CHAPTER I
PLANNING PROCESS

Background

This plan is an update of the Hutchinson County Pre-Disaster Mitigation Plan, which was approved by FEMA in December 2015. The purpose of the plan is to prevent or reduce losses to people and property that may result from future hazard events in Hutchinson County. The plan identifies and analyzes the hazards that the county is susceptible to, and proposes a mitigation strategy to minimize future damage that may be caused by those hazards. The document will serve as a strategic planning tool for use by Hutchinson County in its efforts to mitigate against future disaster events.

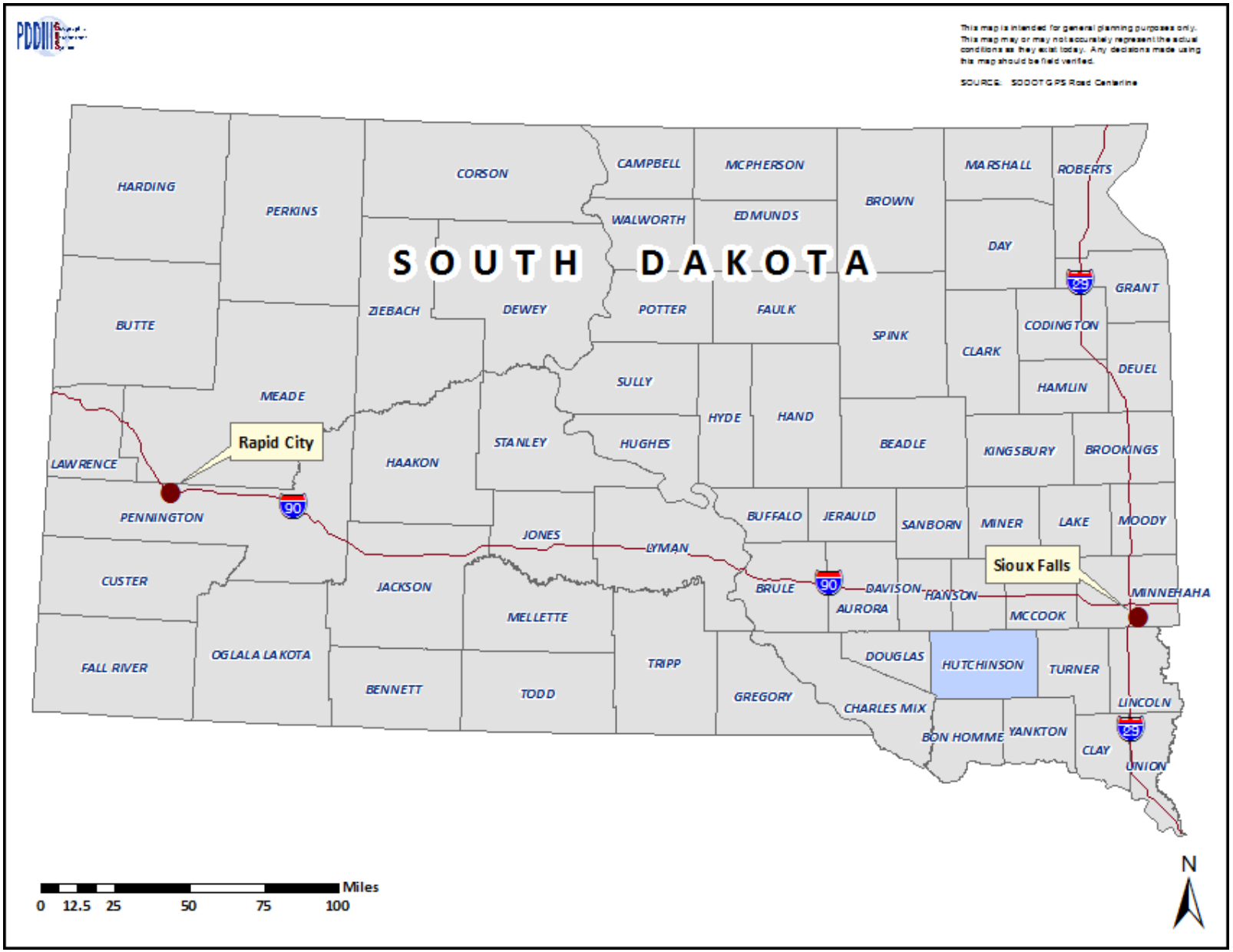
This is a multi-jurisdictional plan. All of the municipalities located within Hutchinson County were invited to participate in the plan's development, as they had when the current plan (that is, the plan now being updated) was being developed. Following is the list of jurisdictions that participated in the plan's development by having a representative attend the planning meetings and by providing input into the plan:

- Hutchinson County
- City of Freeman
- City of Menno
- City of Parkston
- City of Tripp

Production of the plan was the ultimate responsibility of the Hutchinson County Emergency Management Director, who served as the county's point of contact for all activities associated with this plan. Input was received from a disaster mitigation planning team that was put together by the Emergency Management Director and whose members are listed in **Table 1.1** on page 4.

The plan itself was written by an outside contractor, Planning & Development District III of Yankton, South Dakota, one of the state's six regional planning entities. The office has an extensive amount of experience in producing various kinds of planning documents, including municipal ordinances, land use plans, and zoning ordinances, and it is an acknowledged leader in geographic information systems (GIS) technology in South Dakota. Furthermore, its staff has written disaster mitigation plans for all sixteen of the counties in the District's planning area, including Hutchinson County's current plan.

Figure 1.1 – County Location



The following staff members of Planning & Development District III were involved in the production of the plan. John Clem, a Community Development Specialist, was the project manager and author of the plan. Assisting Mr. Clem was Harry Redman, a Geographic Information Systems Professional, who produced maps for the plan, directed the floodplain risk analysis (see **Chapter III**), and completed the county land cover analysis (see **Chapter II**).

Development of Planning Team

The initial planning stages for this plan update began in 2018 when an application was submitted to FEMA for Hazard Mitigation Grant Program (HMGP) funds to help pay for the update. The HMGP funds were awarded to the County in October 2019. Following this, John Clem and the Hutchinson County Emergency Management Director began to develop the methodology and strategy to be used to update the plan.

The first step was to organize the disaster mitigation planning team, the group of individuals representing the participating jurisdictions and other stakeholders at the planning team meetings. These individuals provided information and various documents that were used to produce the plan, reviewed drafts of the plan as it was being assembled, and reviewed and approved the final version of the plan. Personnel at the county and municipal level with the authority to regulate development were a priority for inclusion on the team. Invited to participate on the planning team were representatives from the following groups:

- Hutchinson County (county commissioners, planning/zoning officials, floodplain administrator, GIS staff, director of equalization, highway superintendent, etc.)
- Municipalities (city council members, finance officers, public works staff, etc.)
- Other entities, including the Freeman Regional Hospital, the St Benedict Hospital in Parkston, the Southeastern Electric Cooperative, the Bon Homme-Yankton Rural Water System, and the James River Water Development District

Each individual on the planning team had at least one of the following attributes to contribute to the planning process:

- Significant understanding of how hazards affect the county and participating jurisdictions.
- Substantial knowledge of the county's infrastructure system.
- Resources at their disposal to assist in the planning effort, such as maps or data on past hazard events.
- The authority to help implement the mitigation strategy that was developed.

Table 1.1 on the following page lists the planning team members, including their attendance at the planning meetings that were held as the plan was being developed.

Table 1.1 – Participation in Plan Development

Name	Representing	Position	Meeting Attendance	
			Mtg 1 06/17/20	Mtg 2 08/12/20
John Clem	Planning District III	Plan Author	X	X
David Hoffman	Hutchinson Co/Parkston	Emergency Mgmt/Mayor	X	X
Diane Murtha	Hutchinson County	Auditor	X	X
Clifford Tjaden	Hutchinson County	Planning & Zoning	X	X
Lori Droppers	Hutchinson County	GIS	X	
Joel Baumiller	Hutchinson County	Highway Department	X	X
David Hoffman	Parkston	Mayor	X	X
Mike Wolf	Parkston	Public Works	X	X
Ryan Murtha	Parkston	City Engineer	X	X
Darin Ziegler	Tripp	Water Superintendent	X	
Dana Horn	Tripp	Fire Chief	X	X
Scott Schelske	Tripp	Mayor	X	
Kayla Wilson	Tripp	Finance Officer	X	X
Darrell Mehlhaf	Menno	Mayor	X	
Lisa Edeleman	Menno	Finance Officer	X	X
Adam Van Ningen	Freeman	Finance Officer		X
Brian Humphrey	Hutchinson County	Emergency Mgmt trainee		X

Outreach Effort

Throughout the plan's development, efforts were made to obtain involvement in the plan beyond just the planning team. Emails were distributed, a press release was posted on local websites prior to the first planning meeting, and social media also was used to get the message out to the public. Outreach also was made to emergency management directors in nearby counties, as well as the South Dakota Office of Emergency Management. See **Appendix A** for documentation of the public outreach effort.

Planning Meetings

Several meetings were held to develop the plan, as described in further detail below. The primary purpose of the first meeting was to inform the planning team members about the mitigation planning process and to develop the risk assessment. After this initial meeting, additional meetings were held in each participating jurisdiction to develop the mitigation strategy, including the specific mitigation actions to be included in the plan. A final meeting reconvened the planning team members at the end of the process to review a first draft of the completed plan and to discuss how the plan will be implemented.

The planning process associated with the plan’s development was relaxed and informal, and free-flowing discussion was always encouraged. No subcommittees were formed, no votes were taken or motions made, and decisions were made by mutual consensus of the planning team members. Everyone’s opinion was respected, nobody was discouraged from voicing their opinion, and no one was made to feel any less important than anyone else. Leadership

and guidance at the meetings was provided by Planning & Development District III staff and/or the Hutchinson County Emergency Management Director.

Planning Team Meeting 1 – Introduction and Risk Assessment [1]

The first meeting of the planning team introduced the participants to the mitigation planning process. Discussion occurred about how the plan would be developed in the coming months, and about the basic goals to be achieved with the mitigation plan. Discussion also occurred about how to get broader public input into the planning process, and whether any other potential stakeholders not already present should be invited to participate in the planning process.

Following this, the county's current disaster mitigation plan was reviewed, particularly the risk assessment section. The team also reviewed the hazards identified in the State of South Dakota Hazard Mitigation Plan. Following this, the team determined which hazards it wanted to focus on with this plan.

Representatives from each participating jurisdiction discussed how each specific hazard affected their community, and described their existing resources and capabilities to mitigate against the hazards. As part of this process, the team especially considered the vulnerability of the most important community assets and critical facilities in each jurisdiction. The assets are listed in **Chapter III** and shown on the hazard vulnerability maps included at the end of that chapter.

With the hazards and community assets identified, the risk assessment was completed by the Planning & Development District III office using various methods as discussed in **Chapter III**. The results of the risk assessment, which included a summary of the textual information presented in **Chapter III**, maps showing hazard-prone areas in each jurisdiction, and tables showing the value of property potentially at risk in the jurisdictions, were then distributed to the planning team members. To assist in the development of the mitigation strategy, a list of potential mitigation actions based on FEMA's guidance document *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards* also was distributed.

Jurisdictional Meetings – Develop Mitigation Strategy

Following the initial planning team meeting, meetings were held in each participating jurisdiction to develop the mitigation strategy, focusing on the specific mitigation actions to be included in the plan for each jurisdiction. The meetings took place during city council meetings, which ensured that a broad representation of people would be present, and also ensured that the process was open to public involvement.

The process began with a review of the list of proposed mitigation actions included in the current mitigation plan, with discussion following about the progress that had been made on

[1] Due to the Coronavirus situation, this meeting was conducted via telephone conference call. The second planning team meeting also was conducted over the phone.

implementing the actions. A list summarizing progress on the actions is included in **Chapter IV**.

The focus then turned toward identifying the actions to be included in this plan. The starting point for this discussion was the list of potential mitigation actions based on FEMA's *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards* that had been distributed to the planning team members. The jurisdictions were encouraged to consider a wide range of mitigation actions, whether or not they seemed likely to be achievable in the foreseeable future. After some discussion, consensus was reached about the mitigation actions to include in the plan. Details about the actions, such as estimated cost, the party responsible for implementation, and potential funding sources, were discussed. Prioritization of the actions also was determined. The final list of actions proposed by the participating jurisdictions is presented in **Chapter IV** (see **Table 4.2**).

Planning Team Meeting 2 – Plan Review and Plan Implementation

Following the jurisdictional meetings, the Planning & Development District III office completed a first draft of the plan. After this, the planning team was brought together again to review the draft, and to discuss how the plan will be implemented. The team considered how the plan will be incorporated into the existing planning mechanisms at the county and local levels, and who will be responsible for ensuring the mitigation actions identified in the plan will be carried out. Maintenance of the plan also was discussed, specifically how the plan will be monitored, evaluated, and updated in the coming years.

After the meeting, some additional information was added to the plan based on discussion at the meeting. The plan was then posted on the local websites, and shortly thereafter it was submitted to the South Dakota Office of Emergency Management.

Acknowledgements

The Planning & Development District III office would like to thank the members of the Hutchinson County Disaster Mitigation Planning team for participating in the planning meetings that were held, and for supplying information that was used to develop the plan. We would particularly like to thank County Emergency Management Director David Hoffman for arranging the planning team meetings and for coordinating with the participating jurisdictions.

Thanks also are extended to Jim Poppen, Martin Christopherson, Kyle Kafka, and Marc Macy at the South Dakota Office of Emergency Management for information and guidance in developing the plan.

CHAPTER II
COMMUNITY PROFILE

Background

This chapter serves as a basic introduction of the county. Topics addressed in this chapter cover the county's physical conditions, its population and socio-economic characteristics, utilities and infrastructure, and services. Following chapters are devoted to assessing risks in the county, presenting the mitigation strategy, and discussing how the plan will be implemented.

General Description

Hutchinson County is located in southeast South Dakota, about 60 miles west/southwest of Sioux Falls, the state's largest city (see **Figure 1.1**). The county covers about 815 square miles in area, and its population according to the 2010 Census was 7,343. There are six incorporated municipalities located within the county - Dimock (pop 125), Freeman (pop 1,306), Menno (pop 608), Olivet (pop 74), Parkston (pop 1,508), and Tripp (pop 647). The county seat is located in Olivet. Unincorporated communities within the county include Kaylor (pop 64) and Milltown. Other populated places in the county are the Maxwell, New Elm Springs, Tschetter, and Wolf Creek Hutterite Colonies, each of which has approximately 125 to 150 residents [2]. **Figure 2.1** shows the county's communities and highway network.

Physical Characteristics

The landscape in Hutchinson County is mostly open, and the terrain is generally fairly level, except for undulating areas along the James River and some of the larger streams in the county, including Wolf Creek. An area of somewhat higher terrain, where a wind farm recently was built, is located southwest of Tripp. Prominent bodies of water in addition to the James River include Tripp Lake, Lake Menno, Lake Dimock, and Silver Lake. Silver Lake was naturally formed, while the other three were formed by earthen dams.

Much of the land in the county is devoted to agricultural production, primarily row crops such as corn, soybeans, and wheat, and there is also a considerable amount of pastureland. Several feeding and farrowing hog confinement barns are located in the county.

[2] Hutterite Colonies are rural, agriculturally-based communities occupied by descendants of German people who cling to many of their traditional ways. There are more than 400 Hutterite colonies located in the north-central United States and Canada.

Figure 2.1 – Political Map

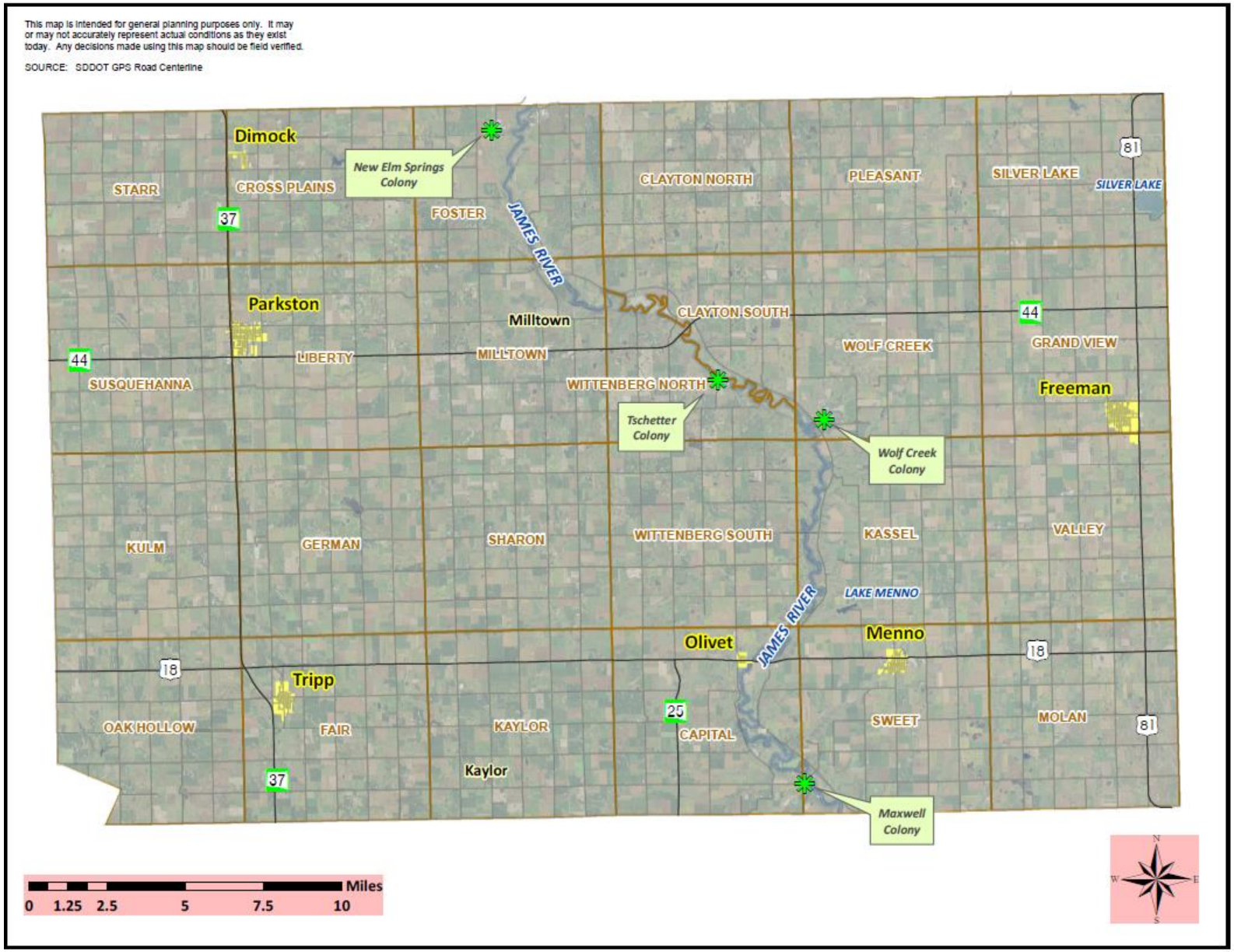


Table 2.1 provides a breakdown of the land cover in Hutchinson County. The table is based off satellite imagery from the United States Geological Service's National Land Cover Database, which was then processed using ArcGIS computer mapping software. As the table shows, the predominant types of land cover in the county are cultivated crops and pasture land, which together comprise about 85 percent of the county's area. In addition, there is a significant amount of grassland and shrub/scrub in the county, located mostly along the James River and its tributaries. Developed land makes up only a small fraction of the land area. **Figure 2.2** is a graphic representation of the county's land cover.

Table 2.1 - Vegetative Land Cover

Cover Type	Square Miles	% of Total Area
Cultivated crops	529.7	65.0
Pasture land	163.0	20.0
Grassland and Shrub/Scrub	55.4	6.8
Developed land (open space)	37.9	4.7
Wetlands	15.9	2.0
Open water	5.8	0.7
Developed land (low to high intensity)	4.4	0.5
Forested land	2.3	0.3
Barren land	0.3	0.0
TOTAL AREA	**814.7**	

http://www.mrlc.gov/index.php

Most soil in the county is fertile and well-drained, and therefore conducive to agriculture, as long as there is sufficient soil moisture. Excessive slopes and rocky soils are rare, except along the James River. Drainage is generally good, but there are many wetlands in the county, some of which are now used as waterfowl or wildlife production areas, while others have been drained for farming.

As in most of South Dakota, the climate of Hutchinson County is characterized as sub-humid and continental, which means that summers are often hot and winters can be very cold. There are no large bodies of water or mountain ranges to mitigate against these extremes. High temperatures in summer can exceed 100 degrees Fahrenheit [3], while winter lows can drop below -20 degrees. Precipitation averages about 24 inches per year, but during drought years the amount can be much less. Most of the precipitation occurs during the spring and early summer; winter snow is not frequent, but snow cover on the ground is fairly constant during many winters. Blizzards and other types of winter storms are a definite hazard. Following is climate data in the county as reported from the Menno weather station.

Table 2.2 - Monthly Climate Conditions in Hutchinson County (1896 – 2013)

[3] According to the National Weather Service, Sioux Falls, South Dakota has averaged about two days per year of 100 degree temperatures since records began to be kept in 1893.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Ave High	28.8	33.3	45.6	62.0	73.1	82.4	88.3	86.2	77.7	65.3	46.3	32.5	60.1
Ave Low	6.8	11.0	22.9	35.6	46.8	56.7	61.7	59.7	49.9	37.9	23.6	11.8	35.4
Ave Precipitation	0.5	0.7	1.4	2.3	3.3	3.9	3.1	2.8	2.4	1.6	1.0	0.6	23.6
Ave Snowfall	6.4	6.6	7.5	2.6	0.2	0.0	0.0	0.0	0.0	1.0	4.5	6.3	35.1
Ave Snow Depth	4	3	2	0	0	0	0	0	0	0	1	2	1.0

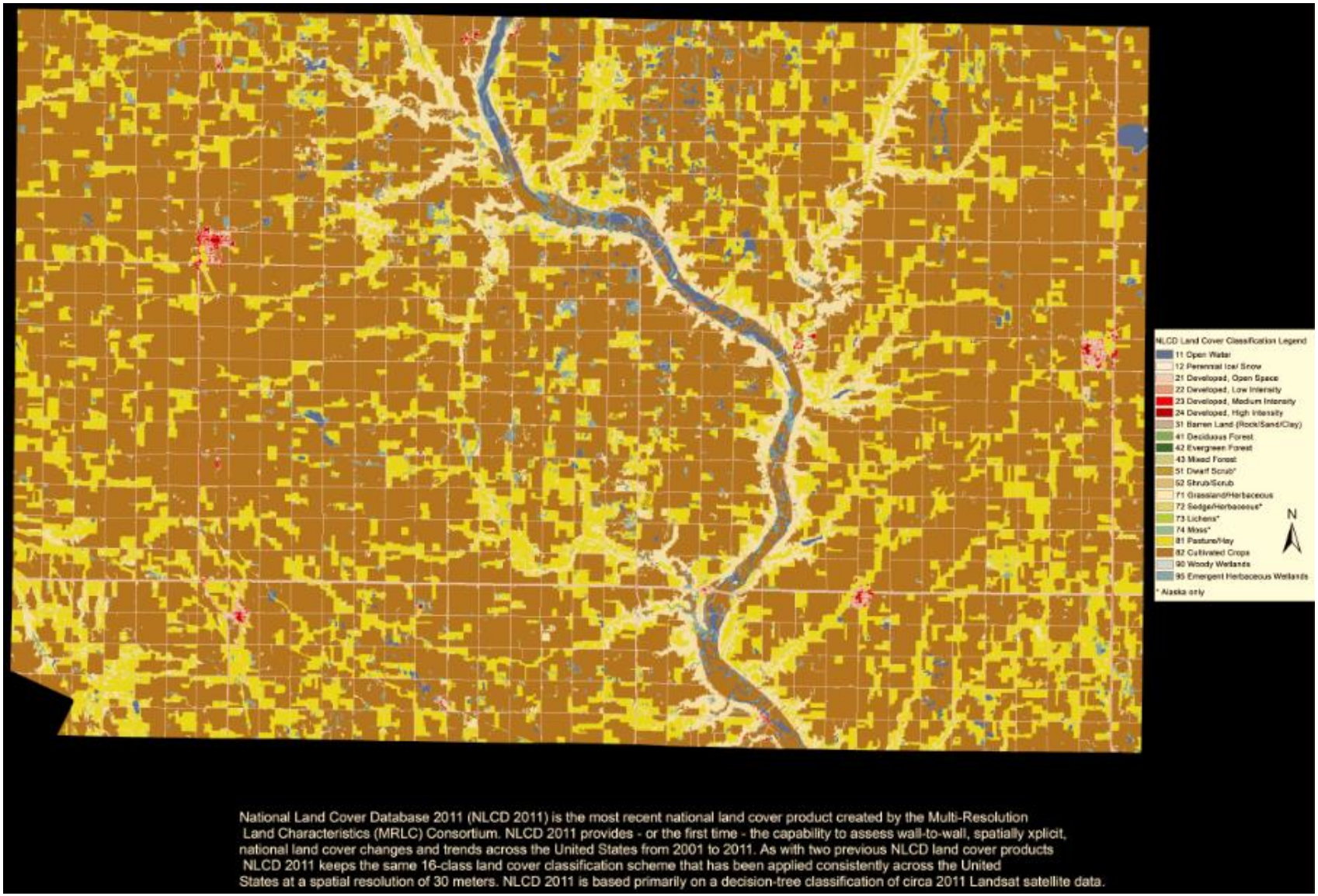
Source: High Plains Regional Climate Center (www.hprcc.unl.edu/data/historical/)

The average high and low are in degrees Fahrenheit; the precipitation figures are in inches

The impact that climate change may have on the county is difficult to predict with any certainty. The South Dakota Hazard Mitigation Plan discusses climate change in some depth, analyzing its possible impacts for each of the hazards affecting the state. According to the plan, mean temperatures have been increasing in the northern Great Plains region where South Dakota is located, especially in the winter. This trend may lead to increased evaporation and drought frequency, which will compound water scarcity problems. Across South Dakota, there is a long-term trend of increasing annual precipitation, among the highest in the country. The majority of this increase is occurring in the spring and fall seasons, and there is high confidence that precipitation extremes will increase in frequency and intensity that could exacerbate flooding.

Communities that are already the most vulnerable to weather and climate extremes will be stressed even further by more frequent extreme events occurring within an already highly variable climate system. According to the plan, increased demand for water and energy will constrain development, stress natural resources, and increase competition for water. New agricultural practices will be needed to cope with changing conditions. Still, there is no consensus as of yet on climate change science, and therefore it is difficult to make any definitive plans for climate change at this time.

Figure 2.2 - County Land Cover



National Land Cover Database 2011 (NLCD 2011) is the most recent national land cover product created by the Multi-Resolution Land Characteristics (MRLC) Consortium. NLCD 2011 provides - or the first time - the capability to assess wall-to-wall, spatially xplicit, national land cover changes and trends across the United States from 2001 to 2011. As with two previous NLCD land cover products NLCD 2011 keeps the same 16-class land cover classification scheme that has been applied consistently across the United States at a spatial resolution of 30 meters. NLCD 2011 is based primarily on a decision-tree classification of circa 2011 Landsat satellite data.

Socioeconomic Description

Hutchinson County is sparsely populated. The county had a Census 2010 population of 7,343, and a population density of only 9.0 people per square mile. In comparison, the State of South Dakota, which is one of the least densely populated states in the nation, has a population density of 10.5 per square mile, and the national figure is 89.5. In addition to being sparsely populated, Hutchinson County has been experiencing a steady population decline for the last several decades, as **Table 2.3** shows. The county has declined in population by about 36% since 1950, and the population is expected to continue decreasing.

Table 2.3 – Hutchinson County Population Change

Pop 1950	Pop 1960	Pop 1970	Pop 1980	Pop 1990	Pop 2000	Pop 2010	Pop 2017 Estimate	Pop 2030 Projected
11,423	11,085	10,379	9,350	8,262	8,075	7,343	7,277	6,617

Sources: U.S. Census (factfinder.census.gov/faces/nav/jsf/pages/index.xhtml); University of South Dakota Governmental Research Bureau

Table 2.4 provides basic demographic information for the county. The table shows that an overwhelming percentage of the county's population is composed of whites. The table also shows that the county's population is quite old, with the median age being almost ten years older than the national figure. This is an indication that many of the young people are forced to leave the county to look for jobs and opportunities elsewhere.

Table 2.4 - Racial and Age Characteristics (2010)

Entity	White Population	Black Population	American Indian Population	Asian Population	Other Racial Group	Population Under 20	Population 65 and Over	Median Age
Hutchinson Co	97.6%	0.2%	1.4%	0.0%	0.8%	24.7%	25.5%	46.9
South Dakota	85.3%	1.5%	8.8%	1.1%	3.3%	27.6%	14.6%	36.8
United States	73.9%	12.6%	0.8%	5.0%	7.7%	26.3%	13.7%	37.4

Source: U.S. Census (factfinder.census.gov/faces/nav/jsf/pages/index.xhtml)

Hutchinson County's economy is dependent to a large extent upon agriculture. Much of the non-ag employment is in education, health care, and manufacturing. Tourism is not significant, except during the fall hunting season when many people from outside the state come to hunt pheasants and other game. In part because of the lack of high wage occupations, income levels in the county are below state figures, as shown in **Table 2.5**.

Table 2.5 - Socioeconomic Characteristics (2010)

Entity	Median Family Income	Family Poverty Rate	High School Grad or Higher	Bachelor's Degree or Higher
Hutchinson Co.	$59,896	6.6%	83.1%	25.0%
South Dakota	$62,967	8.7%	90.1%	26.0%
United States	$64,585	10.9%	85.7%	28.5%

Source: U.S. Census (factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml)

Infrastructure and Utilities

Transportation

Hutchinson County's main transportation routes are US Highway 81, US Highway 18, SD Highway 37, and SD Highway 44. A railroad line owned by the State of South Dakota and operated by the Burlington-Northern Railroad runs through the communities of Kaylor, Tripp, Parkston, and Dimock. The line is used mainly to move grain to regional markets, and there is an increase of activity during the fall harvest season. The only airport in the county is located just south of Parkston. The airport's single asphalt runway has been expanded to accommodate small jet aircraft.

Utilities

Water service throughout most of the county is provided by the Bon Homme-Yankton Rural Water System, which gets its water from the Missouri River. Bon Homme-Yankton Rural Water serves rural county residents individually and provides bulk water to each of the municipalities in the county except Tripp, which has its own well system. All of the municipalities, except for Olivet, have wastewater collection and treatment systems. Rural households, and residents of Olivet, must rely on individual septic tanks and drainfields.

Most solid waste is taken to a regional landfill located in Davison County. Freeman, Menno, Parkston, and Tripp each have a designated rubble site.

Electric power is provided to rural county residents by the Southeastern Electric Cooperative, while NorthWestern Energy supplies power to each of the municipalities and Kaylor. Natural gas service is available in each of the municipalities within the county.

The Kaneb pipeline, which transports various fuels, crosses the eastern side of the county along Highway 81. The TransCanada Keystone pipeline also crosses through the eastern part of the county in a northwest-southeast direction.

The primary telephone companies serving the county are Golden West Communications and Santel Communications. Cellular phone service is available throughout the county, although there are areas where signals are still rather weak.

Services

Medical Services

The primary medical facilities in the county are the Freeman Regional Hospital and Parkston's St. Benedict Hospital. Both hospitals have an emergency generator, and both serve as a critical access facility. More basic medical service is available at medical clinics in Menno and Tripp. People needing serious medical attention can be transported to trauma center hospitals in Sioux Falls or elsewhere.

Fire and Emergency Response

Fire departments are based in Freeman, Menno, Parkston, and Tripp, each in conjunction with an ambulance service. The New Elm Springs Hutterite Colony also operates a fire department, which recently received state certification. Each of the departments has basic firefighting and rescue equipment, and they all respond to structural fires, wildland fires, and to accident situations. Most of the departments also have some capabilities regarding hazardous material (hazmat) response, but a serious incident likely would require assistance from outside the county. See **Table 3.5** for more information about the departments.

Education

High schools are located in Freeman, Menno, Parkston, and Tripp. Education up through the high school level is available for children living on each of the Hutterite Colonies. Post-secondary education is not available in the county.

CHAPTER III
RISK ASSESSMENT

Background

The risk assessment process provides the foundation for the rest of the mitigation planning process. It sets the stage for identifying mitigation goals and actions to help Hutchinson County become disaster resilient and keep county residents safe, and it answers the following questions: What are the hazards that could affect Hutchinson County? What could happen as a result of those hazards? How likely are the possible outcomes? When the outcomes occur, what are the likely consequences and losses?

As outlined in the South Dakota Hazard Mitigation Plan, the Federal Emergency Management Agency defines risk assessment terminology as follows:

- **Hazard**—A hazard is an act or phenomenon that has the potential to produce harm or other undesirable consequences to a person or thing.
- **Vulnerability**—Vulnerability is susceptibility to physical injury, harm, damage, or economic loss. It depends on an asset's construction, contents, and economic value of its functions.
- **Exposure**—Exposure describes the people, property, systems, or functions that could be lost to a hazard. Generally, exposure includes what lies in the area the hazard could affect.
- **Risk**—Risk depends on hazards, vulnerability, and exposure. It is the estimated impact that a hazard would have on people, services, facilities, and structures in a community. It refers to the likelihood of a hazard event resulting in an adverse condition that causes injury or damage.
- **Risk Assessment**—Risk assessment is the process of measuring the potential loss of life, personal injury, economic injury, and property damage resulting from hazards.

According to FEMA's mitigation planning guidance, the basic components of the risk assessment are: 1) identifying hazards that affect the community, 2) profiling the hazards, 3) conducting an inventory of community assets, and 4) estimating losses. This process measures the potential loss of life, personal injury, economic injury, and property damage resulting from natural hazards by assessing the vulnerability of people, buildings and other property, and infrastructure to natural hazards.

After reviewing the risk assessment section of the current plan, the planning team decided that no major changes were needed to the risk assessment. However, many of the tables have been updated with more current information, including **Table C.2** in **Appendix C**, which

lists significant hazard events in the county. Also, it was felt that the flood risk analysis needed to be updated, because the information in the current plan was becoming dated and because of the major flooding impacts that occurred in the county in 2019. This analysis was done under the director of Harry Redman, GIS specialist with Planning & Development District III.

Identifying Hazards

The planning team began the risk assessment by reviewing the South Dakota Hazard Mitigation Plan, focusing on the hazards identified in that plan. The team also reviewed the risk assessment section of the county's current mitigation plan, and it was decided that all of the hazards discussed in that plan should be kept for this update, with no other hazards added or deleted.

Following this, the planning participants reviewed historical records of hazard events that have occurred in the county, relying on the National Climatic Data Center's Storm Events Database. See **Table C.2** in **Appendix C** for a list of the storm events.

After reviewing these sources, the planning team settled on the hazards they wanted to address in this plan, those that they considered to pose a significant threat to the county. Following are the hazards addressed in this plan as selected by the team:

- **Winter storms (includes blizzards, heavy snow, icing, and high wind events)**
- **Summer storms (includes thunderstorms, tornados, hail, and high wind events)**
- **Flooding**
- **Drought**
- **Wildfire**

The planning team acknowledges that additional hazards could have been addressed in this plan. High wind events, for instance, are not considered separate from winter storms and summer storms. Following is a list of other hazards the team considered but chose not to include in this plan, with a justification for their omission:

- Geologic Hazards – these hazards, which include earthquakes and landslides, are given a limited level of planning analysis in the South Dakota Hazard Mitigation Plan, but the state is not particularly vulnerable to such events. For example, the plan states that earthquakes have never caused significant damage in South Dakota. A map generated through the U.S. Geological Service Earthquake Hazards Program website indicates that there is only about a two percent chance that a quake of at least magnitude 5 will occur in Hutchinson County in any 100 year period, and virtually no chance of a magnitude 6 or greater earthquake [4]. Furthermore, no significant earthquake has ever been recorded in the county.

[4] A magnitude 5 earthquake is considered moderate, potentially causing varying amounts of damage to poorly constructed buildings, but significant damage would be unlikely to occur. A magnitude 6 quake is strong, with the potential to cause damage to well-built structures.

Regarding landslides, a review of the United States Geological Survey's Landslide Incidence and Susceptibility Map shows virtually no chance of a significant landslide occurring in Hutchinson County.

- Agricultural pests and diseases - this hazard is given a moderate level of planning analysis in the South Dakota Hazard Mitigation Plan. However, the planning team considered the subject matter to be outside the intended focus of this plan.
- Hazardous materials - this hazard is given a moderate level of planning analysis in the South Dakota Hazard Mitigation Plan. But again, the planning team considered the subject matter to be outside the scope of this plan, as they wanted to focus on natural hazards.
- Infectious diseases – the Coronavirus pandemic of 2020 hit just as this plan was being updated. The team considered the possibility of addressing the Coronavirus and other types of infectious diseases, but decided the subject matter was outside the focus of this plan.

Hazard Profiles

In this section, each of the hazards the planning team chose to focus on is described in terms of the hazard's ***location*** within Hutchinson County, its ***extent***, the ***history*** of the hazard's occurrence in the county, the ***probability*** of future events, and the local ***resources and capabilities*** available to mitigate against the hazard. In addition, a background description of each hazard is presented at the beginning of each hazard's profile.

- ***Location*** is the geographic areas within the county that are affected by each of the hazards. Some of the hazards - winter storms, summer storms, and drought - do not have a geographic definition at this level of analysis, since they impact all areas of the county more or less equally. Flooding and wildfires, however, do impact specific areas of the county more than others. The maps presented at the end of this chapter show locations vulnerable to flooding within each community.
- ***Extent*** is the strength or magnitude of the hazard, which is described in a variety of ways depending on the type of hazard. For example, tornado strength is measured on the Fujita Scale, high wind events are measured by speed, fire is measured in terms of acres affected, and certain hazards are measured in terms of the duration of the event.
- A brief section on the ***history*** of each hazard's occurrence in the county is presented, with a description of some of the most significant events. More information about the hazard events that have impacted the county is presented in **Appendix C**, including a comprehensive list of weather-related hazard events recorded in the county since 1960, and records of hazard events that resulted in a major disaster declaration in the county.
- ***Probability*** of occurrence of a hazard impacting an area is the likelihood that such an event will occur. In this plan, a hazard with a "high" probability is one that is expected to occur at least five times over a ten year period, a "moderate" probability hazard is expected to occur from two to five times in any given ten year

period, and a "low" probability hazard would be expected to occur no more than twice per ten year period. Determination as to the probability of hazard events occurring in the future was based largely on an analysis of the frequency of past hazard events in Hutchinson County and through discussions with members of the planning team.

- Information about the existing ***resources and capabilities*** to mitigate against each hazard is included. This includes plans and regulatory mechanisms, administrative and technical resources, financial resources, and education and outreach.

Winter Storms

Description

Winter storms historically occur from late fall to the middle of spring, varying in intensity from mild to severe. There is a long warning time associated with most winter storms, giving people time to prepare, but they still have a major impact in South Dakota, regularly destroying property and killing livestock. Such storms are generally classified into four categories - freezing rain, sleet, snow, and blizzard - with some taking the characteristics of different categories during distinct phases of the storm.

Freezing rain coats objects with ice, creating dangerous conditions. Sleet does not generally cling to objects like freezing rain, but it does make the ground very slippery, increasing the number of traffic accidents and personal injuries due to falls. Heavy snow can make travel difficult, and can collapse roofs.

Blizzards occur when snow is combined with high wind, producing blowing snow that results in low visibility. When such conditions arise, blizzard warnings are issued. These warnings take effect when wind conditions are at least 35 mph and temperatures of 20 degrees Fahrenheit or less over an extended period of time are expected. Severe blizzard conditions exist when heavy snow is accompanied by winds of at least 45 mph and temperatures of 10 degrees Fahrenheit or lower. Early blizzards in South Dakota were so devastating that the state once had the dubious distinction of being called the Blizzard State.

Winter storms can have a big impact on the power lines operated by rural electric providers, especially when they are accompanied by high winds or freezing rain. They can knock down power lines, which tend to be the most vulnerable elements of the electrical grid, and can even snap the poles.

Location

The topography of South Dakota is such that no part of the state is immune from the effects of winter storms. Farmland and grassland, which covers most of the state (including Hutchinson County) offers little resistance to high winds and drifting snow, and there are no large bodies of water or mountain ranges to mitigate against temperature extremes. All areas of the county are equally likely to be impacted.

Extent

The extent of winter storms in Hutchinson County can be quite substantial. In terms of snowfall, many winter storms in the county have dropped more than 10 inches of snow. In terms of duration, some winter storms in the county have resulted in power outages of over a week in some locations, although typical outages last for no more than a few hours. Regarding wind speed, **Table C.2** in **Appendix C** shows numerous records of high wind events occurring during the winter months with wind speeds in excess of 50 miles per hour.

History

Table C.2 in **Appendix C** lists many significant winter storms that have impacted the county. As **Table C.1** in **Appendix C** shows, winter storms resulting in a major disaster declaration have occurred in Hutchinson County in 1996, 1997, 2005, 2010, 2013, and 2019.

One of the most serious winter storms to occur in the state happened between October 22 and 24, 1995, resulting in FEMA Disaster Declaration 1075, which was declared in January 1996. As the storm moved eastward across South Dakota, ice and five to 15 inches of wet snow formed on electric lines, poles, and trees. Winds associated with the storm caused lines to slap together and poles to snap, producing widespread power outages to large portions of rural South Dakota, including Hutchinson County. The damage included broken poles, broken wires, and substation failures due to transmission line damage. The storm also forced major transportation delays because of snow accumulation on roadways and poor visibility. The combination of power outages and travel difficulty resulted in numerous cancellations and delays in school openings. Total statewide damage from the event was estimated at over $13 million, and approximately 30,290 households were affected by power outages. Crews from electric cooperatives in neighboring states assisted local cooperatives with line repairs.

Another very serious winter storm to impact Hutchinson County occurred in late November 2005 when heavy freezing rain coated roads and power lines with ice up to three inches thick throughout much of southeast South Dakota. The storm resulted in FEMA Disaster Declaration 1620. In the affected area, a total of 9,400 power poles were damaged, leaving approximately 56,000 people without electricity for varying amounts of time. The Southeastern Electric Cooperative lost 1,100 poles in the county due to the storm; their total damages were over $1.5 million. Many roads were shut down for extended periods, and most schools and businesses were forced to close. Some households out of power for up to a week as power lines were being repaired.

A very unusual late-season winter storm struck much of eastern South Dakota in mid-April 2013, resulting in FEMA Disaster Declaration 4115. Hutchinson County was particularly hard hit by this storm, which featured heavy, wet snow and icing that brought down power lines and trees in many areas.

Another late-season winter storm struck South Dakota in March 2019, resulting in FEMA Disaster Declaration 4440. The storm resulted in approximately $760,000 of public assistance funds allocated in Hutchinson County.

Probability

Table C.2 shows numerous records of significant winter storm events in Hutchinson County since the mid-1990s, an average of over four per year. Therefore, based on the historic evidence, the probability of a significant winter storm affecting Hutchinson County in a given year is high. The probability of a winter storm causing substantial damage (e.g. power lines blown down) in any given year is at least moderate. It is a certainty that winter storms will continue to affect the county.

Resources and Capabilities

Following is a description of the local resources and capabilities available for dealing with winter storm events.

- The county and each of the towns has equipment for dealing with winter storms. A list of the equipment can be found in the Hutchinson County Local Emergency Operations Plan, which is updated regularly.
- Facilities are available in each community that can be used to provide shelter to people during an extended power outage or other emergency situation. The following table provides information about the facilities.

Table 3.1 – Shelter Facilities

Community	Facility	Generator	Kitchen	Medical Supplies	Cots/ Blankets
Freeman	Fire hall	Yes	Yes	Basic	
Freeman	Freeman Regional Hosp	Yes	Yes	Yes	21 - 50
Menno	Fire hall	Yes	Yes	Basic	
Menno	Menno-Olivet Care Center	Yes	Yes	Yes	21 - 50
Parkston	City Hall	Yes	Yes	Basic	
Parkston	Fire Hall	Yes	Yes		
Parkston	High School	Yes	Yes		
Parkston	St Benedict Hosp	Yes	Yes	Yes	21 - 50
Tripp	Fire hall	Yes	Yes	Basic	1 - 10
Tripp	High School	Yes	Yes		

- The Southeastern Electric Cooperative maintains a list of priority projects in its work plan. The Cooperative is a party to the South Dakota Electric Cooperatives Mutual Aid Plan, which commits participating cooperatives to come to the aid of other cooperatives in times of emergency [5].
- The county participates actively in public awareness campaigns in conjunction with the State Office of Emergency Management and the National Weather Service, as well as sponsoring local awareness activities.
- The county LEPC plans for winter operations annually, which helps ensure a safe and efficient response for people in need of emergency assistance.

Summer storms

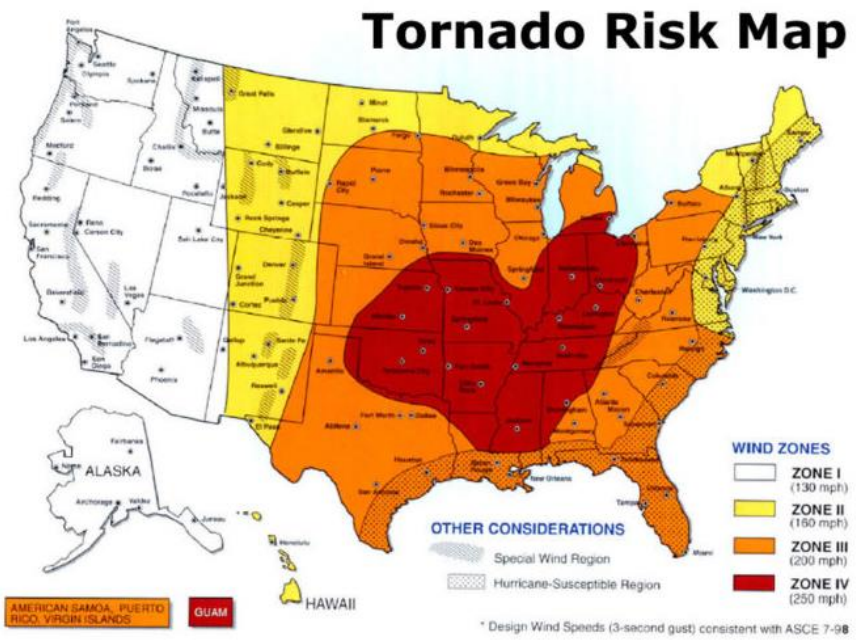
[5] According to the South Dakota Hazard Mitigation Plan, the Cooperative buried 22 miles of power line in Hutchinson County between 2005 and 2012 using HMGP funds.

Description

Summer storms can include heavy rainfall, hail, tornadoes, and thunderstorm activity. These events usually are associated with unstable weather conditions. In Hutchinson County, most damage from summer storms occurs because of high wind events and/or hail. Hail is always closely connected with thunderstorms. Hailstones can be pea-sized, up to the size of baseballs. Large hailstones are dangerous to people and animals, but most hail damage is typically suffered by crops or structures. Almost every year someone in Hutchinson County reports some kind of hail damage to crops or property.

Tornadoes are the most dramatic type of summer storm experienced in Hutchinson County, and are a special source of concern. They are one of nature's most violent storms, capable of tremendous destruction with wind speeds of 250 mph or more. Damage paths can be a mile wide and can extend for more than 50 miles. Tornadoes mostly occur in South Dakota during the months of May, June, and July. The greatest period of tornado activity is between 4 PM and 6 PM. Tornadoes present a difficult mitigation challenge, since few structures can withstand the violent winds of a twister.

South Dakota is located near the northwest edge of the core area of tornado activity in the United States, as shown in this image. Often referred to as “tornado alley”, this part of the country is particularly susceptible to tornadoes in part because the terrain is relatively flat, which allows warm, humid air from the Gulf of Mexico and cool, dry air from Canada to crash into each other, creating large super cells. According to the National Oceanic and Atmospheric Administration’s Storm Prediction Center, South Dakota ranked eighth in the nation in the frequency of tornadoes from 1950 to 1994, with a total of 1,139 tornadoes reported in the state (an average of 25.3 per year). During this period, there were 11 deaths in the state attributed to tornadoes, and 243 injuries. South Dakota ranked 27th in the nation in tornado damage, with average annual losses of $3.8 million.



Location

Summer storms are equally likely to occur in all parts of the county.

Extent

The extent of summer storms can be measured in many ways. In terms of wind speed, **Table C.2** in **Appendix C** shows numerous records of thunderstorms that produced wind speeds over 60 miles per hour, with a few over 80 miles per hour, as well as many high wind events in the warmer months with wind speeds over 60 miles per hour. **Table C.2** also shows many events with hail over one inch in diameter. In terms of onset, summer storms typically develop with a long warning time, although certain hazards associated with such storms, such as hail or tornadoes, can develop more suddenly.

Regarding tornadoes, **Table C.2** shows four records of a tornado with a magnitude greater than F1. The following table lists the entire range of tornado strength according to the enhanced Fujita scale.

Table 3.2 – Enhanced Fujita Scale

Scale	Wind Speed (MPH)	Potential Damage
EFO	65 to 85	Minor damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
EF1	86 to 110	Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	111 to 135	Considerable damage. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	136 to 165	Severe damage. Entire stories of well-constructed houses destroyed; severe damage to large buildings; trains overturned; trees debarked; heavy cars lifted off ground and thrown; structures with weak foundations badly damaged.
EF4	166 to 200	Devasting damage. Well-constructed and whole-frame houses completely leveled; some frame homes may by swept away; cars and other large objects thrown and small missiles generated.
EF5	Over 200	Incredible damage. Well-built frame houses destroyed with foundations swept clean of debris; steel-reinforced concrete structures critically damaged; tall buildings collapse or have severe structural deformations; cars, trucks, and trains can be thrown approximately 1 mile.

https://en.wikipedia.org/wiki/Enhanced_Fujita_scale

History

As shown in **Table C.2** in **Appendix C,** Hutchinson County has experienced many summer storms that have caused significant damage, including many storms that were accompanied by a tornado. **Table C.1** In **Appendix C** shows that several of these storms resulted in a major disaster declaration.

Severe storms in May 2000, August 2000, and June 2003 caused fairly significant damage to the Southeastern Electric Cooperative's utility infrastructure. One of the worst summer storms in recent memory occurred in July 2009 when hail caused substantial property and

crop damage, leading the county commission to request federal disaster assistance. Although there are no records of a truly devastating tornado event in Hutchinson County, several tornadoes have caused significant damage.

Probability

Table C.2 shows that numerous significant summer storm events have occurred in Hutchinson County, well over one per year on average. Therefore, based on the historical evidence, the probability of a summer storm occurring somewhere in the county in a given year is high. However, the probability of a storm causing significant damage (e.g. damaging hail or a tornado) in the county in a given year is low to moderate.

Regarding tornadoes, **Table C.2** shows 29 days in which a tornado was recorded in Hutchinson County since 1960, an average of about one every other year. It is likely that other tornadoes occurred in the county during this period, but were unnoticed or unreported.

Resources and Capabilities

Following is a description of the local resources and capabilities available for dealing with summer storms.

- Outdoor warning sirens are located in each community, as shown in the maps presented at the end of this chapter. Each siren is tested regularly, each has a backup source of power, and each can be activated remotely by local officials or from the 911 dispatch center in Mitchell.
- As described above under the Winter Storm profile section, the Southeastern Electric Cooperative maintains a list of priority projects in its work plan, and the Cooperative is a party to the South Dakota Electric Cooperatives Mutual Aid Plan.
- Weather spotters are in place throughout the county.
- The county participates actively in public awareness campaigns in conjunction with the State Office of Emergency Management and the National Weather Service, as well as sponsoring local awareness activities.

Flooding

Description

Floods are among the most serious and costly disaster events. In South Dakota, there are two main climatologic causes of flooding: runoff from rainfall and runoff from melting snow. The water from rainfall or melting snow flows overland until it reaches a nearby river or lake. If the river or lake cannot hold all of the water that is entering it, some of the water will begin to overflow, causing flooding. The size of the flood is influenced by such factors as the intensity or length of the rainfall, melting rate of the snow, and the infiltration of the water into the ground.

Following is a description of the four types of flooding that have the potential of impacting Hutchinson County, based on information in the South Dakota Hazard Mitigation Plan:

- Flash flooding, which results from several inches or more of rain falling in a very short period of time. This high intensity rainfall is commonly caused by powerful thunderstorms that cover a small geographic area. The flood that occurs as a result of this runoff happens very rapidly, and is generally very destructive, although usually only a small area is affected.
- Long-rain flooding, which results after several days or even weeks of fairly low-intensity rainfall over a widespread area. This is the most common cause of major flooding. The ground becomes "water logged," and the water can no longer infiltrate into the ground. The flooding that results is often widespread, covering hundreds of square miles, and can last for several days or many weeks.
- Flooding resulting from melting snow in the spring. This type has characteristics of both flash floods and long-rain floods. The area covered is generally not as large as that covered by the long-rain flood, but is typically larger than that covered by the flash flood. Generally, the flood lasts for several days, occurring when large amounts of snow melt rapidly due to warm temperatures. The flooding can be made worse if the ground remains frozen while the snow is melting, causing the melt water to run off to nearby rivers and lakes rather than infiltrating into the ground. Some of the largest floods in South Dakota have been the result of melting snow and ice.
- Dam failure, resulting from natural or man-made causes. Hutchinson County is vulnerable to this type of flood primarily because of the Menno Dam, which is classified as a high hazard dam [6].

Location

Any flood profile for Hutchinson County has to start with the James River, which, according to the South Dakota Multi-Hazard Mitigation Plan, is one of the most flood prone rivers in South Dakota. Draining 12,609 square miles of land in South Dakota, representing 16.3 percent of the state's land area, the James flows through Hutchinson County in a generally southeasterly direction. The river lacks good drainage features (the slope of the river is only .28 feet per mile), and the river's valley varies in width from a few hundred feet to three miles. Consequently, the James overruns its banks frequently during the spring snow melt, much of the drainage remaining in small swales and basins.

Extent

The extent of flooding in Hutchinson County has rarely been truly significant. Minor, localized flooding typically occurs in the county after very heavy rain events, especially in the spring following snowy winters. Floodwater depth is usually not significant. In terms of duration, flooding can cause road closures lasting from less than a day to several weeks or longer.

[6] A high hazard dam is one whose loss would cause major economic loss and in which there are anywhere from a few to hundreds of inhabited structures located in the predicted area of inundation.

However, major flooding can occur when the James River overflows its banks. Given the river's large drainage basin and the fact that it moves so slowly, excess water from snowmelt and spring rains simply has nowhere to go. During these major flood events, considerable damage occurs to farmland along the river, ruining crops that have already been planted or making planting impossible. James River flooding can also impact county roads, which often remain closed for long periods of time. During the worst years of flooding along the river, the river rises so high that some bridges over the river have to be closed.

Possibly the most serious flooding the county has experienced was in 2019, when the James River crested at 5.95 feet above flood stage in March, and 8.05 feet above flood stage in September, which was the 4th highest crest on record. Many county and township roads were inundated, including SD Hwy 37, SD Hwy 44, and US Hwy 18, and a great amount of agricultural land was flooded.

History

As shown in **Table C.1** in **Appendix C**, several flood events have resulted in a major disaster declaration in Hutchinson County. **Table C.2** in **Appendix C** shows many other flooding events that have impacted the county. Following is a summary of some of the more significant floods the county has experienced.

Serious flooding in 1984 resulted in FEMA Disaster Declaration 717, which caused almost $4.5 million of damage in the affected counties. The event caused both the Menno and Dimock dams to breach, which resulted in an award of about $700,000 to a property owner located approximately one mile downstream of the Menno Dam.

Flooding in 1993 resulted in FEMA Disaster Declaration 999, which impacted 39 counties in South Dakota. The flood caused $53,427,320 in damage throughout the state, and $11,024,621 of damage to public infrastructure. At the time, the disaster was considered one of the top ten natural disasters ranked by FEMA relief costs. In Hutchinson County, the James River inundated thousands of acres of farmland.

Flooding in 1995 resulted in FEMA Disaster Declaration 1052. All of South Dakota had above normal precipitation from January through May, with many weather stations in the central and eastern portions of the state experiencing their all-time wettest Spring. Damage was caused by ground saturation and flooding due to very high residual groundwater tables from 1994, heavy winter snow and spring rain, and rapid snowmelt. Many roads were under water due to high groundwater saturation, causing interruption of emergency services. Damage also included power transmission and distribution facilities owned by rural electric cooperatives. In the area impacted by the flood, surveys identified over 3,000 homes with some type of damage, the majority caused by groundwater seepage of one to three inches into basements. In many areas the water table rose almost to the surface, saturating septic drain fields and preventing proper treatment of wastewater. The total damage estimate in the affected counties was over $35 million, which included $9.3 million in damage to public infrastructure.

Flooding in 1997 resulted in FEMA Disaster Declaration 1173, which was declared for all counties in South Dakota. At the time, the event was considered one of the top ten natural disasters ranked by FEMA relief costs. From November 1996 through February 1997, the weather across the eastern part of the state was cold and very wet, with record setting snowfall in many places. The persistent cold greatly limited snowmelt between storms, which caused snow to pile up from 10 to 24 inches deep. An early April blizzard added to the snow pack, and heavy rain later in the month combined to further saturate the ground. Prairie potholes turned into lakes, causing many people to be evacuated from their homes and farms, and preventing farmers from planting thousands of acres of land. The flood caused over $87 million in damage statewide, and took the lives of two people. The James River Water Development District estimated that five years of flooding had destroyed or severely damaged approximately 75 percent of the forested areas in the James River valley

Flooding in 2008 resulted in FEMA Disaster Declaration 1774. The event caused approximately $125,000 of public assistance costs throughout the county, primarily due to flooding of county and township roads. Parkston was particularly affected by this flood, which temporarily shut down SD Highway 37 on the western edge of town. This photograph, looking north along SD Hwy 37, shows the floodwater on the highway.

Flooding in 2010 in eastern South Dakota was the worst in a decade, resulting in FEMA Disaster Declaration 1915. The James River met or set records for highest ever flood stage at several locations along the river. Farmland and low-lying areas along the river basin were inundated, and some of the bridges over the river had to be closed temporarily until floodwaters subsided. The SD Highway 44 bridge over the James River was closed for a couple of weeks, which was a major inconvenience for local travel.

Flooding in 2019 had a major impact throughout the year in Hutchinson County, starting in March when heavy rainfall fell on frozen ground, which led to considerable overland flooding of agricultural lands and inundation of numerous roads, including SD Hwy 44. This event resulted in FEMA Disaster Declaration 4440. The James River reached major flood stage, cresting 5.95 feet above flood stage on March 15. Flooding continued during the summer, and became even more severe when 5 to 8 inches of rainfall between September 10 - 12 caused the James River to reach its fourth highest crest on record at 8.05 feet above flood stage on September 13. Numerous county and township roads were inundated, including SD

Hwy 37, SD Hwy 44, and US Hwy 18, a great amount of ag land remained flooded, several homes located in the James River valley reported varying degrees of flood damage, and the Hutterite Colonies along the James River were impacted. The Wolf Creek Hutterite Colony was entirely underwater by September 13, forcing all colony residents to evacuate, while the Tschetter Colony lost six homes. The photo below shows the emergency measures taken to save the Maxwell Colony from flooding. This event resulted in FEMA Disaster Declaration 4469. The 2019 flooding resulted in over $1 million of public assistance costs in Hutchinson County.

A truck sits atop an 8-foot dike constructed by members of Maxwell Colony, located about 11 miles southwest of Menno, to stop floodwaters from entering the colony complex. It took colony members about 30 hours working with heavy equipment to construct the wall, which they built after learning of the heavy rains that struck the area last week. (Erik Kaufman / Republic)

Probability

Based on the historic evidence, the probability of minor flooding occurring somewhere in the county in a given year is moderate, but the probability of flooding resulting in significant damage is low. It is a certainty that flooding will continue to impact the county to some degree, no matter what mitigation actions are pursued.

Resources and Capabilities

Hutchinson County, Freeman, Menno, Olivet, and Parkston participate in the National Flood Insurance Program (NFIP). Each entity is in good standing with the program, and each has a flood ordinance designed to reduce flood risk. Parkston also is one of four communities in South Dakota participating in the Community Rating System (CRS). The goals of the CRS are to reduce flood damages to insurable property, strengthen and support the insurance aspects

of the NFIP, and encourage a comprehensive approach to floodplain management. The city has a Class 9 rating. The following table provides information on NFIP participation in the county.

Table 3.3 – National Flood Insurance Program Information

Jurisdiction	NFIP Participation Status	FIRM Effective Date	Insurance Policies in Force	Amount of Coverage
Hutchinson Co.	Yes	9/02/2009	5	$1,332,600
Dimock	No			
Freeman	Yes	(NSFHA)		
Menno	Yes	9/02/2009		
Olivet	Yes	(2020)		
Parkston	Yes	9/02/2009	7	$487,000
Tripp	No			

Sources: www.fema.gov/policy-claim-statistics-flood-insurance

Following is a description of other local resources and capabilities available for mitigating damage from flooding.

- In 2009, Hutchinson County adopted an official drainage ordinance that provides a framework for landowners in the county to help them plan and execute drainage activities that could affect their land and neighboring land. The ordinance is enforced by a Drainage Administrator, working under the direction of a drainage subcommittee of the Hutchinson County Commission.
- Hutchinson County is one of the counties located in the James River Water Development District. The Hutchinson County Commission works with the water development district regarding management issues involving the James River. Actions that have been partially funded by the district include removal of downed trees along the river, which has improved water flow.
- The U.S. Army Corps of Engineers recently completed a study of the James River and its tributaries, which resulted in the issuance of a new FEMA Flood Insurance Rate Map in September 2009.
- There is an emergency preparedness plan in place for the Menno Dam, and additional riprapping and other repairs were made to the dam in 2019.
- Many of the communities in the county have implemented storm water drainage improvements within the recent past. In 2009, Dimock added an extra culvert at the intersection of First and Main Streets to improve storm water flow. In 2010, Freeman installed storm sewer piping along several blocks of Cedar Street, Parkston made improvements to its sewer system, which used to experience very high levels of groundwater infiltration, and Tripp installed storm sewer piping along several blocks of Dakota Street.

- Each of the Hutterite Colonies in the county has constructed its own dike system, which has significantly reduced their vulnerability to flooding from the James River.

Drought

Description

Drought is a deficiency in precipitation over an extended period of time, usually a season or more, resulting in a water shortage causing adverse impacts on vegetation, animals, and/or people. It is a normal, recurrent feature of climate that occurs in virtually all climate zones. Human factors, such as water demand and water management, can exacerbate the impact that drought has on a region.

Droughts can occur at any time of the year, but the consequences are worse during the summer growing season, especially after winters with below normal precipitation. A small departure in normal precipitation during the months of June through August can have a significantly negative impact on crop production. The demand for water for multiple uses also impacts water availability. Rural water systems that were originally designed to supply water for people are now also being used for cattle and to fight wildfires, taxing the limits of the systems.

Drought in South Dakota is often accompanied by periods of extreme heat. According to the National Weather Service, among natural hazards, only the cold of winter—not lightning, hurricanes, tornadoes, floods, or earthquakes—takes a greater toll on human life. Between 1936 and 1975, nearly 20,000 people were killed in the United States by the effects of heat and solar radiation, and in the heat wave of 1980, more than 1,250 people died. Elderly people, small children, those with chronic illnesses, and those on certain medications are particularly susceptible to heat stress.

Location

All areas of the county are equally likely to be impacted by drought.

Extent

Drought severity, the most commonly used term for measuring drought, is a combination of the magnitude and duration of the drought. In terms of magnitude, Hutchinson County has experienced many years of annual precipitation less than two thirds its average amount. In terms of duration, it is not unusual for Hutchinson County to experience periods of below normal precipitation that last for several months. During the 1930s, drought conditions persisted for multiple years. In an area that is so highly dependent on agriculture, the impact of a major drought can be significant. Although most agricultural producers now have crop insurance and agricultural practices today are more advanced, the impacts of drought can still be serious.

History

Hutchinson County has experienced many significant droughts. The drought of 1976 was one of the most severe in memory, resulting in South Dakota's only drought emergency declaration to date. Drought in 1980 and 1981 affected the entire state of South Dakota, and was rated as a 10 to 25 year event. Drought in 2012 was so devastating that the State of South Dakota activated a Drought Task Force.

The most significant drought in the area's history occurred in the 1930s, the so called dust bowl years. The drought came in three waves, 1934, 1936, and 1939-1940, but some parts of the Great Plains experienced drought conditions for as many as eight consecutive years. The soil, depleted of moisture, was lifted by the wind into great clouds of dust and sand which were so thick they concealed the sun for several days at a time. The "black blizzards" were caused by sustained drought conditions, compounded by years of land management practices that left topsoil susceptible to the forces of the wind.

Probability

Table C.2 in **Appendix C** shows at least one drought record in Hutchinson County in five of the years since 1999. Based on this, the probability of a significant drought occurring in the county in any given year is moderate. The probability of a truly severe drought impacting the county, such as occurred in 2012, is low, expected to occur no more than twice per ten years.

At the statewide level, the developers of the South Dakota Hazard Mitigation Plan cite tree ring research spanning a period of about 400 years indicating that multi-year droughts as significant as the 1930s drought occur on average every 57 years in South Dakota. Based on historical records, notable droughts have occurred somewhere in the state on average about every 12 years.

Resources and Capabilities

Resources at the local level in Hutchinson County to mitigate the impacts of drought are available. The Bon Homme-Yankton Rural Water System has restrictions on the amount of water that it will distribute within its service area, and could take such action during extreme drought conditions. Likewise, the communities served by the water system could enact regulations restricting non-essential water use, such as for watering lawns and washing cars.

In the agricultural sector, most farmers in Hutchinson County have crop insurance, which helps lessen the financial impact of drought. Furthermore, modern agricultural practices are more advanced (such as no-till farming and the development of more drought-tolerant crops), so farmers can better withstand years of below average rainfall.

Resources available at the state or regional level include the State Drought Task Force, which was activated during the severe drought of 2012. The goal of the task force is to monitor drought conditions by gathering the most current data available and to make sure that South Dakotans have access to that information as quickly as possible. The group coordinates the exchange of drought information among government agencies and agriculture groups, fire managers, and water-supply organizations. Another resource is the Natural Resource Conservation Service, which has information available about how to deal with droughts.

Wildfire

Description

Wildfires are uncontrolled conflagrations that spread freely through the environment. Such fires that occur near populated areas pose threats not only to natural resources, but also to human life and personal property. Wildfires are not as serious a concern in Hutchinson County as they are in other more forested parts of the country, but the opinion of the planning team is that the hazard does warrant some attention in this plan.

Location

Wildfires in Hutchinson County are most likely to occur in large areas of extensive brush or unmanaged vegetation, including pastures and other types of grassland. This also includes the hills and draws along the James River, which contain a significant amount of trees and thick brush. Another concern is controlled burns that get out of control, which can occur almost anywhere in the county.

Extent

Each of the fire departments in the county submits reports to the South Dakota Division of Wildland Fire about the fires they fight. The division compiles the reports and produces a comprehensive database of all the records, which the planning team was able to obtain for fires occurring in the county from 2000 through 2019. The following table summarizes this information in terms of the size of the fires that have been fought. It shows that most of the fires have been fairly small, most impacting no more than a few acres.

Table 3.4 – Wildfires in Hutchinson County (2000 – 2019)

1 to 10 Acres	10 to 49 Acres	50 to 99 Acres	100 to 249 Acres	250 + Acres
52	23	5	3	2

Source: South Dakota Division of Wildland Fire (based on reports from the local fire departments)

According to the database, the most common specific cause of wildfires in Hutchinson County is from debris catching fire, although it should be noted that the cause for most of the fires is not known. Information is not available on the dollar amount of damage caused by any of the wildfires, or whether any injuries or deaths occurred.

History

Many notable wildfires have occurred in Hutchinson County, but nothing on a truly destructive scale. Since 2000, the largest fires were a 1,200-acre fire that occurred in 2011 southwest of Tripp, and a 640-acre fire in 2014 two miles west of Parkston.

Probability

Wildfires affecting less than ten acres are likely to occur somewhere in Hutchinson County most years, but large scale wildfires are much less common. **Table 3.4** shows only two

wildfires over 250 acres in size between 2000 and 2019. Based on this period of analysis, the probability of a significant wildfire can be considered low. The probability of a wildfire causing serious damage also is low.

Resources and Capabilities

Each fire department based in the county has volunteer firefighters who have had training in fighting wildfires; the level of training varies from basic to advanced. The departments also have adequate equipment and protective gear for their volunteers to handle most of the wildfires they are likely to encounter. Various mutual aid agreements also are in place which helps ensure that assistance is available during particularly serious wildfires and other emergency events. A summary of the capabilities of the departments is presented in the following table.

Table 3.5 - Fire Department/Ambulance Service Resources and Capabilities

Dept	Members	Vehicles
Freeman	32	2 pumpers, 2 tankers, 2 grass rigs, 1 rescue
Menno	40	3 pumpers, 1 tanker, 2 grass rigs, 1 rescue
Parkston	29	3 pumpers, 1 grass rig, 1 rescue
Tripp	28	4 pumpers, 1 tanker, 2 grass rigs

Following is a summary of the other local resources and capabilities available for dealing with wildfires.

- The county enacts burn bans as conditions warrant. The county emergency management director consults with the local fire chiefs to determine when to put the bans into effect.
- A requirement is in place that those wanting to start controlled burns must first contact the E-911 dispatch center in Mitchell.

Community Assets

Hazards can affect all parts of the community, but their impact on certain community assets is particularly important to consider. In this section, the most important community assets and facilities in Hutchinson County are identified. The section begins by identifying those assets and facilities that would play a critical role in helping the community prepare for and respond to a hazard event. Following this, certain other important community assets are identified, and the section ends with a brief discussion of vulnerable populations in the county.

Hazard Preparedness and Response

Government Offices

- Hutchinson County Courthouse, Olivet

- City office in each municipality

Emergency Response

- Hutchinson County Emergency Management Office
- Hutchinson County Sheriff's Office, Olivet
- Police departments in Freeman, Menno, Parkston, and Tripp
- Fire departments in Freeman, Menno, Parkston, and Tripp
- Hutchinson County Highway Department, Olivet

Major Medical facilities

- Freeman Regional Hospital
- St Benedict Hospital, Parkston

Shelters

- Disaster relief shelters are located in each community (see page 20).

Notification

- At least one warning siren is located in each community.

Other Important Assets

Included in this category are assets and facilities that are important to the basic everyday functioning of communities, including educational facilities, major businesses, and other facilities. These assets generally would not have a direct role in the local response to a disaster event, although they could play a part. The schools, for example, could be used to shelter people during long-term power outages, whether or not they are officially designated as a shelter.

Educational Facilities

- Freeman School (K-12)
- Freeman Academy School (K-12)
- Menno High School (K-12)
- Parkston High School (K-12)
- Tripp High School (K-12)

Important Businesses

- Dimock Dairy
- Amalgamated Milk Producers, Freeman
- Stern Oil Company, Freeman

- Vermeer Corporation, Freeman
- Mettler Fertilizer, Menno
- MDS Manufacturing, Parkston
- Mettler fertilizer, Tripp
- Dakota Plains grain elevator (between Parkston and Tripp)

Vulnerable Populations

The issue of vulnerable populations is important to consider, because such populations may be particularly vulnerable to disaster events. Vulnerable populations include the very young, the elderly, those with physical or mental disabilities, and the very poor. They can also include populations that tend to be isolated in some way from the rest of the community, such as those who are not fluent in English.

The South Dakota Hazard Mitigation Plan includes a section on social vulnerability, using the Social Vulnerability Index for the United States. This index, compiled by the University of South Carolina Hazards and Vulnerability Research Institute, measures the social vulnerability of all counties in the nation to environmental hazards. The index synthesizes 30 socioeconomic variables, which research suggests contribute to reduction in a community's ability to prepare for, respond to, and recover from hazards. The primary variables are race and class, wealth, percentage of elderly residents, Hispanic ethnicity, special needs individuals, Native American ethnicity, and service industry employment. According to the index, Hutchinson County is in the top 20% of counties in the nation most socially vulnerable to environmental hazards.

In the context of this plan, a specific population of concern is the aged, who tend to be more vulnerable to the effects of hazard events because of their physical or mental condition, or other factors. As shown in **Table 2.4**, a very high percentage of the population in Hutchinson County is old, with the median age of the population almost ten years higher than in the nation as a whole. Many of the aged live in nursing homes and assisted living facilities. Such facilities are located in Freeman, Menno, and Parkston.

Vulnerability and Loss Potential

This section assesses the vulnerability of Hutchinson County and the participating jurisdictions to the hazards profiled earlier in this chapter. Vulnerability is defined as the extent to which people and property are exposed to harm or damages created by a hazard. The method of determining vulnerability varies by the type of hazard and the availability of data, but each methodology is based on either potential for loss or actual losses. Following is a description of each specific methodology used.

Potential Loss Methodologies

- FEMA digital Flood Insurance Rate Maps were used to identify 100-year flood zones in the county. Using GIS, these flood zones were overlaid on parcel layer

data to provide estimates of loss potential at the community level.

- FEMA's HAZUS loss estimation software was used to estimate potential losses from flooding in each community. HAZUS produces a flood polygon and flood-depth grid that represents the 100-year floodplain, with losses calculated using national baseline inventories (buildings and population) at the census block level. The maps generated by HAZUS are not as accurate as FEMA's Flood Insurance Rate Maps, nor is the resulting data, but HAZUS is still a helpful planning tool for communities that have not been mapped by the National Flood Insurance Program [7].
- Data on the population living in wildfire threat zones was used to estimate potential wildfire losses.
- The value of buildings within the county was used to estimate potential losses due to winter storms and summer storms (building exposure).
- Population density within the county was used to estimate potential losses due to winter storms and summer storms.

Actual Loss Methodologies

- The National Climatic Data Center's Storm Events Database was consulted for historical information regarding weather-related events (see **Table C.2** in **Appendix C**).
- Records from FEMA were consulted for federal assistance provided to Hutchinson County following major disaster declarations through FEMA's Public Assistance program (see **Table C.1** in **Appendix C**).
- Data from the U.S. Dept of Agriculture Risk Management Agency was used to assess crop loss due to a variety of natural hazards.
- Information from the National Drought Mitigation Center's Drought Impact Reporter was used to assess the local impact of droughts.
- Data from the South Dakota Division of Wildland Fire was used to assess the historical impact of wildfires in the county.

At the conclusion of the vulnerability assessment for each hazard, development trends are considered to determine whether the county's vulnerability to the hazard might increase in the future. Information on development trends in the county was obtained by analyzing population trends and projections, and through discussion with local officials about where housing development and other growth may be likely to occur. Other factors, including the possible impact of climate change, also are considered.

[7] A limitation of HAZUS is the inadequacies associated with its hydrologic and hydraulic modeling, especially in sparsely populated areas where census blocks - the basis of the loss calculations - are large. The software assumes the population and building inventory to be evenly distributed over the census blocks, whereas in reality flooding may occur only in a small part of the block where there are few buildings or people. Also, HAZUS uses default national databases that may not be applicable at the local level.

At the end of the chapter, the county's vulnerability to each hazard is summarized. Vulnerability is characterized as either "low", "moderate", or "high", based on the results of the risk analysis. Following the summary, maps are presented showing the community assets discussed in the previous section, and areas of known risk.

Winter Storms

All areas of South Dakota are vulnerable to winter storms, and the consequences of such storms can be great. They can disrupt the power supply when electrical lines are brought down by high winds, falling trees, or extreme ice buildup. Everyday activities can be significantly disrupted when road conditions deteriorate because of snow cover or precipitation that freezes on road pavement. In extreme situations, roads can be closed because of accumulated snow for days or even weeks. Winter storms also can kill or injure livestock, and can cause significant crop losses when they occur early in the growing season.

The rural areas of the county may be somewhat more vulnerable to winter storms than the towns. For example, transmission of electricity in rural areas is dependent on many miles of power lines located in open country that is highly susceptible to high wind events, especially when combined with freezing rain (high winds can snap power poles, and freezing rain and sleet forms ice on the lines, making them heavy and more susceptible to being blown down). Rural residents also are vulnerable if roads are blocked by snow for an extended period of time and they cannot travel into town for groceries, medical supplies, or other important items.

To assess the county's vulnerability to winter storms, the methodology that was used in the South Dakota Hazard Mitigation Plan was essentially followed for this plan. The following factors were considered:

- The number of prior winter storm events in the county
- Past damage amounts
- The county's building exposure
- Population density

Prior Events:

Table C.2 in Appendix C shows that numerous significant winter storms have occurred in Hutchinson County, including blizzards, ice storms, heavy snows, and extreme cold events. The authors of the South Dakota Hazard Mitigation Plan found that there were 88 total winter storm events in the National Climatic Data Center's Storm Events Database between January 1993 and August 2016 for Hutchinson County, ranking the county tied for 4th among the state's counties.

Past Damage Amounts:

Winter storms have the potential to cause significant amounts of damage. For instance, the ice storm that occurred in November 2005 resulted in over $1.2 million of public assistance

costs to the Southeastern Electric Cooperative, and the late winter storm of 2013 resulted in $242,000 of public assistance costs to the cooperative.

Given Hutchinson County's agriculturally-based economy, another method to determine vulnerability is to look at the impact of winter storms on the county's agricultural producers. Farmers typically protect themselves from the impacts of adverse weather and natural hazards by insuring their crops against losses through multi-peril crop insurance, which is underwritten by the Risk Management Agency, a part of the U.S. Dept of Agriculture. Data on indemnity payouts for crop loss in Hutchinson County due to various types of winter weather events between 2000 and 2017 was obtained from the Risk Management Agency, and is presented in the following table. During this period of analysis, winter weather-related payouts represented about 2% of all indemnity payouts in Hutchinson County.

Table 3.6 – Crop Loss Due to Winter Weather

Year	Frost	Freeze	Cold Winter	Cold Wet Weather
2000	$0	$0	$18,658	$7,095
2001	$0	$0	$384,444	$518
2002	$0	$1,501	$5,455	$10,703
2003	$990	$0	$12,897	$0
2004	$6,518	$6,351	$1,236	$6,117
2005	$1,642	$6,084	$2,006	$0
2006	$0	$928	$6,113	$1,495
2007	$438	$819	$188,113	$434
2008	$0	$20,226	$38,681	$103,563
2009	$0	$0	$341,728	$5,967
2010	$3,029	$0	$14,418	$12,519
2011	$22,201	$0	$17,997	$1,519,133
2012	$0	$0	$3,774	$1,675
2013	$3,001	$1,240	$8,033	$15,132
2014	$0	$0	$235,348	$17,392
2015	$0	$0	$346,430	$12,247
2016	$0	$5,532	$11,512	$28,759
2017	$0	$0	$6,752	$60,200

Source: USDA Risk Management Agency (www.rma.usda.gov/data/cause.html)

Building Exposure:

The total value of buildings in Hutchinson County is approximately $921,743,000, according to the South Dakota Hazard Mitigation Plan, which ranks the county 20th among the state's 66 counties. The median figure for South Dakota counties is approximately $605,000,000. The county's building exposure can be considered moderate.

Population Density:

Hutchinson County is sparsely populated, with an average of 9.0 people per square mile, less than the state figure of 10.5 people per square mile. Given that South Dakota is itself

considered to be very rural, Hutchinson County would have to be rated low in terms of population density.

Development Trends

Looking ahead, the expected decrease in population may reduce somewhat the county's vulnerability to winter storms and other hazards. However, climate change may have an impact on vulnerability to winter storms. According to the South Dakota Hazard Mitigation Plan, the winter season is warming at a faster rate than any other season in South Dakota, but winter storms and blizzards will continue to be a severe weather hazard in the state. Warmer winter temperatures could mean more ice and freezing rain events, which would impact electrical utilities and communication systems, the transportation system, and livestock. An increase in the frequency of large snowfall events also is being experienced in the northern U.S. There remains some uncertainty in projections for the coming decades, but the rising trend of extreme precipitation events is something that needs to be considered.

Summer Storms

All areas of Hutchinson County are vulnerable to summer storms, especially those that are accompanied by tornadoes, lightning, or large hail. Typical damage from summer storms includes blown down power lines, crop damage from hail and high wind, and flooding as the result of heavy rain. Like the rest of the Great Plains, Hutchinson County is especially vulnerable to summer storms accompanied by high wind. This is because the landscape is open and there is little topographic relief to block the wind. Infrastructure and facilities located at higher elevations is somewhat more vulnerable to high wind events.

Vulnerable populations include the elderly, the sick, those with a mobility limitation, and people who happen to be outside during a storm event. People living in mobile homes are also vulnerable, since such structures can be overturned by winds of 60 to 70 miles per hour if they are not anchored properly.

As with winter storms, the methodology that was used in the South Dakota Hazard Mitigation Plan to assess vulnerability to summer storms was followed for this plan. The following factors were considered:

- The number of prior summer storm events in the county
- Past damage amounts
- The county's building exposure
- Population density

Prior events:

Table C.2 in Appendix C shows many significant summer storms that have been recorded in Hutchinson County, including hailstorms, thunderstorms, lightning, and tornadoes, as well as high wind events that occurred during the summer. The table shows over 30 recorded tornadoes, four of which were greater in magnitude than F1. The authors of the South Dakota Hazard Mitigation Plan assigned a rating of 5 (out of 10 maximum) to Hutchinson County in

terms of the frequency of tornadoes recorded between 1950 and 2016, and assigned a rating of 7 for tornadoes of magnitude F1 or greater.

Past Damage Amounts:

Summer storms have the potential to cause significant amounts of damage. A summer storm with hail in July 2009 caused well over $1 million dollars of property and crop damage in Hutchinson County. As shown in **Table C.2**, many other summer storm events have caused lesser amounts of property and/or crop damage in the county.

As with winter storms, another method to determine the county's vulnerability to summer storms is to look at the impact of such storms on the county's agricultural producers. Summer storms can cause a lot of damage to cropland, especially when they are accompanied by hail. Data on indemnity payouts for crop loss in Hutchinson County due to hail as well as high wind events between 2000 and 2017 was obtained from the Risk Management Agency, and is presented in the following table. During this period of analysis, summer storm-related payouts represented just under 6% of all indemnity payouts in Hutchinson County.

Table 3.7 – Crop Loss Due to Severe Summer Weather

Year	Hail	High Wind		Year	Hail	High Wind
2000	$625,527	$22,262		**2009**	$6,792,310	$0
2001	$6,650	$0		**2010**	$0	$1,663
2002	$230,764	$0		**2011**	$343,606	$7,953
2003	$86,282	$0		**2012**	$148,096	$9,012
2004	$103,300	$2,332		**2013**	$1,383,655	$0
2005	$653	$0		**2014**	$503,892	$0
2006	$9,180	$0		**2015**	$102,704	$4,770
2007	$7,038	$23,847		**2016**	$239,199	$33,411
2008	$292,326	$7,028		**2017**	$1,597,002	$22,216

Source: USDA Risk Management Agency (www.rma.usda.gov/data/cause.html)

Building Exposure:

The total value of buildings in Hutchinson County is approximately $921,743,000, according to the South Dakota Hazard Mitigation Plan, which ranks the county 20th among the state's 66 counties. The median figure for South Dakota counties is approximately $605,000,000. The county's building exposure can be considered moderate.

Population Density:

Hutchinson County is sparsely populated, with an average of 9.0 people per square mile, less than the state figure of 10.5 people per square mile. Given that South Dakota is itself considered to be very rural, Hutchinson County would have to be rated low in terms of population density.

Development Trends

Looking ahead, the county's expected decline in population suggests that vulnerability to summer storms is not likely to increase in the future. Regarding the impact of climate change, the South Dakota Hazard Mitigation Plan cites the Climate Science Special Report from 2017, which states that damages from convective weather hazards, such as severe thunderstorms and tornadoes, have undergone the greatest increase relative to other extreme weather since 1980. The plan states that the tornado season is getting longer, and that an increase in potential days for severe thunderstorms is projected for the mid to late 21st century, although the largest increases are projected for neighboring regions of the Midwest and the southern plains. There is some uncertainty in these projections, but severe thunderstorms and tornadoes will remain a hazard in South Dakota.

Flooding

Like all counties in South Dakota, Hutchinson is vulnerable to flooding. Because of the specific nature of flooding, the county's vulnerability to flooding will be analyzed first on a general county-level basis, and then specifically for each community. Given the degree to which flooding is geographically-based, this approach made the most sense to the planning team.

General Flood Vulnerability

According to the HAZUS analysis that was run for the South Dakota Hazard Mitigation Plan (see Table 3-45 of that plan), the potential building damage loss from flooding in Hutchinson County is $5,799,000. The median figure for all South Dakota counties is approximately $2,800,000. Overall, Hutchinson ranks 16th among the state's 66 counties in this measure of vulnerability. The potential displaced population in the county was determined to be 957 people, ranking the county 10th in the state.

Currently, there are a total of 12 National Flood Insurance Program policies in Hutchinson County, with at least nine losses having occurred since 1978. There are no repetitive loss properties in Hutchinson County.

In addition to impacting buildings and other structures, a good deal of public infrastructure throughout the county is vulnerable to flooding. Flood damage frequently involves washed out or damaged roads and drainage culverts, often occurring in the spring, especially following winters with heavy snow. Roads and infrastructure in the vicinity of the James River typically experience the most severe flooding, but many other county roads throughout the county also are somewhat vulnerable. The threat to homes and other structures along the James is usually slight, but significant property loss did occur in 2019, as described earlier.

Flooding also has a major impact on agriculture. Spring flooding can delay farmers getting into their fields to plant, and later in the growing season it can damage crops. Data on indemnity payouts for crop loss in Hutchinson County due to flooding, as well as excess moisture/precipitation, between 2000 and 2017 was obtained from the Risk Management Agency, and is presented in the following table. During this period of analysis, flood-related payouts represented about 20% of all indemnity payouts in Hutchinson County, second only

to drought. Much of the crop loss from flooding in Hutchinson County is due to the James River overflowing its banks onto cropland adjacent to the river.

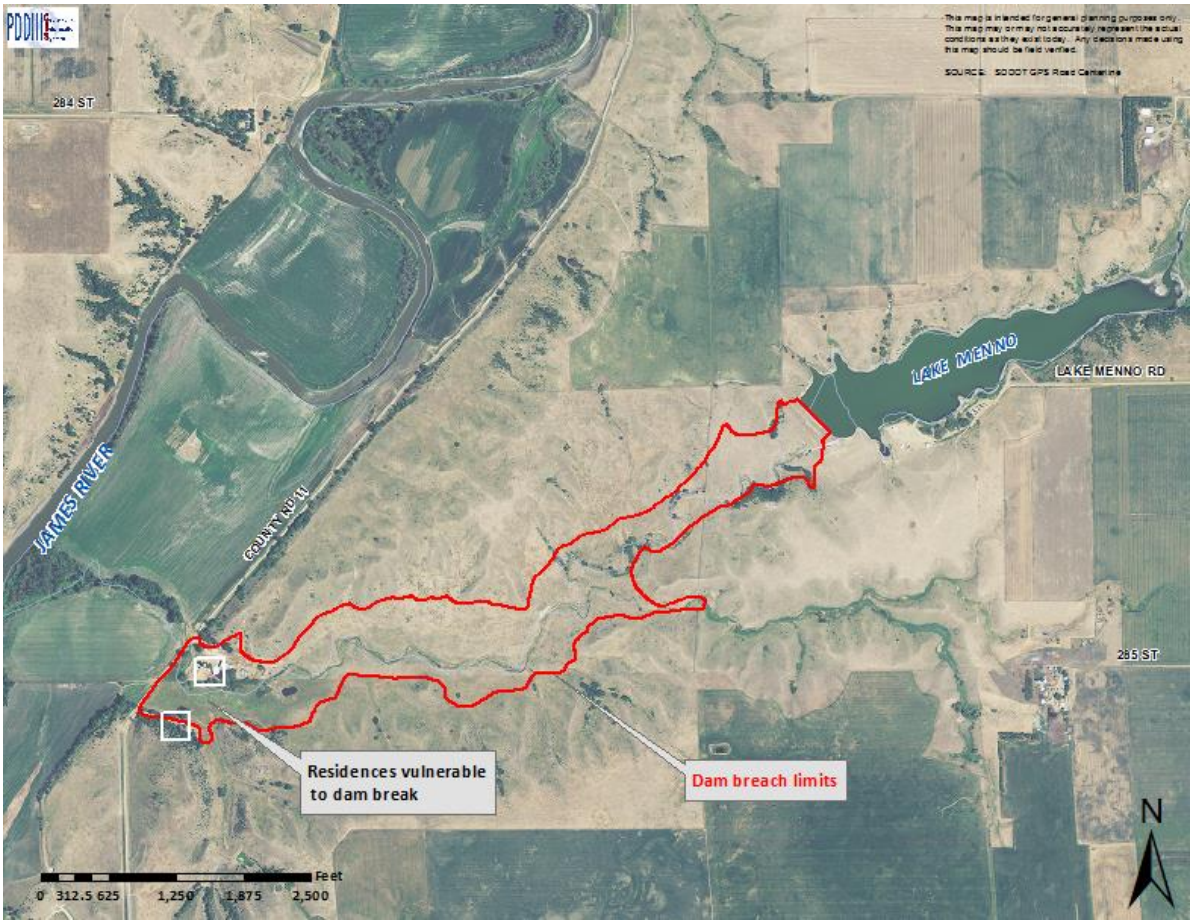
Table 3.8 – Crop Loss Due to Flooding

Year	Flooding	Excess Moisture/ Precipitation		Year	Flooding	Excess Moisture/ Precipitation
2000	$0	$195,712		**2009**	$175,324	$1,922,694
2001	$8,435	$2,459,338		**2010**	$273,895	$5,563,534
2002	$1,476	$321,884		**2011**	$8,843	$5,522,415
2003	$2,715	$242,738		**2012**	$17,059	$71,606
2004	$23,920	$315,088		**2013**	$1,737	$152,976
2005	$18,887	$1,689,061		**2014**	$736	$47,937
2006	$11,151	$24,924		**2015**	$0	$331,576
2007	$154,480	$4,661,921		**2016**	$55,714	$6,053,246
2008	$709,894	$10,583,002		**2017**	$67,746	$2,170,019

Source: USDA Risk Management Agency (www.rma.usda.gov/data/cause.html)

2019 was probably the worst year ever in terms of flooding's impact on South Dakota's agricultural producers. The state ranked first in the nation with almost 4 million acres of farmland prevented from being planted due to flooding, more than double the next nearest state. Hutchinson County was at the epicenter of the flood's impact in South Dakota, ranking 1st in the state with a total of approximately 222,000 acres not planted.

Hutchinson County also is vulnerable to flooding due to dam failure, primarily because of the Menno Dam, which was originally built in 1935, and then rebuilt in 1995 after it was breached in 1984 following heavy rain. Its normal storage capacity is 700 acre-feet, and its maximum capacity is 2,050 acre-feet. The dam is adequate to handle the 50% Probable Maximum Flood without overtopping the dam. If the dam did fail, there are two residences located downstream of the dam that might be affected by floodwater, as shown in the following figure. It is estimated that the residence to the north would be impacted by floodwater within about 35 minutes.



Local Flood Vulnerability

At the community level, flood vulnerability was determined by using FEMA's HAZUS loss estimation software to estimate potential losses from flooding during a 100-year flood event, and by using GIS software to determine the value of property at risk of being flooded. The following table summarizes the results of the HAZUS analysis.

Table 3.9 – HAZUS Base Flood Loss Estimation Results

Community	Building Structural Damage	Debris Generated	Households Displaced	People Needing Shelter
Dimock	*HAZUS SHOWED NO SIGNIFICANT RISK*			
Freeman	$3,000	3 tons	5	0
Menno	$3,000	4 tons	2	0
Olivet	$14,000	9 tons	3	0
Parkston	$1,392,000	460 tons	495	6
Tripp	*HAZUS SHOWED NO SIGNIFICANT RISK*			

Source: FEMA HAZUS loss estimation software (July 2020)

The following table shows the amount and value of property at risk of flooding. The analysis was done by using GIS software to overlay areas of known flood risk (either the 100 year

floodplain or the area identified by HAZUS as flood prone) on parcel data supplied by the county.

Table 3.10 – Property in Flood Prone Areas

Community	Number of Housing Units	Assessed Value of Improvements
Dimock	0	$0
Freeman	14	$1,192,980
Menno	12	$635,810
Olivet	1	$55,600
Parkston	78	$5,536,320
Tripp	0	$0

Sources: HAZUS; FEMA Flood Insurance Rate Maps; Hutchinson County Director of Equalization

Development Trends

Looking ahead, the population of Hutchinson County has been declining for the last several decades, and no major development has occurred anywhere in the county since the current plan was developed. Although population growth is not expected to increase the county's vulnerability to flooding, a factor that is likely to increase vulnerability is the continuing conversion of wetlands and other marginal land to agricultural production. Farming these marginal lands is increasing the probability and severity of flooding in certain areas as the land's natural capacity to absorb excess surface water is decreased. The primary impact is on rural roads and infrastructure. Precise statistics on the amount of road damage that flooding has caused over the years in Hutchinson County are not available, but there appears to be little doubt that county and township roads are suffering more flood-related damage than they used to. Future updates to this plan could explore this trend in more depth.

The nature and frequency of flooding also could be altered by climate change. There is no comprehensive assessment of how climate change might affect flooding in South Dakota, but regional trends for the northern Great Plains show a trend toward less frequent, but more intense, rain events. Climate projections indicate that 1-day, 20-year return events may increase in frequency by 8% to 16% in the coming decades. In the northern Great Plains region, this is compounded by an overall wetter trend of about 15% increase when comparing the years 1986-2015 to 1901-1960. The additional moisture overall can add to the increase in precipitation per extreme event.

Drought

Without question, Hutchinson County is vulnerable to drought. As shown in **Table C.2** in **Appendix C**, there are 18 drought records for the county in the Storm Events Database just since 1999, with many more droughts known to have occurred before then. The biggest impact of drought in Hutchinson County is in the agricultural sector, which is not surprising, given the county's heavy reliance on farming. Non-irrigated cropland is most susceptible to drought, and yield reductions due to moisture shortages can be aggravated by wind-induced soil erosion.

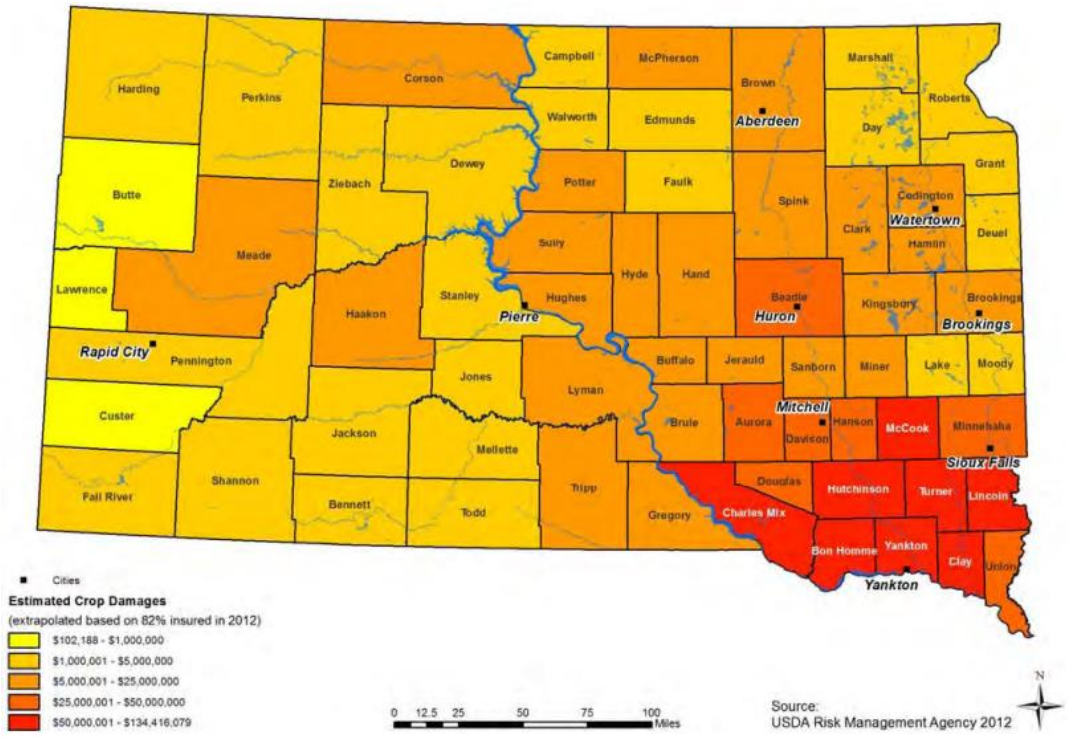
Data on indemnity payouts for crop loss in Hutchinson County due to drought and heat between 2000 and 2017 was obtained from the Risk Management Agency, and is shown in the following table. For this period of analysis, drought-related payouts accounted for almost 73% of all indemnity payouts in Hutchinson County, far higher than any other type of payout. It is obvious that drought is one of the costliest hazards facing county farmers [8].

Table 3.11 – Crop Loss Due to Drought and Heat

Year	Drought	Heat		Year	Drought	Heat
2000	$617,289	$0		**2009**	$6,695	$6,389
2001	$655,967	$6,949		**2010**	$1,151	$0
2002	$9,758,512	$84,810		**2011**	$434,897	$104,628
2003	$728,827	$21,307		**2012**	$110,392,054	$10,331,252
2004	$692,493	$3,373		**2013**	$164,019	$15,243
2005	$5,779,279	$259,037		**2014**	$386,431	$0
2006	$11,200,375	$266,322		**2015**	$301,033	$0
2007	$830,450	$114,897		**2016**	$956,363	$30,438
2008	$3,026,445	$2,209		**2017**	$1,142,904	$22,100

Source: USDA Risk Management Agency (www.rma.usda.gov/data/cause.html)

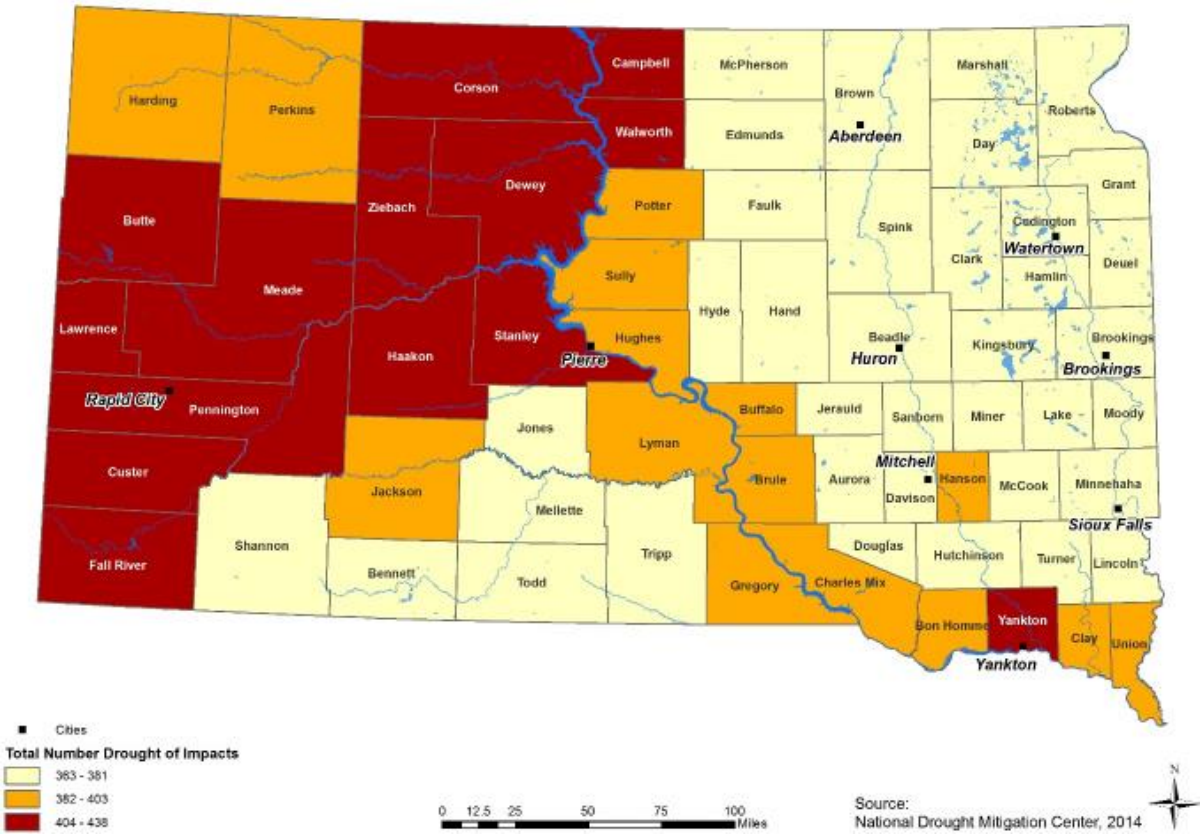
The 2012 drought had by far the biggest impact on the county's agricultural production. In fact, Hutchinson County suffered more crop loss due to drought that year than any other county in South Dakota. The figure below, as reproduced from the South Dakota Drought Mitigation Plan, shows the 2012 drought's impact statewide.



[8] Drought also appears to be the costliest natural hazard statewide for South Dakota farmers. From 2000 through 2013, drought payouts accounted for approximately 50% of all indemnity payouts in the state.

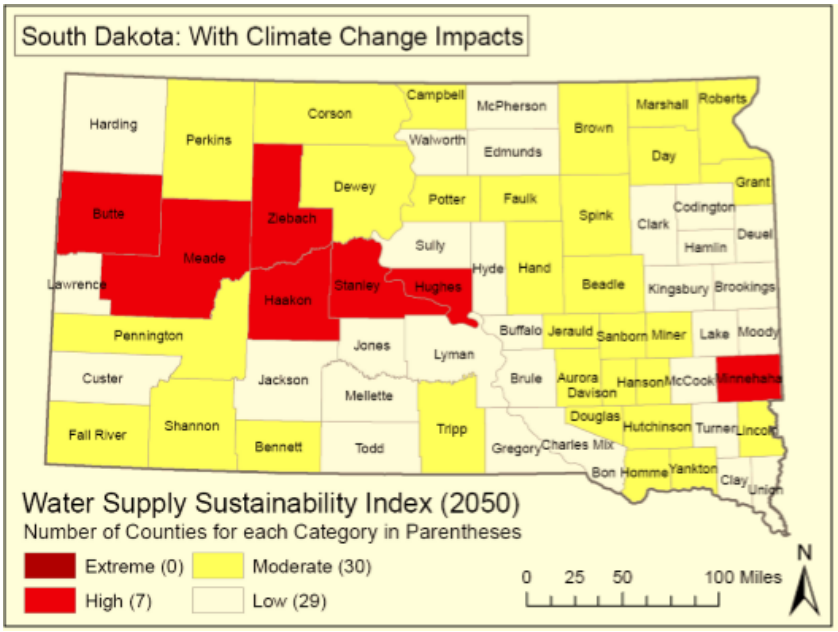
To determine which areas of the state are most vulnerable to the agricultural impacts of drought, the authors of the South Dakota Drought Mitigation Plan analyzed crop losses in each county compared to the total value of the county's crops. Crop value was taken from the 2012 Census of Agriculture, while crop loss was based on the Risk Management Agency's crop indemnity data for the period 2000 to 2014. The resulting loss ratio is the average annual loss divided by total crop value; the higher the ratio the higher the vulnerability. Hutchinson County's average annual loss from drought for the 2000 – 2014 period was $10,795,608, compared to a total crop value of $71,342,000, resulting in a loss ratio of 15.1%, the highest among the state's 66 counties. In comparison, the average loss ratio figure for South Dakota counties was 3.1%. The authors of the South Dakota Drought Mitigation Plan assigned a "Very High" vulnerability rating for Hutchinson County for this measure of drought vulnerability.

Vulnerability also was assessed by reviewing the South Dakota Drought Mitigation Plan's section on the National Drought Mitigation Center's Drought Impact Reporter. The Drought Impact Reporter analyzes drought impact information from a broad range of areas, including the social, economic, and environmental realms. As shown in the figure below from the South Dakota Drought Mitigation Plan, Hutchinson County is in the low range of counties in terms of number of drought impacts.



Development Trends

Vulnerability to drought may increase in coming years if current land use trends continue and more marginal land in the county is brought into agricultural production. Climate change also may increase the frequency and severity of droughts in the future, according to many climate prediction models. As described in the South Dakota Drought Mitigation Plan, an analysis performed for the Natural Resources Defense Council examined the effects of climate change on water supply and demand in the United States. The study found that more than 1,100 counties may face higher risks of water shortages by mid-century as a result of climate change. In South Dakota, more than half of the state's counties could face higher risks of water shortages by mid-century as a result of increasing potential for drought due to climate change impacts. This figure from the Natural Resources Defense Council, reproduced in the South Dakota Drought Mitigation Plan, shows that Hutchinson County may face moderate water shortages due to climate change.



Wildfire

Wildfire risk in Hutchinson County can be determined by analyzing historical records of actual wildfire losses in the county, or by estimating potential wildfire losses. Regarding actual losses, **Table 3.4** provided information about the size and frequency of wildfires that have occurred in the county in the recent past.

To analyze potential wildfire loss in Hutchinson County, information from the SILVIS Lab at the University of Wisconsin was used. The SILVIS webpage displays areas of Wildfire Interface and Wildfire Intermix, which are locations that have a combination of fairly dense housing and vegetation. Such areas are considered to be vulnerable to wildfires. In Hutchinson County, only a few very small areas of vulnerability exist. The total population and number of housing units in Hutchinson County at risk is summarized in the table below, which is based on 2010 Census Block data.

Table 3.13 – Population in Wildfire Risk Zones in Hutchinson County

Housing Units	Total Population	Median Home Value	Total Home Value
14	22	$68,700	$961,800

Source: South Dakota Hazard Mitigation Plan; data from SILVIS Lab at the University of Wisconsin–Madison

The population of 22 living in a High or Moderate Risk threat zone ranks Hutchinson County 62nd among South Dakota counties, and it represents less than one percent of the county's population. Putting things in perspective, in South Dakota as a whole approximately 25% of the population lives in a wildfire threat zone.

This is not to say that there is no threat. Even in areas of the county without much woody vegetation, wildfires are possible. They can occur in pastures and other types of grassland, wetlands (many of which dry out in the summer), and wildlife production areas. The loss potential from these fires is generally slight, although occasional damage has been reported. Wildfire impacts on the county's agricultural producers are insignificant; data on indemnity payouts show no payouts for crop loss due to wildfire in Hutchinson County between 2000 and 2017.

Development Trends

Looking ahead, the population of Hutchinson County is expected to continue to decline, so vulnerability to wildfires is not likely to increase. One factor that could increase wildfire vulnerability is the continued spread of cedar trees. These trees are spreading quickly in Hutchinson County, and efforts to control their spread have met with only limited success. The fuel load they represent could turn an otherwise routine brush fire into a very serious situation.

Climate change also may increase local wildfire vulnerability. The South Dakota Hazard Mitigation Plan cites a U.S. Forest Service study that indicates the potential for an increase in future lightning activity and a higher frequency of weather patterns conducive to surface drying. These factors, together with higher summer temperatures, will likely increase the annual window of high fire risk by 10 to 30%. The plan states that predictions past 2040 are largely speculative, but there will be an increase in the potential for drought and the number of days in any given year with flammable fuels, which may extend the fire season.

Risk Assessment Summary

In this section, the vulnerability of Hutchinson County to each of the hazards profiled is summarized. Maps are presented at the end of the section to augment the analysis, showing areas within each community where vulnerability to flooding exists. Vulnerability to winter storms, summer storms, and drought is not mapped, as those hazards are likely to impact all areas of the county more or less equally.

- **Winter Storms**

Hutchinson County's vulnerability to winter storms can be considered high. All areas of the county are vulnerable to winter storms. Major winter storms accompanied by heavy snow or freezing rain contribute to the vulnerability of county residents by making roads dangerous for travel. The isolation of residents living outside the county's major communities puts them at increased risk. Some of these residents are 15 miles from the nearest place with groceries, medical supplies, or other important items. If roads are blocked by snow for an extended

period of time, some rural residents, particularly the elderly, may be at risk. Winter storms accompanied by high winds have the potential to damage residential and commercial property in the county, as well as infrastructure. A major concern is the vulnerability of rural electric power infrastructure. When winter storms are accompanied by high winds and freezing precipitation, ice can build up on powerlines, which can cause the lines and poles to come down. It is a certainty that the county will remain vulnerable to winter storms no matter what mitigation actions are taken.

- **Summer Storms**

Hutchinson County's vulnerability to summer storms can be considered moderate. All areas of the county are vulnerable to summer storms, and are highly vulnerable to summer storms that are accompanied by tornadoes or hail. Although the county's population density is low and infrastructure development is not extensive, a large amount of cropland in the county is vulnerable to the effects of hail and other violent summer weather.

- **Flooding**

The overall vulnerability to flooding in Hutchinson County can be described as high. Much of the impact is to cropland and to rural county and township roads, especially within the James River valley. The threat of property damage due to flooding is slight, except for property located within the James River valley, and even there little flood damage had ever been experienced prior to 2019. That year, several homes located in the James River valley reported varying degrees of flood damage, the two of the Hutterite colonies suffered substantial damage. Following is a summary of vulnerability to flooding in each of the communities:

Dimock: There appears to be no significant degree of vulnerability to flooding here. The HAZUS software identified no areas prone to flooding in or near the community.

Freeman: There is some vulnerability to flooding here, as shown in **Table 3.9** and **Table 3.10**. One flood prone area is located on the western edge of the city, which includes three residential properties along Cedar Street that have suffered repeated minor flood damage. The southwestern section of the city has also suffered from repeated flooding over the years as excess water flows into the city from the south. Several residential properties in that part of town suffered varying degrees of damage during the March 2019 flood.

Menno: There is some vulnerability to flooding here, as shown in **Table 3.9** and **Table 3.10**. The city swimming pool and the Menno High School football field are both partially located in flood prone areas; no other important or critical infrastructure is affected. Several residential properties in Menno suffered minor damage during the March 2019 flood.

Olivet: There is some degree of vulnerability to flooding here, as shown in **Table 3.9** and **Table 3.10**. The city park often floods when the James River rises in the spring, and one residence on the eastern edge of Olivet comes close to flooding when the river is running especially high.

Parkston: Parkston is quite vulnerable to flooding, as the historical evidence shows, and as shown in **Table 3.9** and **Table 3.10**. The total value of property vulnerable to flooding in the community is over $5 million. Pony Creek runs through the community, and it has a history of overflowing its banks and causing substantial damage and inconvenience. Previously, the City was awarded HMGP funds to address flooding along the creek, but further analysis showed that none of the proposed flood improvements would be cost effective. Many residential properties in Parkston suffered damage during the March 2019 flood.

Tripp: There appears to be no significant degree of vulnerability to flooding here. The HAZUS software identified no areas prone to flooding in or near the community. A few residential properties in Tripp suffered minor damage during the March 2019 flood.

- **Drought**

Hutchinson County's vulnerability to drought can be considered high, and is certain to continue for the foreseeable future. All areas of the county are vulnerable. The impact is primarily to the agricultural sector, where serious losses have occurred. The most recent severe drought, in 2012, caused more crop loss in Hutchinson County than any other county in South Dakota.

- **Wildfire**

The overall vulnerability to wildfire in Hutchinson County can be considered low. Less than one percent of the county's population is considered to be living in a High or Moderate Risk wildfire threat zone, and no truly destructive wildfire has ever been recorded in the county.

Figure 3.1 - Hutchinson County

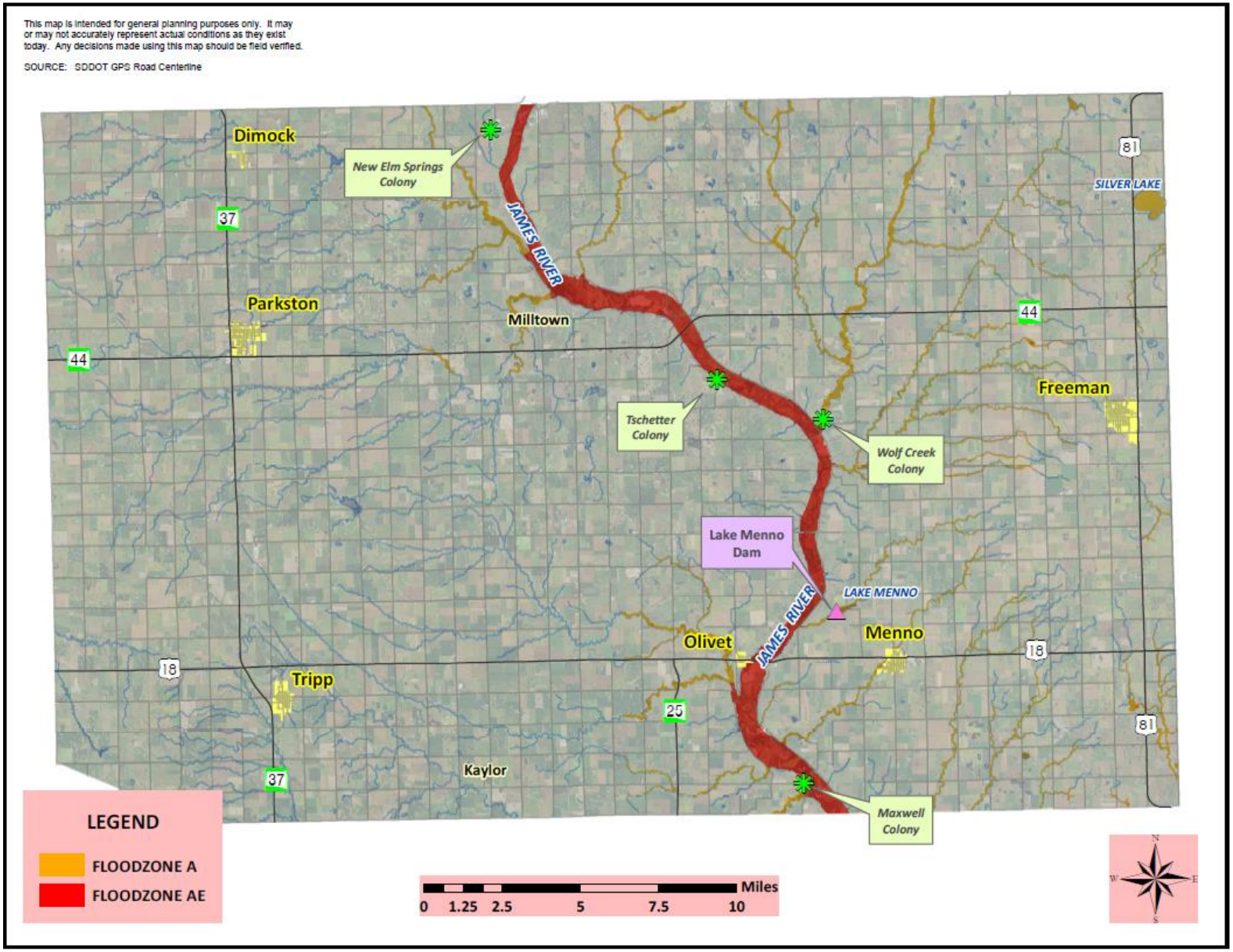


Figure 3.2 - Dimock

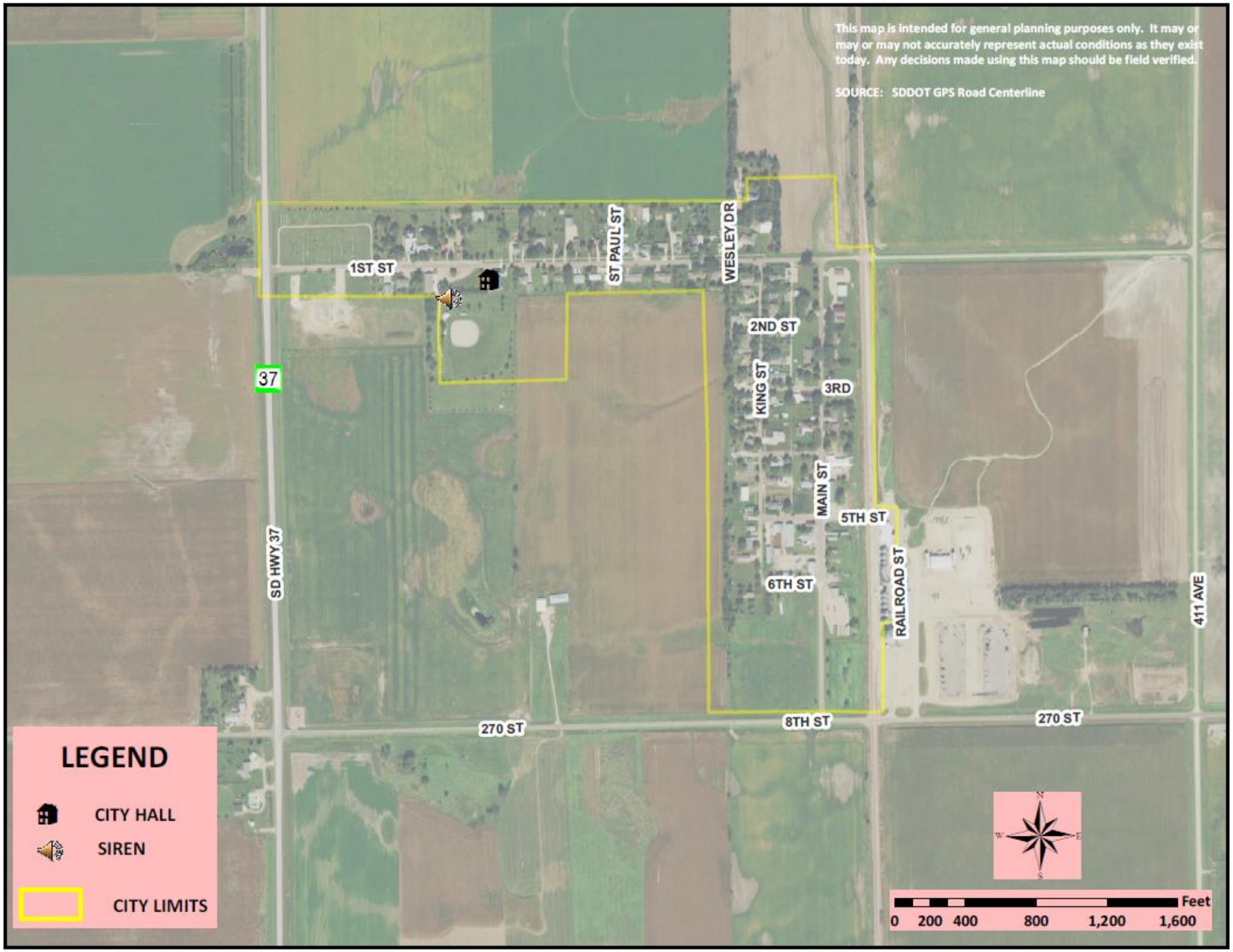


Figure 3.3 – Freeman

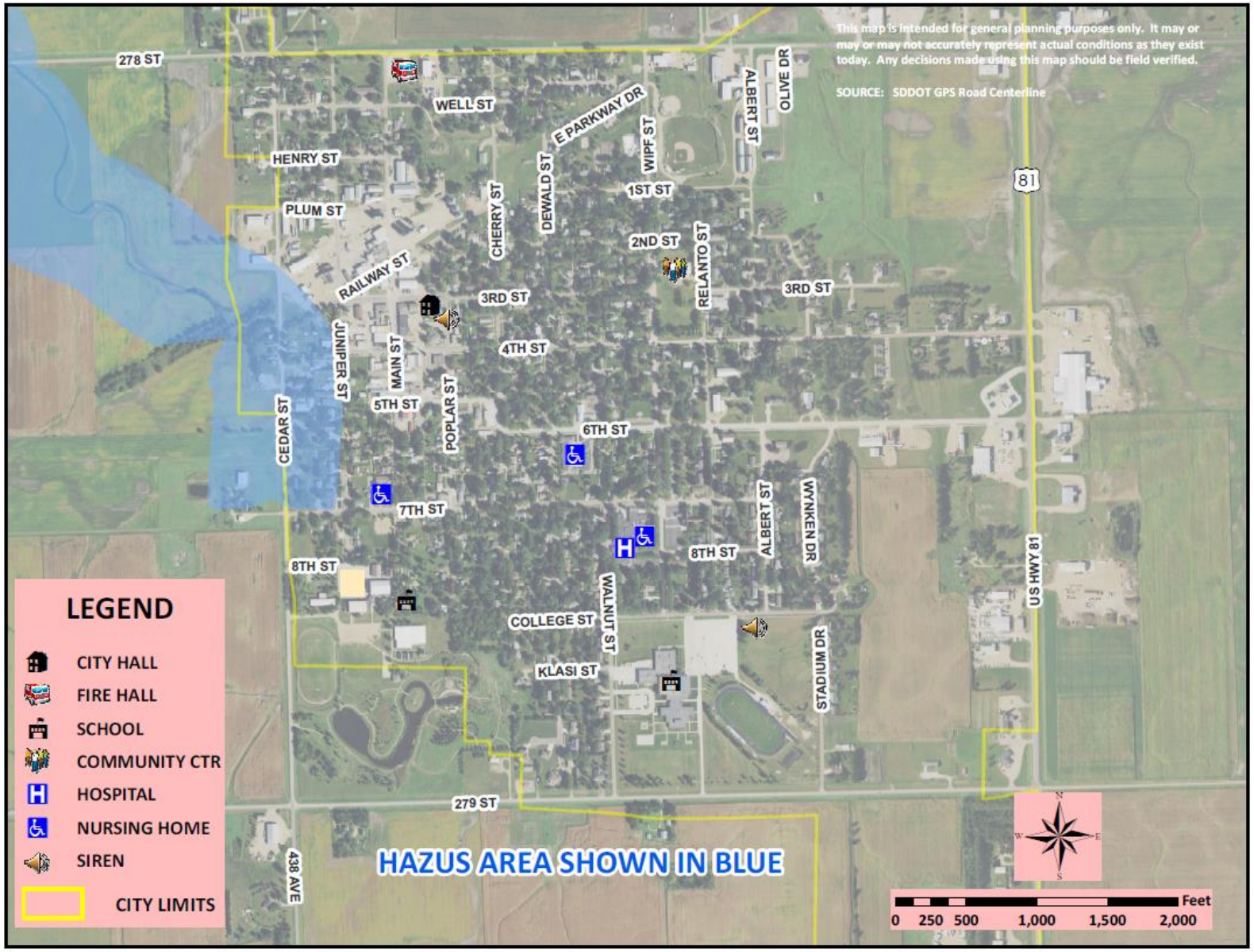


Figure 3.4 – Menno

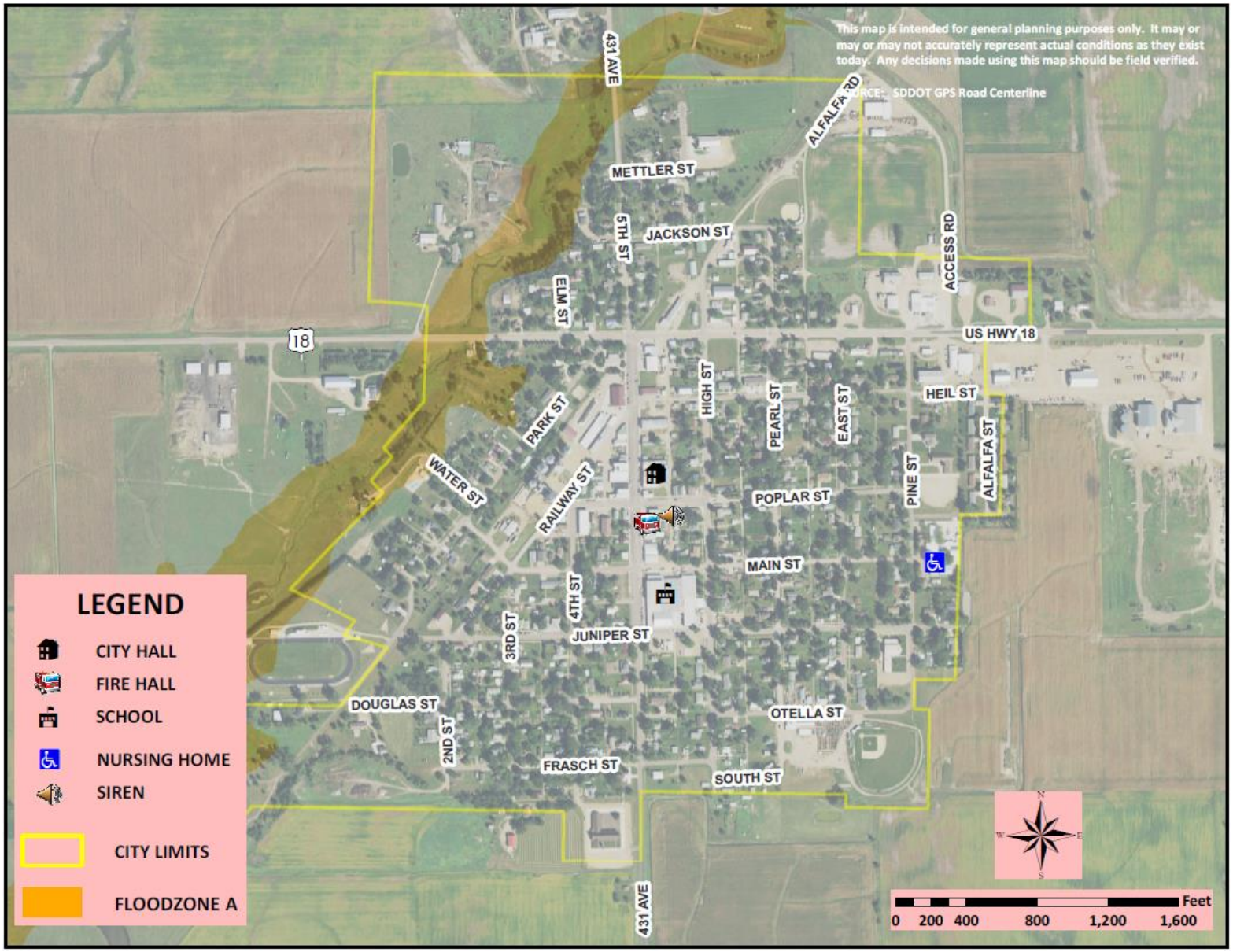


Figure 3.5 - Olivet

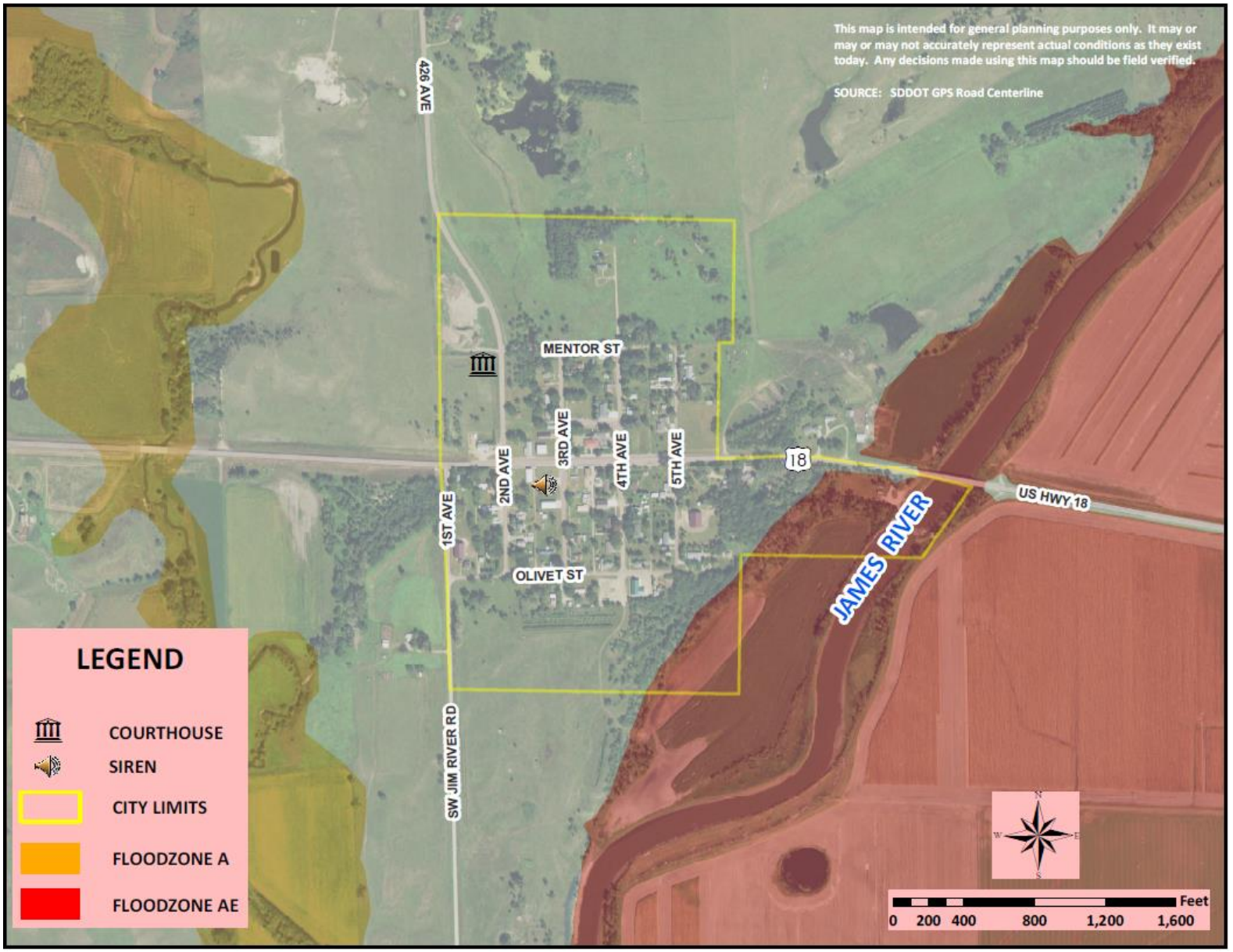


Figure 3.6 – Parkston

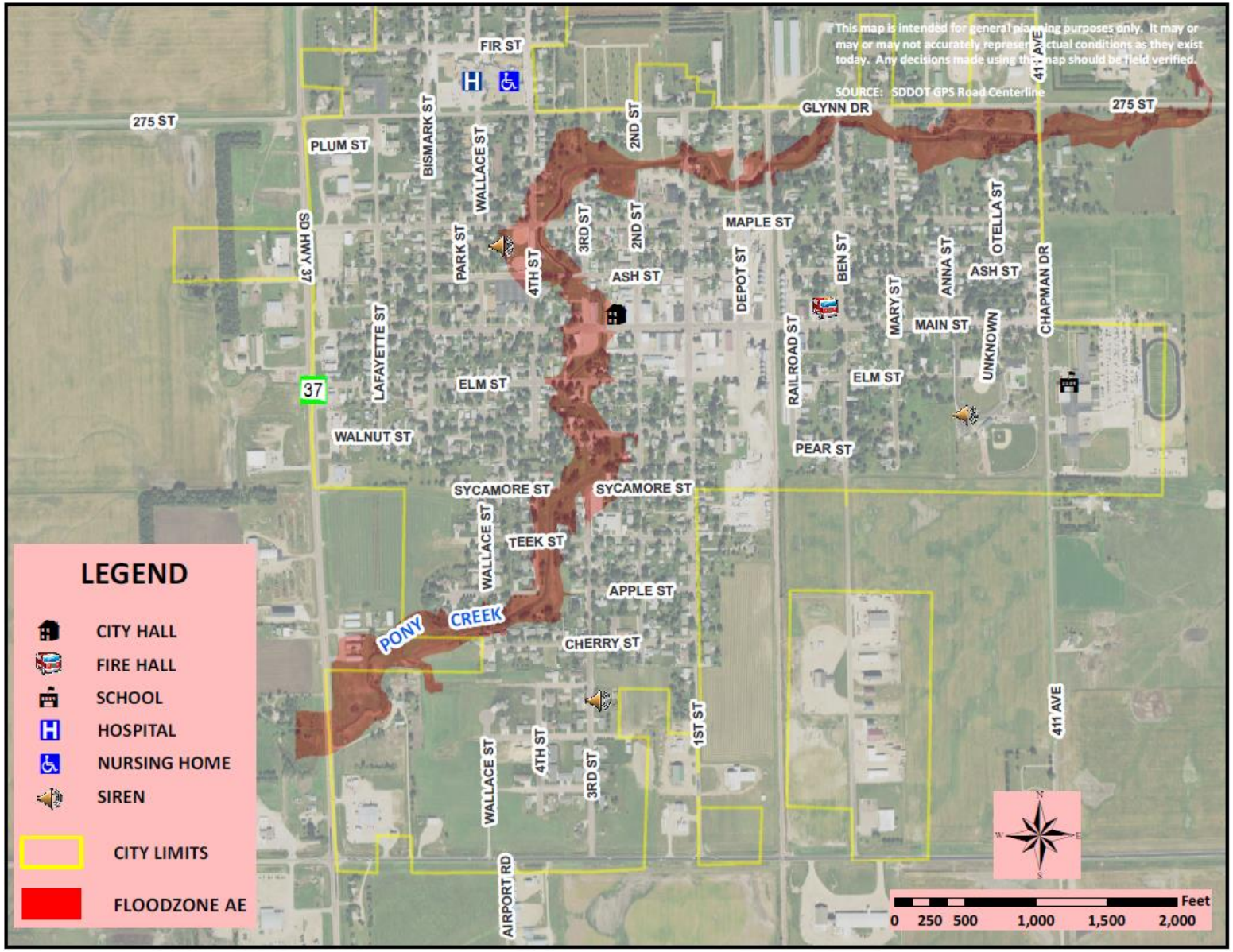
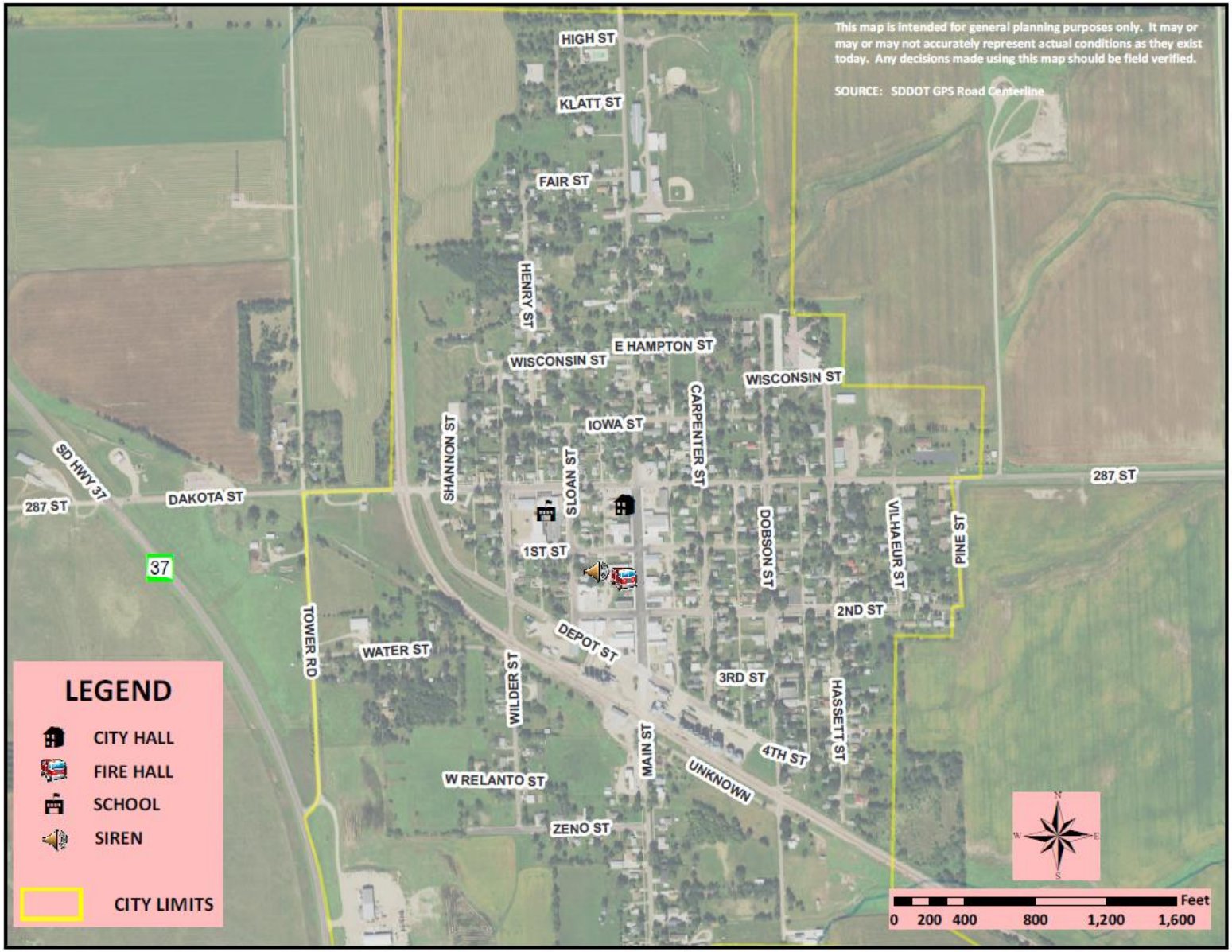


Figure 3.7 - Tripp



CHAPTER IV
RISK MITIGATION STRATEGY

Background

The previous chapter described the types of hazards most likely to impact Hutchinson County, and discussed the county's vulnerability to each of the hazards. This chapter identifies the hazard mitigation goals and objectives that the planning team decided upon, and then focuses on a presentation of the mitigation actions proposed to achieve the goals and objectives. A table showing all of the proposed actions is included. The chapter concludes with a discussion about how the proposed actions were prioritized.

Mitigation Goals and Objectives

After the risk assessment was completed, the planning team identified the goals and objectives it wanted to achieve. The team began by reviewing the goals listed in the county's current plan. The team also wanted to ensure that its goals were consistent with and supported the priorities of the other planning documents that were reviewed as this plan was being developed. In the end, the team decided upon the following general goals:

- Minimize loss of life and injuries from hazards.
- Minimize damage to existing and future structures within hazard areas.
- Reduce losses to critical facilities, utilities, and infrastructure from hazards.
- Reduce impacts to the economy and the environment from hazards.

After the team had settled on the goals, they began to focus more narrowly on each hazard by reviewing the results of the risk assessment and analyzing each jurisdiction's vulnerability to the hazards, and the severity of the threat posed by the hazards. Much of the discussion focused on damage caused by past hazard events, and what could be done to lessen or eliminate damage from future events. The planning team also considered how future development might affect the jurisdictions' vulnerability to each of the hazards faced.

Following are the specific mitigation objectives for each of the hazards:

Winter storm

- Reduce property and infrastructure losses due to winter storms.
- Ensure that people are adequately protected from the effects of winter storms.
- Minimize disruptions to the power distribution system.

Summer storm

- Reduce property and infrastructure losses due to summer storms.

- Ensure that people are adequately protected from the effects of summer storms.
- Ensure that people have adequate warning when violent weather threatens.

Flooding

- Reduce property and infrastructure losses due to flooding.
- Minimize development in areas that are prone to flooding.
- Maintain the natural and man-made systems that protect people and property from floods.

Drought

- Reduce economic and environmental impacts due to drought.

Wildfire

- Reduce property and infrastructure losses due to wildfires.

Mitigation Actions

With the goals and objectives identified by the planning team, the participating jurisdictions began the process of identifying mitigation actions that could be taken to accomplish the goals. The jurisdictions began by reviewing the actions listed in the county's current disaster mitigation plan and discussing the progress that had been made to implement the actions. A list of the actions and a summary of the implementation status of each action is shown in the following table.

Table 4.1 – Progress on Implementing Previously Proposed Actions

Mitigation Action	Hazard	Current Status
HUTCHINSON COUNTY		
Ensure continued NFIP compliance.	Flooding	Ongoing
Continue enforcement of county drainage ordinance.	Flooding	Ongoing
Continue working with James River Water District on James River management.	Flooding	Ongoing
Continue enforcing burn bans as conditions warrant.	Wildfire	Ongoing
Implement road improvement projects along county roads.	Flooding	Some progress
Stabilize James River Road south of Olivet.	Flooding	No progress
Siren upgrade for Dimock.	Summer storm	Completed
Provide countywide access to GIS data through Internet.	All hazards	Completed
911 radio booster for County courthouse and Olivet.	All hazards	No longer a priority
Cell tower booster for Town of Olivet.	All hazards	No longer a priority
Update 911 addressing.	All hazards	About 50% completed
Update LIDAR GIS dataset of land throughout the county.	All hazards	No progress

Mitigation Action	Hazard	Current Status
Participate in StormReady Community Program.	Summer storm	No longer a priority
CITY OF FREEMAN		
Generator acquisition for fire hall.	Winter storm	Completed
Remove structures from a flood prone area.	Flooding	The City has acquired 2 of the 3 properties and the structures will be removed in 2020.
Install warning siren to serve northeast part of city.	Summer storm	No progress
Acquire additional fire truck for fire department.	Wildfire	Completed
Contact state NFIP coordinator regarding NFIP program.	Flooding	Completed
Participate in StormReady Community Program.	Summer storm	No longer a priority
CITY OF MENNO		
Ensure continued NFIP compliance.	Flooding	Ongoing
Implement drainage improvements in various locations.	Flooding	Some progress
Update comprehensive plan and adopt zoning ordinance.	All hazards	No longer a priority
Participate in StormReady Community Program.	Summer storm	No longer a priority
CITY OF PARKSTON		
Ensure continued NFIP compliance.	Flooding	Ongoing
Continue participation in the Community Rating System.	Flooding	Ongoing
Require households to stop discharging stormwater directly into the city's sanitary sewer system.	Flooding	No progress
Address water draining across Hwy 37 into west side of city.	Flooding	No progress
Enhance storm sewer on Elm/Depot Street.	Flooding	About 50% complete
Identify detention basins within city for an alternative way to address excess surface water.	Flooding	No progress
Implement stream channel improvements along Pony Creek.	Flooding	No progress
Property and structure buyouts along Pony Creek floodway.	Flooding	Acquisitions are underway
Participate in StormReady Community Program.	Summer storm	No longer a priority
Construct a tornado safe room in the community.	Summer storm	No progress
Upgrade Parkston St. Benedict Hospital to allow for easier access of emergency vehicles.	All hazards	Completed
CITY OF TRIPP		
Upgrade storm sewer infrastructure along Iowa Street, and along Main Street from Depot Street to Dakota Street.	Flooding	No progress
Install tornado safe room/storm shelters in the community.	Summer storm	No progress
Install two additional warning sirens in the community.	Summer storm	No progress
Install safety upgrades at Dakota Street railroad crossing.	Traffic incidents	Completed
Contact state NFIP coordinator regarding NFIP program.	Flooding	No progress
Participate in StormReady Community Program.	Summer storm	No longer a priority
Reimbursement for firefighter training and certifications.	Wildfire	No longer a priority

Following this review, a list of potential mitigation actions based on FEMA's guidance document *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards* was reviewed. The actions on the list can be grouped into the following general categories:

- Prevention: Government administrative or regulatory actions or processes that influence building and development. Examples include:
  - Adopting zoning regulations.
  - Preserving open space.
  - Reviewing and strengthening local flood ordinances.
  - Adopting stormwater management regulations.
  - Adopting National Building Code standards.
  - Enacting measures to restrict non-essential water usage.

- Education and Outreach: Actions to inform and educate elected officials, stakeholders, property owners, and the general public about potential risks from hazards and potential ways to mitigate them. Examples include:
  - Developing a disaster mitigation public awareness program.
  - Participating in the StormReady program.
  - Participating in the Firewise Communities program.
  - Making presentations to school groups or neighborhood organizations.
  - Mailings to residents in hazard-prone areas.
  - Encouraging people to take various water-saving measures.

- Property Protection: Actions that modify existing buildings or infrastructure to protect them from a hazard or remove them from the hazard area. Examples include:
  - Property acquisition, elevation, or relocation, including elevating roads in flood-prone areas.
  - Making structural retrofits to facilities.
  - Replacing overhead utility lines with underground lines.

- Natural Resource Protection: Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems. Examples include:
  - Using low-lying areas as natural water retention ponds.
  - Restoring and preserving wetlands.
  - Restoring stream corridors.
  - Forest and vegetation management.
  - Providing incentives for xeriscaping.

- Structural Projects: Actions that involve the construction of new structures to reduce the impact of a hazard. Examples include:
  - Upgrading stormwater infrastructure, such as culverts and storm sewer piping.
  - Building floodwalls.
  - Building tornado safe rooms.

It was explained that hazard mitigation is defined as *sustained action* taken to reduce or eliminate the long-term risk to people and property from hazards, as opposed to preparedness planning. Still, some actions to enhance disaster preparedness were discussed. Actions considered in this category included installing warning sirens in areas currently not well served and acquiring emergency power generators for critical facilities.

The final list of mitigation actions identified by the jurisdictions is shown in **Table 4.2**, which contains the following information for each action:

- The local priority rating – either High or Medium.
- The individual (party) primarily responsible for implementing the action.
- The estimated time frame needed to accomplish the action. Short term actions are those that can be completed within a few years, while Long term actions may take several years or more to accomplish due to cost or other factors.
- The estimated cost to implement the action.
- Resources that may be available to help fund the action.

Prioritizing the actions is important because it is unlikely that all of them can be pursued simultaneously, especially when costly projects are being considered. Those actions providing the most overall benefit in terms of cost are likely to be pursued first, while some lower priority actions may never be implemented. The prioritization process was informal and somewhat subjective, but a methodology did help guide the process. This framework, which was suggested by the Planning & Development District III office, is based on the following criteria:

- Overall benefit - how many lives or how much property will be protected, and how much disruption will be prevented? Are there any critical facilities or important public infrastructure that will be protected?
- Financial feasibility - how expensive will the action be? Could the action qualify for grant or loan funding?
- Political feasibility – will the public support the action? Are there any groups or interests that may be opposed to the action and thus prevent it from being implemented?
- Technical feasibility – does the technology exist for the action to be implemented? Is the action likely to function as intended?
- Environmental feasibility - does the action have the potential to have an adverse impact on the environment?
- Legal feasibility – are there any legal issues that might prevent the action from being implemented?

Guesswork was kept to a minimum during the prioritization process. For instance, in determining the potential benefit of a given action, the amount of property that would be protected by the action could in some cases be estimated with a fair amount of certainty. Assessing the proposed actions in relation to the other criteria was sometimes more difficult. Determining the political feasibility of the actions may have been the most subjective part of

the process, but the jurisdiction representatives generally had a good idea of how the public and vested interests would support the actions.

Funding considerations also are critical, because neither Hutchinson County nor any of the other participating jurisdictions have much discretionary money available to fund mitigation activities. Given this reality, it is unlikely that any mitigation action requiring substantial financial resources could be implemented locally without grant assistance. Following are potential sources of outside funding to help the jurisdictions accomplish mitigation projects:

FEMA grant programs

- Hazard Mitigation Grant Program (HMGP)
- Pre-Disaster Mitigation (PDM)
- Flood Mitigation Assistance (FMA)
- Rehabilitation of High Hazard Potential Dams (HHPD)

Other grant and loan programs/sources

- US Economic Development Administration
- US Department of Agriculture Rural Development grant/loan program
- South Dakota Community Development Block Grant program
- South Dakota State Homeland Security Program
- South Dakota Dept. of Environment and Natural Resources
- South Dakota Dept. of Transportation
- James River Water Development District

Table 4.2 - Proposed Mitigation Actions

HUTCHINSON COUNTY ACTIONS	PRIORITY	RESPONSIBLE PARTY	TIME	COST	RESOURCES
Powerline burial.	HIGH	Southeastern Electric Coop	ONGOING	Unknown	FEMA
Road and bridge stabilization improvements (various locations).	HIGH	Hwy Superintendent	LONG	Unknown	FEMA; DOT
Improve seven miles of 426th Ave north of U.S. Hwy 18 junction.	HIGH	Hwy Superintendent	MID	Unknown	DOT
Install culvert at junction of 1st Str and railroad track in Dimock.	HIGH	Dimock Town Board	MID	$25,000	FEMA; JRWDD
Improve countywide communications system.	HIGH	Emergency Mgmt Dir	MID	Unknown	Unknown
Upgrade warning siren in Olivet.	HIGH	Emer Mgmt Dir; Olivet Town Board	SHORT	$22,000	FEMA
FREEMAN ACTIONS	**PRIORITY**	**RESPONSIBLE PARTY**	**TIME**	**COST**	**RESOURCES**
Stormwater drainage study of the city.	HIGH	City Council	MID	$30,000	FEMA
Cedar Street Flood and Detention Pond	HIGH	Public Works	LONG	Unknown	FEMA; DOT
Warning siren for northern part of city	HIGH	City Council; EMD	MID	$25,000	FEMA
Drainage project for South Cherry Street	HIGH	Public Works	LONG	Unknown	FEMA; DOT
Upgrade detention pond on North County Rd	HIGH	Public Works	LONG	Unknown	FEMA; JRWDD
MENNO ACTIONS	**PRIORITY**	**RESPONSIBLE PARTY**	**TIME**	**COST**	**RESOURCES**
Review floodplain regulations.	HIGH	Floodplain Administrator	SHORT	N/A	N/A
Detention pond for Sunrise Acres area (southeast part of town).	HIGH	Public Works	LONG	Unknown	FEMA; DENR
Warning siren for north side of town.	HIGH	City Council; EMD	MID	$25,000	FEMA
Water tower replacement.	MED	City Council	LONG	Unknown	CDBG; DENR; USDA
PARKSTON ACTIONS	**PRIORITY**	**RESPONSIBLE PARTY**	**TIME**	**COST**	**RESOURCES**
Study Pony Creek floodplain, including area west of Hwy 37.	HIGH	City Council; Floodplain Admin	SHORT	$100,000	FEMA
Pony Creek maintenance and flood reduction.	HIGH	City Council; Public Works	LONG	Unknown	FEMA
West Ash Street bridge removal.	MED	Public Works	MID	Unknown	FEMA; DOT

Storm sewer system improvements, incl. Lafayette Storm Sewer.	MED	Public Works	LONG	Unknown	DENR; USDA
Install culverts at various locations.	MED	Public Works	MID	Unknown	FEMA; JRWDD
TRIPP ACTIONS	**PRIORITY**	**RESPONSIBLE PARTY**	**TIME**	**COST**	**RESOURCES**
Warning siren for city.	HIGH	Finance Officer	SHORT	$20,000	FEMA
Storm shelter in the city park.	HIGH	Public Works	MID	Unknown	FEMA

Potential Resources for Funding Assistance:

FEMA FEMA Hazard Mitigation Assistance Programs
DENR South Dakota Dept. of Environment and Natural Resources
USDA US Department of Agriculture Rural Development
CDBG Community Development Block Grant
DOT South Dakota Department of Transportation
JRWDD James River Water Development District

Mitigation Action Plan

The Hutchinson County Hazard Mitigation Plan is the backbone for disaster mitigation planning within the county. To remain useful, the plan cannot exist in a vacuum – it is designed to work with other local planning and development tools and mechanisms, and local officials and policy makers need to be familiar with it. This section first describes how the mitigation plan will be incorporated into existing planning mechanisms, and concludes by describing how the mitigation strategy will be implemented.

Plan Incorporation

It is important that the goals and actions included in this plan be integrated with the other plans and policies within the county that may affect land use and development. Neither this plan nor any of the others will work effectively if they contain contrary goals or policy recommendations. The following table shows the planning-related technical documents that currently exist within the county, each of which was reviewed as this plan was being developed. Looking ahead, future updates of this plan should not be made without reviewing these planning tools.

Table 4.3 – Local Planning Mechanisms

	Capital Improvement Plan	Comprehensive Land Use Plan	Zoning ordinance	Building codes	Electrical Construction Plan	Housing Plan	Flood damage prevention ordinance	Drainage ordinance	Five Year Highway Improvement Plan	Fire Management Plan
Hutchinson Co.		X	X	X			X	X	X	
Dimock										
Freeman	X	X	X	X			X			
Menno		X		X			X			
Olivet							X			
Parkston		X	X	X			X			
Tripp		X	X	X						

Hazard mitigation concepts should be incorporated where appropriate into the policy documents listed in the table. It is also important that major development projects within the jurisdictions be undertaken based on sound hazard mitigation planning.

Hazard mitigation also is discussed in the 2019 Comprehensive Economic Development Strategy (CEDS) for the Planning & Development District III region, which includes Hutchinson County. The CEDS, which is updated every five years for the Economic Development Administration, analyzes development issues, opportunities, and challenges from a regional

perspective. One chapter of the document focuses on economic resiliency, including the role that hazard mitigation can play in helping communities maintain their economic wellbeing.

Plan Implementation

The Hutchinson County Emergency Management Director is ultimately responsible for ensuring that the plan's mitigation strategy is implemented effectively. The director will work under the authority of the county commission to implement the strategy, and will coordinate his/her activities with other county departments and other agencies as needed. Each jurisdiction participating in this plan also will play a critical role in carrying out the action plan by identifying and prioritizing the actions they want to pursue, allocating resources for their implementation, and applying for funding assistance as needed. If and when they are able to secure funding, they will move forward with implementing their actions.

The availability of funding is critical to the success of this plan, and therefore the mitigation actions listed in **Table 4.2** should be considered when the jurisdictions begin the process of working on their annual budgets. In this way, the plan will not become a mere "wish list" of ideas for which there is no practical funding mechanism. For those jurisdictions that lack any other planning tools and mechanisms, this may be the only practical way for the plan to be implemented. To help ensure that this happens, the Emergency Management Director will attend at least one city council meeting annually in each community to discuss hazard mitigation, including the possibility of obtaining funds through FEMA or other sources for the projects they have identified.

If FEMA mitigation funds are awarded for a project, grant administration will be the responsibility of the local jurisdiction, which will appoint an individual who will be responsible for ensuring that the project is completed as proposed and that all grant award conditions and requirements are followed. A resource that can help the jurisdictions meet the FEMA grant requirements (and help develop the grant applications) is the Planning & Development District III office. District III staff have decades of experience working on various planning and community development activities within Hutchinson County, and many years of experience working with the county's emergency management office.

CHAPTER V
PLAN MAINTENANCE

Background

Plan maintenance is a continuous process, which involves monitoring, evaluating, and updating the plan. It provides the foundation for an ongoing mitigation program and helps ensure that the plan remains relevant and effective. This chapter addresses how Hutchinson County officials intend to ensure that the plan will remain a dynamic, useful tool for mitigating against the impact of future disaster events.

Plan Monitoring and Evaluation

Ultimate responsibility for monitoring the plan and evaluating its effectiveness lies with the Hutchinson County Emergency Management Director. The director will work with the support of the Hutchinson County Commission to review the plan at least annually, or as the need arises. Appropriate staff from the participating jurisdictions will be brought into the review process also.

Major points of discussion will include whether the risk assessment remains valid, whether the mitigation goals and objectives identified in the plan remain sound, and whether progress is being made on implementing the mitigation actions identified in the plan. An opportunity also will be provided to add additional mitigation actions to the plan as needed, and to discuss whether development or other factors are affecting vulnerability to any hazards. At this time, a determination will be made about whether the implementation strategy needs to be revised or the plan itself needs to be updated.

Plan evaluation must be an ongoing process. This will help ensure that the plan remains relevant and able to meet local conditions and priorities, which can change. Following are some of the factors that can have a major impact on mitigation planning:

- Occurrence of a significant disaster event – Serious events can reveal flaws in local jurisdictions' disaster preparedness plans. The 9/11 terrorist strikes are a dramatic example of this type of event.
- Change in the nature or magnitude of risks – Changing environmental conditions, increased development in sensitive areas, and other factors can be significant enough to cause localities to rethink their mitigation strategies. As discussed earlier, climate change may increase the county's vulnerability to drought, and possibly other hazards.
- Change in funding availability – The availability of money often determines whether an action can be implemented. For example, local budget cuts can delay, or prevent altogether, a mitigation project's implementation. On the other hand,

grant opportunities for specific types of mitigation actions may argue for their implementation.

- Change in local priorities – Local priorities regarding mitigation projects can change for a number of reasons. Regular meetings between the Hutchinson County commission and the local township boards are one way in which the county stays current on the townships' needs regarding their roads, bridges, and other infrastructure.
- Legal factors – Laws and regulatory requirements may change, which may make certain mitigation actions more or less feasible or desirable.
- Technological change – Advances in technology may make it possible in the future to address certain types of hazards more effectively or at lower cost.
- Other factors – There are many other factors that can have an impact on local disaster mitigation priorities and strategies. For example, a detailed engineering analysis may indicate that a proposed mitigation action may be much costlier than first estimated, which could make the action unpractical to pursue. As discussed earlier, the City of Parkston was awarded HMGP funds to address flooding along Pony Creek, but further engineering study showed that none of the proposed flood improvements was cost effective.

Updating the Plan

Updating the plan may occur at any time in response to the factors identified above. Otherwise, it is expected that the County will begin the process of updating the plan approximately two years prior to the plan's expiration date. Plan updates will reflect changes in growth and development, changing mitigation priorities, and progress in implementing the plan. Led by the Emergency Management Director, the process will consist of the following general steps:

- Obtain funding assistance
- Hire contractor to write the plan
- Organize planning team
- Begin soliciting public participation and input
- Hold meetings of planning team and within jurisdictions to develop the plan
- Make draft of the plan available for public review and comment
- Submit plan for State review
- Revise plan as needed based on reviewer comments
- Plan submitted by State to FEMA
- Revise plan as needed based on reviewer comments
- Jurisdictional adoption of approved plan

Public Involvement

Throughout the development of this plan update, a sustained effort was made to involve the general public in the plan. Outreach included information posted on local websites, as well as social media posts. Looking forward, the outreach strategy will evolve over time as different methods are used to get greater public participation in the mitigation planning process. Once approved, the plan will be available for the public to see at the county courthouse and in each city office. It also will be made available on the community websites. Other outreach activities may include:

- Community visits by the Emergency Management Director to discuss the plan (local schools, civic meetings, etc.)
- Press releases and articles about the plan published in the local newspapers.
- Information about the plan included with utility billing statements.

Another way for the public to participate in the mitigation planning process will be through the mitigation plan review meeting of the Hutchinson County Commission. The review will be an official agenda item, and therefore the public will have an opportunity to provide input into the plan.

All comments and suggestions received from the public through any of the forums described above will be included in a public comment section in the plan's appendix.

APPENDICES

APPENDIX A: Outreach Effort

This section documents the outreach effort that was used to solicit input into the plan.

Mtg #1 - Email to Prospective Members of Planning Team:

From: Dave Hoffman <dcs_htem@santel.net>
Sent: Tuesday, June 9, 2020 11:52 AM
To: Parkston City <parkstoncity@santel.net>; City Of Menno <mennocity@qwtc.net>; Freeman City <adam@cityoffreeman.org>; Tripp City <cityoftripp@santel.net>; HT Auditor <dmurtha@hutchinsoncounty.org>; Lori Droppers <ldroppers@hutchinsoncounty.org>; Jane Gramkow <jgramkow@hutchinsoncounty.org>; John Clem <John.Clem@districtiii.org>
Subject: PDM Meeting

I setting up a phone conference for the 1st meeting.
Wednesday. June 17. 1:15pm
Please pass on to those people that would be interested in PDM update. Mayor, county personnel, city maintenance, GIS, Planning & Zoning, Highway Dept & EM.
Call-in # 1-800-567-5900. Access code. 2044505
Any questions?

Sent from my iPad
David Hoffman
PO Box 716
Parkston, SD. 57366
(605) 770-7927

Mtg #1 - Email to Other Emergency Management Directors:

From: John Clem
Sent: Wednesday, June 10, 2020 11:48 AM
To: Poppen, Jim <Jim.Poppen@state.sd.us>; Brent.Kolstad@state.sd.us; Jeff Bathke <jeffb@davisoncounty.org>; Pat Harrington <douglascountyem@yahoo.com>; bhcem@hcinet.net; Paul Scherschligt <paul@yanktonoem.com>
Cc: Dave Hoffman <dcs_htem@santel.net>
Subject: Hutchinson County PDM Update

Hello folks –

This is just an FYI that **Hutchinson County** is beginning the process of updating its current Pre-Disaster Mitigation Plan. The first meeting will take place on **Wednesday, June 17 at 1:15 PM**. It will be conducted through a phone conference call, and I can forward call-in information if any of you would like to participate in the call. Let me know if there are any questions.

John Clem
Planning & Development District III
PO Box 687
Yankton, SD 57078
800 952-3562
John.Clem@districtiii.org

Mtg #2 - Email to Other Emergency Management Directors:

From: John Clem
Sent: Thursday, August 6, 2020 11:16 AM
To: Poppen, Jim <Jim.Poppen@state.sd.us>; Christopherson, Martin <Martin.Christopherson@state.sd.us>; paul@yanktonoem.com; bhem@hcinet.net; Pat Harrington <douglascountyem@yahoo.com>; Jeff Bathke <jeffb@davisoncounty.org>
Cc: Dave Hoffman <dcs_htem@santel.net>
Subject: Hutchinson County PDM plan

Good morning,

This is just an FYI that **Hutchinson County** will be holding its final meeting to update the county's current Pre-Disaster Mitigation Plan. The meeting will take place on **Wednesday, August 12at 1:15 PM**. It will be conducted via phone conference call, and you are invited to participate. The number to call is 1 800 567-5900, and the access code is 2044505. We anticipate submitting the plan to SD Emergency Management later in August.

John Clem
Planning & Development District III
PO Box 687
Yankton, SD 57078
800 952-3562
John.Clem@districtiii.org

APPENDIX B: History of Previous Hazard Occurrences

This appendix provides details about hazard events that have impacted Hutchinson County in the past. **Table C.1** below lists all of the events since 1970 that resulted in a major disaster declaration in which Hutchinson County was part of the designated area. Records from FEMA were consulted for federal assistance provided following each disaster through FEMA's Public Assistance program.

Table C.1 – Major Disaster Declarations Affecting Hutchinson County

Dec #	When Declared	Type	Primary Damage Impact	Public Assistance To County
3015	Jun 1976	Drought		
717	Jul 1984	Severe storms; Flooding		
764	May 1986	Severe storms; Flooding		
999	Jul 1993	Severe storms; Tornado		
1052	May 1995	Severe storms; Flooding		
1075	Jan 1996	Ice storm		
1156	Feb 1997	Severe winter storm; Blizzard		
1161	Feb 1997	Severe winter storm		
1173	Apr 1997	Severe storms; Flooding		
1620	Dec 2005	Severe winter storm		≈$35,000
1702	May 2007	Severe storms; Tornado; Flood		≈$275,000
1774	Jul 2008	Severe storms; Flooding	Roads, bridges	≈$125,000
1887	Mar 2010	Severe winter storm	Utilities	≈$35,000
1915	May 2010	Flooding	Roads, bridges	≈$335,000
1984	May 2011	Flooding	Roads	≈$115,000
4115	May 2013	Severe winter storm	Debris removal	≈$220,000
4440	Jun 2019	Severe winter storm; Flooding	Roads, bridges	≈$760,000
4469	Nov 2019	Severe storms; Tornado; Flooding	Roads, bridges	≈$300,000

Sources: www.fema.gov/disasters/grid/state-tribal-government/72; www.fema.gov/data-feeds/openfema-dataset-public-assistance-funded-projects-summaries-v1

Table C.2 is a comprehensive list of the most significant hazard events reported for Hutchinson County from 1960 through 2019, as recorded in the National Climatic Data Center's Storm Events Database. The National Climatic Data Center receives storm data from the National Weather Service, which gets its information from a variety of sources, including county, state and federal emergency management officials, local law enforcement officials, National Weather Service damage surveys, the insurance industry, and the general public.

The Storm Events Database is useful, but it does have limitations. One problem is that records for certain hazard events, including winter storms and blizzards, only go back to the 1990s. Another issue is that damage amounts in most cases are estimates, especially for events that impacted multiple counties. Also note that the database contains a preponderance of

records from recent times. This is due to an inconsistency in data reporting over the years, and does not indicate an increase in the frequency of events affecting the county.

The table includes the following information about the events:

- Date - multiple events may be shown for a single day because a storm system may contain many specific storm events affecting different locations.
- Type of event.
- Descriptive information - details are provided for some of the more noteworthy events back to the 1990s.
- Magnitude - the magnitude of tornadoes, hail, thunderstorm winds, and high wind events is given. For events occurring since 2000 the speed is represented by either the highest measured wind gust (M) or the highest estimated wind gust (E). Note that speeds are shown in knots - multiply figure by 1.15 to get approximate speed in miles per hour.
- Property and crop damage - the National Weather Service uses all available data from the sources identified above in compiling the damage amounts, but the figures should be considered as broad estimates. In many cases, damage amounts are unknown.

Table C.2 – History of Significant Hazard Events in Hutchinson County

DATE	EVENT TYPE	DESCRIPTION	MAG	PROP DAMAGE ($1,000s)	CROP DAMAGE ($1,000s)
6/19/1963	Hail		1.50 in.		
5/8/1964	Tornado		F1	25	
5/8/1964	Tornado		F1		
7/10/1964	Hail		1.75 in.		
9/9/1964	Hail		1.50 in.		
6/7/1965	Tornado		F1		
6/28/1965	Tornado		F2		
6/19/1966	Hail		2.75 in.		
8/17/1967	Hail		4.00 in.		
6/29/1968	Hail		4.00 in.		
7/23/1969	Hail		2.00 in.		
5/30/1970	Tornado		F0		
6/19/1970	Hail		1.75 in.		
7/14/1970	Hail		3.00 in.		
7/14/1970	Hail		1.75 in.		
6/8/1971	Tornado		F0		
6/12/1971	Tornado		F0		
6/13/1972	Tornado		F0		

DATE	EVENT TYPE	DESCRIPTION	MAG	PROP DAMAGE ($1,000s)	CROP DAMAGE ($1,000s)
7/8/1973	Tornado		F2	2.5	
6/19/1975	Tornado		F1	25	
5/7/1979	Hail		1.75 in.		
6/6/1980	Hail		1.75 in.		
6/30/1983	Thunderstorm Wind		61 kts.		
6/5/1984	Tornado		F2	25	
6/22/1984	Hail		1.75 in.		
6/22/1984	Hail		1.75 in.		
6/28/1984	Tornado		F0		
6/28/1984	Tornado		F0		
4/19/1985	Tornado		F0		
4/19/1985	Thunderstorm Wind		61 kts.		
5/11/1985	Tornado		F0		
7/21/1985	Hail		1.75 in.		
6/29/1986	Tornado		F0		
5/17/1987	Tornado		F0		
7/9/1987	Thunderstorm Wind		60 kts.		
7/11/1987	Thunderstorm Wind		78 kts.		
5/28/1991	Tornado		F1	250	
5/28/1991	Tornado		F1	25	
5/28/1991	Tornado		F0		
5/28/1991	Tornado		F0		
7/27/1991	Thunderstorm Wind		60 kts.		
6/16/1992	Tornado		F0	25	
5/7/1993	Tornado	A tornado carried a 60 X 120 foot metal pole barn into the tops of four grain bins causing extensive damage. The tornado also destroyed many small buildings and blew roofs off larger buildings on many farms in the area.	F2	500	
5/7/1993	Tornado	A tornado touched down on a farm west of Parkston and destroyed two pig barns and a corn crib.	F1	50	
8/7/1994	Tornado		F0	1	4
8/7/1994	Hail		1.75 in.		
1/17/1996	Blizzard	A blizzard spread across the area from the west. Snow 3 to 12 inches deep was accompanied by 50 to 60 mph winds and very cold temperatures. The wind chill dropped to around -70. Roads and many businesses and schools were shut down. The total destruction of at least 3 homes by fire was due in part to the inability of firefighters to travel across blocked roads. Several accidents occurred and other vehicles slid into ditches or became stranded.			
1/29/1996	Extreme cold	Wind chill readings as cold as 80 below zero occurred as winds over 30 mph combined with temperatures of 10 below to 30 below zero. Many vehicles failed to start, but the main impact			

DATE	EVENT TYPE	DESCRIPTION	MAG	PROP DAMAGE ($1,000s)	CROP DAMAGE ($1,000s)
		was financial with greatly increased heating energy use, and purchase of supplies and services to ensure furnace operation.			
2/10/1996	High Wind		58 kts.	10	
3/24/1996	Blizzard	Snow accumulating 3 to 8 inches was accompanied by winds over 50 mph at times, producing widespread whiteout conditions. Numerous vehicles slid into ditches and many people were stranded in vehicles. There were some rollovers and other accidents, including a fatality near Tripp.		20	
4/25/1996	High Wind		62 kts.	20	
8/6/1996	Thunderstorm Wind		75 kts.	50	
10/26/1996	High Wind		50 kts.	30	
10/29/1996	High Wind		57 kts.		
11/14/1996	Ice Storm	Several periods of freezing rain caused widespread damage and paralyzed travel. Widespread damage occurred to electrical poles and lines, leaving thousands without power for up to four days. Numerous accidents occurred. Tree damage was widespread with tree debris blocking several roads and siedwalks. Some farm buildings and other small structures were damaged by the weight of ice and snow on roofs.		10	
12/14/1996	Heavy Snow				
12/16/1996	Blizzard				
1/4/1997	Blizzard				
1/9/1997	Blizzard				
1/15/1997	Extreme cold	Temperatures a few degrees below zero accompanied by wind gusts over 40 mph created wind chills as cold as 70 below zero. Drifting snow and areas of low visibility in blowing snow also occurred in open areas.			
2/3/1997	Heavy Snow				
3/12/1997	Flood	Widespread snowmelt flooding began in March and continued through the end of the month. Record flooding occurred on the James River. Widespread flooding of farmland and other lowlands occurred, both near and away from major river basins. Many roads, farm buildings, and some homes and businesses were flooded. Many basements were flooded just from groundwater seepage. Travel was severely hampered by flooded roads in some areas. Farmland flooding was severe and widespread.			
4/1/1997	Flood				
4/6/1997	High Wind		63 kts.	10	
4/9/1997	Heavy Snow				
5/1/1997	Flood				
6/19/1997	Hail		1.25 in.	10	100
6/20/1997	Thunderstorm Wind	Thunderstorm winds caused widespread damage to farm structures and trees, including roofs blown off of barns and grain bins destroyed.	61 kts.	300	
7/27/1997	Thunderstorm Wind	Thunderstorm winds caused tree and power line damages, and destroyed a fertilizer building and a barn near Menno.	61 kts.	100	
8/29/1997	Thunderstorm Wind		61 kts.	3	
9/8/1997	Tornado		F0		

DATE	EVENT TYPE	DESCRIPTION	MAG	PROP DAMAGE ($1,000s)	CROP DAMAGE ($1,000s)
3/31/1998	Heavy Snow	Snowfall of 6 to 16 inches occurred over a large area, causing some damage to power lines resulting in power outages.			
5/20/1998	Flood				
6/17/1998	Thunderstorm Wind		52 kts.	20	
7/6/1998	Hail		1.75 in.		
7/6/1998	Thunderstorm Wind		61 kts.		
8/5/1998	Lightning	Lightning injured a person who took shelter under a tree at a golf course. He received minor burns.			
11/10/1998	Blizzard	Snow accumulating 4 to 14 inches combined with winds gusting as high as 60 mph caused zero visibilities in snow and blowing snow, drifting snow, and damage to trees and power lines with resultant power outages. Some of the power outages lasted over 2 days. Most roads were closed and many people were stranded in vehicles after the sudden onset of the heavy snow.		20	
1/1/1999	Winter Storm				
3/8/1999	Winter Storm				
5/12/1999	Flood				
7/15/1999	Thunderstorm Wind	Thunderstorm winds caused tree damage, and triggered a power outage which lasted for 3 hours.	52 kts.	100	
11/1/1999	Drought	Generally dry weather that began in August continued through November. Dry surface and soil conditions became quite pronounced in November. Water levels fell, especially in small streams and lakes. Damage to winter wheat crops was feared. The area experienced the third driest fall (September through November) period on record. Unusually warm weather during the month contributed to the drying. The most noticeable manifestation of the dry conditions was the large number of grass fires across the area. While damage was mainly limited to the grasslands, considerable manpower and expense was needed to fight the fires.			
12/1/1999	Drought				
2/1/2000	Drought	Dry weather that prevailed during the fall continued in February, Dry surface and soil conditions remained quite pronounced. Water levels continued to fall slowly. especially in wetlands, small streams, and lakes. Above normal temperatures contributed to further drying. Grass fires were again a problem in some areas. Two significant fires requiring considerable effort and time to extinguish took place in the Freeman area on the 3rd and the 6th of the month.			
3/1/2000	Drought				
4/1/2000	Drought				
4/5/2000	High Wind		56 kts. E	17	
4/16/2000	Ice Storm	Freezing rain caused significant ice accumulation on trees, power lines, and other exposed surfaces. The ice caused tree damage, much of it minor. A few power lines and poles were also pulled down by the weight of the ice.			
5/11/2000	Tornado		F0	10	
5/11/2000	Thunderstorm Wind		52 kts. E	20	
8/7/2000	Hail		1.75 in.	1,000	
8/7/2000	Hail		1.50 in.		
8/7/2000	Thunderstorm Wind		52 kts. E	20	

DATE	EVENT TYPE	DESCRIPTION	MAG	PROP DAMAGE ($1,000s)	CROP DAMAGE ($1,000s)
8/7/2000	Thunderstorm Wind		61 kts. E	20	
11/11/2000	Winter Storm				
12/16/2000	Blizzard				
12/28/2000	High Wind		52 kts. E		
1/29/2001	Winter Storm				
2/24/2001	Winter Storm				
4/1/2001	Flood				
5/1/2001	Flood				
6/12/2001	Tornado		F0		
8/29/2001	Hail	Large hail caused damage to vehicles, including severe damage to vehicles at new car dealers. Windows were broken, and crops, especially soybeans, were damaged.	2.00 in.	100	50
11/26/2001	Heavy Snow	Most areas of southeast South Dakota received at least 8 inches of snow. The snowfall closed many schools and businesses, closed some government offices, and severely hampered transportation. The wet and heavy nature of the snow made it difficult to clear away.			
2/9/2002	Winter Storm				
3/14/2002	Winter Storm				
6/25/2002	Hail		1.75 in.		
8/16/2002	Hail		1.75 in.		
2/14/2003	Winter Weather				
3/3/2003	Winter Weather				
4/6/2003	Heavy Snow				
6/24/2003	Thunderstorm Wind	Thunderstorm winds caused widespread tree damage, including several large trees blown down. Numerous roads were blocked by tree debris. There was shingle and trim damage to houses, and at least one window was broken. Power lines were down in part of town. At least two vehicles were heavily damaged by falling trees.	61 kts. E	200	
6/24/2003	Thunderstorm Wind		61 kts. E		
7/3/2003	Thunderstorm Wind	Thunderstorm winds caused tree damage, including at least one large tree blown down and other large trees split. Numerous limbs and large branches were also blown down. Power lines were downed, resulting in power outages which lasted for several hours. At least three vehicles were damaged by trees and tree debris.	52 kts. E	100	
11/23/2003	Winter Storm				
12/2/2003	Winter Weather				
12/8/2003	Winter Storm				
2/5/2004	Winter Storm				
2/11/2004	Winter Weather				
3/15/2004	Heavy Snow				
3/27/2004	High Wind	High winds associated with the passage of a cold front tore off shingles and blew down a large metal television antenna near	57 kts. E	1,000	

DATE	EVENT TYPE	DESCRIPTION	MAG	PROP DAMAGE ($1,000s)	CROP DAMAGE ($1,000s)
		Kaylor. The winds also blew part of the roof off a barn and damaged the walls of a barn near Silver Lake.			
4/18/2004	Hail		1.75 in.		
4/18/2004	Hail		1.50 in.		
6/10/2004	Thunderstorm Wind		69 kts. E		
7/3/2004	Hail		2.50 in.		
7/3/2004	Hail		1.75 in.		
7/3/2004	Hail		1.50 in.		
7/3/2004	Hail		1.25 in.		
8/2/2004	Thunderstorm Wind		61 kts. E		
10/30/2004	High Wind		50 kts. E		
12/20/2004	Winter Weather				
1/4/2005	Heavy Snow				
3/10/2005	High Wind		54 kts. E	20	
3/18/2005	Heavy Snow				
4/10/2005	Thunderstorm Wind		52 kts. E	1	
4/10/2005	Thunderstorm Wind	Thunderstorm winds caused widespread damage in Menno. Numerous trees including several large trees were uprooted. Numerous homes were damaged, some directly by the wind and others by tree and other debris. Many homes and other buildings had windows broken and siding damaged. Several vehicles were damaged, including one pickup which was pushed partly onto the porch of a house. Power lines and poles were blown down, resulting in a power outage in Menno.	78 kts. E	500	
11/8/2005	High Wind		52 kts. E		
11/27/2005	Ice Storm	Heavy freezing rain coated roads, and power lines with ice up to 3 inches thick throughout SE South Dakota. Many roads were shut down for extended periods. Most schools and businesses were forced to close. Many miles of power lines and thousands of poles were brought down, resulting in power outages to thousands of households. In some rural areas, power was out for more than two weeks. Many people took shelter wherever they could. Damage to power poles and lines was so great that repairs required assistance from crews from eight states.		1,000	
11/28/2005	Blizzard	Snowfall from 4 to 15 inches combined with winds gusting over 50 mph to produce blizzard conditions. Heaviest snowfall was near and west of the James River, in the area where a severe ice storm immediately preceded the blizzard. Several reports of 6 to 8 foot drifts were received. Travel was made impossible in many areas as roads were closed for extended periods. Most schools and businesses not already closed because of the ice storm were forced to close. The winds during the blizzard continued to bring down power lines and poles, most of which had been coated and weighted down by ice in the area hit by the ice storm.		100	
11/30/2005	Winter Weather				
12/2/2005	Winter Weather				
1/1/2006	Winter Weather				
2/16/2006	Winter Weather				

DATE	EVENT TYPE	DESCRIPTION	MAG	PROP DAMAGE ($1,000s)	CROP DAMAGE ($1,000s)
3/12/2006	Winter Storm				
3/19/2006	Winter Storm	A prolonged period of snowfall spread into the area from the west and south, and continued for over a day. Snowfall totals varied from 6 to 10 inches, with winds gusting over 35 mph, which caused near blizzard conditions. The storm halted travel in the area of the heaviest snow, and greatly curtailed travel in other areas. Numerous schools and businesses were closed. Power outages were reported from collapsed lines due to the heavy snow and winds.			
7/18/2006	Drought				
8/1/2006	Drought				
9/16/2006	Tornado		F0		
11/26/2006	Winter Weather				
12/20/2006	Winter Storm	Freezing rain caused significant icing of around a quarter inch, which caused branches and power lines to break in a few places. The freezing rain was followed by 1 to 3 inches of snow. Travel was greatly slowed. Classes for December 21st were cancelled at several schools.		20	
12/29/2006	Winter Storm	Freezing rain and snow caused heavy icing of roads, trees, and power lines, with 2 to 6 inches of snow. Travel was brought to a standstill in places and many vehicles slid off roads. Ice accumulation was between a quarter and a half inch. Numerous power lines and tree branches were brought down by the ice, resulting in power outages.		100	
1/14/2007	Winter Weather				
1/20/2007	Winter Weather				
2/12/2007	Winter Weather				
2/24/2007	Winter Storm	Rain changed to freezing rain, causing light icing before the precipitation quickly changed to snow. Snow accumulated 5 to 7 inches. The icing and subsequent snow accumulation made travel very difficult, with several vehicle accidents and numerous vehicles sliding into ditches.			
2/28/2007	Heavy Snow				
3/1/2007	Blizzard				
3/11/2007	Flood				
5/5/2007	Tornado		EF1		
5/5/2007	Tornado		EF0		
5/5/2007	Tornado		EF0		
5/5/2007	Hail		1.75 in.		
5/5/2007	Flood	Heavy rainfall caused flooding of low areas including fields, homes, businesses, schools, roads, streams, and bridges. The flooding was a longer term event than flash flooding, which also had resulted. Long term major flooding of the James River also resulted, with the river peaking at 6.2 feet above flood stage southeast of Olivet on May 11th. Some parks and other recreation areas were affected. A few roads and bridges were washed out by the high water. The flooding delayed planting of crops in some areas.		200	
5/5/2007	Flash Flood				
6/1/2007	Flood				

DATE	EVENT TYPE	DESCRIPTION	MAG	PROP DAMAGE ($1,000s)	CROP DAMAGE ($1,000s)
12/1/2007	Winter Storm				
12/25/2007	Winter Weather				
1/20/2008	Winter Weather				
2/4/2008	Winter Weather				
2/11/2008	Winter Weather				
3/16/2008	Winter Weather				
3/31/2008	Winter Weather				
4/10/2008	Blizzard				
4/25/2008	Winter Weather				
6/5/2008	Flash Flood	Repeated heavy rain from thunderstorms caused widespread flash flooding in western Hutchinson County. Communities affected included Parkston and Tripp, with Parkston being especially hard hit. Numerous roads and homes were flooded, including up to 200 homes in Parkston. Parks and businesses were also flooded. In nearby rural areas, numerous fields were flooded, causing an unknown amount of crop damage. Small streams such as Pony Creek in Parkston flooded, adding to the damage.		1,000	
6/5/2008	Flood				
6/6/2008	Flood				
6/27/2008	Thunderstorm Wind		52 kts. E	5	
7/24/2008	Flash Flood				
11/6/2008	Winter Weather				
12/14/2008	Winter Weather				
12/20/2008	Winter Weather				
1/12/2009	Winter Weather				
2/26/2009	Winter Weather				
3/23/2009	Thunderstorm Wind		61 kts. E		
3/31/2009	Blizzard				
4/1/2009	Flood				
4/4/2009	Blizzard				
5/1/2009	Flood				
6/1/2009	Flood				
6/16/2009	Tornado	A tornado blew the roof off a hog barn, blew down two grain bins, blew about 20 feet of concrete off a silo, and blew down numerous trees.	EF1		
6/16/2009	Tornado		EF0		
6/16/2009	Tornado		EF0		
6/16/2009	Tornado		EF0		
6/16/2009	Hail		1.75 in.		
6/16/2009	Thunderstorm Wind	Thunderstorm winds blew the roof off a tire storage building, blew out several windows, and caused shingle and other roof damage to several structures in Menno. The winds blew down	70 kts. E	100	

DATE	EVENT TYPE	DESCRIPTION	MAG	PROP DAMAGE ($1,000s)	CROP DAMAGE ($1,000s)
		numerous trees, some large. Several vehicles, garages, and roofs were damaged by falling trees and tree debris, including at least 2 vehicles destroyed. The winds blew down power lines, causing a power outage.			
7/1/2009	Flood				
7/9/2009	Hail	Large hail caused widespread damage to vehicles, windows, and siding and roofs on homes. The hail also caused widespread crop damage, with over 66,000 acres affected. Damage to both property and crops was estimated to be in the millions of dollars.	1.75 in.	3,000	3,000
7/9/2009	Thunderstorm Wind	Thunderstorm winds blew down several trees, some as large as two feet in diameter, and blew down numerous branches. Minor damage to homes and vehicles was caused by falling trees and tree debris.	61 kts. E	40	
12/8/2009	Winter Weather				
12/23/2009	Blizzard	Prolonged snowfall produced heavy accumulations over southeast South Dakota, ranging up to over 20 inches in several areas. The snowfall took place from two days before to the day after Christmas. The snowfall was accompanied by increasing north to northwest winds which caused widespread blizzard conditions on Christmas day and the start of the next day.			
1/6/2010	Blizzard	Snowfall of 3 to 6 inches, previously existing snow cover, and northwest winds gusting to over 40 mph produced widespread blizzard conditions, with visibilities less than a quarter mile. New snowfall included 6 inches at Menno. Schools and businesses were closed, and travel became impossible in much of the area. The wind combined with cold temperatures to produce wind chills colder than 35 below zero during the latter part of the storm. This extreme cold continued into the next day, Friday, January 8th.			
1/7/2010	Extreme cold	Persistent north/northwest winds combined with very cold air to produce wind chill values that dropped to 35 below zero.			
1/25/2010	Winter Weather				
2/13/2010	Winter Weather				
3/11/2010	Flood				
4/1/2010	Flood				
5/1/2010	Flood				
6/1/2010	Flood				
6/11/2010	Thunderstorm Wind		61 kts. E		
6/16/2010	Flood				
6/26/2010	Tornado		EF0		
7/1/2010	Flood				
7/21/2010	Flash Flood	Heavy rain caused flooding of streets in and near the town of Freeman. The water was deep enough on streets to result in numerous stalled vehicles.			
8/1/2010	Flood				
9/23/2010	Flood				
10/26/2010	High Wind		52 kts. E		
12/11/2010	Blizzard				
12/30/2010	Winter Weather				

DATE	EVENT TYPE	DESCRIPTION	MAG	PROP DAMAGE ($1,000s)	CROP DAMAGE ($1,000s)
12/31/2010	Winter Storm				
1/1/2011	Winter Storm				
1/9/2011	Winter Weather				
2/1/2011	Extreme cold	North/northwest winds averaging 15 to 30 mph combined with temperatures dropping below zero to produce wind chills of 35 to 40 below zero.			
2/20/2011	Winter Storm				
3/16/2011	Flood				
4/1/2011	Flood	Major flooding of the James River, as well as flooding of small streams and lakes in the county, continued through April. Much farmland remained flooded, both near to and away from the James River. The James River was 5.8 feet above flood stage northeast of Scotland on April 1st, and fell very slowly during the month. A large area of land and numerous roads were flooded at the start of the month. Water was running over other roads, from flooded streams, creeks, and fields as well as from the James River. Many roads were heavily damaged. Some homes and businesses were also flooded, with the flooding of these places slowly alleviating through the month. High water and groundwater levels from record precipitation in the year 2010, a main reason the flooding onset was so fast in March, was also a main reason that the flooding subsided so slowly during April.		1,000	
4/15/2011	Heavy Snow				
5/1/2011	Flood				
5/29/2011	Hail		1.50 in.		
5/30/2011	Hail		1.75 in.		
6/1/2011	Flood	Moderate to major flooding of the James River, ongoing since the snowmelt season in March, continued through June. Farmland and other lowlands near the river remained flooded, with the water level varying slowly during the month. The highest stage northeast of Scotland was 3.1 feet above flood stage on June 2nd, though water levels were mostly below the levels of May.			
6/20/2011	Thunderstorm Wind		56 kts. E	5	
6/20/2011	Thunderstorm Wind		56 kts. E	5	
7/1/2011	Flood	Moderate to major flooding of the James River, ongoing since the snowmelt season in March, continued through July. Farmland and other lowlands near the river remained flooded, with the water level varying slightly up and down due to sporadic heavy rainfall. The highest stage northeast of Scotland was 3.3 feet above flood stage on July 7th, slightly higher than the peak stage of June, but not as high as peak levels earlier in the Spring.			
7/15/2011	Excessive Heat				
8/1/2011	Flood	Moderate to major flooding of the James River, ongoing since the snowmelt season in March, continued into early August, with the flooding continuing but very slowly abating through the month. Flooding of farmland and other lowlands near the river very slowly abated. The highest stage northeast of Scotland was 3.0 feet above flood stage on August 3rd			
8/11/2011	Thunderstorm Wind	Thunderstorm winds blew down trees and power lines in Freeman, causing a power outage. The winds also caused minor roof damage to several structures. More substantial damage	61 kts. E	100	

DATE	EVENT TYPE	DESCRIPTION	MAG	PROP DAMAGE ($1,000s)	CROP DAMAGE ($1,000s)
		was caused to a few homes, mainly roofs, by falling trees and large limbs. Fallen trees and tree debris blocked some roads in town.			
8/28/2011	Hail		3.00 in.		
8/28/2011	Hail		2.00 in.		
8/28/2011	Hail		1.75 in.		
2/13/2012	Winter Weather				
5/8/2012	Flood	Heavy rain caused minor flooding of the James River, affecting some farmland and roads. The flooding was noticed mostly in the northern part of the county, with lesser flooding downstream. The River crested at less than a tenth of a foot above flood stage near Scotland on May 12th.			
6/1/2012	Drought	Well below normal rainfall aggravated long term dry soil conditions, producing stress on crops which had been planted unusually early due to a warm late winter and early spring. The crops had begun their growth with ample mid spring rains, but the stress quickly developed with the return to dry conditions which had existed generally since the previous fall.			
6/26/2012	Excessive Heat				
7/1/2012	Drought	Drought conditions became established over the area. Stress on crops increased with no relief during the month. Hot weather added to the stress. Crop damage became certain. Severe non-ag water supply problems were not observed, but the long term dry conditions raised fears for the future.			
7/2/2012	Excessive Heat				
7/15/2012	Excessive Heat				
7/18/2012	Excessive Heat				
8/1/2012	Excessive Heat				
8/1/2012	Drought	Drought was generally listed as severe to extreme for the area, and was being compared to the worst of the dust bowl years, though not yet over as long a time period. Stress on crops continued, even though August was less hot than July. Crop damage was quite evident. Many local governments had water use restrictions in place.			
9/1/2012	Drought	Drought conditions continued over all of southeast South Dakota. Rainfall for the month varied from around half to less than a quarter of normal. Stress on crops that prevailed over the growing season became even more evident with the start of harvest. Local governments continued to use water use restrictions in an effort to prevent serious water supply problems.			
10/1/2012	Drought	Drought conditions continued over all of southeast South Dakota in October with well below normal rainfall keeping soil and vegetation dry.			
10/17/2012	High Wind		52 kts. E		
11/1/2012	Drought	Drought conditions continued over all of southeast South Dakota in November.			
12/1/2012	Drought	Drought conditions continued over all of southeast South Dakota in December. Although precipitation was generally normal to above normal, the amount of excess over the low winter normals was not enough to relieve the dry conditions. The effects of the drought on farmers and ranchers continued. Hunting was also affected, with low pheasant numbers, and disease in the deer population.			

DATE	EVENT TYPE	DESCRIPTION	MAG	PROP DAMAGE ($1,000s)	CROP DAMAGE ($1,000s)
12/9/2012	Blizzard				
12/27/2012	Winter Weather				
1/1/2013	Drought				
2/1/2013	Drought				
2/10/2013	Blizzard	Variable snowfall of 2 to 8 inches, northwest winds gusting to 45 mph, and snow cover existing before the storm in part of the area, produced blizzard conditions with visibilities below a quarter mile in blowing snow in many areas. The low visibilities and drifting snow forced some businesses to close, and also forced several school closings on Monday February 11th.			
2/21/2013	Winter Weather				
3/1/2013	Drought				
4/1/2013	Drought				
4/9/2013	Winter Storm	An extended period of precipitation began with freezing rain quickly producing moderate to heavy ice accumulations, ranging up to more than a quarter of an inch. The precipitation then changed to sleet and then snow, with sleet and snow accumulations reaching the 5 to 8 inch range. Numerous branches and power lines were downed by the weight of ice and accompanying wind, with much of the power line damage affecting rural electric cooperatives. Trees and tree debris blocked roads, and damaged some vehicles and homes. Several power outages were reported. The winter precipitation made travel impossible in many areas, resulting in schools and businesses being forced to close.		10,000	
8/10/2013	Hail		2.00 in.		
8/10/2013	Hail		1.75 in.	10	
8/10/2013	Hail		1.50 in.	10	
8/10/2013	Hail		1.50 in.		
8/10/2013	Thunderstorm Wind		61 kts. E	50	
8/10/2013	Thunderstorm Wind		61 kts. E	20	
12/3/2013	Winter Storm	Snow, heavy in areas, accumulated up to 8 inches from the evening of December 3rd through the afternoon of December 4th. Difficult travel conditions forced delayed openings or early closings of some schools and businesses on December 4th.			
1/26/2014	High Wind		50 kts. E		
5/26/2014	Hail		1.25 in.		
6/16/2014	Flood	Persistent rain caused flooding of fields and other lowlands, including several roads, homes, and businesses. This flooding lasted for almost two days. Some roads were damaged or washed out.		50	
7/26/2014	Hail		1.50 in.		
7/26/2014	Thunderstorm Wind		52 kts. E		
11/15/2014	Winter Weather				
12/15/2014	Winter Weather				
1/5/2015	Winter Weather				

DATE	EVENT TYPE	DESCRIPTION	MAG	PROP DAMAGE ($1,000s)	CROP DAMAGE ($1,000s)
1/8/2015	Winter Weather				
1/31/2015	Winter Storm				
5/10/2015	Tornado		EF0		
6/22/2015	Thunderstorm Wind		53 kts. MG		
7/5/2015	Thunderstorm Wind		58 kts. MG		
8/9/2015	Hail		1.00 in.		
8/15/2015	Hail		1.00 in.		
11/20/2015	Heavy Snow				
11/30/2015	Winter Storm				
12/25/2015	Winter Storm				
12/28/2015	Winter Weather				
2/2/2016	Blizzard	Snow, combined with winds gusting over 40 mph, produced near zero visibilities. Total snow amounts included over 6 inches southeast of Menno. Travel was brought to a halt and several vehicles slid off roads due to the combination of snowy roads and low visibility. Schools and numerous businesses were closed.			
2/19/2016	High Wind		65 kts. MG		
2/29/2016	Winter Weather				
3/23/2016	Winter Storm				
3/26/2016	Winter Weather				
6/10/2016	Excessive Heat				
6/17/2016	Hail		1.25 in.		
7/16/2016	Thunderstorm Wind		58 kts. MG		
7/19/2016	Excessive Heat				
9/9/2016	Hail		1.75 in.		
11/18/2016	Winter Storm				
12/17/2016	Cold/wind Chill				
12/24/2016	Winter Weather				
1/24/2017	Winter Storm				
2/23/2017	Winter Storm				
5/15/2017	Thunderstorm Wind		55 kts. MG		
6/12/2017	Hail		1.00 in.		
6/29/2017	Hail		1.00 in.		
7/11/2017	Thunderstorm Wind		52 kts. EG		
8/1/2017	Thunderstorm Wind		52 kts. EG		
8/21/2017	Hail		2.00 in.		
12/21/2017	Winter Weather				
12/26/2017	Cold/wind Chill				

DATE	EVENT TYPE	DESCRIPTION	MAG	PROP DAMAGE ($1,000s)	CROP DAMAGE ($1,000s)
12/31/2017	Extreme Cold	Low temperature at Parkston was -25, with a wind chill of -36.			
1/1/2018	Extreme Cold				
1/10/2018	Winter Weather				
1/15/2018	Extreme Cold				
1/22/2018	Winter Storm				
2/5/2018	Winter Weather				
2/8/2018	Winter Weather				
2/10/2018	Extreme Cold				
2/19/2018	Winter Weather				
2/22/2018	Winter Storm				
2/24/2018	Winter Weather				
3/5/2018	Blizzard				
3/10/2018	Winter Weather				
3/16/2018	Winter Weather				
3/18/2018	Flood				
3/18/2018	Flood				
4/2/2018	Winter Weather				
4/13/2018	Hail	Hail up to golf ball size fell for a few minutes north of Tripp.	1.75 in.		
4/13/2018	Blizzard	Life threatening conditions developed, as a mix of rain, sleet and snow changed to all snow. Brutal winds gusting over 40 mph whipped visibility to less than a quarter mile at times. Businesses and schools were closed. Travel was not recommended for a two day period. Total snowfall of 9 inches measured at Menno.			
4/18/2018	Winter Storm				
4/23/2018	Flood				
4/29/2018	Flood	Snow melt and runoff from periods of heavy rainfall produced minor flooding which impacted lowland agricultural areas.			
5/23/2018	Hail		1.00 in.		
5/23/2018	Hail		1.00 in.		
5/25/2018	Hail		1.00 in.		
6/8/2018	Thunderstorm Wind		52 kts. EG		
6/26/2018	Flood				
7/3/2018	Heat				
7/11/2018	Heat				
7/13/2018	Flood				
8/28/2018	Hail		1.75 in.		

DATE	EVENT TYPE	DESCRIPTION	MAG	PROP DAMAGE ($1,000s)	CROP DAMAGE ($1,000s)
8/28/2018	Hail		1.75 in.		
9/20/2018	Flood	Runoff from heavy rain produced moderate flooding which significantly impacted lowland agricultural areas between Mitchell and Yankton. River levels reached 2.1 feet above flood stage on the James River near Scotland.			
10/14/2018	Winter Weather				
11/28/2018	Winter Weather				
12/1/2018	Winter Storm				
12/27/2018	Winter Storm				
12/31/2018	Winter Weather				
12/31/2018	Extreme Cold				
1/1/2019	Extreme Cold				
3/3/2019	Extreme Cold				
3/13/2019	Flood	Snow melt and heavy rainfall resulted in extensive flooding of agricultural lands and inundation of numerous roads, including SD Hwy 44 south of Milltown. A few farm buildings along the river stretch were also flooded. The James River at Scotland reached major flood stage cresting 5.95 feet above flood stage on March 15. Major flooding continued at the end of the month.			
4/1/2019	Flood	Runoff from occasional precipitation in late March and April maintained considerable flooding in the area. The James River at Mitchell crested at 6.30 feet above flood stage on April 22, the sixth highest crest on record. Major flooding continued at the end of the month.			
4/11/2019	Blizzard				
5/1/2019	Flood	Flooding continued during the month. The James River near Mitchell crested at major flood stage twice during the month. The first occurred on May 1 when levels crested at 5.79 feet above flood stage. Additional rainfall later in the month resulted in a secondary crest of 5.44 feet above flood stage on May 31. The river remained at major flood stage at the end of the month.			
6/1/2019	Flood	Flooding continued during the month. The James River near Scotland started at 4.90 feet above flood stage on June 1. Many rural roads near the river were inundated, with continued flooding of significant amounts of agricultural land.			
6/21/2019	Funnel Cloud				
6/29/2019	Extreme Heat				
6/30/2019	Heat				

DATE	EVENT TYPE	DESCRIPTION	MAG	PROP DAMAGE ($1,000s)	CROP DAMAGE ($1,000s)
7/1/2019	Flood	Flooding continued during the month. The James River near Mitchell crested 4.74 feet above flood stage on July 12, with a secondary crest 3.17 feet above flood stage on July 30. Many rural roads near the river were inundated, with continued flooding of significant amounts of agricultural land.			
7/17/2019	Thunderstorm Wind		81 kts. EG	100	
7/17/2019	Tornado		EF1	100	
7/17/2019	Thunderstorm Wind		77 kts. MG		
7/17/2019	Lightning			90	
8/1/2019	Flood	Flooding continued during the month. The James River near Mitchell crested 4.97 feet above flood stage on August 8. Many rural roads near the river were inundated, with continued flooding of significant amounts of agricultural land.		10	
8/3/2019	Flood			10	5
8/17/2019	Hail		1.00 in.		
9/1/2019	Flood	A continuation of flooding from August. The James River near Mitchell responded sharply to 5 to 8 inches of rainfall between September 10-12 to reach the 4th highest crest on record at 8.05 feet above flood stage on September 13. Numerous county and township roads were inundated, including SD Hwy 37, SD Hwy 44, and US Hwy 18. A great amount of ag land remained flooded.		400	
9/10/2019	Hail		0.88 in.		
10/1/2019	Flood	A continuation of flooding from September, as the James River near Scotland spent much of the month at moderate flood stage. Significant amounts of agricultural land remained flooded.		5	
10/22/2019	Flood				
11/1/2019	Flood				
11/25/2019	Flood	The James River near Scotland crested on November 30 at 0.30 feet above flood stage. Impacts were generally inundation of agricultural lands near the river.			
11/26/2019	Winter Storm				
11/29/2019	Winter Weather				
12/1/2019	Flood				
12/1/2019	Winter Weather				
12/29/2019	Blizzard	**Light mixed precipitation resulted in a minor glaze of ice accumulation, then heavy snowfall (9 inches at Parkston and Menno) and high wind resulted in white out conditions . Travel was not recommended. Snow drifts to several feet were common.**			

Source: National Climatic Data Center's Storm Events Database

APPENDIX C: References

PRINT REFERENCES

- Hutchinson County Comprehensive Plan. Planning & Development District III.
- City of Freeman Comprehensive Plan. Planning & Development District III.
- City of Menno Comprehensive Plan. Planning & Development District III.
- City of Parkston Comprehensive Plan. Planning & Development District III.
- City of Tripp Comprehensive Plan. Planning & Development District III.
- Menno Dam Emergency Preparedness Plan. South Dakota Dept of Game, Fish and Parks. 1997.
- Southeastern Electric Cooperative construction work plan.
- Electrical Transmission and Distribution Mitigation: Loss Avoidance Study Nebraska and Kansas FEMA-1674-DR-KS and FEMA-1675-DR-NE. Federal Emergency Management Agency. 2008.
- Local Mitigation Planning Handbook. FEMA. March 2013.
- Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards. FEMA. January 2013.
- State of South Dakota Hazard Mitigation Plan April 2019. South Dakota Office of Emergency Management/Wood. 2019.
- South Dakota Drought Mitigation Plan. South Dakota Drought Task Force/South Dakota Office of Emergency Management. 2015.
- South Dakota's Five-Year Floodplain Management Work Plan. South Dakota Office of Emergency Management. 2005.
- South Dakota Electric Cooperatives Mutual Aid Plan. South Dakota Rural Electric Association. 2008.

ELECTRONIC REFERENCES

- Census data: factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml
- Population data: census.gov/population/www/censusdata/cencounts/files/sd190090.txt
- Land cover information: www.mrlc.gov/index.php
- Climate extremes: www.weather.gov/fsd/climatearchive
- Major disaster declarations and emergency declarations in South Dakota: www.fema.gov/disasters/grid/state-tribal-government/
- Public assistance amounts following declared disasters: www.fema.gov/data-feeds/openfema-dataset-public-assistance-funded-projects-summaries-v1
- Storm event records: www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=46, SOUTHDAKOTA
- Crop loss records: www.rma.usda.gov/data/cause.html
- Flood insurance information: www.fema.gov/policy-claim-statistics-flood-insurance
- National Flood Insurance Program participation: www.fema.gov/cis/SD.html
- 2019 flooding impact: fb.org/market-intel/prevent-plantings-set-record-in-2019-at-20-million-acres
- Drought impact: droughtreporter.unl.edu/map/
- Wildfire vulnerability: silvis.forest.wisc.edu/data/wui-change/
- Earthquake history in South Dakota: www.sdgs.usd.edu/publications/maps/earthquakes/earthquakes.htm
- Earthquake magnitude: en.wikipedia.org/wiki/Richter_magnitude_scale
- Landslide information: landslides.usgs.gov/hazards/nationalmap/
- Social vulnerability: artsandsciences.sc.edu/geog/hvri/sovi%C2%AE-0