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I. INTRODUCTION

CHANGES/REVISIONS TO EXECUTIVE SUMMARY:

The executive summary has been revised entirely. Any valid information from this section is now included in the section of the plan titled Introduction. The introduction has also been revised entirely to follow the format of FEMA's planning tool. Information that was outdated, not required, lacked purpose, or was covered or further explained in another section of the plan has been removed. Purpose, scope, and goals were added to the Introduction.

Additionally for organization purposes, the County Profile section was included in the Introduction rather than written as a separate Chapter of the plan. Minor changes were made to the County Profile as some elements such as population have changed since the 2006 draft was written.

INTRODUCTION

McPherson County has determined that it is vulnerable to natural and man-made hazards that have the possibility of causing serious threat to the health, welfare, and security of its citizens. The cost of response and recovery from potential disasters in terms of potential loss of life, property or infrastructure can be reduced when attention is turned to mitigating the impacts of a natural hazard before an event occurs.

This plan identifies the County's vulnerabilities to natural hazards and will be used by local leaders to mitigate risks associated with natural hazards. The purpose of the plan is to help identify planning activities that can significantly reduce threats to people, property, and infrastructure caused by natural hazards. The plan is based on the premise that hazard mitigation works. With increased attention to mitigating natural hazards, communities reduce the impact natural hazards have on its citizens and local governing bodies. With appropriate measures of planning local governing bodies can avoid creating new problems in the future. Since many mitigation actions can be implemented at minimal cost, it is possible by implementing activities defined in the plan that the County will save money in the long run.

This is not an emergency response or emergency management plan. Certainly, the plan can be used in conjunction with other types of planning documents to identify weaknesses and/or refocus emergency response planning. Sometimes emergency response planning aligns with mitigation strategies and can be enhanced through mitigation efforts. However, the focus of this plan is for local leaders to discuss and implement strategies and identify activities that avoid or eliminate future risks as well as reduce or eliminate existing risks caused by natural hazards.

PURPOSE OF THE PRE-DISASTER MITIGATION PLAN

In October 2000, the Disaster Mitigation Act (DMA2K) was signed to amend the 1988 Robert T. Stafford Disaster Relief and Emergency Assistance Act. Section 322 of the Disaster Mitigation Act requires that local governments, as a condition of receiving

federal disaster mitigation funds, have a local disaster mitigation plan in place. The plan must:

1. Identify hazards and their associated risks and vulnerabilities;
2. Develop and prioritize mitigation activities; and
3. Encourage cooperation and communication between all levels of government and the public.

The purpose of this plan is to meet the hazard mitigation planning needs for McPherson County and participating entities. Consistent with the Federal Emergency Management Agency's guidelines, this plan will review all possible activities related to natural hazards to reach efficient solutions, link hazard management policies to specific activities, educate and facilitate communication with the public, build public and political support for mitigation activities, and develop implementation and planning requirements for future hazard mitigation projects.

PURPOSE

The purpose of the local natural hazard mitigation plan is to fulfill federal, state, and local hazard mitigation planning responsibilities; to promote pre and post disaster mitigation measures; implement short/long range strategies that minimize suffering, loss of life, and damage to property and infrastructure resulting from hazardous or potentially hazardous conditions to which citizens and institutions within the county are exposed; and to eliminate or minimize conditions which would have an undesirable impact on the citizens, economy, environment, and the well-being of the county. This plan will aid city, township, and county agencies and officials in enhancing public awareness to the threat hazards have on its citizens, property, and infrastructure; and what can be done to help prevent or reduce the vulnerability to risks of each McPherson County jurisdiction.

PLAN USE

First, the plan should be used to help local elected and appointed officials plan, design and implement programs and projects that will help reduce their community's vulnerability to natural hazards. Second, the plan should be used to facilitate inter-jurisdictional coordination and collaboration related to natural hazard mitigation planning and implementation. Third, the plan should be used to develop or provide guidance for local emergency response planning. Finally, when adopted, the plan will bring communities in compliance with the Disaster Mitigation Act of 2000.

SCOPE

1. Provide opportunities for public input and encourage participation and involvement regarding the mitigation plan.
2. Identify hazards and vulnerabilities within the county and local jurisdictions.
3. Combine risk assessments with public and emergency management ideas.
4. Develop goals based on the identified hazards and risks.
5. Review existing mitigation measures for gaps and establish projects to sufficiently fulfill the goals.
6. Prioritize and evaluate each strategy/objective.
7. Review other plans for cohesion and incorporation with the PDM.
8. Establish guidelines for updating and monitoring the plan.

9. Present the plan to McPherson County and the participating communities within the county for adoption.

LOCAL GOALS

These ideas form the basis for the development of the PDM Plan and are shown from highest priority, at the top of the list, to those of lesser importance nearer the bottom.

- Protection of life before, during, and after the occurrence of a disaster;
- Protection of emergency response capabilities (critical infrastructure);
- Establish and maintain communication and warning systems;
- Protection of critical facilities;
- Government continuity;
- Protection of developed property, homes and businesses, industry, education opportunities and the cultural fabric of a community, by combining hazard loss reduction with the community's environmental, social, and economic needs; and
- Protection of natural resources and the environment, when considering mitigation measures.

LONG-TERM GOALS

- Eliminate or reduce the long-term risk to human life and property from identified natural and man-made hazards;
- Aid both the private and public sectors in understanding the risks they may be exposed to and finding mitigation strategies to reduce those risks;
- Avoid risk of exposure to identified hazards;
- Minimize the impacts of those risks when they cannot be avoided;
- Mitigate the impacts of damage as a result of identified hazards;
- Accomplish mitigation strategies in such a way that negative environmental impacts are minimized;
- Provide a basis for funding of projects outlined as hazard mitigation strategies; and
- Establish a regional platform to enable the community to take advantage of shared goals, resources, and the availability of outside resources.

WHAT IS HAZARD MITIGATION?

Hazard mitigation is defined as any cost-effective action(s) that has the effect of reducing, limiting, or preventing vulnerability of people, property, and the environment to potentially damaging, harmful, or costly hazards. Hazard mitigation measures, which can be used to eliminate or minimize the risk to life and property, fall into three categories: First are those that keep the hazard away from people, property, and structures; second are those that keep people, property, and structures away from the hazard; and third are those that do not address the hazard at all but rather reduce the impact of the hazard on the victims, such as insurance. This mitigation plan has strategies that fall into all three categories.

Hazard mitigation measures must be practical and cost effective, as well as environmentally and politically acceptable. Actions taken to limit the vulnerability of

society to hazards must not in themselves be more costly than the value of anticipated damages.

Mitigation actions should be incorporated into the planning activities associated with capital improvements with consideration given to areas with the greatest vulnerability to natural hazards. Capital investments, whether for homes, roads, public utilities, pipelines, power plants, or public works, determine to a large extent the nature and degree of hazard vulnerability of a community. Once a capital facility is in place, very few opportunities will present themselves over the useful life of the facility to correct any errors in location or construction with respect to hazard vulnerability. It is for these reasons, that zoning and ordinances (which manage development in high vulnerability areas) along with building codes (which ensure that new buildings are built to withstand the damaging forces of hazards) are often the most useful mitigation approaches local governments can implement.

Previously, mitigation measures have been the most neglected programs within emergency management. Since the priority to implement mitigation activities is generally low in comparison to the perceived threat, some important mitigation measures take time to implement. Mitigation success can be achieved, however, if accurate information is portrayed through complete hazard identification and impact studies, followed by effective mitigation management. Hazard mitigation is useful for eliminating long-term risk to people, property, and infrastructure in South Dakota.

This plan evaluates the impacts, risks and vulnerabilities of natural hazards within the jurisdictional areas of the entire county. The plan supports, provides assistance, identifies and describes mitigation projects for each of the local jurisdictions who participated in the process of drafting the plan update. The suggested actions and plan implementation for local governments could reduce the impact of future natural hazard occurrences. Lessening the impact of natural hazards can prevent such occurrences from becoming disastrous, but will only be accomplished through coordinated partnership with emergency managers, political entities, public works officials, community planners and other dedicated individuals working to implement this program.

MCPHERSON COUNTY PROFILE

GEOGRAPHIC BACKGROUND

McPherson County is named after James B. McPherson, a Civil War general. The County was established in 1873 by the Territorial Legislature. The original county boundaries included land now in North Dakota and excluded a small area along the eastern border that is now within the county. The present boundaries were established in 1885 and the first permanent settlers arrived in 1882. The geographic area of McPherson County is 1,137 square miles of land and 15 square miles of water. In March of 1884, Leola was made the county seat. Leola is situated at the intersections of SD Highway 10 and SD Highway 45.

The main industry in the county is agriculture. Most businesses within the county are agriculture-related or goods-related; necessary for serving the day-to-day needs of the rural population base. Soil is the most important natural resource in McPherson County. It provides a growing medium for crops and for the grass grazed by livestock. Other natural resources are ground water, wildlife, sand, and gravel. Sand and gravel are deposited in scattered areas throughout the county. These deposits range from a few inches to more than 50 feet in thickness. They consist mainly of fine to coarse sand and some gravel, silt, and clay. Because of an excessive amount of fine rock fragments, such as shale, chalk, and clay ironstone, the sand and gravel are unsuitable as concrete aggregate or as construction material. They are suitable, however, as subgrade material for roads and as bituminous aggregate.

The central and western parts of McPherson County are on the Missouri Coteau. The contour of the land is undulating to hilly. Many potholes or closed depressions exist in the central and western parts of the county, and the drainage pattern is poorly defined. Spring Creek is the main drainageway. It flows westward to the Oahe Reservoir. The eastern part of the county is on the Drift Prairie part of the James River Lowland. Relief is dominantly level to undulating. The drainage pattern is well defined. The two principal drainageways are Foot Creek and Snake Creek. They flow southeast to the James River. Land elevations range from 1,400 feet above sea level in the southeastern part of the county to about 2,100 feet in the north-central part of the county.

Crompton, Elm, Eureka, Leola, and Wolff Lakes provide opportunities for fishing, boating, and waterfowl hunting. The drainageways flow only intermittently and provide water only during periods of snowmelt and high rainfall. In some areas shallow ground water of good quality is available in sufficient volume for irrigation.

Maps for McPherson County and participating entities have been included with the plan in Attachment A.

POPULATION DEMOGRAPHICS

According to the Census Bureau, in 2010 the County had a population of 2,459, a decline of 15.3 percent from the 2000 census. With only 2,459 people residing in 1,137 square miles, it averages 2.16 persons per square mile. In most classification systems McPherson County is defined as sparsely populated and extremely rural.

Within McPherson County there are four incorporated municipalities. The largest is the City of Eureka, which has a population of 868; followed by Leola (pop. 457); Long Lake (pop. 31); Wetonka (pop. 8); and Hillsview (pop. 3) respectively. In addition to these communities, McPherson County also has four townships located in the northeast part of the county and two areas of unorganized territory called West McPherson and Central McPherson, as well as three Hutterite Colonies: Grassland Colony, Long Lake Colony, and Spring Creek Colony.

The colonies tend to have relatively large populations in comparison to some of the organized municipalities such as Wetonka, Long Lake, and Hillsview, ranging anywhere from 60 to 150 people in one colony. Typically the colonies limit their populations and break off and create new colonies when the cap is met because the colonies are only designed to sustain a limited number of people. The exact population of the colonies is unknown, however some of the information can be derived from the Census; specifically, when information is analyzed at the township level. For example, Weber Township has a total population of 156. Spring Creek Colony is located within Weber Township and 145 of the 156 residents in the township are classified as “non-institutionalized group quarters.” This classification is commonly used for populations living in colonies; thus it can be assumed that those 145 residents classified as such are the residents of the Spring Creek Colony.

Unfortunately since McPherson County has only four organized townships and only one of the three colonies is located within a township, the population and statistical information for the other two colonies is not available.

According to the 2010 Census, the County is predominately white (98.1%) and has a nearly one to one male to female ratio. Of the 2,459 residents in McPherson County, nearly one third (30%) are 65 years and older. Most of the residents within the County fall into the low to moderate income category. With 733 of the population being 65 years or older, the County can expect further decline in population over the course of the next two decades if the trend continues. A combination of two factors, 1) the aging population, and 2) youth leaving rural areas to pursue higher education followed by employment in urban areas, has contributed to the steady decline in population which is prevalent in many of the rural areas of South Dakota.

The 2010 Census reported 1,025 occupied housing units located within the 1,137 square miles of land located in McPherson County which averages less than one occupied housing unit per square mile. Census also reported 363 vacant properties in the county; with only 16 of those being for sale and 61 for rent.

ECONOMIC PROFILE

Agriculture is the principle enterprise in McPherson County. About 66 percent of the farm income is derived from the sale of livestock and livestock products. While the first settlers grew mostly wheat, eventually, fertility was reduced due to wind and water erosion. In 1954 the McPherson County Conservation District was formed to alleviate the situation. Grass was seeded on the eroding cropland and trees were planted to provide protection for farmsteads and to help control wind erosion.

In 1975 there were 670 farms in McPherson County with the average size farm being 1,090 acres according to the United States Department of Agriculture. The trend is toward fewer and larger farms. In 2007 the USDA National Agricultural Statistical Data Service Agency estimated the number of farms in McPherson County was approximately 398 with an average acreage of 1,302 per farm. USDA will be releasing data for 2014 in late February. Although there is a decline in the number of small family farms along with a continuous trend in declining population, McPherson County's agriculture industry is thriving.

GOVERNANCE

McPherson County is governed by a five-member board of commissioners. The sheriff and one deputy provide law enforcement for the entire county. The City of Leola has an aldermanic government made up of a seven-member council and also has a city police chief who provides law enforcement within the city limits of Leola. The City of Eureka has an aldermanic government with a six-member board. Eureka contracts with the sheriff's office for law enforcement within the city. Hillsvie, Long Lake, and Wetonka all have a three-member board of trustees that serves as the governing body. They do not have their own law enforcement officials, but are covered by the county sheriff's office.

The colonies keep to themselves and have their own form of governance within. For the most part they live peacefully and tend to be self-sustaining and self-sufficient in most aspects of life. However, they do rely on public resources for law enforcement, medical and ambulatory services, and fire protection when necessary. McPherson County is required to provide those services to all areas that lie within the boundaries of the county. The colonies have adapted equipment as a means for hauling water to assist in fighting grass fires. FEM Electric provides power to all three of the colonies.

Due to the extremely rural nature of the county, it is important to note that many of the residents who serve in the public capacity are constantly stepping in and filling many other roles. For example, the county sheriff not only works as law enforcement but also volunteers for the local fire department as firefighter/emergency response personnel and serves in other capacities such as participating in the mitigation planning efforts of the county and volunteering for other local planning groups. While this is just one example, the general attitude of the people in McPherson County is to step in and help out whenever and wherever necessary. Despite the challenging expectations for those serving in many different capacities—taking on duties that in other places would be considered several different full time positions—McPherson County residents are committed to helping their neighbors and take much pride in doing what they can with limited resources. In McPherson County, being self-sufficient and resourceful *is* the way of life.

CLIMATE

McPherson County is located in North-Central South Dakota, a place known to have some of the largest temperature variances in the world, from 35 degrees below zero Fahrenheit in the winter to 109 degrees Fahrenheit above zero in the summer. The annual precipitation average is 19 inches, of this approximately 80 percent falls between April and September. Thunderstorms occur approximately 36 days per year. The average seasonal snowfall is 35 inches. The prevailing wind is from the northwest with an average speed of 13 miles per hour. However the county has experienced strong winds with speeds above 100mph. Wind speed tends to be the highest in the spring.

Sometimes the county experiences high precipitation and rapid snow melt which cause localized flooding of roads, culverts, and bridges. Eureka and Leola also experience lowland flooding within their communities during times of high water table, excessive precipitation, and rapid snow melt. McPherson County participates in the National Flood Insurance Program (NFIP). The only mapped community in McPherson County is the City of Eureka. Eureka Lake which is a manmade lake is located within the City of Eureka and could be conceived as a possible natural hazard to the residents, property, and infrastructure of Eureka. Long Lake which is located outside the city limits to the west of the Town of Long Lake does not pose a threat to the town due to the difference in elevations between the two. There are many lowland sloughs, small creeks and waterways that vary between being completely dry and filling up during periods of high precipitation and rapid snow melt.

TRANSPORTATION

Transportation planning for streets and roads begins with understanding the relationship between land use and road network. Streets and roads balance functions of mobility and land access. On one side, such as interstate highways, mobility is the primary function of the network. On the other side, such as local roads, land access to farms and residences is the primary service. In between these two extremes, mobility and land access varies depending on the function of the road network.

Functional classification is the process of grouping streets and roads into classes according to the function they are intended to provide. Listed below is McPherson County's functional classification system. The classification is according to the rural systems classification as developed by the Federal Highway Administration.

1. Principal Arterials – serve longer strips of a statewide or interstate nature, carry the highest traffic volumes, connect larger urban areas, provide minimal land access, and include both interstate and non-interstate principal arterial highways.
2. Minor Arterials – interconnect the principal arterials, provide less mobility and slightly more land access, and distribute travel to smaller towns, and major resorts attracting longer trips.
3. Major Collectors – provide both land access and traffic circulation connecting county seats not served by arterials and connect intracounty traffic generators

like schools, shipping points, county parks, and important mining and agricultural areas.

4. Minor Collectors – collect traffic from local roads and bring all developed areas within a reasonable distance of a collector road.
5. Local Roads – provide direct access to adjacent land and to the highest classified roads and serve short trips.

SD Highway 10 is the main East/West route through the county and SD Highway 45 is the main North/South route through the county. In addition to Hwy 10 and 45, the county recognizes SD Hwy 47, SD Hwy 247, and SD Hwy 239 as major routes through the county. Other than the State and County road systems, no other transportation systems exist.

The Eureka City Airport has a single paved runway used by light private/general aviation and crop spraying aircraft. The airport does not have any navigation aid, communications or flight service capabilities.

The Mound City & Eastern Railway was a small, short-lived railroad that operated in McPherson County, South Dakota from 1929 to 1940 when it was abandoned. The railroad was conceived in the early twentieth century as part of a plan to provide rail access to the small town of Mound City in neighboring Campbell County, South Dakota. The projected route of the railway extended eastward from Mound City to the town of Leola, South Dakota, where a connection could be made with the Minneapolis and St. Louis Railway. Only 18 miles of track were completed running northwest from Leola to the Town of Long Lake. Financial difficulties ended work at Long Lake and the remainder of the line was never built. Initially, the company operated conventional trains pulled by steam locomotives, but by the 1930s limited financial resources and a lack of traffic forced the railroad to resort to a gasoline engine capable of dragging five or six cars, making two or three trips a week, except in winter when the rail frequently shut down. Substantial portions of the old railway grade remain evident today.

The county has the Northern Border Pipeline main facility near Wetonka, and the pipeline traverses southeast to northwest through the county. No towns are serviced by the pipeline within McPherson County.

NATIONAL FLOOD INSURANCE PROGRAM PARTICIPATION

One jurisdiction located within McPherson County participates in the National Flood Insurance Program (NFIP): Eureka and McPherson County participate. The remaining towns currently do not participate in the NFIP: Hillsvie, Leola, Long Lake, and Wetonka. Table 1.1 was taken from the 2006 PDM Plan. It lists population, latitude and longitude, elevation, and NFIP status of communities within the county. Population statistics were taken from Census 2010 and location and elevation were taken from Wikipedia. NFIP status was provided by McPherson County Emergency Management.

Table 1.1: McPherson County Municipalities Overview				
Name	Pop. (2010)	Location	Elevation	NFIP
<i>Cities/Towns</i>				
Eureka	868	45°46'9"N 99°37'19"W	1890 ft	Yes
Hillsvie	3	45°40'4"N 99°33'38"W	1850 ft	No
Leola	457	45°43'16"N 98°56'19"W	1591 ft	No
Long Lake	31	45°51'23"N 99°12'24"W	1952 ft	No
Wetonka	8	45°37'28"N 98°46'8"W	1470 ft	No

Table 1.2 lists the McPherson County Townships by population:

Township	Population	Township	Population
Hoffman	25	Wacker	15
Wachter	30	Weber	156

II. PREREQUISITES

CHANGES/REVISIONS TO PREREQUISITES:

The Prerequisites section is entirely new to the McPherson County PDM as it is required by the FEMA as demonstrated in the planning tool, but did not exist in the 2007 draft.

ADOPTION BY LOCAL GOVERNING BODY

The local governing body that oversees the update of the McPherson County Pre-Disaster Mitigation (PDM) Plan is the McPherson County Commission. The Commission has tasked the McPherson County Emergency Management Office with the responsibility of ensuring that the PDM Plan is compliant with Federal Emergency Management Agency (FEMA) Guidelines and corresponding regulations.

MULTI-JURISDICTIONAL PLAN PARTICIPATION

This plan is a multi-jurisdictional plan which serves the entire geographical area located within the boundaries of McPherson County, South Dakota. McPherson County has five incorporated municipalities. Most of the municipalities located within McPherson County elected to participate in the planning process and the update of the existing McPherson County Pre-Disaster Mitigation (PDM) Plan. The participating local jurisdictions include the following municipalities:

Table 2.1: Plan Participants		
New Participants	Continuing Participants	Not Participating
	Eureka	Hillsview
Long Lake	Leola	Hoffman Township
Wetonka	FEM Electric	Wachter Township
	McPherson County	Wacker Township
		Weber Township

The non-participants include Hillsview and all four townships. The non-participating communities will be given the option to complete the requirements for the plan and to formally adopt the plan during the annual update of the plan.

The new participants are incorporated municipalities that took part in the planning process and decided to adopt the County PDM plan.

The McPherson County Commission and each of the listed participating municipalities will pass resolutions to adopt the updated PDM Plan. In addition to these municipalities, FEM Electric also participated in the plan update and will pass a resolution to adopt the McPherson County PDM Plan.

The townships did not participate in the planning process for the plan update. The townships are served by the County whenever necessary. The townships were invited to participate in the PDM Plan update and asked to submit information to the plan author

for projects they would like to see included in the PDM plan. No information was submitted to the plan consultant from the townships.

The McPherson County PDM Plan will be adopted by resolution by the participating incorporated municipalities, the McPherson County Commission, and FEM Electric. The Resolutions of Adoption are included as supporting documentation for the PDM Plan. The dates of adoption by resolution for each of the jurisdictions are summarized in Table 2.2.

Jurisdiction	Date of Adoption
McPherson County Commission	
Eureka	
Hillsview	
Leola	
Long Lake	
Wetonka	

All of the participating jurisdictions were involved in the plan update. Representatives from each municipality, the County, and Northern Electric attended the planning meetings and provided valuable perspective on the changes required for the plan. All representatives took part in the risk assessment by completing the risk assessment worksheets which are included as Appendix C and by profiling the risks.

Representatives also took information from the PDM planning meetings back to their respective councils and presented the progress of the plan update on a monthly basis. The local jurisdictions have also presented the Resolution of Adoption to their councils and will pass the resolutions upon FEMA approval of the PDM Plan update. The Resolutions are included as Attachment B at the end of this section.

Table 2.3 was derived to help define “participation” for the local jurisdictions who intend on adopting the plan. Out of eleven categories, each jurisdiction must have at least eight of the participation requirements fulfilled.

Nature of Participation	Eureka	Leola	Long Lake	Hillsview	Wetonga	McPherson County
Attended Meetings or work sessions (a minimum of 2 meetings will be considered satisfactory).	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Submitted inventory and summary of reports and plans relevant to hazard mitigation.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Submitted Risk Assessment Worksheet.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Submitted description of what is at risk (including local critical facilities and infrastructure at risk from specific Hazards) Worksheet 3A	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Submitted a description or map of local land-use patterns (current and proposed/expected).	C	C	C	C	C	C
Developed goals for the community.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Developed mitigation actions with an analysis/explanation of why those actions were selected.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Prioritized actions emphasizing relative cost-effectiveness.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Reviewed and commented on draft Plan.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Hosted opportunities for public involvement (allowed time for public comment at a minimum of 2 city council meetings after giving a status report on the progress of the PDM Plan update)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

III. PLANNING PROCESS

CHANGES/REVISIONS TO PLANNING PROCESS:

Planning Process is an entirely new section to the McPherson County PDM as it is required by FEMA's Planning Tool guidelines, but was not included in the 2006 PDM plan.

DOCUMENTATION OF THE PLANNING PROCESS

"An open and public involvement process is essential to the development of an effective plan." Requirement 201.6(b).

Public meetings were held at the Leola Municipal Building to inform the public about the required PDM Plan update. The McPherson County Emergency Manager worked with NECOG staff to organize resources and sent out a mailing to all the stakeholders, community organizations, municipalities, townships, local planning groups, and non-profits. A steering committee was formed from those persons who attended the public meetings. None had previously served as planning committee members during the drafting of the first PDM plan. After the informational meetings were held, the steering committee started working through the existing plan and noting deficiencies, corrections, and updates that needed to be made. The meeting minutes from each of the planning meetings give an overview of what was covered at each of the meetings and are included as Appendix A.

The 2006 PDM plan did not include all of the necessary requirements found in the 2011 Local Mitigation Plan Review Tool provided by FEMA. Thus, to ensure that the updated plan included everything required by FEMA, the plan author used the planning tool to guide the discussions. The 2006 PDM Plan was then compared to the new Planning Tool and any portion of the 2006 PDM Plan that was not needed to fulfill the new requirements was eliminated and deficiencies were noted as areas of focus.

The sections of the 2006 plan that were deemed useful were reorganized and placed under the appropriate sections of the new plan. This process was completed through a number of work sessions which were advertised in the local newspapers, radio announcements, and notices were sent to the stakeholders. The date of the next meeting was set at the end of each of the meetings. These methods of notifying the public of the plan update process were determined by the steering committee to be the most likely way to create public awareness and public involvement in the process of updating the PDM Plan. The Plan Author followed the direction provided at the FEMA G318 Mitigation Planning Workshop for Local Governments and also used the FEMA Multi-Hazard Mitigation How-To Guidance and Planning Tool to develop the plan.

SELECTION OF THE PLANNING TEAM [§201.6(c)(1)]

The McPherson County Emergency Manager and staff from Northeast Council of Governments led the development of the plan update. Participating jurisdictions and their staff were also instrumental in leading the discussions at the PDM planning meetings. The local jurisdictions were represented by city council members and/or

finance officers who attended the meetings. The council members then took the information from the work sessions back to their jurisdictions and discussed the progress of the plan at their council meetings. There was one external contributor, FEM Electric, who provides power to parts of the County. Mid Dakota Utility (MDU), also a rural electric who provides power to parts of McPherson County, did not participate. Those who attended the initial planning meeting for the PDM Plan update were asked to volunteer to serve on the planning committee. The planning committee was tasked with reviewing the drafts and providing comments after Northeast Council of Governments initiated changes to the existing plan. Each of the local jurisdictions had a member of their respective councils represent the municipalities in the plan. Those representatives are listed by jurisdiction:

Table 3.1: PDM Plan Representatives for Local Jurisdictions

Eureka	Bobbi Ottenbacher, Finance Officer
Hillsview	**Did not participate
Leola	Candace Kappes, Finance Officer
Long Lake	*Sonja Klebs, President
Wetonga	Roger Rohwedder, President
McPherson County	Dawn Jenner, Emergency Manager
Volunteer Organizations	Dave Ackerman, Sheriff
FEM Electric	Scott Moore
<p>** Did not participate; only 3 residents in town *Sonja Klebs has left her position as President and has been replaced by Steven Hege</p>	

The representatives from the municipalities were asked to share the progress of the plan at their monthly council/board meetings and to ensure that those attending the meetings were aware that they are invited to make comments on and participate in the process of updating the new plan. Comments provided by local residents at the city council meetings were collected and incorporated into the plan.

PUBLIC INVOLVEMENT [§201.6(b)(1)]

The public was provided several opportunities to comment on the plan during the drafting stages, both at the PDM Planning Meetings and at City Council Meetings. There were several work sessions and public hearings held to keep the public updated and involved in the plan, however, no one from the public showed up to comment on the plan or to help with the plan update. Those who were most involved were the representatives from the municipalities and those previously mentioned as being instrumental in leading discussions. The municipalities put the PDM plan update on the agenda at their council meetings and allowed people to comment at the meetings. Table 3.2 identifies the location and date of each opportunity that was provided for the public to comment and how it was advertised. After the plan was drafted it was posted on the McPherson County, City of Leola, and City of Eureka websites and emailed to all of the participants and to the emergency managers in the neighboring counties of: Campbell, Walworth, Edmunds, and Brown; and McIntosh County and Dickey County in North Dakota. Everyone who received an email copy of the plan draft was allowed 45 days to comment on the draft.

Table 3.2: Opportunities for Public Comment

Location of Opportunity	Date	Type of Participation			How Was Meeting Advertised			
		City Council Meeting	PDM Meeting	Survey	Public Notice	Agenda	Mailing	Website
Eureka		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hillsview	NA	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	NA	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Leola	07/09/2012	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	08/06/2012	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Long Lake		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wetonga		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
McPherson County		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SURVEY RESULTS

In addition to the public hearings, worksessions, and council meetings, the PDM planning group decided to conduct a survey which was distributed as an insert in the local newspapers, the McPherson County Herald and the Northwest Blade. During the planning meetings, the PDM plan participants decided that distributing the survey in the newspaper was the best way to get residents in McPherson County to respond. The Plan participants used the survey as an opportunity for the public to provide comments and decided the information and comments collected from the surveys should be included as part of the updated plan. The survey is attached as Appendix D and the results of the survey are summarized in the following paragraphs.

Of the 54 completed surveys, 11 respondents reside in rural McPherson County, 23 reside in Eureka, 1 resides in Long Lake, 17 reside in Leola, 1 resides in Hillsview, and 1 person marked “other” but did not fill in a location.

When asked which natural hazards cause the most concern to the respondents in McPherson County, the following hazards were presented in the survey: flood, tornado, severe winter weather, thunder/lightening/hail, string winds, drought, and wildfire. Additionally, the survey provided an option marked “other” with a line to write in other hazards. In the other category several respondents added drainage and ice storms. One person added, “ice on sidewalks and streets everywhere.” Respondents were

supposed to rank the hazards from highest concern to lowest concern however, due to unclear directions in the survey the responses came back in many different forms. In effort to compile the data for the summary of findings, the responses were tallied by the number of times a hazard was ranked as most likely to occur. When an x or a check mark were noted on the survey a tally was given for each hazard noted, and if respondents had given a rank of 1 through 7, a tally mark was given for hazards that were ranked first with the number one. There was also an option for respondents who felt that all of the natural hazards listed would have an equal chance or likelihood of occurrence in their area.

Table 3.3: Survey Responses for Hazard		
Natural Hazard	# of times ranked #1	# of times ✓
Flood	0	2
Tornado	1	8
Severe Winter Weather	10	10
Thunder/lightening/Hail	12	8
Strong Winds	13	10
Drought	2	7
Wildfire	1	1
Other- Ice and drainage	2	2
All Hazards Equal...	NA	17

Seventeen respondents indicated that they thought all of the listed hazards have an equal chance or likelihood of occurring in the area, however it should be noted that some respondents also ranked the hazards *and* marked the option for all hazards have an equal change or likelihood of occurring in the area.

Thirty-three of the 54 respondents indicated that they had been negatively affected by a natural hazard in the last 10 years. Nineteen of the respondents answered “no” to the question asking if they had been negatively affected by a natural hazard in the last 10 years. Fifteen respondents had been negatively affected by a natural hazard that occurred more than 10 years ago. Some respondents answered either yes or no to the question and also marked that they had been affected by an event that happened more than 10 years ago and one respondent did not answer the question.

For those who answered “yes” to the question of being negatively affected by a natural hazard in the past decade, they were asked to identify what type of natural hazard affected them. Fourteen respondents said they were negatively affected by thunderstorms and hail. Twenty-seven respondents were negatively affected by severe winter weather. Twenty-four respondents reported strong winds as a natural hazard that has affected them. Fourteen respondents were affected by drought. Three respondents reported being affected by tornados. Five respondents reported being affected by wildfire. Ten respondents reported being negatively affected by flooding and/or drainage issues caused by heavy rains or spring thaw. Four respondents have been affected by fires and fourteen respondents either did not answer or reported that the question was not applicable.

The survey asks if the natural hazard that affected the respondents caused any of the following:

EFFECTS	# OF RESPONSES
Cause displacement from primary residence for more than 3 days	10
Cause you to have to take an alternate route to work, school, church, medical facility, etc	10
Damage personal property to include home, structures, land, or crops	30
Cause injuries to yourself or someone you know	3
Cause death to someone you know	0
Respondents that did not answer the question	18

Ten respondents indicated that they do not have a safe place to go in the event of a tornado, while 43 respondents indicated that they have a safe place to go in the event of a tornado; with 32 designating their basements, crawl space, or root cellar as the “safe place” for them. One person did not answer.

Eighteen respondents did not feel there is a need for a storm shelter in their area and 27 respondents feel there is a need for storm shelters in the area. Nine respondents did not answer. Those who indicated that there is a need for storm shelters identified the following locations for such shelters: Eureka School, at the park, near the firehall, near Kenwood manor, the courthouse, near the east and west Eureka apartments, Leola Citizens Building Auditorium, and one respondent wrote “more than one location.” The responses to the survey appear to follow the same sentiment as was shared among the steering committee members about summer storm shelters; that being there is definitely a need for storm shelters in McPherson County.

The next portion of the survey addresses alternate sources of heat in the event of loss of power during severe winter storms, the type of energy source, and how long the respondent could survive without power. Thirty-three respondents indicated they have alternate sources of power and twenty-one indicated that they do not have an alternate source of power. Those who do have alternate sources of heat indicated that the source of heat/power comes from the following: generators, propane heaters, wood burners, kerosene heaters, and fireplaces.

Respondents were asked how many days they could survive without electricity. The responses were divided into four groups and summarized in Table 3.5:

How long can you survive	# of Responses
---------------------------------	-----------------------

without power?	
Less than 24 hours	1
1 to 7 days	22
8 to 30 days	2
Indefinitely	3
No Answer/Unsure	26

The final question on the survey asked if respondents felt like the local governing bodies could or should do more to mitigate the effects of natural hazards that occur in their areas. Fifteen respondents indicated “yes” that more could or should be done. Twenty-five respondents answered “no,” two were unsure, and twelve did not answer. Those which indicated yes were supposed to provide project ideas that might help mitigate the effects of natural hazards in the area. Those who answered yes provided the following comments:

- “Educate public further on how to deal with those emergencies.”
- “Equip first responders with equipment needed to communicate with each other. We currently lack that ability.”
- “Winter storm shelter.”
- “Backup generator for City water.” (Leola)
- “Leola needs a storm sewer to prevent flooding basements”
- “Remove snow faster.”
- “A rule or place where people could take their pets to safety. Some people won’t leave their animals behind.”
- “Neighbors look after each other; and governing bodies and ValleyTel joined forces.
- “Last disaster law enforcement, fire departments, and hospital and nursing home all coordinated to relocate and feed persons unable to remain in homes.”
- “Make the public aware of what is available in the event of a natural disaster.”
- “Local governing bodies doing a good job. The schools could use a backup system that would have adequate space and equipment to house non-hospice individuals.”
- “Chemical spill (Propane, gasoline/diesel, fertilizer) should have hazard cleanup unit in our area.”
- “City of Eureka does a super great job with snow on streets.”
- “They do a good job but there are many projects.”

The last section of the survey provided a place for additional comments. The following were provided comments:

- “This is a good program.”
- “New people to the State need to be taught about tornados. Learn sirens and what to do.”
- “Had standby at farm but could not get out to stay there. Farm out of power for 6 days. We had 4 blankets on bed, 30 degrees in house. Slept long; only way to stay warm in bed.”
- “When would we as locals go if tornado would wipe out most of Eureka. How about Artas or Long Lake? The Kansas tornados serve as a reminder.”

“It would be nice to know that ALL of the elderly might be checked on if there was a disaster, not just the VIPs or friends or family.”

“Provide some seminars for the public on how to recognize a severe threatening storm and what to do.”

“Flooded roads every way out of farm back after the winter of 1997. Had to drive through the one road that was still not washed out and had to go through 14 inches of water with a four-wheeler in order to get to a regular vehicle on the other side to get to school/work/etc.”

“I would enjoy being part of the education plan—providing presentations etc. This sounds interesting and having experiencing these disasters and living in McPherson County all my life it would be fulfilling to help others.”

“During the last extended outage our local hospital and nursing home took in people primarily the elderly to give them warm place to stay with food and water. City blocks/neighborhoods could have similar plans in place.”

“Would be ideal for every farm site to have a [storm] shelter, but it’s not feasible.”

“The folks in our County have disaster plans in place. The communities in this County all work together to help others in need out and would do so during times of disaster. This is in our Cities of Eureka and Leola. In an ideal world it would be great to have everything in place—but in a sparsely populated area labeled as have a “frontier” population, the citizens could not bear the burden of additional taxes to cover these items. Individuals need to be educated and take the initiative to put some of these items in place in their homes or farm sites or have a plan what they would do in such events. Perhaps there could be rebates or supplemental funding of some type to assist people to put these disaster preparation items in place. However once again these “funds/grants” are supported by the taxpayer and that is each of us and how much more of a tax burden can we endure without going “bust.” Education would be a great start through perhaps some volunteers who would help build shelters etc. Encourage groups looking for community service projects to complete some of these projects. Tax Credits might be a good idea as well.”

The comments provided by survey participants were not edited or revised. The results of the survey were published in the local newspapers. The Northwest Blade published the results on page 12 of the Thursday, January 23, 2014 publication. The McPherson County Herald published the results on the front page on Wednesday, January 15, 2014 (Volume 121, No. 48).

TECHNICAL REVIEW OF EXISTING DOCUMENTS [§201.6(b)(3)]

The review and incorporation of existing plans, studies, reports and technical information was completed by the plan author. Each of the communities were asked to provide a list of existing documents that they have available. Many of the smaller communities do not have such documents. Additionally, the 2006 PDM Plan was used as a resource for the new plan because most of the natural hazard profile research had already been completed when it was drafted. In addition to the 2006 PDM Plan, the plan author reviewed several other existing documents including but not limited to the South Dakota State Hazard Mitigation Plan and the City and County’s Zoning Ordinances and Comprehensive Plans, the flood damage prevention ordinance, and Flood Insurance Rate Maps for the local jurisdictions. In McPherson County, Eureka and Leola have their own comprehensive plans and zoning ordinances. Long Lake and Wetonka are covered under the County Zoning Ordinances and Comprehensive Plan therefore they

do not have their own individual zoning or planning documents. Hillsview has formally opted out of McPherson County Zoning however they still comply with the County's zoning ordinances. Enforcement of the county zoning is managed by the County. A summary of the technical review and incorporation of existing plans is included in Table 3.6 provided on page 20.

Existing Program/Policy/ Technical Documents	Local Jurisdiction					
	Eureka	Hillsview	Leola	Long Lake	Wetonka	McPherson County
Comprehensive Plan	✓	NA	✓	C	C	C
Growth Management Plan	NA	NA	NA	NA	NA	NA
Flood Damage Prevention Ordinance	✓	NA	NA	NA	NA	✓
Floodplain Management Plan	✓	NA	NA	NA	NA	✓
Flood Insurance Studies or Engineering studies for streams	NA	NA	NA	NA	NA	NA
Hazard Vulnerability Analysis (by the local Emergency Management Agency)	C	C	C	C	C	C
Emergency Operations Plan	NA	NA	C	NA	NA	C
Zoning Ordinance	✓	NA	✓	C	C	C
Building Code	IBC 2012	IBC 2012	IBC 2012	IBC 2012	IBC2012	IBC 2012
Drainage Ordinance	NA	NA	NA	NA	NA	NA
Critical Facilities maps	NA	NA	C	NA	NA	NA
Existing Land Use maps	✓	NA	✓	NA	NA	NA
Elevation Certificates	NA	NA	NA	NA	NA	NA
State Hazard Mitigation Plan	✓	✓	✓	✓	✓	✓
HAZUS	NA	NA	NA	NA	NA	NA

NA: the jurisdiction does not have this program/policy/technical document

C: the jurisdiction is regulated under the County's policy/program/technical document

✓ the jurisdiction reviewed the program/policy/technical document

IBC 2012: Jurisdiction follows International Building Code 2012

REVIEW OF THE 2006 PDM PLAN

The planning committee reviewed and analyzed each section of the plan and each section was revised as part of the update process. The 2006 PDM plan did not include all requirements listed in the Local Mitigation Plan Tool. When the planning committee reviewed the 2006 PDM plan, they found that the PDM plan would be more easily read and understood if it followed the outline of the planning tool. The outline was then used to create a new Table of Contents and the rest of the plan was developed from the Table of Contents. The plan author also used the Local Multi-hazard Mitigation Planning Guidance (dated July 1, 2008) and the How-to Guides provided by FEMA to develop tables for the updated plan.

When the planning committee reviewed the introduction section of the plan, it was determined that there was a significant amount of information that was missing. This section was completely rewritten and additional information was included. The Basic Plan section needed to be completely rewritten, but the information provided in that section was useful and was reused whenever possible in the updated plan. Some of the appendices were eliminated, and others were revised. Additional appendices were added. Every section of the plan was reconsidered by the planning committee and the group decided which sections were useful and which sections should be eliminated. The committee review of the plan took place over the course of several two-hour work sessions that were held at the Leola Municipal Building from 1:0 o'clock p.m. to 3:30 o'clock p.m. on the following dates:

May 14, 2013
June 18, 2013
July 16, 2013
August 13, 2013
May 13, 2014

The meeting minutes from each of the work sessions give an overview of how each section was analyzed, discussion that took place, and changes that were made. The meeting minutes are attached as Appendix A to the plan for reference.

IV. RISK ASSESSMENT

CHANGES/REVISIONS TO RISK ASSESSMENT:

- The 2006 PDM plan did not have a section titled Risk Assessment. Section B: Hazards was comparable to the risk assessment so information was reused when possible and definition and explanation of natural hazards were revised.
- Addressing Repetitive Loss Properties and Addressing Vulnerability (Overview) were added.
- Estimating Potential Losses, Methodology for Calculating estimated losses and Analyzing Development Trends are entirely new sections

IDENTIFYING HAZARDS [§201.6(c)(2)(i)]

Many websites have been further developed and updated since the drafting of the previous McPherson County PDM plan in 2006. Some of those websites were used as resources for the updated plan. Specifically, the National Oceanic Atmosphere Administration (NOAA) and National Weather Service were used to research natural hazards and disasters that have occurred within the last 10 years within the geographic location covered under the McPherson County PDM Plan. A summary of the findings for significant hazard occurrences from the past 10 years is provided in Table 4.1:

Table 4.1: Significant Hazard Occurrences 2004-2013		
Type of Hazard	# of Occurrences Since 2004	Source
Drought	11	NOAA
Wildfire/ Other Fire	216	NOAA & State Fire Marshall
Flood/Flash Flood	7	NOAA
Hail	74	NOAA & SHELDUS
Tornado	5	NOAA & SHELDUS
Temperature Extremes	14	NOAA
Winter Storm/Blizzard	27	NOAA
Thunderstorm (35) and High Wind (9)	44	NOAA & SHELDUS

While researching the hazard occurrences that have taken place in McPherson County, it became evident that the information found on the NOAA website was incomplete. Therefore, other sources were contacted whenever possible. Specifically, NOAA zero

occurrences listed for wildfires in McPherson County, but the State Fire Marshall's Office was contacted to verify that information. Doug Hinkle, the State Fire Marshall, said their information is derived from the reports submitted by the local fire departments who respond to the fires. He also explained that since many of the fire departments in McPherson County are Volunteer Fire Departments many times wildfires are extinguished and reports are never filed with the State. Thus, the information provided by the State Fire Marshall's office is not entirely complete either.

For the purpose of this plan we have used the numbers provided by the State Fire Marshall's Office as a point of reference in determining the likelihood of a wildfire hazard occurrence within the jurisdiction. The information provided by Doug Hinkle identifies 31 structure fires, 25 vehicle fires, and 160 outside fires reported between 2003 and 2012. The cause of the outside fires is not listed, so it is not known for certain whether all or some of these fires resulted due to a natural hazard occurrence or as a result of human behavior. From 2003-2012 the total dollar loss accumulated was \$1,602,110. Additionally, the State Fire Marshall provided information about the number of injuries and fatalities reported as a result of these fires. According to Hinkle's records, zero civilian injury and zero civilian fatalities were reported and zero firefighter injuries have been reported since 2003.

Table 4.2 is a list of hazards produced from the FEMA worksheets completed by each local jurisdiction located within McPherson County. Representatives from each community completed the worksheet for their geographical location, while representatives of McPherson County completed the worksheet for county-wide risks. All of the worksheets are included as Appendix C.

Table 4.2: Hazards Categorized by Likelihood of Occurrence		
High Probability	Low Probability	Unlikely to Occur
Communication Disruption	Aircraft Accident	Avalanche
Drought	Biological	Coastal Storm
Extreme Cold	Civil Disorder	Hurricane
Extreme Heat	HAZMAT	Volcanic Ash
Flood	Landslide	Volcanic Explosion
Freezing Rain/Sleet/Ice	National Emergency	Tsunami
Hail	Radiological	
Heavy Rain	Subsidence	
Heavy Snow	Earthquake***	
Ice Jam	Dam Failure	
Lightning		
Rapid Snow Melt	***Earthquakes are marked with an asterisk because they occur but are so small that the effects are minimal. Thus, mitigation measures specifically for earthquakes are not a priority. ** Utility interruptions are not a natural hazard but often occur as a result of natural hazards such as ice storms and strong winds.	
Strong Winds		
Thunderstorm		
Tornado		
Transportation		
Urban Fire		
Utility Interruption**		
Wild Fire		

Every possible hazard or disaster was evaluated and then placed in three separate columns depending on the likelihood of occurrence in the PDM jurisdiction. Hazards that occur at least once a year were placed in the High Probability column; hazards that may have occurred in the past or could occur in the future but do not occur on a yearly basis were placed in the low probability column; and hazards or disasters that have never occurred in the area before and are unlikely to occur in the PDM jurisdiction any time in the future were placed in the Unlikely to Occur column.

Due to the topographical features of the County and the nature of the natural hazards that affect the geographical area covered by this PDM plan, most areas of the county have similar likelihood of being affected by the natural hazards identified. Only the natural hazards from the High Probability and Low Probability Columns will be further evaluated throughout this plan. All manmade hazards and hazards in the Unlikely to Occur column will not be further evaluated in the plan. Table 4.3 identifies the hazards that will be addressed in the PDM Plan update throughout the planning process.

Table 4.3: Overall Summary of Vulnerability by Jurisdiction

Natural Hazards Identified	McPherson Co	Eureka	Leola	Long Lake	Hillsview	Wetonka
Drought	M	M	M	M	O	M
Extreme Cold	H	H	H	H	O	H
Extreme Heat	H	H	H	H	O	H
Flood	M	M	M	L	O	M
Freezing Rain/Sleet	H	H	H	H	O	H
Hail	H	H	H	H	O	H
Heavy Rain	H	H	H	H	O	H
Ice Jam	L	L	L	L	O	L
Landslides	L	NA	NA	NA	O	NA
Lightning	H	H	H	H	O	H
Heavy Snow	H	H	H	H	O	H
Strong Winds	H	H	H	H	O	H
Earthquakes	L	L	L	L	O	L
Tornadoes	M	M	M	M	O	M
Wildfire	L	L	M	M	O	M

- NA** : Not applicable; not a hazard to the jurisdiction
- L** : Low risk; little damage potential (minor damage to less than 5% of the jurisdiction)
- M** : Medium risk; moderate damage potential (causing partial damage to 5-10% of the jurisdiction, and irregular occurrence)
- H** : High risk; significant risk/major damage potential (for example, destructive, damage to more than 10% of the jurisdiction and/or regular occurrence)
- O** : Jurisdiction did not fill out risk assessment worksheet

While man-made hazards were listed on the worksheets and discussed briefly during the completion of the worksheets, the steering committee decided to eliminate man-made hazards from the PDM plan because those types of hazards are difficult to predict and assess due to wide variations in the types, frequencies, and locations. Types and scopes of manmade hazards are unlimited.

NATURAL HAZARDS IN THE PDM PLAN JURISDICTION

Descriptions of the natural hazards likely to occur in the PDM Jurisdiction were revised from the 2006 McPherson County PDM Plan. Some of the descriptions needed to be revised for better clarity. For the purpose of consistency throughout the plan, additional definitions were included to reflect all of the hazards that have a chance of occurring in the area and all of the hazards are alphabetized. For all of the hazards identified the probability of future occurrence is expected to be the same for all jurisdictions covered in the Plan.

Blizzards are snow storms that last at least 3 hours with sustained wind speeds of 35 mph or greater, visibility of less than a quarter mile, temperatures lower than 20°F and white out conditions. Snow accumulations vary, but another contributing factor is loose snow existing on the ground which can get blown around and aggravate the white out conditions resulting in limited or zero visibility. These conditions are extremely dangerous to motorists and cause many traffic accidents each year; many resulting in death. When such conditions arise, blizzard warnings or severe blizzard warnings are issued. Severe blizzard conditions exist when winds obtain speeds of at least 45 mph plus a great density of falling or blowing snow and a temperature of 10°F or lower.

Drought is an extended period of months or years when a region notes a deficiency in its water supply. Generally, this occurs when a region receives consistently below average precipitation. It can have a substantial impact on the ecosystem and agriculture of the affected region. Although droughts can persist for several years, even a short, intense drought can cause significant damage and harm the local economy. This global phenomenon has a widespread impact on agriculture.

Dam Failure Dams function to serve the needs of flood control, recreation, and water management. During a flood, a dam's ability to serve as a control agent may be challenged. An excessive amount of water may result in a dam breach, simply an overflowing. Dams that are old or unstable, dams that receive extreme amounts of water, or dams that get debris pile-up behind their face may result in dam failure, a cracking and/or breaking. The County has 3 dams and all 3 have the potential to endanger lives and damage property.

Earthquakes are a sudden rapid shaking of the earth caused by the shifting of rock beneath the earth's surface. Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric and phone lines, and often cause landslides, flash floods, fires, avalanches, and tsunamis. Larger earthquakes usually begin with slight tremors but rapidly take the form of one or more violent shocks, and are followed by vibrations of gradually diminishing force called aftershocks. The underground point of origin of an earthquake is called its focus; the point on the surface directly above the focus is the epicenter.

Extreme Cold What constitutes extreme cold and its effects can vary across different areas of the country. In regions relatively unaccustomed to winter weather, near freezing temperatures are considered "extreme cold," however, Eastern South Dakota is prone to much more extreme temperatures than other areas in the country. Temperatures typically range between zero degrees Fahrenheit and 100 degrees Fahrenheit, so extreme cold could be defined in the McPherson County PDM jurisdiction area as temperatures below zero.

Extreme Heat, also known as a Heat Wave, is a prolonged period of excessively hot weather, which may be accompanied by high humidity. There is no universal definition of a heat wave; the term is relative to the usual weather in the area. Temperatures in McPherson County have a very wide range typically between 0-100 degrees Fahrenheit, therefore anything outside those

ranges could be considered extreme. The term is applied both to routine weather variations and to extraordinary spells of heat which may occur only once a century.

Flooding is an overflow of water that submerges land, producing measurable property damage or forcing evacuation of people and vital resources. Floods can develop slowly as rivers swell during an extended period of rain, or during a warming trend following a heavy snow. Even a very small stream or dry creek bed can overflow and create flooding. Two different types of flooding hazards are present within McPherson County.

1. Inundation flooding occurs most often in the spring. The greatest risks are realized typically during a rapid snowmelt. There are no rivers in McPherson County however there are many creeks and ditches. Spring Creek runs through the northwest portion of McPherson County from Campbell County. In the past 10 years there have been two flood events in McPherson County; the events occurred in March of 2010 and June of 2011. Snowmelt runoff from an expansive snow cover flooded many creeks, roads, and thousands of acres of pasture and cropland through northeast South Dakota in the spring of 2010. There were numerous road closures in neighboring counties, however McPherson County only had a few. Most lakes and rivers in northeast South Dakota were at or very near record levels. On June 20, 2011, a large upper level low pressure area long with deep moisture brought very heavy rains to northeast South Dakota. Rainfall amounts of three to seven inches occurred across much of the area resulting in widespread flooding.
2. Flash Flooding typically occurs during the summer months. This flooding is primarily localized, though enough rain can be produced to cause inundation flooding in Leola, Eureka, and surrounding areas. Heavy, slow moving thunderstorms often produce large amounts of rain. Eastern parts of McPherson County are relatively flat area, allowing moisture to remain in low-lying areas. The threat of flooding would be increased during times of high soil moisture. In addition, debris carried by water can significantly compromise the effectiveness of otherwise adequately designed bridges, dams, culverts and other structures. McPherson County has been a part of a number of past flooding events that have hit the region. In the past decade, there have been flash flood events in McPherson County six consecutive years between 2006 and 2011.

Freezing Rain/Ice occurs when temperatures drop below 30 degrees Fahrenheit and rain starts to fall. Freezing rain covers objects with ice, creating dangerous conditions due to slippery surfaces, platforms, sidewalks, roads, and highways. Sometimes ice is unnoticeable, and is then referred to as black ice. Black ice creates dangerous conditions, especially for traffic. Additionally, a quarter inch of frozen rain can significantly damage trees, electrical wires, weak structures, and other objects due to the additional weight bearing down on them.

Hail is formed through rising currents of air in a storm. These currents carry water droplets to a height at which they freeze and subsequently fall to earth as round ice particles. Hailstones usually consist mostly of water ice and measure between 5 and 150 millimeters in diameter, with the larger stones coming from severe and dangerous thunderstorms.

Heavy Rain is defined as precipitation falling with intensity in excess of 0.30 inches (0.762 cm) per hour. Short periods of intense rainfall can cause flash flooding while longer periods of widespread heavy rain can cause rivers to overflow.

Ice Jams occur when warm temperatures and heavy rain cause snow to melt rapidly. Snow melt combined with heavy rains can cause frozen rivers to swell, which breaks the ice layer on top of the river. The ice layer often breaks into large chunks, which float downstream and often pile up near narrow passages other obstructions, such as bridges and dams.

Landslide is a geological phenomenon which includes a wide range of ground movement, such as rock falls, deep failure of slopes and shallow debris flows, which can occur in offshore, coastal and onshore environments. Although the action of gravity is the primary driving force for a landslide to occur, there are other contributing factors build up specific sub-surface conditions that make the area/slope prone to failure, whereas the actual landslide often requires a trigger before being released.

Lightning results from a buildup of electrical charges that happens during the formation of a thunderstorm. The rapidly rising air within the cloud, combined with precipitation movement within the cloud, results in these charges. Giant sparks of electricity occur between the positive and negative charges both within the atmosphere and between the cloud and the ground. When the potential between the positive and negative charges becomes too great, there is a discharge of electricity, known as lightning. Lightning bolts reach temperatures near 50,000° F in a split second. The rapid heating and expansion, and cooling of air near the lightning bolt causes thunder.

Severe Winter Storms deposit four or more inches of snow in a 12-hour period or six inches of snow during a 24-hour period. Such storms are generally classified into four categories with some taking the characteristics of several categories during distinct phases of the storm. These categories include: freezing rain, sleet, snow, and blizzard. Generally winter storms can range from moderate snow to blizzard conditions and can occur between October and April. The months of May, June, July, August, and September could possibly see snow, though the chances of a storm is very minimal. Like summer storms, winter storms are considered a weather event not a natural hazard, and thus will not be evaluated as a natural hazard throughout this plan.

Sleet does not generally cling to objects like freezing rain, but it does make the ground very slippery. This also increases the number of traffic accidents and personal injuries due to falls. Sleet can severely slow down operations within a community. Not only is there a danger of slipping, but with wind, sleet pellets become powerful projectiles that may damage structures, vehicles, or other objects.

Snow is a common occurrence throughout the County during the months from October to April. Accumulations in dry years can be as little as 5-10 inches, while wet years can see yearly totals between 110-120 inches. Snow is a major contributing factor to flooding, primarily during the spring months of melting.

Strong winds are usually defined as winds over 40 m/h, are not uncommon in the area. Winds over 50 m/h can be expected twice each summer. Strong winds can cause destruction of property and create a safety hazards resulting from flying debris. Strong winds also include severe localized wind blasting down from thunderstorms. These downward blasts of air are categorized as either microbursts or macrobursts depending

on the amount geographical area they cover. Microbursts cover an area less than 2.5 miles in diameter and macrobursts cover an area greater than 2.5 miles in diameter.

Subsidence is defined as the motion of a surface as it shifts downward relative to a datum. The opposite of subsidence is uplift, which results in an increase in elevation. There are several types of subsidence such as dissolution of limestone, mining-induced, faulting induced, isostatic rebound, extraction of natural gas, ground-water related, and seasonal effects.

Summer Storms are generally defined as atmospheric hazards resulting from changes in temperature and air pressure which cause thunderstorms that may cause hail, lightning, strong winds, and tornados. Summer storms are considered a weather event rather than a natural hazard, therefore summer storms are not evaluated as a natural hazard throughout this plan.

Thunderstorms are formed when moisture, rapidly rising warm air, and a lifting mechanism such as clashing warm and cold air masses combine. The three most dangerous items associated with thunderstorms are hail, lightning, and strong winds.

Tornados are violent windstorms that may occur singularly or in multiples as a result of severe thunderstorms. They develop when cool air overrides warm air, causing the warm air to rapidly rise. Many of these resulting vortices stay in the atmosphere, though touchdown can occur. The Fujita Tornado Damage Scale categorizes tornadoes based on their wind speed:

- F0=winds less than 73 m/h
- F1=winds 73-112 m/h
- F2=winds 113-157 m/h
- F3=winds 158-206 m/h
- F4=winds 207-260 m/h
- F5=winds 261-318 m/h
- F6=winds greater than 318 m/h

Wildland Fires are uncontrolled conflagrations that spread freely through the environment. Other names such as brush fire, bushfire, forest fire, grass fire, hill fire, peat fire, vegetation fire, and wildland fire may be used to describe the same phenomenon. A wildfire differs from the other fires by its extensive size; the speed at which it can spread out from its original source; its ability to change direction unexpectedly; and to jump gaps, such as roads, rivers and fire breaks.

Fires start when an ignition source is brought into contact with a combustible material that is subjected to sufficient heat and has an adequate supply of oxygen from the ambient air. Ignition may be triggered by natural sources such as a lightning strike, or may be attributed to a human source such as "discarded cigarettes, sparks from equipment, and arched power lines.

HAZARD PROFILE [§201.6(c)(2)(ii)]

Requirement §201.6 (c)(2)(i): [The risk assessment shall include a] description of the type of the... location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

Geographic location of each natural hazard is addressed in the updated plan. Most of the hazards identified have the potential of occurring anywhere in the County. Previous occurrences are listed individually by the type of hazard and by location in the following tables. Table 4.4 identifies the Latitude and Longitude of the local jurisdictions along with the population, elevation, and number occupied homes according to the 2010 US Census.

Table 4.4: Latitude/Longitude of Communities within the County					
City	Population	Location		Elevation	Occupied Units
Eureka	868	45°46'9"N	99°37'19"W	1890 ft	420
Hillsview	3	45°40'4"N	99°33'38"W	1850ft	1
Leola	457	45°43'16"N	98°56'19"W	1591 ft	214
Long Lake	31	45°51'23"N	99°12'24"W	1952ft	22
Wetonga	8	45°37'28"N	98°46'8"W	1470ft	3

Population and Occupied Units information was collected from US Census Bureau website:
<http://factfinder2.census.gov>

Additionally, the extent (i.e., magnitude or severity) of each hazard, information on previous occurrences of each hazard and the probability of future events (i.e., chance or occurrence) for each hazard are addressed in the following tables. While the planning committee reviewed all hazard occurrences that have been reported in the last 100 years, the list for some of the hazards was extremely long. The information provided in the tables is not a complete history, but rather an overview of the hazard events which have occurred over the last ten years. The planning committee felt the hazard trend for the last 10 years could be summarized in this section and decided to include any new occurrences that have taken place since the previous plan was drafted.

DAM FAILURE

Dam breach or failure is of lesser concern for the citizens of McPherson County than flooding due to the location of the dams in the County. Dam Failure is usually associated with intense rainfall or a prolonged flood condition (rainy day), or it can occur anytime (clear day). Dam failure can be caused by a variety of sources, to include: faulty design, construction and operational inadequacies, outliving its useful life, intentional breaches, or a flood event larger than the design. The greatest threat from dam failure is to people and property in areas immediately below the dam since flood discharges decrease as the flood wave moves downstream.

The degree and extent of damage depend on the size of the dam and circumstances of the failure. A large dam failure might bring about considerable loss of property, destruction of cropland, roads and utilities and even loss of life; as well as similar consequences to a small dam failure: loss of irrigation water for a season and extreme financial hardship to many farmers. More severe consequences of dam failure can include loss of income, disruption of services and environmental devastation.

Dam Data

McPherson County has one high-risk dam identified by the National Inventory of Dams: Eureka Dam. The Eureka Dam is owned by the City of Eureka. It has a height of 15 feet and capacity of 594 acre feet.

In general, Eureka Dam is in reasonably good structural condition. It is, however, seriously inadequate hydrologically because the dam is capable of passing about 30 percent of the Probable Maximum Flood (PMF). Since Lundquist Dam is an intermediate size dam with a Category I hazard classification, the minimum spillway design flood is 50 percent of the PMF.

The locations of the dams are found in Table 4.5:

4.5 Dam Locations in McPherson County						
ID	Name	Owner	Location (Lat/Long)	Hazard	Height	Storage
SD00665	Lundquist Dam	SD School and Park Lands	45.7266 -98.9533	L	12ft	163 acre ft
SD00666	Eureka Lake	City of Eureka	45.7166 -98.64000	H	15ft	594 acre ft
SD02203	Crompton Lake	SD School and Park Lands	45.61166 -98.86353		20ft	275 acre ft
SD00667	Wolff Lake	SD School and Park Lands	45.89166 -99.41833	L	20ft	285 acre ft
SD02418	Dohn Dam	Private	45.89166 -99.63833	L	17ft	36 acre ft
SD02495	Krein Dam	Private	45.66170 -98.95500	L	10ft	60 acre ft

DROUGHT AND WILDFIRE

South Dakota's climate is characterized by cold winters and warm to hot summers. There is usually light moisture in the winter and marginal to adequate moisture for the growing season for crops in the eastern portion of the state. Semi-arid conditions prevail in the western portion. This combination of hot summers and limited precipitation in a semi-arid climatic region places South Dakota present a potential position of suffering a drought in any given year. The climatic conditions are such that a small departure in the normal precipitation during the hot peak growing period of July and August could produce a partial or total crop failure.

South Dakota's economy is closely tied to agriculture and only magnifies the potential loss which could be suffered by the state's economy during drought conditions. Table 4.6 identifies the 10-year drought history for McPherson County.

Table 4.6: McPherson County 10-year Drought History			
Location	Date	Time	Type
McPherson County	6/1/2006-9/1/2006	12:00 AM	Drought
McPherson County	10/01/2012-12/01/2012	12:00 AM	Drought
McPherson County	1/01/2013-1/01/2013	12:00 AM	Drought

Drought in McPherson County tends to be cyclical depending on weather patterns in the region. Over the course of the past three decades McPherson County has had regular drought occurrences, every two to three years on average. Roughly every 50 years a significant drought is experienced within the county, while many less severe droughts occur.

Major drought occurrences:

- 1988-1989: An abnormally low amount of precipitation in the summer of 1987 combined with a hot and dry summer during 1988, left South Dakota in serious condition. McPherson County experienced 75 to 100 percent crop damage in both years. Farmers were forced to sell cattle due to lack of feed and grazing. Sometimes drought disasters are declared due to failure of growth in small grains during spring planting.
- 1930s: During the infamous dust bowl years, McPherson County was not spared a fair share of problems. Particularly dry summers were in 1934 and 1936.
- 1880s-1890s: The years 1887, 1894-1896, 1898-1901 were very dry years.

A strong possibility exists for simultaneous emergencies during droughts. Wildfires are the most common. As mentioned on page 20 of this plan, the accuracy of the fire history is questionable, because the State Fire Marshall's Office collects information from the County, thus the accuracy of the information reported relies on the local fire departments, some of which are volunteer fire departments that are responsible for filing the reports.

The 2006 Plan did not list or identify the history of wildfire occurrences. Several notable structural fires were identified, but were left out of the 2012-2013 Plan Update because these structural fires were isolated incidents and not a result of a natural hazard. McPherson County is mostly pasture grassland and CRP so the probability of wildfire occurrences depends on the weather conditions. There are no urban interface areas in McPherson County so likelihood of occurrence is not more prevalent in any part of the County. Property at risk includes all public and private land and structures in the fire's path.

FLOOD

Flooding is a temporary overflow of water onto lands not normally covered by water producing measurable property damage or forcing evacuation of people and resources. Floods can result in injuries and even loss of life when fast flowing water is involved. Six inches of moving water is enough to sweep a vehicle off a road. Disruption of communication, transportation, electric service, and community services, along with contamination of water supplies and transportation accidents are very possible. A summary of the 10-year flood history has been included in tables 4.7 and 4.8.

Table 4.7: McPherson County 10-Year Flash Flood History 2003 to 2013							
LEOLA	MCPHERSON	SD	06/14/2006	04:30	CST	Flash Flood	0.00K
Heavy rains of 3-5 inches flooded several roads along with many ditches and fields.							
EUREKA	MCPHERSON	SD	06/17/2007	22:03	CST-6	Flash Flood	0.00K
Severe thunderstorms developed along a strong cold front which moved quickly east across South Dakota. Several supercell thunderstorms developed in a strongly sheared environment producing several tornados. Also, large hail, damaging winds, along with some flash flooding occurred. Heavy rains caused flash flooding in Eureka. Several basements had water in them with some sewers backing up. One basement wall collapsed.							
SPRING CREEK COLONY	MCPHERSON	SD	08/11/2008	16:00	CST-6	Flash Flood	40.00K
A cold front and upper level trough moving across central and northeast South Dakota interacting with moist and unstable air brought several severe thunderstorms along with heavy rains to the area. Large hail up to the size of golf balls along with heavy rains up to 3 inches occurred. Several areas of flash flooding were observed with water over some roads along with flooded cropland. Heavy rain caused flash flooding of a farm and surrounding crops and roads 10 miles north northeast of Leola. Water flowed into the basement of the home and severely damaged or destroyed the basement and everything in it.							
GREENWAY	MCPHERSON	SD	07/14/2009	08:00	CST-6	Flash Flood	0.00K
Non-severe thunderstorms moved over an area that had previously received up to 3 inches of rain just a few hours earlier. This resulted in flash flooding again with more county and township roads having water flowing over them. A National Weather Service employee visually saw numerous fields with water running through them, estimated 6 to 8 inches deep at times.							

LEOLA	MCPHERSON	SD	05/22/2010	20:10	CST-6	Flash Flood	0.00K
<p>Several supercell thunderstorms developed along a very strong warm front and produced nine tornadoes from Akaska to Bowdle to Hecla. The largest of the tornadoes was an EF4 tornado which occurred near Bowdle. This tornado produced devastating damage in the Bowdle area. The other tornadoes ranged from EF0 to EF2 and caused extensive tree and building damage. Nearly one-hundred power poles were downed along with several high line towers leaving nearly a thousand customers without power. Also, very strong straight line winds and large hail up to the size of golfballs affected parts of the area causing some damage. Heavy rain of over two inches fell in Leola within one hour causing street flooding throughout town.</p>							

Table 4.8: McPherson County 10-year Flood History							
GREENWAY	MCPHERSON CO.	SD	03/15/2010	08:00	CST-6	Flood	
<p>Snowmelt runoff from an expansive snow cover flooded many creeks, roads, along with thousands of acres of pasture and cropland throughout northeast South Dakota. There were numerous road closures. The flooding lasted through the end of the month and for many locations into April. The counties mainly affected were Brown, Marshall, Day, Spink, and Roberts. Numerous communities were affected including Aberdeen, Claremont, Waubay, Amherst, Kidder, and the Richmond Lake area. The Claremont, Amherst, and Britton areas were the hardest hit with flooded land and roads. Several farms were surrounded by water with some people stranded. Between Aberdeen and Britton, sixty percent of the land was under water. Thousands of acres of cropland will not be planted due to too much water with estimates that 20 to 25 percent of Brown county cropland would not be planted. Many people in northeast South Dakota have had too much water for many years. The road damage was extensive and repairs will be in the millions of dollars. Many roads across the area will also have to be raised. Many people had extra long commutes due to flooded roads with some people having to move out of their homes. Across Day and Marshall counties, rising lakes threatened many homes and cabins with sandbagging taking place. Most lakes and rivers across northeast South Dakota were at or near record levels.</p>							
GREENWAY	MCPHERSON CO.	SD	06/20/2011	14:00	CST-6	Flood	
<p>A large upper level low pressure area along with deep moisture brought very heavy rains to central, north central, and northeast South Dakota. Rainfall amounts of 3 to 7 inches occurred across much of the area resulting in widespread flooding. Many creeks were flooded along with many roads and thousands of acres of crop and pastureland by the two day heavy rain event. Many roads were closed across the area. The two day rainfall amounts were generally more than the normal June rainfall across the region.</p>							

Some rainfall amounts across the region included; 3.07 inches at Kennebec; 3.22 inches at Roscoe; 3.45 inches at Ipswich; 3.50 inches near Hosmer; 3.61 inches at Fort Pierre; 3.69 inches at Leola; 3.77 inches near Onida and at Mission Ridge; 3.82 inches near Akaska; 3.92 inches at Westport; 3.96 inches at Seneca; 4.03 inches at Murdo; 4.60 inches at Highmore; 4.63 inches at Miller; 4.70 inches at Pierre and north of Gettysburg; and 4.98 inches east of Hayes. Locations with more than five inches of rainfall included; 5.07 inches north of Vivian; 5.39 inches southeast of Pierre; 5.72 inches 10 south of Reliance; 7.00 inches near Fort Thompson; and 7.50 inches at Lake Sharpe.

Table 4.7 shows numerous flash flood events that occurred in McPherson County over the course of the past decade. While this information is valuable in showing the likelihood of future flood events, the information collected from the NOAA website appears to be incomplete as it does not show values in the property and crop damage column. It would be reasonable to assume that damage was caused in each event listed but for whatever reason was not reported in dollars lost or damaged. For the purpose of mitigation planning, future damage was estimated based on the historical evidence that flooding will occur in McPherson County on a regular basis. One should note that the type of flooding is not always a result of an overflowing body of water but usually a result of flash flooding and high ground water which leaves the ground saturated and unable to absorb any additional water from rainfall or snowmelt.

Information provided in the 2008 McPherson County disaster mitigation plan shows a total of seven occurrences between the years of 1950 and 2004, however it is highly likely that the records provided in the previous plan was based on information that was available at that time. Information found on the NOAA website is sometimes inaccurate due to incomplete reporting at the local, State, and Federal level.

NFIP: [§201.6(c)(2)(ii)]

Currently Eureka is the only community in McPherson County that participates in the NFIP program; however, currently there are no flood insurance policies in the community. McPherson County has never been mapped therefore no DFIRMS are available.

CRS Program:

McPherson County is not part of the Community Rating System program at this time.

CURRENT FLOODING CONDITIONS:

Due to recent drought and low moisture in 2012 and 2013, flooding in McPherson County has not been a problem this year. However, mitigation for flooding is always a priority even during dry years. McPherson County plans on developing project applications for flood mitigation later this year and submitting them to the HMGP program.

HAIL

Table 4.9 indicates hail occurrences by location throughout the county. However, the information provided by the NOAA and SHELDUS websites was incomplete due to inconsistent reporting after such hazards occur. Obviously, with such a high number of occurrences it is reasonable to expect that at least some property or crop damage was sustained in the communities during some of the occurrences, even though the damage may not have been reported or recorded. It is possible that such damage was not reported because it was believed to be insignificant at the time, or because those responsible for reporting such information did not report to the proper agencies.

Table 4.9: McPherson County 10-year Hail History							
Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag
EUREKA	MCPHERSON	SD	05/11/2004	17:15	CST	Hail	0.75 in.
EUREKA	MCPHERSON	SD	05/11/2004	17:55	CST	Hail	0.75 in.
EUREKA	MCPHERSON	SD	05/11/2004	18:45	CST	Hail	0.75 in.
LONG LAKE	MCPHERSON	SD	05/11/2004	19:10	CST	Hail	0.88 in.
EUREKA	MCPHERSON	SD	08/06/2004	16:45	CST	Hail	1.00 in.
HILLSVIEW	MCPHERSON	SD	08/06/2004	17:45	CST	Hail	1.00 in.
EUREKA	MCPHERSON	SD	05/07/2005	17:50	CST	Hail	1.75 in.
EUREKA	MCPHERSON	SD	05/07/2005	18:18	CST	Hail	0.75 in.
LEOLA	MCPHERSON	SD	05/08/2005	14:20	CST	Hail	0.75 in.
LEOLA	MCPHERSON	SD	05/08/2005	15:15	CST	Hail	0.88 in.
LEOLA	MCPHERSON	SD	06/26/2005	17:15	CST	Hail	0.75 in.
EUREKA	MCPHERSON	SD	07/02/2005	19:45	CST	Hail	0.75 in.
LEOLA	MCPHERSON	SD	08/02/2005	23:10	CST	Hail	1.00 in.
LONG LAKE	MCPHERSON	SD	08/17/2005	16:10	CST	Hail	1.75 in.
LEOLA	MCPHERSON	SD	08/17/2005	16:35	CST	Hail	0.88 in.
LONG LAKE	MCPHERSON	SD	08/17/2005	16:42	CST	Hail	1.75 in.
LEOLA	MCPHERSON	SD	08/17/2005	16:59	CST	Hail	1.00 in.
EUREKA	MCPHERSON	SD	06/14/2006	02:00	CST	Hail	0.75 in.
HILLSVIEW	MCPHERSON	SD	06/14/2006	03:12	CST	Hail	2.50 in.
LONG LAKE	MCPHERSON	SD	06/14/2006	03:30	CST	Hail	1.75 in.
LEOLA	MCPHERSON	SD	06/14/2006	08:05	CST	Hail	0.88 in.
EUREKA	MCPHERSON	SD	06/23/2006	17:40	CST	Hail	0.75 in.
EUREKA	MCPHERSON	SD	08/09/2006	19:00	CST	Hail	0.88 in.
EUREKA	MCPHERSON	SD	08/09/2006	19:45	CST	Hail	1.75 in.
HILLSVIEW	MCPHERSON.	SD	08/09/2006	20:05	CST	Hail	1.75 in.

LEOLA	MCPHERSON	SD	08/09/2006	20:15	CST	Hail	1.00 in.
LEOLA	MCPHERSON	SD	08/09/2006	20:40	CST	Hail	1.00 in.
LEOLA	MCPHERSON	SD	08/09/2006	21:00	CST	Hail	0.75 in.
LONG LAKE	MCPHERSON	SD	08/16/2006	17:35	CST	Hail	0.75 in.
LONG LAKE	MCPHERSON	SD	08/16/2006	17:47	CST	Hail	1.00 in.
LONG LAKE	MCPHERSON	SD	08/16/2006	18:05	CST	Hail	1.00 in.
LONG LAKE	MCPHERSON	SD	08/16/2006	18:12	CST	Hail	1.50 in.
LONG LAKE	MCPHERSON	SD	08/16/2006	18:29	CST	Hail	1.75 in.
LONG LAKE	MCPHERSON	SD	08/16/2006	19:09	CST	Hail	0.75 in.
LONG LAKE	MCPHERSON	SD	08/22/2006	21:40	CST	Hail	0.75 in.
LEOLA	MCPHERSON	SD	08/22/2006	22:25	CST	Hail	1.00 in.
EUREKA	MCPHERSON	SD	08/24/2006	15:52	CST	Hail	0.88 in.
LEOLA	MCPHERSON	SD	08/24/2006	17:30	CST	Hail	0.75 in.
HILLSVIEW	MCPHERSON	SD	06/11/2007	00:00	CST-6	Hail	0.75 in.
EUREKA	MCPHERSON	SD	06/21/2007	01:35	CST-6	Hail	0.88 in.
LANGLAKE	MCPHERSON	SD	06/21/2007	02:21	CST-6	Hail	1.75 in.
EUREKA MUNI ARPT	MCPHERSON	SD	06/25/2007	23:00	CST-6	Hail	0.75 in.
EUREKA	MCPHERSON	SD	06/25/2007	23:15	CST-6	Hail	1.75 in.
LEOLA	MCPHERSON	SD	06/26/2007	00:40	CST-6	Hail	0.88 in.
EUREKA MUNI ARPT	MCPHERSON	SD	08/10/2007	20:14	CST-6	Hail	1.75 in.
LONG LAKE	MCPHERSON	SD	08/10/2007	23:48	CST-6	Hail	0.75 in.
WETONKA	MCPHERSON	SD	07/10/2008	18:50	CST-6	Hail	1.00 in.
EUREKA	MCPHERSON	SD	07/10/2008	20:02	CST-6	Hail	1.75 in.
EUREKA	MCPHERSON	SD	07/19/2008	19:00	CST-6	Hail	0.75 in.
EUREKA	MCPHERSON	SD	07/19/2008	19:05	CST-6	Hail	0.88 in.
LEOLA	MCPHERSON	SD	07/19/2008	22:43	CST-6	Hail	1.50 in.
LONG LAKE COLONY	MCPHERSON	SD	07/19/2008	23:10	CST-6	Hail	1.75 in.
SPRING CREEK COLONY	MCPHERSON	SD	07/28/2008	22:10	CST-6	Hail	0.75 in.
LEOLA	MCPHERSON	SD	07/31/2008	02:40	CST-6	Hail	1.00 in.
HILLSVIEW	MCPHERSON	SD	06/18/2009	14:10	CST-6	Hail	0.88 in.
HILLSVIEW	MCPHERSON	SD	06/18/2009	14:37	CST-6	Hail	0.88 in.
LONG LAKE COLONY	MCPHERSON	SD	07/13/2009	23:20	CST-6	Hail	1.00 in.

LEOLA	MCPHERSON	SD	08/08/2009	03:20	CST-6	Hail	1.00 in.
HILLSVIEW	MCPHERSON	SD	08/14/2009	15:40	CST-6	Hail	1.00 in.
HILLSVIEW	MCPHERSON	SD	08/14/2009	15:40	CST-6	Hail	1.00 in.
LONG LAKE	MCPHERSON	SD	08/14/2009	16:15	CST-6	Hail	1.00 in.
SPRING CREEK COLONY	MCPHERSON	SD	04/12/2010	10:49	CST-6	Hail	0.88 in.
SPRING CREEK COLONY	MCPHERSON	SD	04/12/2010	10:53	CST-6	Hail	1.00 in.
LEOLA	MCPHERSON	SD	05/24/2010	16:41	CST-6	Hail	0.75 in.
LANGLAKE	MCPHERSON	SD	06/22/2010	02:20	CST-6	Hail	1.25 in.
MADRA	MCPHERSON	SD	06/25/2010	20:45	CST-6	Hail	1.00 in.
WETONKA	MCPHERSON	SD	07/04/2011	20:21	CST-6	Hail	1.00 in.
WETONKA	MCPHERSON	SD	07/04/2011	20:32	CST-6	Hail	1.00 in.
EUREKA	MCPHERSON	SD	07/10/2011	15:15	CST-6	Hail	1.75 in.
HILLSVIEW	MCPHERSON	SD	05/22/2012	18:48	CST-6	Hail	1.25 in.
WETONKA	MCPHERSON	SD	06/19/2012	01:45	CST-6	Hail	1.75 in.
HILLSVIEW	MCPHERSON	SD	06/19/2012	02:00	CST-6	Hail	1.25 in.
SPRING CREEK COLONY	MCPHERSON	SD	07/09/2013	17:38	CST-6	Hail	1.00 in.
EUREKA	MCPHERSON	SD	07/21/2013	21:01	CST-6	Hail	0.75 in.

Like the information provided in previous tables, the information in Table 4.9 was collected from NOAA website and appears to be incomplete. Again, hail is common for this region during the spring, summer, and fall and causes thousands of dollars of damage every year. Unfortunately the total damages for each event are not available but hopefully in the near future a method for collecting this data will evolve so that it can be made available to local governments for mitigation planning.

HIGH/SEVERE WIND

Severe wind events are common in eastern South Dakota. Several times a year the residents of McPherson County can expect to experience strong winds in excess of 40 mph. Gusts of wind in excess of 100 mph have also been recorded for the area.

Table 4.10: McPherson County 10-year History of High/Severe Winds							
Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag
MCPHERSON (ZONE)	MCPHERSON (ZONE)	SD	03/10/2005	09:00	CST	High Wind	50 kts. EG
High winds of 35 to 45 mph with gusts to near 70 mph occurred across all of central and northeast South Dakota from early morning to early evening. The high winds overturned a							

semi truck near Mound City; knocked a large branch down onto a pickup truck in Selby; blew a glass door off a store in Clark; tore a sign down in Aberdeen; and ripped the roof off a mobile home in South Shore.

MCPHERSON (ZONE)	MCPHERSON (ZONE)	SD	07/10/2008	18:00	CST-6	High Wind	52 kts. EG
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A shallow boundary heading west combined with the large scale winds brought damaging winds to Eureka. Several large branches were brought down along with a few trees. Also, a power pole was brought down by the high winds.

MCPHERSON (ZONE)	MCPHERSON (ZONE)	SD	10/26/2008	14:15	CST-6	High Wind	51 kts. MG
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A fast moving cold front ushered in very strong and damaging northwest winds across central, north central, and northeast South Dakota. Northwest winds of 30 to 50 mph with gusts over 60 mph began in the early morning and continued into the early evening. The high winds downed many trees and branches along with several power lines and poles. The high winds also damaged some roofs and signs and broke off many acres of unharvested corn. The highest measured wind gust was 73 mph just west of Onida in central South Dakota.

MCPHERSON (ZONE)	MCPHERSON (ZONE)	SD	04/13/2010	14:15	CST-6	High Wind	50 kts. MG
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Very strong south winds developed over central and northeast South Dakota in the early afternoon and continued into the early evening hours. South winds of 30 to 50 mph with gusts to near 70 mph caused some structural and shingle damage across the area. In Presho, the chamber sign was blown down with a carport tipped and damaged. A pickup on Interstate-90 lost a camper to the high winds. The high winds, combined with lowered humidity and dry fuels, helped fan several grassland fires across the region. The largest fire was started from a downed power line in Campbell County near the town of Glenham. The fire grew to be five miles long by two miles wide and traveled eight miles before it was brought under control. Almost 6000 acres were burned with nearly 20 fire departments dispatched

MCPHERSON (ZONE)	MCPHERSON (ZONE)	SD	10/26/2010	12:00	CST-6	High Wind	53 kts. MG
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A record breaking surface low pressure area moved across the Northern Plains and brought high winds to all of central and northeast South Dakota from the early morning of the 26th into the early evening of the 27th. Sustained northwest winds of 40 to 50 mph with gusts to 60 to 75 mph caused scattered property damage across the region along with blowing several vehicles off the road. Along with the high winds came snowfall of 1 to 5 inches which resulted in treacherous driving conditions. Several schools started late on the 27th due to the slippery roads and high winds.

The high winds, combined with slippery roads at times, blew several semis and other vehicles off the road on Interstate-29 and at several other locations across the region. Only minor injuries occurred with these incidents. The high winds damaged many traffic signs and signals, downed many power lines and poles, along with downing branches and several trees. As a result, several hundred customers were without power for a time across the area. The high winds caused roof and siding damage to many buildings along with damaging some fences. A shed was also completely destroyed near Sisseton

MCPHERSON (ZONE)	MCPHERSON (ZONE)	SD	04/30/2011	15:00	CST-6	High Wind	36 kts. MS
<p>A very strong surface low pressure area moving across North Dakota brought high winds to much of central into parts of northeast South Dakota. Northwest winds of 35 to 50 mph with gusts to over 60 mph occurred from the morning to the late evening of the 30th. The high winds did cause some property damage across the region. A semi was tipped over on Highway 50 in Buffalo county, a large sign was brought down in Highmore, with some damage to security lights and twisted traffic signals in Pierre. Some of the highest wind gusts included, 59 mph at Eagle Butte, 61 mph at Oacoma, 66 mph in Corson county, and 69 mph at Hayes in Stanley county</p>							
MCPHERSON (ZONE)	MCPHERSON (ZONE)	SD	09/20/2011	10:00	CST-6	High Wind	36 kts. MS
<p>A compact and strong low pressure area along with a strong cold front brought high winds to much of central and parts of northeast South Dakota. The high winds caused some spotty damage across the region to trees and structures. The highest wind gust of 75 mph was recorded in Corson county</p>							
MCPHERSON (ZONE)	MCPHERSON (ZONE)	SD	10/07/2011	10:00	CST-6	High Wind	35 kts. ES
<p>A strong low pressure system to the northwest and a strong high pressure system to the southeast brought very strong south winds across central and north central South Dakota from the late morning until the early evening. South winds of 30 to 40 mph with gusts over 60 mph caused spotty damage across the region. The high winds created large waves on Lake Oahe near Pierre which damaged several docks along with some boats at a marina. There were also some tree branches downed across the region along with some damage to a few structures. With the high winds, warm temperatures, and low humidity several grassland fires also broke out across parts of the region. The highest wind gust of 68 mph occurred in Corson county</p>							
MCPHERSON (ZONE)	MCPHERSON (ZONE)	SD	10/17/2012	12:15	CST-6	High Wind	37 kts. MS
<p>An area of low pressure rapidly intensified once it moved east of the northern plains. This strengthening resulted in very strong northwest winds across the region. Some of the higher reported wind gusts include 77 mph at the Fort Pierre and Grand River RAWs sites, 74 mph at the Pierre airport, and 70 mph at Murdo, Presho and Hayes public observation sites. McPherson County was 37 knots.</p>							

LIGHTNING/THUNDERSTORM

The extent or severity of lightening can range from significant to insignificant depending on where it strikes and what structures are hit. Water towers, cell phone towers, power lines, trees, and common buildings and structures all have the possibility of being struck by lightning. People who leave shelter during thunderstorms to watch or follow lightening also have the possibility of being struck by lightning. The lightning history for the past 10 years shows zero occurrences listed on the NOAA website. Since lightning is common in this region of the United States and in McPherson County it is evident that the information reported in the NOAA website is inaccurate and incomplete. Since no

information was provided a table showing location, date, time, and magnitude was not included in the plan. It is reasonable to believe that lightning can occur anywhere in the County.

Table 4.11: McPherson County 10-year Thunderstorm History							
EUREKA	MCPHERSON	SD	06/07/2005	21:00	CST	T-storm/Wind	52 kts. EG
WETONKA	MCPHERSON	SD	06/07/2005	22:15	CST	T-storm/Wind	52 kts. EG
EUREKA	MCPHERSON	SD	06/07/2005	22:40	CST	T-storm/Wind	52 kts. EG
EUREKA	MCPHERSON	SD	07/02/2005	23:15	CST	T-storm/Wind	56 kts. MG
EUREKA	MCPHERSON	SD	07/19/2005	20:37	CST	T-storm/Wind	52 kts. EG
WETONKA	MCPHERSON	SD	09/05/2005	16:45	CST	T-storm/Wind	52 kts. EG
WETONKA	MCPHERSON	SD	05/29/2006	00:45	CST	T-storm/Wind	52 kts. EG
LONG LAKE	MCPHERSON	SD	06/30/2006	20:30	CST	T-storm/Wind	52 kts. EG
EUREKA	MCPHERSON	SD	06/17/2007	20:10	CST-6	T-storm/Wind	52 kts. EG
LONG LAKE	MCPHERSON	SD	06/11/2008	00:55	CST-6	T-storm/Wind	63 kts. MG
LONG LAKE	MCPHERSON	SD	06/11/2008	01:00	CST-6	T-storm/Wind	52 kts. EG
LONG LAKE	MCPHERSON	SD	07/27/2008	04:20	CST-6	T-storm/Wind	56 kts. MG
SPRING CREEK COLONY	MCPHERSON	SD	07/28/2008	21:55	CST-6	T-storm/Wind	61 kts. EG
LONG LAKE	MCPHERSON	SD	07/31/2008	02:04	CST-6	T-storm/Wind	63 kts. MG
LANGLAKE	MCPHERSON	SD	07/31/2008	02:16	CST-6	T-storm/Wind	52 kts. EG
LEOLA	MCPHERSON	SD	07/31/2008	02:30	CST-6	T-storm/Wind	59 kts. MG
HILLSVIEW	MCPHERSON	SD	06/18/2009	14:10	CST-6	T-storm/Wind	61 kts. EG
EUREKA	MCPHERSON	SD	06/18/2009	14:12	CST-6	T-storm/Wind	52 kts. EG
LEOLA	MCPHERSON	SD	08/14/2009	17:00	CST-6	T-storm/Wind	61 kts. EG
EUREKA	MCPHERSON	SD	06/22/2010	01:30	CST-6	T-storm/Wind	52 kts. EG
LONG LAKE	MCPHERSON	SD	07/10/2011	14:45	CST-6	T-storm/Wind	52 kts. MG
EUREKA	MCPHERSON	SD	07/22/2011	23:45	CST-6	T-storm/Wind	61 kts. EG
EUREKA MUNI ARPT	MCPHERSON	SD	07/22/2011	23:45	CST-6	T-storm/Wind	65 kts. EG
LONG LAKE	MCPHERSON	SD	07/23/2011	00:00	CST-6	T-storm/Wind	70 kts. EG

LANGLAKE	MCPHERSON	SD	07/23/2011	00:15	CST-6	T-storm/Wind	61 kts. EG
LANGLAKE	MCPHERSON	SD	07/23/2011	01:00	CST-6	T-storm/Wind	65 kts. EG
LEOLA	MCPHERSON	SD	05/22/2012	19:10	CST-6	T-storm/Wind	52 kts. EG
HILLSVIEW	MCPHERSON	SD	06/10/2012	00:50	CST-6	T-storm/Wind	70 kts. EG
HILLSVIEW	MCPHERSON	SD	06/10/2012	00:55	CST-6	T-storm/Wind	70 kts. EG
EUREKA	MCPHERSON	SD	06/10/2012	01:10	CST-6	T-storm/Wind	52 kts. EG
SPRING CREEK COLONY	MCPHERSON	SD	07/09/2013	17:46	CST-6	T-storm/Wind	52 kts. EG
EUREKA	MCPHERSON	SD	09/09/2013	01:10	CST-6	T-storm/Wind	61 kts. EG
EUREKA	MCPHERSON	SD	09/09/2013	01:13	CST-6	T-storm/Wind	52 kts. MG
EUREKA	MCPHERSON	SD	09/09/2013	01:15	CST-6	T-storm/Wind	56 kts. EG
LONG LAKE	MCPHERSON	SD	09/09/2013	01:26	CST-6	T-storm/Wind	53 kts. MG

Thunderstorms and high wind occurrences in the County are also very common. Table 4.11 denotes the extent and severity of such hazards. The County continues to educate residents of the dangers of such storms through public service announcements and other printed media.

TORNADOS

The annual risk for intense summer storms is very high. All of McPherson County is susceptible to summer storms. Warning time for summer storms is normally several hours, sufficient for relocation and evacuation if necessary. However, tornadoes may occur with little or no warning. Table 4.12 includes the tornado history in McPherson County over the course of the past 10 years.

Table 4.12: McPherson County 10-year Tornado History							
Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag
WETONKA	MCPHERSON	SD	06/26/2005	17:30	CST	Tornado	F0
A tornado touched down in an open field. No damage occurred.							
LEOLA	MCPHERSON	SD	08/09/2006	20:32	CST	Tornado	F0
A tornado touched down in an open field. No damage occurred.							
EUREKA	MCPHERSON	SD	08/24/2006	16:03	CST	Tornado	F3
A supercell thunderstorm produced an F3 tornado in southwest Mcpherson county. The tornado was on the ground for nearly a half hour and covered about 14 miles. The tornado touched down near the Campbell county line. There were four different sites damaged with the greatest damage 8 miles south of Eureka and 2 miles southeast of Hillsview. Damage included numerous power poles snapped off, trees							

shredded of leaves, bark and/or uprooted. Numerous livestock and deer were killed. Devastating damage was observed to farm equipment, homes, barns, grain bins, and vehicles. A well anchored mobile home was completely destroyed. Debris from each site was observed up to 3 miles away. One person received minor scrapes and bruises.

EUREKA	MCPHERSON	SD	08/08/2007	14:59	CST-6	Tornado	EF0
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A tornado touched down briefly just northwest of Eureka. No damage was reported.

LONG LAKE COLONY	MCPHERSON	SD	05/22/2010	19:12	CST-6	Tornado	EF2
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Several supercell thunderstorms developed along a very strong warm front and produced nine tornadoes from Akaska to Bowdle to Hecla. The largest of the tornadoes was an EF4 tornado which occurred near Bowdle. This tornado produced devastating damage in the Bowdle area. The other tornadoes ranged from EF0 to EF2 and caused extensive tree and building damage. Nearly one-hundred power poles were downed along with several high line towers leaving nearly a thousand customers without power. Also, very strong straight line winds and large hail up to the size of golfballs affected parts of the area causing some damage. A tornado entered southeast McPherson county from northeast Edmunds county. The tornado struck a farm along State Highway 45 where a calving shed was completely destroyed with large sections of the roof blown over 100 yards. The tornado then caused moderate damage to a barn with one collapsed wall. Multiple softwood and hardwood trees were uprooted and many power poles were completely snapped near the base. The tornado tore the roof off a turkey barn at the Long Lake Colony. Several Wetonka homes also sustained minor roof damage. The wind speeds were estimated between 111 and 120 mph. The tornado then moved into western Brown county and dissipated.

The information provided in Table 4.12 illustrates how several tornados can occur very close together in the same area. While the 10-year history for McPherson County does not indicate that tornados occur very often and when they do the tornados many times do not touch down, or cause any damage; however many of the neighboring counties have had severe damage caused by tornado so it is reasonable to expect that similar tornado events can occur in McPherson County.

On June 23, 2002, a powerful supercell thunderstorm produced six tornados from eastern McPherson County and across northern Brown county during the evening hours. The first weak tornado (F0) touched down briefly 6.4 miles northeast of Leola and resulted in no damage. The second tornado (F1) touched down 8.5 miles northeast of Leola and crossed over into McPherson County where it dissipated 9 miles northwest of Barnard. This tornado brought down many trees and a barn and caused damage to the siding and the roof of a farmhouse in McPherson County and caused no damage in Brown County. A third weak satellite tornado (F0) occurred following the dissipation of the second tornado and resulted in no damage.

A fourth strong tornado (F3) developed 6 miles west of Barnard and moved east and dissipated 3 miles southeast of Barnard. This tornado brought down some high power lines along with a support tower and tossed a pickup truck 100 yards into a group of

trees. The pickup truck was totaled. The tornado caused extensive damage to two farmhouses, several farm buildings, and farm equipment. One farmhouse lost its garage and most of its roof with many trees completely snapped off down low and debarked.

The fifth tornado developed 5 miles southeast of Barnard and became a violent tornado (F4). This tornado caused damage to one farmhouse, several outbuildings, trees, and equipment as it moved northeast and strengthened. The tornado then completely demolished two unoccupied homes, several outbuildings, many trees, along with destroying or damaging some farm equipment before dissipating 7.6 miles northeast of Barnard. Also, a sixth weak satellite tornado (F0) occurred with this violent tornado and caused no damage. This was the first F4 tornado recorded in Brown county and one of few recorded in South Dakota.

The total estimated property loss exceeded a million dollars. This is just one example of the extent and severity of a tornado; however, gathering historical data on tornadoes and thunderstorms is very difficult due to the number of occurrences and unconfirmed reports. Each year, many storms and a few tornadoes affect the county. Summer storms in McPherson County usually produce a wide range of damage making damage estimates very difficult. A complete listing of all summer storms having occurred within the county is not possible due to inaccurate reporting. The National Weather Service reports online were the primary source for this information.

EXTREME TEMPERATURES

Extreme temperatures in McPherson County are common occurrences. It is expected that at least two times each year there will be extreme heat or extreme cold in the area. The following information was found on the SHELDUS and NOAA websites. It is possible that people in the area have adapted to this type of extreme temperatures and thus such weather events are not reported as often as they occur. It is also possible that the information has only in recent years been tracked or reported. Table 4.13 identifies dates and times of the temperature extremes.

Table 4.13 McPherson County 10-year History of Extreme Temperatures					
Location	County/Zone	Type	Date	Time	Time Zone
MCPHERSON (ZONE)	MCPHERSON (ZONE)	Excessive Heat	07/15/2011	12:00	CST-6
<p>A large upper level high pressure area built over the region bringing very hot and humid conditions. This was the worst heat wave to hit the region since July 2006. Beginning on Friday July 15th and persisting through Wednesday July 20th, many locations experienced high temperatures in the 90s to lower 100s, with low temperatures in the 70s at night. In addition, humidity levels rose to extreme levels at times. Surface dew point temperatures in the 70s and lower 80s brought extreme heat index values of up to 110 to 125 degrees. The dewpoints were some of the highest ever recorded in the region. The dewpoint at Aberdeen tied the previous record with 82 degrees. Sisseton also tied their record with 83 degrees. Watertown came a degree shy of tying their record with 80 degrees. The prolonged heat took its toll on livestock with fifteen hundred cattle perishing during the heat. Numerous sports and outdoor activities were cancelled. Some of the highest heat index values included; 110 degrees at Mobridge; 111 degrees at Watertown; 113 degrees at Miller and Gettysburg; 114 degrees at Wheaton and</p>					

Faulton; 116 degrees at Pierre; 118 degrees at Sisseton; and 121 degrees at Aberdeen. The highest heat index value occurred at Leola with a temperature of 98 degrees and a dewpoint of 82 degrees, the heat index hit 125 degrees

Location	County/Zone	St.	Date	Time	T.Z.	Type
MCPHERSON (ZONE)	MCPHERSON (ZONE)	SD	01/29/2008	08:00	CST-6	Extreme Cold/Wind Chill
MCPHERSON (ZONE)	MCPHERSON (ZONE)	SD	02/10/2008	04:00	CST-6	Extreme Cold/Wind Chill
MCPHERSON (ZONE)	MCPHERSON (ZONE)	SD	02/19/2008	20:00	CST-6	Extreme Cold/Wind Chill
MCPHERSON (ZONE)	MCPHERSON (ZONE)	SD	12/14/2008	23:00	CST-6	Extreme Cold/Wind Chill
MCPHERSON (ZONE)	MCPHERSON (ZONE)	SD	12/21/2008	03:00	CST-6	Extreme Cold/Wind Chill
MCPHERSON (ZONE)	MCPHERSON (ZONE)	SD	01/13/2009	21:00	CST-6	Extreme Cold/Wind Chill
MCPHERSON (ZONE)	MCPHERSON (ZONE)	SD	01/07/2010	06:00	CST-6	Extreme Cold/Wind Chill
MCPHERSON (ZONE)	MCPHERSON (ZONE)	SD	02/01/2011	18:00	CST-6	Extreme Cold/Wind Chill
MCPHERSON (ZONE)	MCPHERSON (ZONE)	SD	02/08/2011	04:00	CST-6	Extreme Cold/Wind Chill
MCPHERSON (ZONE)	MCPHERSON (ZONE)	SD	01/18/2012	20:00	CST-6	Extreme Cold/Wind Chill
MCPHERSON (ZONE)	MCPHERSON (ZONE)	SD	01/20/2013	21:00	CST-6	Extreme Cold/Wind Chill
	MCPHERSON	SD	01/30/2013	21:00	CST-6	Extreme Cold/Wind

The location in table 4.13 is not specifically identified in the table by jurisdiction due to the vast area across the State of South Dakota affected by extreme temperatures. On January 13, 2009, after a clipper system dropped from 1 to 4 inches of snow, Arctic air and blustery north winds pushed into the area. The coldest air and the lowest wind chills of the season spread across much of central and northeast South Dakota. Wind chills fell to 35 to 50 degrees below zero late in the evening of the 13th and remained through the 14th and into the mid morning hours of the 15th.

Across northeast South Dakota, wind chills were as low as 60 degrees below zero by the morning of the 15th. Many vehicles did not start because of the extreme cold and several schools had delayed starts. The Arctic high pressure area settled in on the morning of the 15th bringing the coldest temperatures to the region in many years. The combination of a fresh and deep snow pack, clear skies, and light winds allowed temperatures to fall to record levels at many locations on the 15th. Daytime highs remained well below zero across the area.

This was one of the coldest days that most areas experienced since the early 1970s. The records were broken by 1 to as much as 7 degrees. Some of the record lows included, -30 degrees at Kennebec; -31 degrees at Sisseton; -32 degrees at Milbank; -33 degrees at Mobridge; -35 degrees at Andover and near Summit; -38 degrees at Eureka; -39 degrees 8 miles north of Columbia and Castlewood; -42 degrees at Aberdeen; and -47 degrees at Pollock. Some near record low temperatures included, -24 degrees at Pierre; -29 degrees at Redfield and Victor; -32 degrees at Roscoe; and -34 degrees at Watertown. In Aberdeen, the low temperature of -42 degrees tied the third coldest temperature ever recorded. The coldest temperature ever recorded in Aberdeen was -46 degrees. With these types of temperature extremes the biggest concern for people is exposure because prolonged exposure means almost certain death.

The counterpart to extreme cold is extreme heat which also has dangerous implications to humans, livestock, and critical structures and facilities if certain conditions are present. On July 23, 2007, high heat indices along with very little wind contributed to the deaths of over 2800 cattle in Brown, McPherson, Day, and Marshall Counties. Most of the cattle deaths occurred on July 23rd. The high heat indices continued through the 25th with some more cattle deaths but protective measures kept the death count down. Most of the cattle that died were on feedlots. The total loss was around 3 million dollars.

Another temperature extreme occurrence took place in July 2006 when record heat and high humidity affected central, north central, and northeast South Dakota. Heat indices rose to 105 to 115 degrees across the area. Record high temperatures were set at Pierre, Mobridge, Kennebec, Timber Lake, and Aberdeen. Aberdeen set a record high of 106 on July 30, 2006.

WINTER STORMS

Table 4.14 shows just how common snow and ice storms are in McPherson County. While such storms would be considered extreme in many parts of the Country, the consistent nature of such weather hazards are expected in this area. Thus, planning and response mechanisms for snow and ice storms are vital to the County and are routine procedures in McPherson County due to the common nature of such storms.

Table 4.14: McPherson County 10-year Winter Storm History						
Location	County/Zone	St.	Date	Time	T.Z.	Type
MCPHERSON	MCPHERSON (ZONE)	SD	12/29/2005	10:00	CST	Winter Storm
MCPHERSON	MCPHERSON (ZONE)	SD	02/24/2007	10:00	CST-6	Winter Storm
MCPHERSON	MCPHERSON (ZONE)	SD	02/26/2009	01:00	CST-6	Winter Storm
MCPHERSON	MCPHERSON (ZONE)	SD	03/10/2009	05:00	CST-6	Winter Storm
MCPHERSON	MCPHERSON (ZONE)	SD	01/22/2010	09:00	CST-6	Winter Storm
MCPHERSON	MCPHERSON (ZONE)	SD	04/14/2011	20:00	CST-6	Winter Storm
MCPHERSON	MCPHERSON (ZONE)	SD	12/08/2012	14:00	CST-6	Winter Storm
MCPHERSON	MCPHERSON (ZONE)	SD	01/28/2013	10:00	CST-6	Winter Storm

MCPHERSON	MCPHERSON (ZONE)	SD	04/13/2013	22:00	CST-6	Winter Storm
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Winter storms in South Dakota are known to cover large geographical areas, often an entire county or multiple counties can be affected by a single storm. All of the storms identified in Table 4.14 were considered to have occurred countywide. Due to the multiple occurrences of winter storms each year, an exhaustive compilation is not possible.

Tables 4.15 and 4.16 show the 10-year history for heavy snow and blizzards. Both are components of winter storms and therefore it is possible the information overlaps. However, since the NOAA database has the event history separated, the information was included as it was found on the database.

Table 4.15: McPherson County 10-year Heavy Snow History						
Location	County/Zone	St.	Date	Time	T.Z.	Type
MCPHERSON (ZONE)	MCPHERSON (ZONE)	SD	03/11/2006	06:00	CST	Heavy Snow
MCPHERSON (ZONE)	MCPHERSON (ZONE)	SD	12/30/2006	03:00	CST-6	Heavy Snow
MCPHERSON (ZONE)	MCPHERSON (ZONE)	SD	04/02/2007	22:00	CST-6	Heavy Snow
MCPHERSON (ZONE)	MCPHERSON (ZONE)	SD	03/20/2008	12:30	CST-6	Heavy Snow
MCPHERSON (ZONE)	MCPHERSON (ZONE)	SD	04/06/2008	06:00	CST-6	Heavy Snow
MCPHERSON (ZONE)	MCPHERSON (ZONE)	SD	11/21/2010	23:00	CST-6	Heavy Snow

Table 4.16: McPherson County 10-year Blizzard History						
Location	County/Zone	St.	Date	Time	T.Z.	Type
MCPHERSON	MCPHERSON (ZONE)	SD	11/27/2005	16:00	CST	Blizzard
MCPHERSON	MCPHERSON (ZONE)	SD	03/02/2007	09:25	CST-6	Blizzard
MCPHERSON	MCPHERSON (ZONE)	SD	11/06/2008	06:00	CST-6	Blizzard
MCPHERSON	MCPHERSON (ZONE)	SD	12/13/2008	17:00	CST-6	Blizzard
MCPHERSON	MCPHERSON (ZONE)	SD	01/11/2009	22:00	CST-6	Blizzard
MCPHERSON	MCPHERSON	SD	03/30/2009	11:00	CST-6	Blizzard

	(ZONE)					
MCPHERSON	MCPHERSON (ZONE)	SD	12/23/2009	16:00	CST-6	Blizzard
MCPHERSON	MCPHERSON (ZONE)	SD	01/06/2010	12:00	CST-6	Blizzard
MCPHERSON	MCPHERSON (ZONE)	SD	01/25/2010	11:00	CST-6	Blizzard
MCPHERSON	MCPHERSON (ZONE)	SD	12/30/2010	10:00	CST-6	Blizzard
MCPHERSON	MCPHERSON (ZONE)	SD	01/01/2011	00:00	CST-6	Blizzard
MCPHERSON	MCPHERSON (ZONE)	SD	02/20/2011	11:00	CST-6	Blizzard
MCPHERSON	MCPHERSON (ZONE)	SD	03/11/2011	18:00	CST-6	Blizzard
MCPHERSON	MCPHERSON (ZONE)	SD	02/29/2012	00:00	CST-6	Blizzard
MCPHERSON	MCPHERSON (ZONE)	SD	12/09/2012	03:00	CST-6	Blizzard
MCPHERSON	MCPHERSON (ZONE)	SD	02/10/2013	14:00	CST-6	Blizzard
MCPHERSON	MCPHERSON (ZONE)	SD	02/18/2013	09:30	CST-6	Blizzard
MCPHERSON	MCPHERSON (ZONE)	SD	03/18/2013	00:00	CST-6	Blizzard

Tables 4.14 through 4.16 may have some overlapping information. McPherson County's Winter Storm History listed in the 2006PDM Plan had one table listing all occurrences of or relating to winter weather events including snow, ice, winter storms, etc. In comparison to the tables provided above, it is evident that the information is being reported and recorded more accurately now than in previous decades which is most likely a result of technology, internet, and a coordinated and focused effort to share information between agencies and local governments.

ASSESSING VULNERABILITY: OVERVIEW

Requirement §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

The following paragraphs summarize the description of the jurisdiction's vulnerability to each hazard and the impact of each hazard on the jurisdiction.

Blizzards are characterized by high winds, blowing snow, cold temperatures, and low visibility. Blizzards create conditions such as icy roads, closed roads, downed power lines and trees. McPherson County's population is especially vulnerable to these conditions because people tend to leave their homes to get places such as work, school, and stores rather than staying inside. Traffic is one of the biggest hazards in McPherson County during a blizzard because people often get stuck, stranded, and lost when driving their vehicles which usually prompts others such as family and or emergency responders to go out in the conditions to rescue them.

Drought can be defined as a period of prolonged lack of moisture. High temperatures, high winds, and low relative humidity all result from droughts and are caused by droughts. A decrease in the amount of precipitation can adversely affect stream flows and reservoirs, lakes, and groundwater levels. Crops and other vegetation are harmed when moisture is not present within the soil.

South Dakota's climate is characterized by cold winters and warm to hot summers. There is usually light moisture in the winter and marginal to adequate moisture for the growing season for crops in the eastern portion of the state. Semi-arid conditions prevail in the western portion. This combination of hot summers and limited precipitation in a semi-arid climatic region present a potential position of suffering a drought in any given year. The climatic conditions are such that a small departure in the normal precipitation during the hot peak growing period of July and August could produce a partial or total crop failure. In fact South Dakota's economy is closely tied to agriculture only magnifies the potential loss which could be suffered by the state's economy during drought conditions. Roughly every 50 years a significant drought is experienced within the county, while less severe droughts have occurred as often as every three years.

Earthquakes occur in the area, but have not had a great enough magnitude or intensity in the past 10 years to be reported. The magnitude and intensity of an earthquake is measured by the Richter scale and the Mercalli scale. An earthquake of noteworthy magnitude has not occurred in the County for decades, but it would be reasonable to expect that a large earthquake would have comparative impact on McPherson County as it would anywhere else. McPherson County does not have skyscrapers or very many tall buildings other than the courthouse and grain elevators, but it also does not have building codes in place that require homes or buildings to be retrofitted. If earthquakes were a regular occurrence in McPherson County, the County would be extremely vulnerable because of the lack of building requirements but since the likelihood of an earthquake is minimal, the risk is also considered low.

Extreme Cold temperatures often accompany a winter storm, so you may have to cope with power failures and icy roads. Whenever temperatures drop decidedly below normal and as wind speed increases, heat can leave your body more rapidly. These weather-related conditions may lead to serious health problems. Extreme cold is a dangerous situation that can bring on health emergencies in susceptible people, such as those without shelter or who are stranded, or who live in a home that is poorly insulated or without heat. Exposure is the biggest threat/vulnerability to human life, however, incidences of exposure are isolated and thus unlikely to happen in masses.

Extreme Heat: Severe heat waves have caused catastrophic crop damage, thousands of deaths from hyperthermia, and widespread power failures due to increased use of air conditioning. Loss of power as well as crop and livestock damage are the largest

vulnerability to the county during extreme heat. Both have an effect on quality of life, however, neither are detrimental to the existence of the population of McPherson County.

Flooding: Floods can result in injuries and even loss of life when fast flowing water is involved. Six inches of moving water is enough to sweep a vehicle off a road. Disruption of communication, transportation, electric service, and community services, along with contamination of water supplies and transportation accidents are very possible.

Freezing Rain causes adverse conditions such as slippery surfaces and extra weight buildup on power lines, poles, trees, and structures. The additional weight can often cause weak structures to cave in and cause tree branches and power lines to break and fall. McPherson County and the local jurisdictions within are susceptible to these conditions due to the types of structures and surfaces that exist in the county that can not be protected from freezing rain. Traffic on the roads and highways tend to be the biggest hazard during freezing rain conditions because vehicles often slide off the road which prompts emergency responders and others to have to go out on rescue missions in the adverse conditions.

Hail causes damage to property such as crops, vehicles, windows, roofs, and structures. McPherson County and its local jurisdictions are vulnerable to hail, like most other areas in the State due to the nature of the hazard. Mitigating for hail is difficult and is usually found in the form of insurance policies for structures, vehicles, and crops.

Heavy Rain causes damage to property such as homes and roads. Often when heavy rains occur it causes sewers to backup in homes due to excess water entering the wastewater collection lines. The excess water sometimes has no place to go and thus basements fill up with water which results in damage to water heaters, furnaces, and damage to living quarters for people who live in basement apartments. Roads and bridges can be washed out, thus causing traffic hazards for travelers and commuters. Many times the roads have to be closed causing rural traffic to have to take alternate routes which can sometimes be an additional 5-10 miles out of the way. All areas of the County are vulnerable when heavy rains occur. Typically storm sewers are built for the average storm and therefore do not accommodate excessive or heavy rains.

Ice Jams cause damage to bridges, roads, and culverts due to water currents pushing large chunks of ice under or through small openings. There are two locations in the County which are at risk of ice jams: one on County Road 23 and the other is the bridge on County Road 1 North of Highway 10 7 miles. There may also be other unidentified areas throughout the county that are vulnerable to ice jams.

Landslides have a low chance of occurring in McPherson County due to the relatively flat topography.

Lightning often strikes the tallest objects within the area. In towns trees and poles often receive the most strikes. In rural areas, shorter objects are more vulnerable to being struck. Electrical lines and poles are also vulnerable because of their height and charge. In addition, many streetlights function with sensors. Since thunderstorms occur primarily during hours of darkness, lightning strikes close to censored lights cause the lights to go out, causing a potential hazard for drivers. Flickering lights and short blackouts are not at all uncommon in the county.

One of lightning's dangerous attributes includes the ability to cause fires. Since the entire county is vulnerable to lightning strikes and subsequent fires, these fires will be treated under the fire section of this plan.

Most injuries from lightning occur near the end of thunderstorms. Individuals who sought shelter leave those areas prior to the entire completion of the thunderstorm. Believing it is safe to freely move around, concluding lightning strikes catch them off guard.

Severe Winter Storms have a high risk of occurrence. Approximately five snowstorms each resulting in 5-10 inches of snow occur in the McPherson County area annually. Heavy snow can immobilize transportation, down power lines and trees and cause the collapsing of weaker structures. Livestock and wildlife are also very vulnerable during periods of heavy snow. Most storms can be considered to have occurred countywide. Due to the multiple occurrences of winter storms each year, an exhaustive compilation is not possible.

Additionally, winter storms often result in some forms of utility mishaps. High voltage electric transmission/distribution lines run the length of McPherson County. These lines are susceptible to breaking under freezing rain and icy conditions and severing during high blizzard winds. Within the county there are fiber optics associated with phone transmissions that are the lifeline to communications. Any electrical complications bring associated risk of food spoilage, appliance burnout, loss of water, and potential harm for in-house life support users. Limited loss of power is not uncommon on an annual basis. A typical power interruption lasts from 1 to 3 hours. Most residents are prepared to deal with this type of inconvenience.

The greatest danger during winter weather is traveling. Many individuals venture out in inclement weather. Reasons include the necessity of getting to work, going to school, going out just to see how the weather is, and to rescue stranded persons.

Snow Drifts are caused by wind blowing snow and cold temperatures. These drifts can be small finger drifts on roadways causing cautionary driving, or 20-40 foot high drifts that block entire highways, roads, and farmyards for several days.

Populations at highest vulnerability for this type of hazard are rural homeowners, which account for approximately 46 percent of the county, and the elderly. As with any weather event, those dependent upon healthcare supplies and other essentials will also bear the brunt of highway closures and slowed transportation due to snow and ice. Emergency services will also be delayed during winter storms.

Snow removal policies and emergency response is at excellent performance and no projects will be considered in this area. Generators provide back-up power to many critical facilities within Redfield and in rural areas. However, some of the critical facilities that could be utilized in disaster situations do not have backup generators. Also, some facilities have generators that only power a portion of operations.

Strong Winds can be detrimental to the area. Trees, poles, power lines, and weak structures are all susceptible and vulnerable to strong winds. When strong winds knock down trees, poles, power lines, and structures it creates additional traffic hazards for travelers and commuters. Strong winds are a common occurrence in all parts of

McPherson County. The farming community tends to be vulnerable because many old farm sites have weak, dilapidated, or crumbling structures or structures such as grain bins which can easily be blown over. Another area of particular vulnerability would be those areas with dense tree growth where dead or decaying trees lose their stability and can be blown over or knocked down easily.

Subsidence is a hazard that has a very low probability of occurring in the area. Therefore the jurisdictions do not consider themselves particularly vulnerable to such a hazard.

Thunderstorms cause lightning and large amounts of rain in a small timeframe. The entire county experiences thunderstorms on a regular basis and is only vulnerable when weather events outside the norm occur. Specific vulnerabilities are further identified in the paragraphs for "Lightning" and "Heavy Rains".

Tornadoes present significant danger and occur most often in South Dakota during the months of May, June, and July. The greatest period of tornado activity (about 82 percent of occurrence) is from 11 am to midnight. Within this time frame, most tornadoes occur between 4 pm and 6 pm. The annual risk for intense summer storms is very high. Often associated with summer storms are utility problems. High voltage electrical transmission lines run the length of McPherson County. These lines are susceptible to breaking during high winds and hail. Tall trees located near electrical lines can be broken in wind or by lightning strikes and land on electrical lines, severing connections. Any electrical complications bring associated risk of food spoilage, appliance burnout, loss of water, and potential harm to in-house life support dependents. Limited loss of power is common on an annual basis. Typical power interruptions last around 1 to 3 hours. Most residents are prepared to deal with this.

Wildfires occur primarily during drought conditions. Wildfires can cause extensive damage, both to property and human life, and can occur anywhere in the county. Even though wildfires can have various beneficial effects on wilderness areas for plant species that are dependent on the effects of fire for growth and reproduction, large wildfires often have detrimental atmospheric consequences, and too frequent wildfires may cause other negative ecological effects. Current techniques may permit and even encourage fires in some regions as a means of minimizing or removing sources of fuel from any wildfire that might develop.

Since there are no remote forested regions in McPherson County, wildfires can be easily spotted and are capable of being maintained. McPherson County does not have any areas that are considered Wildland-urban interface because property outside city limits is primarily agricultural land, thus, there are no urban interface areas at risk in McPherson County. In addition, fire interference with traffic on highways is not a major concern. The most important factor in mitigating against wildfires continues to be common sense and adherence to burning regulations and suggestions disseminated by the County.

Moisture amounts have the biggest impact on fire situations. During wet years, fire danger is low. More controlled burns are conducted and less mishaps occur. During dry years, severe restrictions are placed on any types of burns. For information on dealing with open/controlled burning within the county, see SDCL 34-29B and 34-35.

Hunting season brings thousands of hunters to the area. Shots have the potential to ignite dry grassland, hay bales, or storage areas. This is a risk that is addressed in hunting education and safety.

ADDRESSING VULNERABILITY: REPETITIVE LOSS PROPERTIES

Requirement §201.6(c)(2)(ii): [The risk assessment] must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged by floods.

Repetitive loss properties are those for which two or more losses of at least \$1,000 each have been paid under the National Flood Insurance Program (NFIP) within any 10-year period since 1978. McPherson County does not keep an official record of repetitive loss properties however; the State of South Dakota Office of Emergency Management (SDOEM) provided a Statewide listing repetitive loss properties and there were no listings for McPherson County.

ASSESSING VULNERABILITY: IDENTIFYING STRUCTURES

Requirement §201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area...

One of the primary purposes of this plan is identifying critical facilities, emergency shelters, and summer storm shelters and equipping those facilities with the means to provide the necessary energy for access to sanitation and maintain important functions during a natural hazard occurrence. In the event of a disaster as a result of severe summer or winter storms, a terrorist attack, or a hazardous materials incident, McPherson County and participating entities will have the ability to prevent further loss of life by generator powered critical facility shelters. The City of Eureka and the Town of Leola have many structures that are vital to emergency operations including the County’s only hospital, a nursing home, the McPherson County Courthouse which also serves at the local emergency operations center when needed. Table 4.17 is a list of critical facilities that would cause the greatest distress in the county if destruction occurred. The table is organized alphabetically by location (column 1) and then alphabetically by structure name (column 5).

Table 4.17: Critical Structures in McPherson County

<u>Location</u>	<u>Value</u>	<u>Size of Bldg</u>	<u>Type</u>	<u>Structure Name</u>	<u>Owner Type</u>
Eureka	4,2552,827	1248 sq ft	Govt Building	City Hall/Police Station/ Ambulance/Library	City
Eureka	500,000	6240 sq ft	Fire Dept	Firehall	Fire Dist
Eureka	513,032	14000 sq ft	Govt Bldg	City Shop	City
Eureka	1,000,000	4800	Govt Bldg	County Highway	County
Eureka	575,000	200,000 gal	Govt Structure	Water Tower	City
Eureka	14,631	186 sq ft	Govt Structure	City Well #1	City
Eureka	23,126	303 sq ft	Govt Structure	City Well #2	City
Eureka	13,372	170 sq ft	Govt Structure	City Well #3	City
Eureka	43,888	200,000 gal	Private Structure	WEB Water Reservoir	Private

Eureka	100,000	23 acres	Govt Structure	Wastewater Lagoon	City
Eureka	65,728	Unknown	Govt Structure	Sewer Lift Station	City
Eureka	20,311	Unknown	Govt Structure	Lift Station at Ballpark	City
Eureka	100,000	Unknown	Govt Structure	City Parks	City
Eureka	5,000,000	80100 sq ft	Govt Bldg	Eureka School & Auditorium	Public
Eureka	unknown	3932 sq ft	Govt Bldg	Eureka School Bus Bldg	Public
Eureka	unknown	3540 sq ft	Private Bldg	Senior Citizen's Bldg	Private
Eureka	unknown	19446 sq ft	Building	Community Health Services	Private
Eureka	unknown	31926 sq ft	Hospital	Eureka Healthcare Ctr	Private
Eureka	1,018,000		Govt Structure	Airport	City
Eureka	unknown	1560 sq ft	Private	Alandy Vision Care Clinic	Private
Eureka	unknown	24000 sq ft	Private	Eureka Manufacturing	City
Eureka	unknown	28,000 sq ft	Private Bldg	Dakota Woodworking	Private
Eureka	45,000	224 sq ft	Private	Round Reservoir & equipment	Private
Eureka	560,500	Unknown	Private	Museum	Private
Long Lake	\$350,000	7960 sq ft	Govt Bldg	Old School/Community Bldg	City
Long Lake	\$38,000	5616 sq ft	Private	Apartment Bldg	Private
Long Lake	\$23,043	6016 sq ft	Private	L&L Bar	Private
Long Lake	\$250,000	2496 sq ft	Non profit	Church	Private
Long Lake	\$50,000	Unknown	Govt Bldg	County Shed	County
Long Lake	\$50,000	Unknown	Govt Structure	Fire Hall	Govt
Long Lake	\$200,000	6,000 sq ft	Non profit	American Legion	Private
Leola	\$330,000	2,400 sq ft	Govt Bldg	Municipal Building	City
Leola	Unknown	4,480	Fire District	Leola Fire Dept	Fire Dist
Leola	\$86,000	4,480 sq ft	Govt	Leola Citizens Bldg	City
Leola	\$318,000		Govt Structure	City Shop/ Water Tower/ Storage Tank	City
Leola	Unknown	6,000	Govt Bldg	SD DoT Bldg	State
Leola	Unknown	Unknown	Education	Leola School	School
Leola	\$22,541	1,675	Private	USPS Bldg	Private
Leola	\$230,000	Unknown	Govt Bldg	Library/Med Bldg	City
Leola	Unknown	Lot 175 x 60	Govt Bldg	Leola Bus Garage	School
Leola	\$276,976	3,164	Private	Cortrust Bank & Ins.	County
Leola	\$918,856	4,369	Private	North Central Farmer's Elevator	Coop
Leola	\$60,730	9,680	Private	North Central Farmer's Elevator	Coop
Leola	\$23,702	121,300 gal/ 42,000 gal	Private	North Central Farmer's Elevator	Coop
Leola	\$18470	Bldg 2148 sq ft/ 2000 gal	Private	Gene's Oil	Private
Leola	\$28,520	Bldg 84 sq ft/ 18,000 gal tank	Private	Bulk Plat-Propane	Private
Leola	Unknown	Bldg 1056 sq ft	Coop	Valley Telecommunication	Coop
Leola	Unknown	No Figures	Private	Leola Grocery	Private
Leola	\$44,430	5,184 sq ft	Non Profit	American Legion/ Bar	Public

Leola	\$50,789	6,000 sq ft	Private	USDA Farm Service Agency	Private
Leola	\$15,687	10,624 sq ft	Private	Homestead Bldg Supply	Private
Leola	\$155,000	Unknown	City Structure	Swimming Pool	City
Leola	Unknown	4,136 sq ft	Private Bldg	United Methodist Church	Church
Leola	Unknown	10,408 sq ft	Private Bldg	St. James Lutheran	Church
Leola	Unknown	4,000 sq ft	Private Bldg	St. Paul's Lutheran	Church
Leola	Unknown	6,943 sq ft	Private Bldg	OLPH Catholic	Church
Leola	\$148,672	14,468 sq ft	Private	Dakota Ag	Private
Leola	\$33,342	Unknown	Private	Engergy Alliance	Private
Leola	\$14,219	Unknown	Private	McPherson Co. Herald	News
Leola	\$9,454	864 sq ft	Private	McPherson Co Abstract & Title Company	Private
Leola	\$90030	5680 sq ft	Private	G's Convenience	Private
Leola	Unknown	Unknown	Govt Bldg	North Central Heritage Museum	Public
Leola	\$49,638	2912 sq ft	Private	Swine Robotics	Private
MCPHERSON	\$100,000	60 x 120	Govt Bldg	Eureka Pole Structure	County
MCPHERSON	\$500,000	26 x 100	Govt Bldg	Eureka Wooden Shop	County
MCPHERSON	\$26,000	80 x 40	Govt Bldg	Eureka Steel Building	County
MCPHERSON	\$2,500	Unknown	Govt Bldg	Long Lake Storage Bldg	County
MCPHERSON	\$7,000	24 x 100	Govt Bldg	Leola Wood Bldg	County
MCPHERSON	\$24,000	40 x 60	Govt Bldg	Leola Steel Bldg	County
MCPHERSON	\$100,000	60 x 120	Govt Bldg	Leola Pole Bldg	County
MCPHERSON	\$2,567,797	19,603	Govt Bldg	County Courthouse	County

The information provided in Table 4.17 was taken from the Inventory Assets Worksheet #3B that was given to all of the plan participants to fill out and return. The participants were instructed to think of structures that would cause the most devastation to their communities if the structures were to be lost in a natural hazard event, "In other words, list those structures that you cannot live/operate without." Plan participants were then instructed to determine value of those structures. Most of the values provided are the insured values from the insurance policies. The plan author acknowledges that determining what is "critical" can mean something different to every community and that the information provided in the table is not comprehensive. However, the information provided by the plan participants in their worksheets was used as a baseline and can be supplemented in future years during the annual plan review and/or during the 5-year update. By using information provided by the representatives from each community it also helps establish a sense of ownership in the PDM plan.

While the information may not be comprehensive it does give FEMA, SDOEM, and any other readers of the Plan an idea of how communities in rural South Dakota feel about certain structures. For example, FEMA may not view a City Park as a "critical" structure, however, in many small communities the City Park or baseball field is the hub of where activities take place and may also be the only thing that attracts tourists and people from outside the community. So it may be the case that without these "landmarks" the communities' existence would be at stake.

ASSESSING VULNERABILITY: ESTIMATING POTENTIAL LOSSES

Requirement §210.6(c)(2)ii(B): [The plan should describe vulnerability in terms of an estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate...]

The information provided in the following tables was collected from the local jurisdictions by the representatives from each community. The McPherson County Emergency Manager provided the information for McPherson County and representatives from the private participating businesses as well as the local jurisdictions provided information regarding their vulnerabilities. Inconsistencies and missing information result from lack of existing mechanisms, plans, and technical documents available to the communities and also a result of people who are serving their communities on a volunteer basis as opposed to many other areas in the nation which have larger communities who pay salaried professionals to represent them during the PDM drafting process. Each of the communities provided the best available data considering the lack of resources in which to access the information. Since this section of the plan is new, those jurisdictions that have submitted incomplete information in the 2014 PDM Plan will be requested to provide more complete data during the next five-year update and review of the Plan.

The assessor’s office provided the assessed valuation of properties within the municipalities. All properties with structures, whether owner occupied or not were included in the valuations provided in Tables 4.18 through 4.26. Tables 4.27 through 4.28 represent private partners of the PDM and thus they provided their own information. The reports provided by the assessor’s office did not include the number of structures or the number of people in each structure; thus, many of the tables are missing this information. Those tables that do have number of structures or number of people listed are a result of the municipalities providing the information. Some of the communities (local jurisdictions) can literally count every structure and every resident from their doorstep, which shows just how small and rural some of these communities are.

4.18 McPherson County Estimated Potential Dollar Losses to Vulnerable Structures									
Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in County	# in HA	% in HA	\$ in County	\$ in HA	% in HA	# in County	# in HA	% in HA
Residential	865	865	100%	41,276,254	41,276,254	100%	2459	2459	100%
Commercial	154	154	100%	5,513,994	5,513,994	100%			
Industrial	0	0		0					
Agricultural	523	523	100%	20,934,796	20,934,796	100%			
Religious	11	11	100%						
Government	11	11	100%						
Education	5	5	100%						
Utilities									
Total	1569	1569	100%	\$67,725,044	\$67,725,044	100%	2459	2459	100%

4.19 Eureka Estimated Potential Dollar Losses to Vulnerable Structures

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in HA	% in HA	\$ in City	\$ in HA	% in HA	# in County	# in HA	% in HA
Residential	462	462	100%	\$17,096,533	\$17.1M	100%	867	867	100%
Commercial	57	57	100%	\$3,584,798	\$3.6M	100%			
Industrial	0	0		0	0				
Agricultural	2	2		0	unknown				
Religious	7	7		0	unknown				
Government	6	6	100%	\$2,797,837	\$2.8M	100%			
Education	1	1	100%	\$1,000,000	\$1.0M	100%			
Utilities									
Total	535	535	100%	\$24,479,168+	\$24.5M+	100%	867	867	100%

4.20 Leola Estimated Potential Dollar Losses to Vulnerable Structures

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in HA	% in HA	\$ in City	\$ in HA	% in HA	# in City	# in HA	% in HA
Residential	170	170	100%	6,590,659	6,590,659	100%	457	457	100%
Commercial	51	51	100	1,738,169	1,738,169	100%			
Industrial									
Agricultural	31	31	100%	45025	45025	100%			
Religious	4	4	100%	Unknown	Unknown	100%			
Government	9	9	100%	Unknown	Unknown	100%			
Education	1	1	100%	Unknown	Unknown	100%			
Utilities	1	1	100%	Unknown	Unknown	100%			
Total	267	267	100%	\$8,373,853+	\$8,373,853+	100%	457	457	100%

4.21 Long Lake Estimated Potential Dollar Losses to Vulnerable Structures

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in HA	% in HA	\$ in City	\$ in HA	% in HA	# in City	# in HA	% in HA
Residential	30	30	100%	\$1,500,000	\$1.5M	100%	35	35	100%
Commercial	5	5	100%	\$500,000	\$500,000	100%			
Industrial									
Agricultural	7	7	100%	\$140,000	\$140,00	100%			100%
Religious	1	1	100%	\$100,000	\$100,000	100%			100%
Government	1	1	100%	\$75,000	\$75,000	100%	2	2	100%
Education									
Utilities									
Total	95	95	100%	\$2,315,000+	\$2,315,000+	100%	35	35	100%

4.22 Wetonka Estimated Potential Dollar Losses to Vulnerable Structures									
Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in HA	% in HA	\$ in City	\$ in HA	% in HA	# in City	# in HA	% in HA
Residential	3	3	100%	54,796	54,796	100%	8	8	100%
Commercial	1	1	100%	126,896	126,896	100%			
Industrial									
Agricultural	2	2	100%	2,859	2,859	100%			
Religious									
Government									
Education									
Utilities									
Total	6	6	100%	\$184,551	\$184,551	100%	8	8	

4.23 Hillsvie Estimated Potential Dollar Losses to Vulnerable Structures									
Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in HA	% in HA	\$ in City	\$ in HA	% in HA	# in City	# in HA	% in HA
Residential	3	3	100%	\$100,000	\$100,000	100%	3	3	100%
Commercial									
Industrial									
Agricultural									
Religious									
Government									
Education									
Utilities									
Total	3	3		\$100,000	\$100,000		3	3	100%

ASSESSING VULNERABILITY: ANALYZING DEVELOPMENT TRENDS

Requirement §201.6(c)(2)(ii)(C): [The plan should describe vulnerability in terms of providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

The land use and development trends for each jurisdiction were identified by the representatives from each of the jurisdictions. None of the communities in McPherson County are experiencing any growth at this time as all of the jurisdictions have experienced declining populations over the past 2 decades. At this time McPherson County communities are just trying to maintain the population they have, so the trend for development is sustaining the population and businesses that currently exist with the hope of attracting new residents and businesses to the county. Due to the extremely small populations McPherson County jurisdictions do not maintain plans for growth and development.

UNIQUE OR VARIED RISK ASSESSMENT

Requirement §201.6(c)(2)(iii): For multi-jurisdictional plans, the risk assessment must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

After conducting the risk assessment for each jurisdiction, the group decided that all areas of the county have an equal chance of a natural hazard occurrence in their area. While the extent to which each jurisdiction is affected by such hazards varies slightly between the local jurisdictions, the implications are the same. Thus the steering committee decided that all areas outside the municipal jurisdictions of Eureka and Leola are equally affected by the types of hazards/risks that affect the PDM jurisdiction. Leola and Eureka are exceptions because of their proximity to the dams. Thus, the unique or varied risk requirement is not applicable to the McPherson County PDM Plan.

V. MITIGATION STRATEGY

CHANGES/REVISIONS TO THE MITIGATION SECTION:

Additional projects submitted by individual communities were added at the end of the mitigation section as well as Project #6 and #7 under Section I Mitigation Activities for Summer Storms. Several projects were eliminated due to completion and/or reconsideration by the Steering Committee. Those projects are identified under their original Project #.

MITIGATION REQUIREMENTS

Requirement §201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

Requirement §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard with particular emphasis on new and existing buildings and infrastructure.

MITIGATION OVERVIEW

The State Hazard Mitigation Plan addresses several mitigation categories including warning and forecasting, community planning, and infrastructure reinforcement. McPherson County and participating entity's greatest needs are mitigating flood hazards, backup generators for critical infrastructure and storm shelters, and public awareness.

After meetings with the local jurisdictions and opportunities for public input, a series of mitigation goals were devised to best aid the County in reducing and lessening the effects of hazards. Projects previously identified in the 2006 PDM Plan were carefully analyzed and discussed to determine which of the projects had enough merit to be included in the updated plan and to determine if the projects meet the hazard mitigation needs of the county. These projects were evaluated based on a cost/benefit ratio and priority. A *high* priority classification means that the project should be implemented as soon as possible and would minimize losses at a very efficient rate. A *moderate* classification means that the project should be carefully considered and completed after the high priority projects have been completed. A *low* priority means that the project should not be considered in the near future. However, it is a potential solution and should not be eliminated until further evaluation can be completed. Such projects may be completed in light of failures of all other projects striving toward the same goal.

A timeframe for completion, oversight, funding sources, and any other relevant issues were addressed. These implementation strategies are geared toward the specific goal and area. Often, these projects will not encounter any resistance from environmental agencies, legal authorities, and political entities. Where these are a concern, address is made.

MCPHERSON COUNTY MITIGATION ACTIVITIES FOR FLOODING HAZARDS

Goal #1: Reduce the impact of flooding in McPherson County

Project #1: Replace culverts that are collapsed or blocked.

Priority:	High
Funding Sources:	County, State, FEMA
Timeframe:	ASAP
Oversight:	County
Cost:	The cost of building up the road and shoulders would be around \$45,000. There would need to be a traffic flow study done to determine exactly how much the road is utilized and how the improvements should be carried out.

Project #2: Raise the grade on low-lying roads that get washed out during rapid snow melt, heavy rains, or flash floods.

Project #3: Use HAZUS software to determine flood risk throughout the county. A minimal cost would be incurred in purchasing the correct software; however office time spent would be more costly. This office time would include analysis and practical application of the data gathered. Funding of approximately \$1,500 should serve the purpose of analyzing level 1 flood data. More detailed level 2 and 3 data would require considerable more time, but would serve the County well. A cost of \$10,000 would provide ample time to compile more detailed flood data for specific portions of the county

MCPHERSON COUNTY MITIGATION ACTIVITIES FOR SUMMER STORM HAZARDS

Goal #1: Reduce the impact of severe summer storms in the County

Project #1: Construct storm shelters wherever needed throughout the county and place signage along major thoroughfares where travelers can see the locations of the nearest shelters.

Project #2: Evaluate existing shelters and other structures, such as schools, to determine usefulness (and accessibility) as community shelters. Retrofitting these facilities should be considered.

Project #3: Update warning siren system throughout the County

Project #4: Protect the public from summer storms through information and education. With existing and newly developed education materials, the public can be warned of the dangers of summer storms. Book covers, magnets, and brochures have been disseminated through severe weather campaigns. News releases and emergency checklists are also other options.

Some of the issues that may be addressed within the information would include: safety issues on downed power lines, electrical and fire dangers, the necessity for generators and advice on using them, survival strategies during storms, and purchasing of back-up power for various household and farming operations. There should also be information regarding the construction of safe rooms in new and existing houses and the designation/recognition of the safest places within houses during severe weather.

Discussion: This project is not mitigation, while it is good measure to ensure people are educated and informed this activity falls under the category of preparedness.

Project #5: Use HAZUS software to estimate losses particularly for tornados. A minimal cost would be incurred in purchasing the correct software; however office time spent would be more costly. This office time would include analysis and practical application of the data gathered. Funding of approximately \$1,500 should serve the purpose of analyzing basic datasets. Data analysis specific to homes and businesses would require considerable more time, but would serve the County and participating entities well. A cost of \$10,000 would provide significant time to analyze more detailed cost-benefit data for specific portions of the county

MITIGATION ACTIVITIES FOR DAM FAILURE

Goal #1: Reduce the impact of dam failure for citizens located below the dam.

Project #1: Work with the City of Eureka to incorporate a Dam Emergency Preparedness Plan. Since the Eureka dam has a rating of “significant hazard” the County should make this a priority.

MITIGATION ACTIVITIES FOR WINTER STORM HAZARDS

Goal #1: Reduce the impact of severe winter storms on the citizens of McPherson County. (submitted by FEM)

Project #1: Mitigate utility mishaps by upgrading utility lines.

There are three identified areas with this project.

1. Advise utility companies of future construction projects.
2. Burial of utility lines.
3. Require upgrading of overhead lines when age or disaster provides opportunity.

Specific upgrades that could help McPherson County and participating entities reduce the risk of utility mishap in any situation are as follows:

Guy wires: guy wires are normally attached to dead-end poles. By increasing the wire strength or adding guys to poles that are not dead-end poles, strength and durability during adverse weather is increased.

Power anchors: power anchors provide guy wires a stronger connection/tie to the material it is attached to.

Dead-end poles: by using additional dead-end poles, reliability will be increased.

Cross arms: the use of cross arms can provide a fuse type link in power line construction. These arms will fail before the pole or conductor would. Ideally, when the cross arms fail the conductor will fall without damaging the pole. Specially designed laminated cross arms could provide for even greater security.

Anti-galloping devices: reduce power line galloping induced by high winds. These should be used in conjunction with other measures, since pole failure risk increases with the use of anti-galloping devices.

T2 conductors: designed to limit ice build-up and wind effects on lines.

Pole testing: current pole strength code. All poles should be updated to meet the current requirements.

Specific projects identified thus far are listed below:

Project #1: Replace 10 miles of three-phase overhead electric line with new three-phase underground line in NW Section 7 to NE Section 12, Township 127, Range 68 and NW Section 7 to NE Section 10, Township 127, Range 67. The existing three-phase line was built in 1964 and spans across the Leola Hills. The upper elevation of this grass range seems to attract dense fog and rain that sticks to existing overhead conductors. This stretch of three-phase has experienced many ice storms and FEM Electric continues to maintain this line. This line is a main three-phase line that ties the Leola and Newtown substations together allowing FEM to provide reliable power to residents in McPherson County and the town of Long Lake. Estimated project cost is \$450,000.

Priority: High
Funding Sources: Private enterprises, utility companies, State/Federal
Timeframe: 5 years
Oversight: Appropriate electrical companies
Cost: Burial of utility lines is not cost effective; therefore upgrading existing lines would be most efficient. Utility upgrades would range from several hundred dollars to hundreds of thousands of dollars. After damage from storms or replacement of old poles and lines, upgrades need to be considered. Each company must determine what costs are present and determine what is in the best interest of the citizens. There is no authority to mandate this action for a regional basis.

Project #2: Survey areas in need of snow shelterbelts and plant trees accordingly.

Priority: Low-Moderate
Funding Sources: FLEP, Tree City, County, Private
Timeframe: 5 years
Oversight: Forestry Service/Cities
Cost: A survey of needy areas would require minimal cost. A typical shelterbelt would cost several thousand dollars.

The locations of structures and persons within the affected area should be included in the survey and a definite cost/benefit analysis must be conducted. Shelterbelts could benefit for rural and semi-urban areas of the county.

MITIGATION ACTIVITIES FOR WILDFIRES/DROUGHT

Goal #1: Reduce the impact of wildfires and drought

Project #1: Continue enforcement of burn ban as deemed appropriate by officials.

Project #2: Have rural fire departments locate dry fire hydrants.

Project #3: Work with the State Forester to complete a wildlife risk assessment and to create a wildlife risk map.

Priority:	Low
Funding Sources:	Undetermined
Timeframe:	T.B.D.
Oversight:	State Forester, McPherson County
Cost:	Has yet to be determined

MITIGATION ACTIVITIES FOR MAN-MADE HAZARDS

Discussion: This section of the plan was eliminated due to none of the projects being mitigation of man-made hazards.

CITY OF EUREKA MITIGATION GOALS AND ACTIONS

Goal #1: Reduce the impact flood hazard within the City of Eureka

Project #1:

Goal #2: Reduce the impact of severe storms on the community

Project #1: Install a siren system to warn people of tornado and severe weather. The City is currently in the process of securing funds for installing the sirens. This project will likely be completed in 2013.

Goal #3: Reduce the impact of flooding in the community

Project #1: Adopt a Dam Emergency Preparedness Plan for Eureka Lake.

Project #2: Address flooding and drainage issues throughout the town by conducting a hydrology study to determine if culvert resizing and/or grade raises are necessary

Project #3: Inspect culverts and determine if replacements are needed for proper flow.

CITY OF LEOLA MITIGATION GOALS AND ACTIONS

Goal #1: Reduce the impact of severe storms on the community

Project #1: Construct storm shelter in the City of Leola. The City of Leola would need to be surveyed to determine the precise need for size and location of a shelter (i.e. How many residents would use or need the shelter). It is possible an existing building within the city could be retrofitted to serve as a storm shelter.

Goal #2: Reduce the impact flood hazard within the City of Leola

Project #1: Increase the size of the spill way at the dam to prevent flooding which occurs on the south side of town.

Project #2: Address flooding and drainage issues throughout the town by conducting a hydrology study to determine if culvert resizing and/or grade raises are necessary

Project #3: Inspect culverts and determine if replacements are needed for proper flow.

Goal #3: Reduce the impact of severe winter storms

Project #1: Install a backup generator at the citizens building for winter storm shelter

Project #2: Install a backup generator at the water tower to allow pumps to continue to fill water tower in the event of a prolonged power outage caused by severe winter/summer storms.

TOWN OF LONG LAKE MITIGATION GOALS AND ACTIONS

Goal #1: Reduce the impact of severe winter storms

Project #1: Purchase and Install a stationary standby generator to operate the fire hall and storm shelter if power is lost.

Goal #2: Reduce the impact of severe summer storms

Project #1: Construct storm shelter in the Town of Long Lake. The Town of Long Lake would need to be surveyed to determine the precise need for size and location of a shelter (i.e. How many residents would use or need the shelter).

Goal #3: Reduce the impact of wildfires

Project #1: Install dry fire hydrants in the Town of Long Lake. The Town of Long Lake does not have any means for fire protection other than the fire trucks. The fire department does not have a place in Long Lake to fill their trucks. With a dry fire hydrant installed by the nearby lakes, the trucks could siphon from the lakes for additional water. The hydrants would be non-pressurized. In

TOWN OF HILLSVIEW MITIGATION GOALS AND ACTIONS

Hillsview did not participate in the PDM plan update and thus will not be adopting the plan at this time. Hillsview has a population of 3 people and a total of 3 residences, 1 occupied and two unoccupied as of the 2010 Census.

TOWN OF WETONKA MITIGATION GOALS AND ACTIONS

Goal #1: Reduce the impact of severe winter/summer storms on the community

Project #1: Purchase backup generators to be used to provide power to the residents in the event of a long term power outage.

Goal #2: Reduce the impact of flood hazard within the City

Project #1: Improve the flow of water by inspecting culverts and determining if replacements are needed for proper flow.

Goal #3: Reduce the impact of wildfire and structural fires within the City

Project #1: Improve fire protection by determining if fire hydrants can be installed throughout the City.

PRIORITIZATION OF MITIGATION ACTIVITIES

Requirement 201.6(c)(3)(iv) & Requirement 201.6 (c)(3)(iii)

Many of the plan participants only had one mitigation goal and one action. Many who participated had a very specific goal in mind that they were trying to achieve. Additionally, because small rural towns and townships continuously have problems accomplishing capital improvements project due to very small budgets caused by limited ability to generate revenue. Obviously, when only one project is identified, that project becomes the priority and the only other consideration to make is budgeting for the 25 percent local match requirement. Those communities that have more than one action listed prioritized based on the number of people who would benefit from the project and also by the estimated or approximate total project cost. Some projects may be too large of an undertaking and therefore those projects were moved down the priority list. The plan participants were instructed that a complete Benefit Cost Analysis would be required at the time of application and the plan author advised that specific details of each project could be analyzed in closer detail during the application period. Redfield prioritized projects by those that are the most urgent.

NATIONAL FLOOD INSURANCE PROGRAM PARTICIPATION

Requirement: §201.6(c)(3)(ii): [The mitigation strategy] must also address the jurisdiction’s participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate.

McPherson County does not participate in the National Flood Insurance Program and has not ever been mapped. There is only one community located in McPherson County that participates in NFIP, but there has never been a flood insurance policy sold in McPherson County.

5.1 MCPHERSON COUNTY NFIP PARTICIPATION	
Non-Participants	Participants
McPherson County	Eureka
Leola	
Long Lake	
Hillsview	
Wetonka	

Since McPherson County has never been mapped and does not adopt a flood plain ordinance the development of new homes and businesses and all new construction is not regulated by a flood plain administrator. The planning and zoning department is responsible for issuing building certificates and permits.

IMPLEMENTATION OF MITIGATION ACTIONS

Requirement: §201.6(c)(3)(iii): [The mitigation strategy section shall include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

Upon adoption of the updated McPherson County PDM plan, each jurisdiction will become responsible for implementing its own mitigation actions. Those who did not participate or adopt the PDM will be required to coordinate all mitigation actions with the County. The planning required for implementation is the sole responsibility of the local jurisdictions and private businesses that have participated in the plan update. All of the municipalities have indicated that they do not have the financial capability to move forward with projects identified in the plan at this time, however, all will consider applying for funds through the State and Federal Agencies once such funds become available. If and when the municipalities are able to secure funding for the mitigation projects, they will move forward with the projects identified. Since most of the local jurisdictions only had one mitigation action/goal, prioritization was not necessary. The City of Redfield and McPherson County had several mitigation projects and thus, will prioritize those projects in a manner that will ensure benefit is maximized to the greatest extent possible. A benefit cost analysis will be conducted on an individual basis after the decision is made to move forward with a project.

The 2006 PDM Plan was approved after several revisions were recommended by FEMA and made by the plan author. At that time the plan was drafted under the requirements found in the March 2004 version of the crosswalk. Since then, FEMA has produced several planning documents to help aid in the development of local mitigation plans. Some of those documents include the October 1, 2011 Plan Review Guide, and the Local Mitigation Plan Review Tool. Since disaster mitigation was a relatively new concept at that time, mitigation plans were approved with less scrutiny. The same depth of planning was not utilized in the 2006 PDM Plan as was used for the 2012 plan update. The 2006 Plan had the “bare minimum” to meet the FEMA requirements for a mitigation plan, thus the plan lacked relevant information that could be utilized and easily integrated into the County’s and Municipalities’ existing planning mechanisms. Thus, the 2006 Plan was not used or incorporated into other planning documents or mechanisms. It is anticipated with the amount of time, energy, and professional guidance involved during the drafting process of the updated plan, that the County has created a document that has validity and a clear purpose which will be more likely to fit in the existing planning mechanisms that exist county-wide. Additionally, by involving most of the local jurisdictions and by bringing the plan to the attention of neighboring communities, the planning process has brought more awareness of mitigation to the people residing in the County, which will encourage further involvement in the future.

VI. PLAN MAINTENANCE

CHANGES/REVISIONS TO PLAN MAINTENANCE:

The entire Monitoring section in the 2003 Plan was only two paragraphs. Both of those paragraphs are still included in the Plan Maintenance section of the updated plan; however everything else in this section is new.

MONITORING, EVALUATING, AND UPDATING THE PLAN

Requirement §201.6(c) (4)(i): [the plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

McPherson County and all of the participating local jurisdictions thereof will incorporate the findings and projects of the PDM in all planning areas as appropriate. Periodic monitoring and reporting of the plan is required to ensure that the goals and objectives for the McPherson County PDM plan are kept current and that local mitigation efforts are being carried out.

During the process of implementing mitigation strategies, the county or communities within the county may experience lack of funding, budget cuts, staff turnover, and/or a general failure of projects. These scenarios are not in themselves a reason to discontinue and fail to update the Pre-Disaster Mitigation Plan. A good plan needs to provide for periodic monitoring and evaluation of its successes and failures and allow for appropriate changes to be made.

ANNUAL REPORTING PROCEDURES

The plan shall be reviewed annually, as required by the County Emergency Manager, or as the situation dictates such as following a disaster declaration. The McPherson County Emergency Manager will review the plan annually in November and ensure the following:

1. The County Elected body will receive an annual report and/or presentation on the implementation status of the plan;
2. The report will include an evaluation of the effectiveness and appropriateness of the mitigation actions proposed in the plan; and
3. The report will recommend, as appropriate, any required changes or amendments to the plan.
- 4.

FIVE YEAR PLAN REVIEW

Every five years the plan will be reviewed and a complete update will be initiated. All information in the plan will be evaluated for completeness and accuracy based on new information or data sources. New property development activities will be added to the plan and evaluated for impacts. New or improved sources of hazard related data will also be included.

In future years, if the County relies on grant dollars to hire a contractor to write the PDM plan update, the County will initiate the process of applying for and securing such funding in the third year of the plan to ensure the funding is in place by the fourth year of the plan. The fifth year will then be used to write the plan update, which in turn will prevent any lapse in time where the county does not have a current approved plan on file.

The goals, objectives, and mitigation strategies will be readdressed and amended as necessary based on new information, additional experience and the implementation progress of the plan. The approach to this plan update effort will be essentially the same as the one used for the original plan development.

The Emergency Manager will meet with the County Commission and Plan Participants for review and approval prior to final submission of the updated plan.

PLAN AMENDMENTS

Plan amendments will be considered by the McPherson County Emergency Manager, during the plan's annual review to take place the end of each county fiscal year. All affected local jurisdictions (cities, towns, and counties) will be required to hold a public hearing and adopt the recommended amendment by resolution prior to considerations by the steering committee.

INCORPORATION INTO EXISTING PLANNING MECHANISMS

Requirement: §201.6(c)(4)(ii): [The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

Eureka is the only jurisdiction located in McPherson County that has a comprehensive or capital improvements plan. Leola has a comprehensive plan but no capital improvements plans. All of the other jurisdictions do not have the resources, staff, funding, or need for such planning mechanisms. The McPherson County Comprehensive plan includes all of the municipalities. The City of Eureka and McPherson County will consider the mitigation requirements, goals, actions, and projects when it considers and reviews the other existing planning documents such as the capital improvements plan. The Eureka mitigation projects will be considered and prioritized in conjunction with non-mitigation projects, such as water and wastewater infrastructure improvements, new construction of schools, libraries, parks, etc.

The rest of the local jurisdictions cannot incorporate the requirements of the mitigation plan into other planning mechanisms because they do not have any other planning mechanisms that currently exist. The risk assessment which was conducted for the purpose of this plan is specific to mitigation actions and projects included in the Plan and thus is not tied into any other mechanisms that would initiate conversations or actions by the city councils to move forward with actions or projects outlined in the Plan. Absence of such mechanisms creates a problem for the local jurisdictions because ideas, projects, and actions identified as a result of the PDM Plan update process often never move forward because they are forgotten about and no mechanism exists to initiate the process of completing such projects. Thus, the local jurisdictions identified one unrelated mechanism, that could be used to remedy the problem of mitigation projects

getting lost in a bookshelf. Municipalities are required by State law to prepare budgets for the upcoming year and typically consider any expenditure for the upcoming year at that time. South Dakota Codified Law 9-21-2 provides that:

The governing body of each municipality shall, no later than its first regular meeting in September of each year or within ten days thereafter, introduce the annual appropriation ordinance for the ensuing fiscal year, in which it shall appropriate the sums of money necessary to meet all lawful expenses and liabilities of the municipality....an annual budget for these funds shall be developed and published no later than December thirty-first of each year.

Since all of the local jurisdictions lack planning mechanisms in which to incorporate the mitigation actions identified in this plan, it was determined that each year when the budget is prepared the municipalities will also consider the mitigation actions at that time. The local jurisdictions will post a permanent memo to their files as a reminder for them to incorporate their annual review of the mitigation actions identified into the budget preparation process. This does not require the projects be included in the budget, it merely serves as a reminder to the City officials that they have identified mitigation projects in the PDM plan that should be considered if the budget allows for it.

POTENTIAL FUNDING SOURCES

Although all mitigation techniques will likely save money by avoiding losses, many projects are costly to implement. None of the local jurisdictions have the funds available to more forward with mitigation projects at this time, thus, the Potential Funding Sources section was included so that the local jurisdictions can work towards securing funding for the projects. Inevitably, due to the small tax base and small population most of the local jurisdictions do not have the ability to generate enough revenue to support anything beyond the basic needs of the community. Thus mitigation projects will not be completed without a large amount of funding support from State or Federal programs. The McPherson County jurisdictions will continue to seek outside funding assistance for mitigation projects in both the pre- and post-disaster environment. Primary Federal and State grant programs have been identified and briefly discussed, along with local and non-governmental funding sources, as a resource for the local jurisdictions

Federal

The following federal grant programs have been identified as funding sources which specifically target hazard mitigation projects:

Title: Pre-Disaster Mitigation Program
Agency: Federal Emergency Management Agency
Through the Disaster Mitigation Act of 2000, Congress approved the creation of a national program to provide a funding mechanism that is not dependent on a Presidential Disaster Declaration. The Pre-Disaster Mitigation (PDM) program provides funding to states and communities for cost-effective hazard mitigation activities that complement a comprehensive mitigation program and reduce injuries, loss of life, and damage and destruction of property.
The funding is based upon a 75% Federal share and 25% non-Federal share. The non-Federal match can be fully in-kind or cash, or a combination. Special accommodations will be made for

small and impoverished communities who will be eligible for 90% Federal share/10% non-Federal.

FEMA provides PDM grants to states that, in turn, can provide sub-grants to local governments for accomplishing the following eligible mitigation activities: State and local hazard mitigation planning,
Technical assistance (e.g. risk assessments, project development), Mitigation Projects,
Acquisition or relocation of vulnerable properties, Hazard retrofits, Minor structural hazard control or protection projects
Community outreach and education (up to 10% of State allocation)

Title: Flood Mitigation Assistance Program

Agency: Federal Emergency Management Agency

FEMA's Flood Mitigation Assistance program (FMA) provides funding to assist states and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes and other structures insurable under the National Flood Insurance Program (NFIP). FMA was created as part of the National Flood Insurance Reform Act of 1994 (42 USC 4101) with the goal of reducing or eliminating claims under the NFIP.

FMA is a pre-disaster grant program, and is available to states on an annual basis. This funding is available for mitigation planning and implementation of mitigation measures only, and is based upon a 75% Federal share/25% non-Federal share. States administer the FMA program and are responsible for selecting projects for funding from the applications submitted by all communities within the state. The state then forwards selected applications to FEMA for an eligibility determination. Although individuals cannot apply directly for FMA funds, their local government may submit an application on their behalf.

Title: Hazard Mitigation Grant Program

Agency: Federal Emergency Management Agency

The Hazard Mitigation Grant Program (HMGP) was created in November 1988 through Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act. The HMGP assists states and local communities in implementing long-term mitigation measures following a Presidential disaster declaration.

To meet these objectives, FEMA can fund up to 75% of the eligible costs of each project. The state or local cost-share match does not need to be cash; in-kind services or materials may also be used. With the passage of the Hazard Mitigation and Relocation Assistance Act of 1993, federal funding under the HMGP is now based on 15% of the federal funds spent on the Public and Individual Assistance programs (minus administrative expenses) for each disaster.

The HMGP can be used to fund projects to protect either public or private property, so long as the projects in question fit within the state and local governments overall mitigation strategy for the disaster area, and comply with program guidelines. Examples of projects that may be funded include the acquisition or relocation of structures from hazard-prone areas, the retrofitting of existing structures to protect them from future damages; and the development of state or local standards designed to protect buildings from future damages.

Eligibility for funding under the HMGP is limited to state and local governments, certain private nonprofit organizations or institutions that serve a public function, Indian tribes and authorized tribal organizations. These organizations must apply for HMPG project funding on behalf of their

citizens. In turn, applicants must work through their state, since the state is responsible for setting priorities for funding and administering the program.

Title: Public Assistance (Infrastructure) Program, Section 406
Agency: Federal Emergency Management Agency
FEMA's Public Assistance Program, through Section 406 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, provides funding to local governments following a Presidential Disaster Declaration for mitigation measures in conjunction with the repair of damaged public facilities and infrastructure. The mitigation measures must be related to eligible disaster related damages and must directly reduce the potential for future, similar disaster damages to the eligible facility. These opportunities usually present themselves during the repair/replacement efforts.
Proposed projects must be approved by FEMA prior to funding. They will be evaluated for cost effectiveness, technical feasibility and compliance with statutory, regulatory and executive order requirements. In addition, the evaluation must ensure that the mitigation measures do not negatively impact a facility's operation or risk from another hazard.
Public facilities are operated by state and local governments, Indian tribes or authorized tribal organizations and include: *Roads, bridges & culverts *Draining & irrigation channels *Schools, city halls & other buildings *Water, power & sanitary systems *Airports & parks
Private nonprofit organizations are groups that own or operate facilities that provide services otherwise performed by a government agency and include, but are not limited to the following: *Universities and other schools *Hospitals & clinics *Volunteer fire & ambulance *Power cooperatives & other utilities *Custodial care & retirement facilities *Museums & community centers

Title: SBA Disaster Assistance Program
Agency: US Small Business Administration
The SBA Disaster Assistance Program provides low-interest loans to businesses following a Presidential disaster declaration. The loans target businesses to repair or replace uninsured disaster damages to property owned by the business, including real estate, machinery and equipment, inventory and supplies. Businesses of any size are eligible, along with non-profit organizations. SBA loans can be utilized by their recipients to incorporate mitigation techniques into the repair and restoration of their business.

Title: Community Development Block Grants
Agency: US Department of Housing and Urban Development
The community Development Block Grant (CDBG) program provides grants to local governments for community and economic development projects that primarily benefit low- and moderate-income people. The CDBG program also provides grants for post-disaster hazard mitigation and recovery following a Presidential disaster declaration. Funds can be used for activities such as acquisition, rehabilitation or reconstruction of damaged properties and facilities and for the redevelopment of disaster areas.

Local

Local governments depend upon local property taxes as their primary source of revenue. These taxes are typically used to finance services that must be available and delivered on a routine and regular basis to the general public. If local budgets allow, these funds are used to match Federal or State grant programs when required for large-scale projects.

Non-Governmental

Another potential source of revenue for implementing local mitigation projects are monetary contributions from non-governmental organizations, such as private sector companies, churches, charities, community relief funds, the Red Cross, hospitals, Land Trusts and other non-profit organizations.

CONTINUED PUBLIC PARTICIPATION/INVOLVEMENT

Requirement: §201.6(c)(4)(iii): [the plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.

During interim periods between the five year update, efforts will be continued to encourage and facilitate public involvement and input. The plan will be available for public view and comment at the McPherson County Emergency Management Office located in the McPherson County Courthouse and the NECOG office. Comments will always be received whether orally, written or by e-mail.

All ongoing workshops and trainings will be open to the public and appropriately advertised. Ongoing press releases and interviews will help disseminate information to the general public and encourage participation.

As implementation of the mitigation strategies continues in each local jurisdiction, the primary means of public involvement will be the jurisdiction's own public comment and hearing process. State law as it applies to municipalities and counties requires this as a minimum for many of the proposed implementation measures. Effort will be made to encourage cities, towns and counties to go beyond the minimum required to receive public input and engage stakeholders.