@stillwaterhospital.org	(Yes or) No (circle one) 40 miles
Pam Shrauger	Big Sky Hazard Management LLC consultant	pam@bigskyhazards.com	(Yes) or No (circle one) ____ miles
			Yes or No (circle one) ____ miles

Stillwater County Pre-Disaster Mitigation Plan Meeting, Columbus

~~July 7~~ July 6, 2010, ~~7:30-8:30 a.m.~~ 1:30-2:30 p.m.

Name	Title(s) & Organization(s)	E-mail or Mailing Address	Salary-Federally Funded? Round Trip Miles Traveled
Pam Shrauger	Big Sky Hazard Management LLC Consultant	pam@bigskyhazards.com	(Yes) or No (circle one) ____ miles
Eric Frank	Stillwater County DES	efrank@stillwater.mt.gov	(Yes) or No (circle one) ____ miles
Cathy McClurg	Absarokee Sewer Dist. Operator	mcclurgtraining@yahoo.com	Yes or (No) (circle one) 28 miles
Keith Bell	Environmental Health	kbell@stillwater.mt.gov	Yes or No (circle one) ____ miles
George Bokma	Stillwater Fire	gramavernie@wildblue.net	Yes or (No) (circle one) ____ miles
Rich Conger	Columbus Fire	rconger@columbusfirerescue.com	Yes or No (circle one) ____ miles
Maureen Davey	Stillwater Co. Commission	mdavey@stillwater.mt.gov	Yes or No (circle one) ____ miles
Dennis Shupak	" " "		Yes or No (circle one) ____ miles
			Yes or No (circle one) ____ miles

Stillwater County Pre-Disaster Mitigation Plan Meeting, Columbus

~~July 6, 2010, 1:30-2:30 p.m.~~

July 7, 2010 7:30AM-8:30AM

Name	Title(s) & Organization(s)	E-mail or Mailing Address	Salary-Federally Funded? Round Trip Miles Traveled
Charlie Hansen	District II Rep MT DES	deslists@imt.net	Yes (circled) or No (circle one) ______ miles
Dennis Shupak	Commissioner		Yes or No (circled) (circle one) ______ miles
Tammie Mullikin	PIO SCSO DES		Yes or No (circled) (circle one) ______ miles
Jeri Reis	SCN		Yes or No (circle one) ______ miles
Linda Halstead Acharya	citizen Blgs Gazette reporter	Bacha76070@aol.com	Yes or No (circled) (circle one) ______ miles
Dot Gallager	Citizen	gallager@dishmail.net	Yes or No (circled) (circle one) ______ miles
Forest Mandeville	County Planning	fmandeville@stillwater.mt.gov	Yes or No (circled) (circle one) ______ miles
Bill Pronovost	CHIEF - Columbus Police	bprono@hotmail.com	Yes or No (circled) (circle one) ______ miles
Carol Arkell	GIS Coordinator	carkell@stillwater.mt.gov	Yes (circled) or No (circle one) ______ miles

Stillwater County Pre-Disaster Mitigation Plan Meeting, Columbus

~~July 6~~ July 7, 2010, ~~1:30-2:30 p.m.~~ 7:30AM 8:30 AM

Name	Title(s) & Organization(s)	E-mail or Mailing Address	Salary-Federally Funded? Round Trip Miles Traveled
Cliff Brophy	Sheriff	sheriff@cablent.net	Yes or No (circle one) [No circled] 15 miles
Bobbie Protain	Sheriff's Assistant	bprotain@cablemt.net	Yes or No (circle one) [No circled] ____ miles
George Bokme	Fire Warden Assistant	Gromeverne@wildBlue.net	Yes or No (circle one) [No circled] ____ miles
Ken Mesch	Fire Warden	KMesch@stillwater.	Yes or No (circle one) [No circled] 110 miles
Chris Rasmussen	MDT		Yes or No (circle one) [No circled] ____ miles
Rich Conger	Columbus Fire Dept	rconger@columbusfirerescue.com	Yes or No (circle one) [No circled] ____ miles
TERRY BROMFIELD	ROAD & BRIDGE	BROOMIG 4 @ YAHOO.COM	Yes or No (circle one) ____ miles
Eric Frank	DES		Yes or No (circle one) ____ miles
			Yes or No (circle one) ____ miles

Appendix D. MEETING NOTES

PRE-DISASTER MITIGATION ADVISORY COMMITTEE
Meeting Minutes

Date of Meeting: August 31, 2004 8am Commissioner's Office
Present: Tom Kelly
Chuck Sweeney
Brianna Griffith
Joe Morse
George Bockma
Maureen Davey
Chuck Egan
Karen Tyra
Lee Schmelser
Cliff Bare
Jim Larson

Next Meeting: September 7, 2004 8am Commissioner's Office

I. Discussion

- Overview of Plan and the Planning Process
  - What are the Jurisdictions, Towns, and Planning Teams
  - Importance of Community Involvement
  - Letter of Approval from Commissioners to proceed with the plan
  - What is our Budget?

II. Agenda for Next Meeting

- Letter of approval and adoption by Commissioners
- Review of Budget
- Plan for Public Meetings
  - Present a template for public meetings
  - Determine a format to be used for Maureen to take to the Stock Growers Association Meeting on September 11, 2004

PRE-DISASTER MITIGATION ADVISORY COMMITTEE
Meeting Minutes

Date of Meeting: September 7, 2004 8am Commissioner's Office
Present: Chuck Sweeney
Brianna Griffith
Maureen Davey
Chuck Egan
Karen Tyra
Lee Schmelser
Jim Larson

Next Meeting: September 15, 2004 8am Commissioner's Office

I. Discussion

- Outline of Plan dated Sept 1, 2004 – June 30, 2005:
  - Hold Meetings:
    - Stakeholders: Meet with individual groups
      - A: 3 minutes – discuss reason for plan
      - B: Hand out short survey on agency concerns
    - Public Meetings: Discuss two concerns:
      - A. What are the concerns for your community?
      - B. What are the concerns for your family?
  - Prepare information for writing
  - Submit the material for writing and proof reading

- Outline of Budget dated Sept 1, 2004 – June 30, 2005 (see attached)
- List of Jurisdictions, Towns, Communities, and Planning Teams in Stillwater County was handed out.
- Letter of approval and adoption by Commissioners sent out August 31, 2004

II. Agenda for Next Meeting

- Progress Report on stakeholders meetings
- Definition of individual roles
- Timeline of Public Meetings
- Examples of Surveys with explanation of plan
- Need Surveys for:
  - Community meeting with Cindy Younkin (Supreme Court Justice nominee)
  - RC & D meeting
  - Conservation District
  - Stock Growers
  - 4H and Homemakers

LEPC - E-9-1-1 - DES
March 1, 2006

Present:	George Bokma	Fire Warden
	Dana Strobel	Environmental Health
	Charlie Hanson	Mt. DES - District V
	Rich Cowger	Columbus Fire and Ambulance
	Lee Schmelzer	MSU Extension
	Dot Gallager	Citizen
	Carol Rice	Treasurer
	Linda Halstead - Acharya	Billings Gazette
	Nick Hauer	Stillwater Mining Company
	Keith Bell	Environmental Health
	Karen Tyra	MSU Extension
	Chuck Egan	County Commissioner

Agenda

Opening:	Pledge to the Flag
	Introduction
DES:	Pre-Disaster Mitigation Plan Data Needs
	Tire Pile Removal Status
	Governor Conference on Disaster Emergency Services
	Interoperable Communication
	Update Plan for the EOP
LEPC:	Organizational Structure for Stillwater County
	Ambulance and first responders grant program
E-9-1-1:	Dispatch System and Facilities
	Rural Addressing
	Internal procedures for Emergency Telephone
	Notification System

Charlie Hanson, Montana Disaster and Emergency Services - District V, expressed interest in our county and offered any assistance that would be needed. He has met with the DES Coordinator, Ken Mesch, to gather information and assist in his program. He is available at any time for training or information.

The famous tire pile east of Columbus is being removed. Envirocon is the company that will be chipping the tires and hauling to Silesia. There had been some concern about liability issues for the county and this was clarified with Darrell Stankey, Project Coordinator, DEQ. The project will begin in April with the improvement of the road surface the first priority. As soon as the road is treated with some gravel the equipment will begin to move in from Missoula.

The Governor's Conference is set to begin May 23. A summary of the program was available with invitation extended to a broad audience. Medical providers, law enforcement, Elected Officials, Emergency Responders, etc. There is benefit throughout the program and parts of the program may be of

interest more than others. The agenda will be published on the web very soon. We will let everyone know as soon as it is posted.

A Stillwater County Emergency Resource Inventory is being developed by Ken Mesch and Jim Larson. A database has been prepared with changes being made to update the visual.

Rich Cowger announced that Columbus had gone from a Class 6 to a Class 5 due to the improvement of the water distribution system and available equipment. Dispatch received a score of 6. The fire standard calls for 2 dispatchers on duty. They would also like to see generators at each of the towers along with a monitoring system that would send an alert when there is an outage or other problem. Additions would raise the classification of the Columbus Fire.

Keith Bell said the open burning begins, March 1.

Dana Strobel said there was a Montana Highway Patrol training to prepare for the influx of traffic when the Hell's Angels gather in Cody, May 6. There may be heavy traffic through Stillwater County at that time.

Meeting adjourned at 8:30.

Respectfully submitted
Charles E. Egan, acting recorder

LEPC/DES/E-9-1-1 MEETING
COLUMBUS COURTHOUSE
7:30 AM 4/5/06

PRESENT:	Kelly Shumway	Public Health Nurse
	George Bokma	Fire Warden
	Ken Mesch	DES
	April Hutsen	DES
	Nick Hauer	Stillwater Mining Company
	Carol Rice	County Treasurer
	Dot Gallager	Citizen
	Chris Fleck	Citizen
	Chuck Egan	County Commissioner
	Keith Bell	Environmental Health
	Rich Cowger	Columbus Fire
	Lee Schmelzer	Extension Office

INTRODUCTIONS

Introductions of each individual started at 7:35a.m. Following, our new County Health Nurse, Kelly Shumway, gave a brief biography of herself.

DES/LEPC

- Ken Mesch and April Hutsen are gathering information on Stillwater County's historical disasters from the Beartooth Museum and from other research sources. In addition to the disaster research, Ken is continuing his fire research by interviewing each fire chief from the individual districts in our county. Meanwhile, April is gathering information about values for subdivisions and homes within each district.
- Governor's Disaster Preparedness Summit on May 22nd
- Tire pile disposal status
- Hwy 78 construction emergency response plan

Ken passed out a list of emergency resources for Stillwater County. He asked that people check it for accuracy.

Following, Ken discussed Stillwater Mining Company's general and disaster equipment with SMC Safety Coordinator, Nick Hauer. Nick volunteered SMC's equipment to the county in the case of a county disaster. Nick will be emailing a list of all SMC's equipment to Ken.

George Bokma stated plans for a fire prevention presentation and publications for our county citizens. For this program, George, would like to hold a barbeque cook-off offering some general fire safety for our county residents. The BLM has offered funding.

Rich discussed Columbus Rural fire district recently applied for and received an approximate $73,000 grant from FEMA to purchase a portable fire classroom trailer.

General discussions prompted by Ken:

- Jim Larson and Ken will be working on issuing an RFP for design and construction of a new dispatch facility at the courthouse.
- The Emergency Preparedness Notification System was tested on March 21, 2006 and successfully contacted targeted residents throughout the county. A policy for launching the system was distributed.

LEPC/DES/E-9-1-1 Meeting
COLUMBUS COURTHOUSE
7:30 AM 5/3/06

PRESENT:	Kelly Shumway	Public Health Nurse
	George Bokma	Fire Warden
	Jim Larson	GIS
	Ken Mesch	DES
	April Hutsen	DES
	Charlie Hanson	MT DES
	Cliff Brophy	County Sheriff
	Nick Hauer	Stillwater Mining Company
	Carol Rice	County Treasurer
	Chris Fleck	Citizen
	Chuck Egan	County Commissioner
	Keith Bell	Environmental Health
	Rich Cowger	Columbus Fire
	Linda Halstead-Acharya	Citizen

OPENING

Pledge to the flag.

INTRODUCTIONS

Introductions of each individual started at 7:35a.m.

DES

- General Updates:
  Ken gave updates on the Pre-Disaster Mitigation Report and the Community Wildfire Protection Plan. Jim Larson has been nominated to serve as assistant DES Coordinator. Charlie Hanson, MT DES, discussed the process and scheduled to email Ken the documentation of an appointment. The Commissioners will discuss the appointment on May 10.

- *TIRE PILE REMOVAL PRESENTATION:*
  Chuck gave this presentation through a PowerPoint demonstration with detailed facts and pictures of the site.

- Governor Conference on Disaster Emergency Services:
  Ken encouraged all to sign up if they hadn't already as the topics being covered are a great learning tier tool for the committee.

LEPC

- SARA Title III-Tear II -Ken explained the community right to know program and how it will be transitioning from the Sheriff's Office to the DES Office within the next year.

E-9-1-1

- Jim discussed the dispatch center is in the process of putting the construction up for bids.
- Jim discussed the new rural address policy. All committee members agreed to the policies and a motion to accept was made by George with a second by Cliff, all were in favor without objections; motion carried. Jim and Ken were requested by Chuck to attend and represent the policy to the commissioner's at 9:00 AM.
- Cliff updated the committee on the emergency notification system. A basic review was made of the system and methods utilized to contact citizens through publications in order to prepare for the telephone notifications.

PUBLIC HEALTH (KELLY SHUMWAY, COUNTY RN)

- 11 states have active cases of Mumps; no cases are active in Montana.
- 1 case of animal rabies was found in another county within Montana. (Animal: skunk)
- Pandemic Flu Plan-A mass immunization plan is in place utilizing the Stillwater Pavilion. (Estimated wait-15 minutes for shots, without shortages.)

GENERAL DISCUSSION

- George announced the fire committee has a teleconference every Monday morning at 11AM in the courthouse.
- Jim wants to arrange for a meeting to discuss the communication tower relocation proposal and grant funding for the project.
- Carol wanted to know the response time for emergency assistance. Apparently, there was an accident last Monday and the response time was 55 minutes. She and others are concerned if this is normal. Cliff was going to research the situation.

Stillwater County Pre-Disaster Mitigation Plan Meeting Notes
October 22, 2009, 6:00-7:15 p.m. in Columbus, Montana

Attendees:

· Drew Brown	US Forest Service, Custer National Forest, Beartooth Ranger District, Assistant Fire Management Officer
· Eric Frank	Stillwater County Disaster and Emergency Services
· Jill Grim	Stillwater County Public Health Nurse
· Thad Moseman	Beartooth Electric Cooperative, Engineering Manager
· Jennifer Ries	Stillwater County News, Editor
· Lee Schmelzer	Montana State University Extension, Stillwater County Stillwater County Public Information Officer
· Pam Shrauger	Big Sky Hazard Management LLC, Consultant
· Dennis Shupak	Stillwater County Commissioner

Introduction:

Participants were introduced to hazard mitigation and mitigation planning. The definition and purpose of mitigation were described. Details regarding the planning process for Stillwater County were also outlined. See attached handouts.

Discussion Items:

1. What hazards should be included and analyzed in the plan?
   Think about what hazards have the greatest community-wide impact potential, affecting things such as critical facilities, critical infrastructure, structures, life and safety, economic, ecologic, historic, and social values, and future development.

   - Dam Failure
   - Disease (including human and animal diseases)
   - Drought
   - Earthquake
   - Flood (including riverine, ice jam, and flash floods)
   - Hazardous Material Release and Explosions (including fixed, mobile, and pipeline releases)
   - Landslide and Avalanche
   - Severe Weather (including tornadoes, hail, downbursts, lightning, strong winds, blizzards, winter storms, heavy snow, ice storms, and extreme cold)
   - Terrorism and Civil Unrest
   - Transportation Accident (including vehicular, railroad, and aircraft accidents)
   - Volcanic Ashfall
   - Wildfire

   Special considerations:
   - Unique vulnerabilities include the Stillwater Mine, Smelter, and Refinery, NorthWestern Energy transmission lines, crude oil/petroleum pipelines, and fiber optic lines.
   - Disease: large number of livestock feed lots
   - Hazardous Materials Release: mining operations, railroad, interstate

- Severe Weather: winter storms that bring about early or late season power outages and isolate rural subdivisions
- Transportation Accident: wildlife collisions (especially deer and elk)

2. What would you consider to be the top five disasters in Stillwater County's history?

   - Derby Fire (Eric Frank has the statistics)
   - Yellowstone Flood (1996 and/or 1997?)
   - 1988-2007 Drought (because of economic and social impacts)
   - Winter of 1978

3. What studies, data, or information currently exist that would be valuable when analyzing the hazards? Are we missing any important participants or organizations that should be represented?

   - Stillwater County Community Wildfire Protection Plan
   - Initial Pre-Disaster Mitigation Plan (not FEMA approved), including meetings and interviews conducted in 2006
   - Stillwater County Floodplain Office for mapping
   - Yellowstone River Conservation District Council studies
   - Mystic Dam PPL Emergency Action Plan for inundation mapping
   - Montana State University Extension for drought information

4. What types of activities would mitigate the impacts in Stillwater County?
   Remember: We're talking mitigation, not preparedness or response.

   - Continued improvements to subdivision regulations
   - Fuel reductions/management (near structures, road right-of-ways, utility right-of-ways, and along federal and state lands)
   - Bridge, culvert, and road improvements
   - Conservation easements
   - Continued flood ordinances
   - Drought range and agriculture management tools (using weather and soil monitoring, planning, and education)
   - Earthquake retrofits
   - Generators (especially for schools that could serve as community shelters)
   - Electric and communications infrastructure protection
   - Large game fencing
   - Firewise standards and home audits

5. Is new and future development at risk from the identified hazards? If so, what can be done now to minimize the risk to this development? What tools are currently used (growth policies, subdivision regulations, zoning, building codes, etc.)?

   - Stillwater County Growth Policy
   - Stillwater County Subdivision Regulations
   - Town of Columbus Zoning

Stillwater County Pre-Disaster Mitigation Plan Meeting Notes
July 6, 2010, 1:30-2:15 p.m. in Columbus, Montana

Attendees:

- Keith Bell — Stillwater County Environmental Health
- George Bokma — Stillwater County Fire Warden
- Rich Cowger — Columbus Fire Rescue
- Maureen Davey — Stillwater County Commissioner
- Cathy McClurg — Absarokee Sewer District, Operator
- Eric Frank — Stillwater County Disaster and Emergency Services
- Pam Shrauger — Big Sky Hazard Management LLC, Consultant
- Dennis Shupak — Stillwater County Commissioner

Plan Review:
Hard copies of the draft plan are available in the Stillwater County Commissioners' office, the Stillwater County Disaster and Emergency Services office, and the Columbus town office. The plan is also online at http://www.bigskyhazards.com/draftplans.asp and sections can be read, downloaded, or printed. The comments deadline is July 15, 2010. Comments can be sent to: Pam Shrauger, pam@bigskyhazards.com, 406-581-4512, 4855 S. 3rd Avenue, Bozeman, MT 59715.

Based on a suggestion at the meeting, a link to the plan will also be placed on the Stillwater County website home page at http://www.stillwater.mt.gov/. If anyone feels they need more time beyond the July 15, 2010 deadline, please contact Pam Shrauger at 406-581-4512.

Plan Highlights:
A hazard mitigation plan is a federal requirement, through the Federal Emergency Management Agency, for each incorporated jurisdiction. Without an adopted and approved plan, the jurisdiction is not eligible to receive certain types of federal disaster mitigation assistance following a disaster. As additional incentive, each jurisdiction with an adopted and approved plan is eligible to apply for nationally competitive pre-disaster mitigation funds.

The Stillwater County Pre-Disaster Mitigation Plan/Program consists of five major components:

1. Planning Process
2. Assets and Community Inventory
3. Risk Assessment
4. Mitigation Strategy
5. Plan Implementation/Maintenance

Risk Assessment Overview Comments/Discussion Items:

- Some clarifications on how the hazards were rated and listed were made.
- Absarokee had a significant hail event recently on June 16, 2010.
- Structure fire was mentioned as a potential hazard that could be significant in Columbus, but the community-wide "disaster" potential was not considered significant enough for this plan. The greater concern is hazardous materials release which is addressed in the plan.

Mitigation Strategy Overview Comments/Discussion Items:

- Communications with PPL Montana regarding dam releases at the Mystic Lake Dam could be improved. In June 2010, significant releases caused some road problems in the Fishtail area and the county was not notified prior to the releases. PPL Montana resolved the problem upon notification.
- Strategies were developed to be flexible enough to meet future needs. An example was the building codes project. Some codes, such as life and safety codes or commercial structures, could be taken on in phases. No external funding sources for establishing building codes are known of, but a permit system was mentioned as a way to maintain an inspector position and other costs.

Next Steps:

Following the public comment period, any comments received will be incorporated into the plan where applicable. Each jurisdiction will receive a mailing with any pages that were changed or added and a DVD containing electronic versions of the plan and other useful tools and information. The final plan will be sent to Montana Disaster and Emergency Services and then the Federal Emergency Management Agency for review and approval. During this time frame, the jurisdictions will be asked to adopt the plan by resolution (a sample resolution will be included on the DVD). The jurisdictions are encouraged to apply for grants and to implement or continue many of the activities listed in the plan. Annually, each jurisdiction should create a record of any disasters or mitigation activities occurring over the past year. These records should be maintained by the Stillwater County Local Emergency Planning Committee. Every five years, the plan needs to be updated and resubmitted for approval.

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Appendix F. ACRONYMS

AD – Anno Domini
BLM – Bureau of Land Management
BFE – Base Flood Elevation
CAMA – Computer Assisted Mass Appraisal
CDBG – Community Development Block Grant
CFR – Code of Federal Regulations
CRP – Conservation Reserve Program
DEQ – Department of Environmental Quality
DES – Disaster and Emergency Services
DHS – Department of Homeland Security
DMA – Disaster Mitigation Act
DNRC – Department of Natural Resources and Conservation
DOT – Department of Transportation
EAS – Emergency Alert System
EDA – Economic Development Administration
EO – Executive Order
EOC – Emergency Operations Center
EMS – Emergency Medical Services
EPA – Environmental Protection Agency
EPCRA – Emergency Planning Community Right-to-Know Act
FALN – Armed Forces of National Liberation (translated)
FBI – Federal Bureau of Investigation
FEMA – Federal Emergency Management Agency
FHBM – Flood Hazard Boundary Map
FIRM – Flood Insurance Rate Map
FIS – Flood Insurance Study
FMA – Flood Mitigation Assistance
FWS – Fish & Wildlife Service
GIS – Geographic Information System
GPS – Global Positioning System
HAZUS-MH – Hazards United States Multi-Hazard
HMGP – Hazard Mitigation Grant Program
HUD – Housing and Urban Development
HVAC – Heating, Ventilating, and Air Conditioning
IA – Individual Assistance
IFG – Individual and Family Grants
LEPC – Local Emergency Planning Committee
LP – Liquefied Petroleum
MCA – Montana Code Annotated
MDT – Montana Department of Transportation
MOU – Memorandum of Understanding

MT - Montana
NCDC – National Climatic Data Center
NIFC – National Interagency Fire Center
NFIP – National Flood Insurance Program
NFP – National Fire Plan
NID – National Inventory of Dams
NOAA – National Oceanic and Atmospheric Administration
NRCS – Natural Resources Conservation Service
NWS – National Weather Service
OPEC – Organization of Petroleum Exporting Countries
PA – Public Assistance
PCB – Polychlorinated Biphenyls
PDM – Pre-Disaster Mitigation
PGA – Peak Ground Acceleration
RFA – Rural Fire Assistance
RFC – Repetitive Flood Claims
SARA – Superfund Amendment and Reauthorization Act
SARS – Severe Acute Respiratory Syndrome
SBA – Small Business Administration
SFHA – Special Flood Hazard Area
SHELDUS – Spatial Hazard Events and Losses Database for the United States
SRL – Severe Repetitive Loss
US – United States
USACE – United States Army Corps of Engineers
USDA – United States Department of Agriculture
USGS – United States Geological Survey
USFA – United States Fire Administration
USFS – United States Forest Service
VFA – Volunteer Fire Assistance
WMD – Weapons of Mass Destruction
WPDG – Wetland Program Development Grant
WUI – Wildland Urban Interface
YVO – Yellowstone Volcano Observatory

Appendix G. FEMA CROSSWALK REFERENCE DOCUMENT

Appendix H. STATE AND FEMA APPROVAL LETTERS

Appendix I. GRANT PROGRAM INFORMATION

Appendix J. LISTING OF COMPLETED MITIGATION ACTIVITIES

Appendix K. ADOPTION DOCUMENTATION