2026

HAZARD MITIGATION PLAN

Brule County, South Dakota



PREPARED BY:

Brule County Hazard Mitigation Planning Team

TECHNICAL ASSISTANCE PROVIDED BY:

Planning & Development District III

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2026 Brule County (SD)
Hazard Mitigation Plan



CHAPTER I

Planning Process

PLANNING & DEVELOPMENT DISTRICT III

CHAPTER I
PLANNING PROCESS

Background

This plan is an update of the Brule County Hazard Mitigation Plan, which was approved by FEMA in September 2021. The purpose of the plan is to prevent or reduce losses to people and property that may result from future hazard events in Brule 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 Brule County in its efforts to mitigate future disaster events.

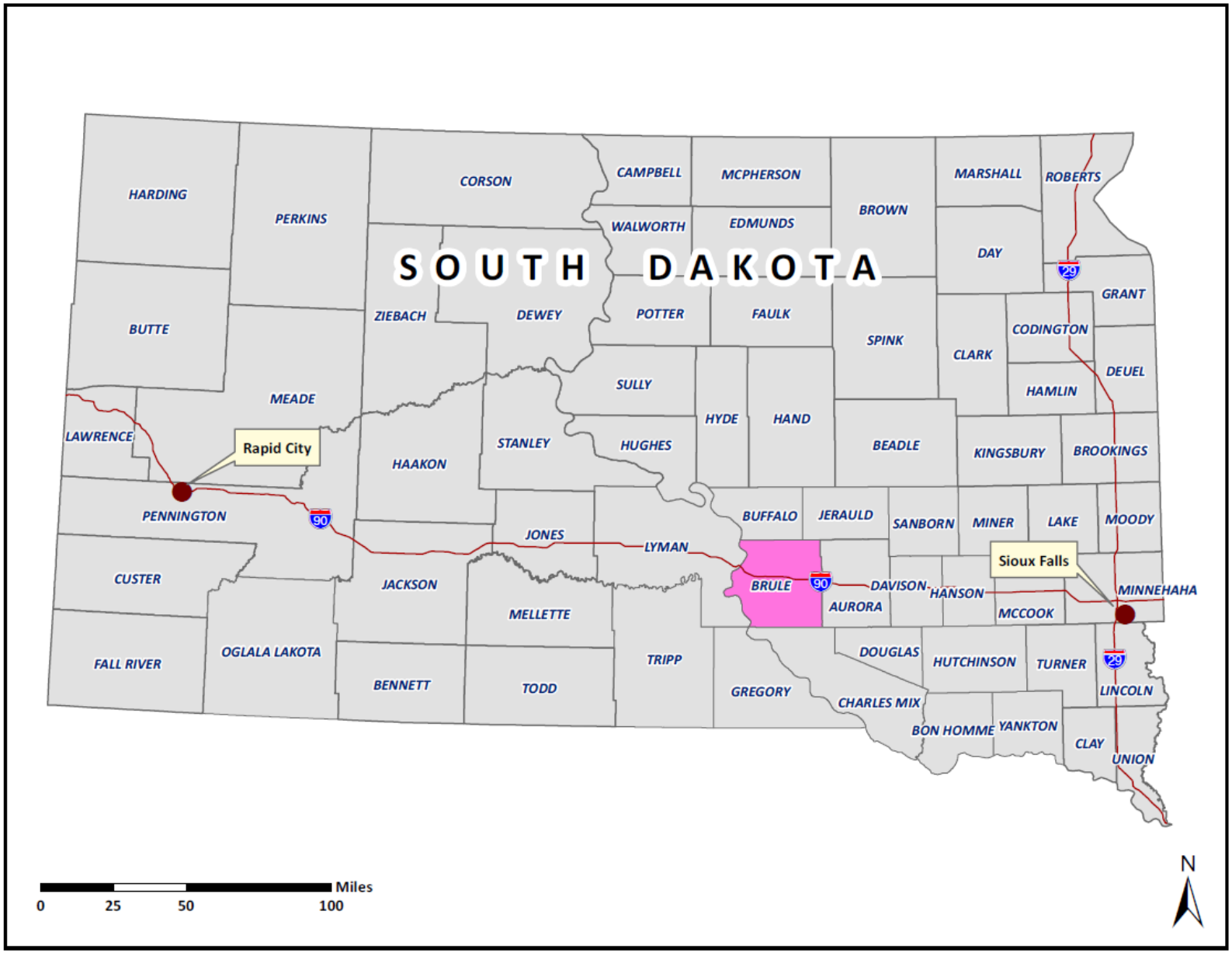
This is a multi-jurisdictional plan. All the municipalities located within Brule County were invited to participate in the plan's development. Following is the list of jurisdictions that chose to participate by sending representatives to attend the planning meetings and by providing input into the plan:

- Brule County
- City of Chamberlain
- City of Kimball
- Town of Pukwana

Production of the plan was the ultimate responsibility of the Brule 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 hazard mitigation planning team whose members are listed in **Table 1.1**, as well as the public and other stakeholders.

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 hazard mitigation plans for all fifteen of the counties in the District's planning area, including Brule County's current plan.

Figure 1.1 – County Location



The following staff members of Planning & Development District III were involved in producing the plan. John Clem, a Community Development Specialist, was the project manager and author of the plan. Shannon Viereck assisted in the public outreach and risk assessment efforts, provided additional research assistance, and edited the final copy of the plan. Harry Redman, a Geographic Information Systems Professional, produced maps for the plan, directed the floodplain risk analysis, and completed the county land cover analysis. Jen Moser assisted with the public outreach and survey effort.

Development of Planning Team

The initial planning stages for this plan update began in November 2025 when FEMA funds were awarded to the County. Following this, Mr. Clem and the Brule County Emergency Management Director began to develop the methodology and strategy that was used to update the plan.

The first step was to organize the hazard mitigation planning team, the group of individuals representing the participating jurisdictions at the planning team meetings. People invited to participate from each jurisdiction included elected officials, finance personnel, public works staff, planning and zoning staff, code enforcement staff, floodplain management staff, and emergency response personnel. These individuals provided information that was used to develop the plan, reviewed drafts of the plan as it was being assembled, and approved the final version of the plan.

Other organizations were also contacted by email and/or telephone to participate in the plan's development. These stakeholders included:

- Central Electric Cooperative
- Aurora-Brule Rural Water System
- Tri-County Landfill
- DGR Engineering
- U.S. Army Corps of Engineers
- Sanford Chamberlain Medical Center
- Chamberlain School District
- Central Dakota *Times*
- Neighboring counties (Aurora, Buffalo, Charles Mix, Jerauld, and Lyman)

Each individual invited to participate had knowledge in various subject areas pertinent to the plan's development. These subject areas included the following:

- Infrastructure within the county
- Economic development activities within the county
- Floodplain management
- Building codes and other development regulations
- Mapping and GIS

- Natural and cultural resources
- Social services

Table 1.1 lists the individuals who participated in the plan's development, including their contribution to the process. The columns on the right show their attendance at the planning meetings that were held. Additional meetings took place in the participating jurisdictions; those meetings are not reflected in the table, but documentation is provided in **Appendix B**.

Table 1.1 – Participation in Plan Development

Name	Representing	Position	Role	Mtg 1 07/16/26	Mtg 2 8/20/26	Mtg 3 10/01/26
John Clem	Planning District III	Planner	Plan author	X	X	X
Shannon Viereck	Planning District III	Planner	Research, Support	X	X	X
Katheryn Benton	Brule County	Emergency Manager	Input, Review	X	X	
Gary Dozark	Brule County	Commissioner	Input, Review	X	X	X
Greg Mairose	Brule County	Commissioner	Input, Review	X	X	X
Donn DeBoer	Brule County	Commissioner	Input, Review	X	X	X
Sharman Swanson	Brule County	Commissioner	Input, Review	X	X	X
Monte Leiferman	Brule County	Commissioner	Input, Review	X	X	X
Jim Ketelhut	Brule County	Commissioner (elect)	Input, Review	X	X	X
Pam Petrak	Brule County	Auditor	Input, Review	X	X	X
Mike Schlaffman	Brule County	Hwy Superintendent	Input, Review	X	X	X
Steve Meyer	Brule County	States attorney	Input, Review	X	X	X
Clint Soulek	City of Chamberlain	City administrator	Input, Review	X	X	
Nicky Gaulke	City of Chamberlain	Finance officer	Input, Review			X
Lydia Morley	City of Kimball	Finance officer	Input, Review	X	X	X
Richard Two Two	City of Kimball	Police chief	Input, Review	X	X	X
Andrew London	City of Kimball	Ambulance dept	Input, Review	X		
Brandon Buck	City of Kimball	Fire chief	Input, Review	X		
Lonnie Sharping	Town of Pukwana	Finance officer	Input, Review	X	X	
Jerry Wingert	Town of Pukwana	Fire chief	Input, Review	X	X	
Janet Petrak	Central Dakota Times	Editor		X	X	X
Sheena Larsen	Lake Francis Case Dev Corp	Director			X	X

Public Outreach

Throughout the plan's development, efforts were made to obtain broader involvement in the plan beyond the core planning team and stakeholders. This outreach effort included press releases that were printed in the local newspaper, information posted online, and social media.

Surveys were also made available to provide another way for people to contribute their thoughts and opinions on hazard mitigation. Survey forms were distributed to all planning team members and to other city and county staff who did not participate in the planning

meetings. To generate broader public input, the surveys were also made available online and a press release at the start of the planning process included a QR code so the public could participate in the survey. Respondents were able to provide their opinion of which hazards have the biggest impact on the county, how those hazards have personally impacted them, and what actions could be taken to mitigate the hazards. See **Appendix A** for documentation of the public outreach effort.

Incorporation of Other Plans

Information from various local plans, studies, and reports was incorporated into this plan. Each of the items listed in the table below was reviewed as this plan was developed, and a brief description is given of how relevant information was incorporated into this plan. In addition to these local resources, a considerable amount of information and data was incorporated into this plan from the South Dakota Hazard Mitigation Plan (both the 2019 version and the current enhanced version).

Table 1.2 – Plans, Studies, and Reports Incorporated Into Plan

Item	Notes
Planning & Development District III Comprehensive Economic Development Strategy (CEDS)	The CEDS analyzes development issues within the District III service area, which includes Brule County. Economic resiliency, including the role that hazard mitigation can play in helping communities maintain economic strength, is discussed at some length. Regional development priorities and demographic data from the CEDS was incorporated into this plan.
Brule County Comprehensive Plan	The environmental constraints section of the plan was used to identify areas suitable for development in the county.
Brule County Highway Plan	The plan includes a list of county roads scheduled for improvements within the next five years.
Brule County Storm Water Evaluation	The study evaluates Brule County's stormwater collector system, ditches, and intermittent streams, focusing on areas contributing to drainage into Red Lake, Lake Wanalain, and American Creek. The study identifies options for upgrading the stormwater system so it can function more effectively.
Chamberlain Comprehensive Plan	The environmental constraints section of the plan was used to identify areas suitable for development within the city.
Chamberlain Capital Improvements Plan	The plan, which is expected to be completed by the end of 2026, prioritizes major stormwater system needs, as well as water, sewer, street, and other areas of need.
Chamberlain Water Treatment, Water Main, & Sanitary Sewer Improvements Facilities Plan	The plan outlines recommended upgrades to Chamberlain's utility systems, including expected cost of the improvements and a timeline for implementation.
Kimball Comprehensive Plan	The environmental constraints section of the plan was used to identify areas suitable for development within the city.
Pukwana Electric System Mapping and Burial Analysis	This memo describes the Town's electrical system and provides an estimate of the cost to convert the existing overhead electric facilities to underground.
Central Electric Cooperative Construction Work Plan 2023-2026	The plan includes a map showing the status of projects listed in the work plan.

Lake Wanalain Emergency Preparedness Plan	The plan outlines procedures for warning, evacuation, and care of people living within the area potentially affected by failure of the dam.

Planning Meetings

Several meetings were held to develop the plan, all of which took place at the Brule County courthouse as described below. 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, and nobody was discouraged from voicing his/her opinion. Leadership and guidance at the meetings were provided by Planning & Development District III staff and the Brule County Emergency Management Director.

Prior to the first planning team meeting, the stakeholders identified earlier in this chapter were contacted and invited to participate in the planning process. A survey instrument was also developed, which was distributed to the planning team members and made available to the public as described earlier in the Public Outreach section.

First Planning Team Meeting

The first planning team meeting began with an introduction to the concept of hazard mitigation for the team members, some of whom had not participated in the development of the current plan, followed by a discussion about the process by which the plan would be developed over the coming months. The team then reviewed the initial results of the survey and additional surveys were collected. The rest of the meeting was spent reviewing the County's current mitigation plan and discussing local mitigation capabilities, focusing on land use regulations, building code enforcement, and National Flood Insurance Program activities.

Activity between meetings

After the meeting, the Planning & Development District III office did a considerable amount of work on the risk assessment using various methods as described in **Chapter III**. The results of this work were shared with the planning team, including a summary of the textual information presented in **Chapter III**, maps showing hazard-prone areas in relation to important assets in each jurisdiction, and information about the value of property at risk to the various hazards impacting the county. Since the next meeting would focus on development of the mitigation strategy, the District III office also distributed a list of potential mitigation actions to the team, based on FEMA's guidance document *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards*.

Second Planning Team Meeting

The mitigation strategy began to be developed at this meeting, starting with the identification of hazards to be addressed. Following this, a review was made of the status of the proposed mitigation actions listed in the current plan.

Discussion then turned to identification of the mitigation goals and objectives to be achieved, followed by initial discussion of the specific mitigation actions to include in the plan. The participants were reminded to focus on hazard mitigation, as opposed to preparedness, and they were encouraged to consider a comprehensive range of actions, regardless of whether they could be achieved in the foreseeable future.

Activity between meetings

After the second meeting, each jurisdiction further discussed the mitigation actions they wanted to include in the plan. This discussion took place at an official meeting of each jurisdiction's governing body, which ensured that the public could participate in the selection process, since hazard mitigation was an agenda item. The list of mitigation actions selected by the communities is presented in **Chapter IV** (see **Table 4.5**).

Final Planning Team Meeting

Following the jurisdictional meetings, the Planning & Development District III office completed the first draft of the plan. After this, the planning team was brought together again for a final meeting to review the draft and discuss how the plan will be maintained going forward [1]. The importance of integrating the plan into the existing planning mechanisms within the county was emphasized. Additional information was added to the plan based on discussion at the meeting, primarily involving clarification of some of the details of the proposed mitigation actions. The plan was then submitted to the South Dakota Office of Emergency Management.

Acknowledgements

The Planning & Development District III office would like to thank the members of the Brule County Hazard 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 Emergency Management Director Katheryn Benton for arranging the planning team meetings and for coordinating with the participating jurisdictions. Thanks also are extended to Jim Poppen, Blaire Jonas, and Kyle Kafka at the South Dakota Office of Emergency Management for information and guidance that was helpful in developing the plan.

[1] The Town of Pukwana was not represented at the meeting, but they were briefed on the meeting discussion.

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CHAPTER II

Community Profile

PLANNING & DEVELOPMENT DISTRICT III

CHAPTER II
COMMUNITY PROFILE

Background

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

General Description

Brule County is located in south-central South Dakota (see **Figure 1.1**). The county covers approximately 846 square miles in area, and its population according to the 2020 Census was 5,247. Its population density is only 6.2 people per square mile compared to 11.7 people per square mile in South Dakota and 93.8 people per square miles in the United States. There are three incorporated municipalities located within the county - Chamberlain (pop 2,473), Kimball (pop 572), and Pukwana (pop 233). The county seat is located in Chamberlain. Other populated places include the Grass Ranch and Cedar Grove Hutterite Colonies [2]. **Figure 2.1** shows the county's communities and highway network.

Physical Characteristics

The landscape of Brule County is mostly open, and the terrain is generally level, except along the Missouri River, which forms the county's western border. Red Lake is the largest body of water located within the county. Most of the land is devoted to livestock grazing or the raising of crops, primarily corn, soybeans, wheat, hay, and sorghum.

[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 – Brule County

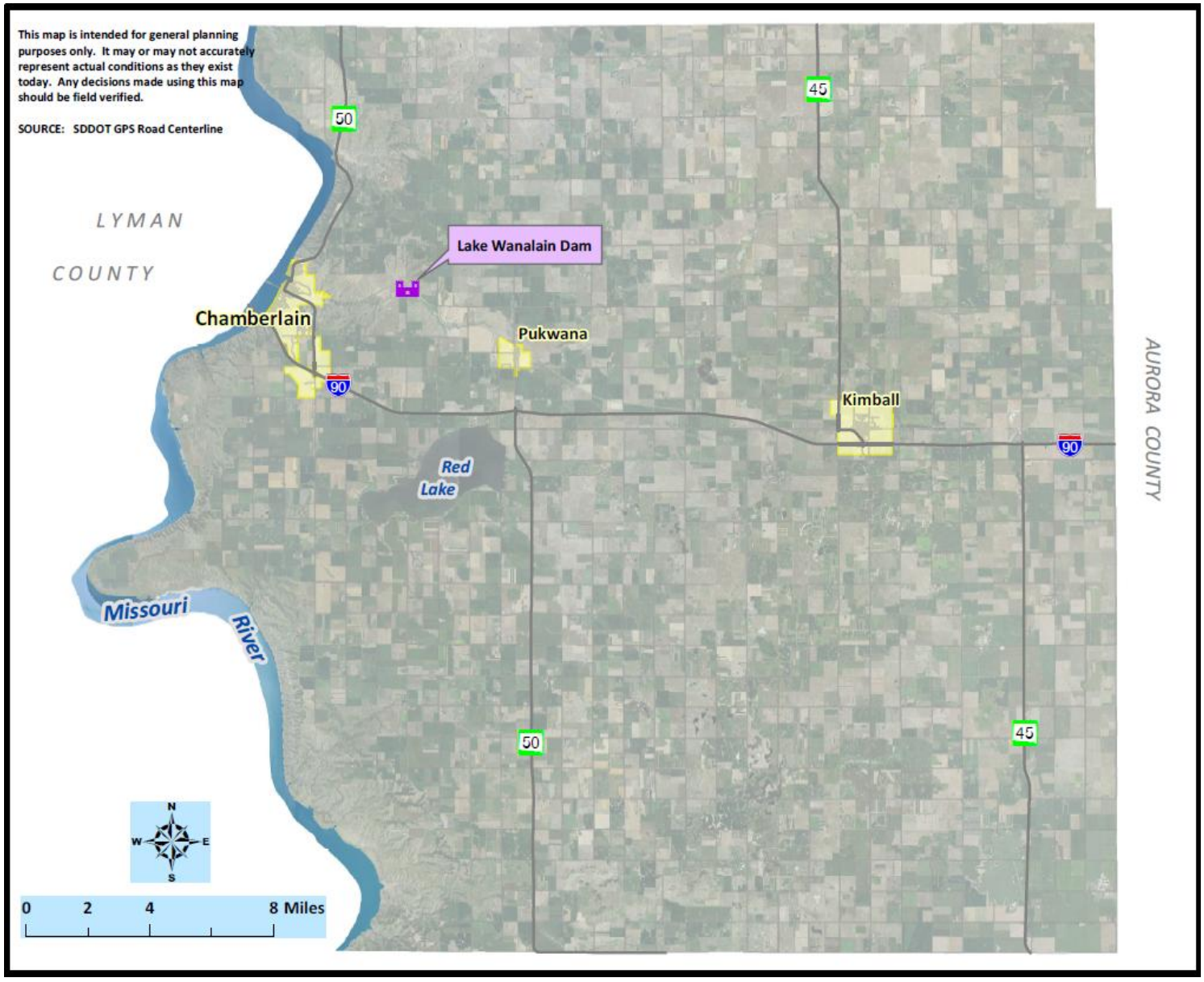


Table 2.1 provides a breakdown of the land cover in Brule County, which is shown graphically in **Figure 2.2** on the following page. The table is based off satellite imagery from the United States Geological Service's National Land Cover Database. As the table shows, the predominant types of land cover in the county are pastureland and cropland, which together comprise approximately 77 percent of the county's total land base. Developed land makes up only a very small fraction of the land area.

Table 2.1 - Vegetative Land Cover

Cover Type	Square Miles	Percent of Total Area
Pastureland	368.7	43.6
Cultivated crops	285.1	33.7
Grassland and Shrub/Scrub	108.6	12.8
Open water	31.1	3.7
Developed land (open space)	27.6	3.3
Wetlands	11.5	1.4
Forested land	9.8	1.2
Developed land (low to high intensity)	3.5	0.4
Barren land	0.3	0.0

Source: www.mrlc.gov/index.php

As in most of South Dakota, the climate of Brule 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 the summer can exceed 100 degrees Fahrenheit [3], while winter lows can drop below -20 degrees. Precipitation averages about 20.4 inches per year, much of which occurs during the spring and early summer. Following is climate data reported from the Chamberlain weather station.

Table 2.2 - Monthly Climate Conditions in Brule County (1991 - 2020)

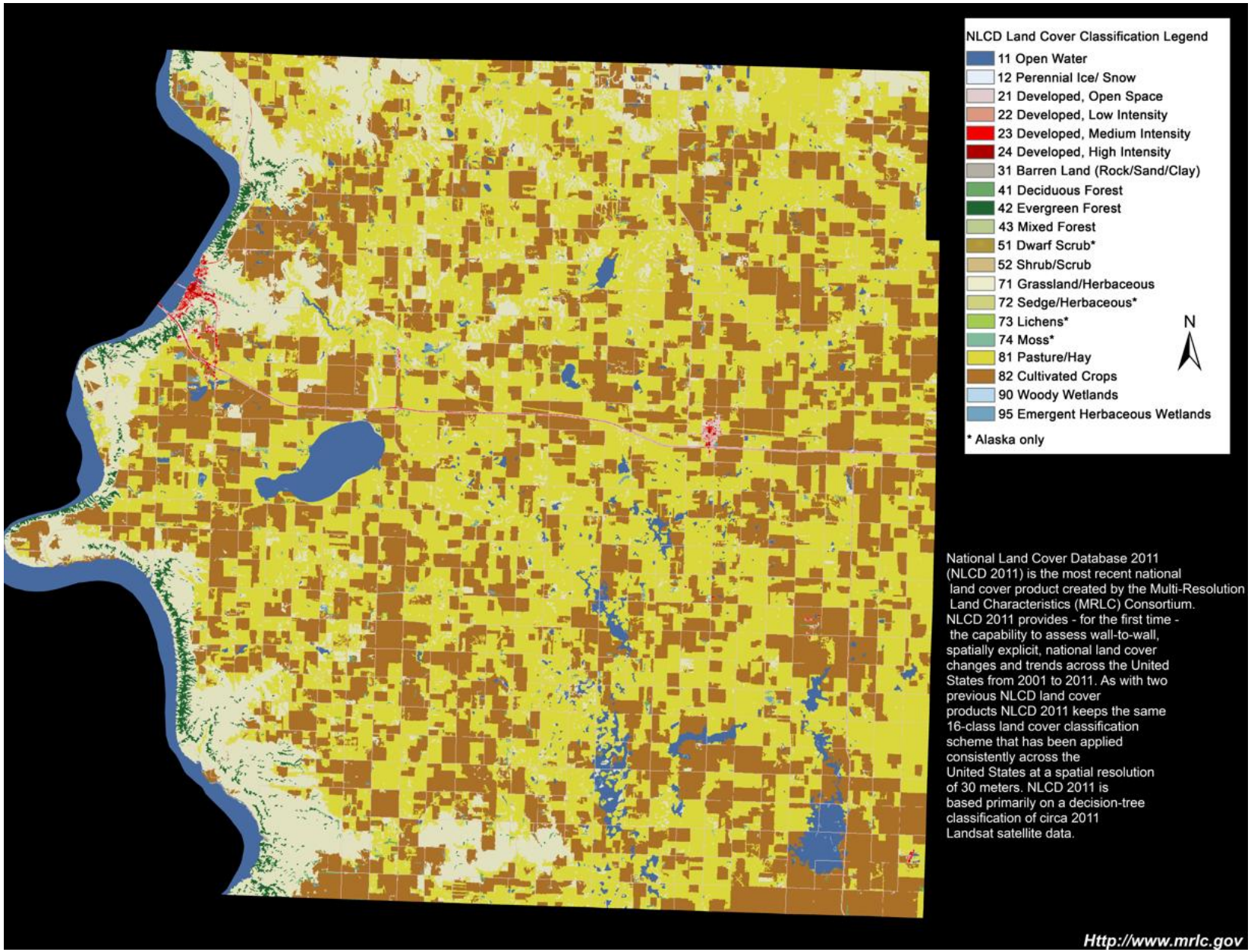
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ave High	30.6	35.3	46.9	59.1	69.9	80.6	87.7	85.7	77.4	61.7	46.3	33.6
Ave Low	11.1	14.2	24.7	35.1	46.7	57.6	62.8	61.2	51.2	37.5	24.7	15.0
Ave Precipitation	0.40	0.58	1.12	2.32	3.19	3.57	2.18	2.28	2.13	1.57	0.51	0.52

Source: www.weather.gov/wrh/climate

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

[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.

Figure 2.2 - County Land Cover



The impact that climate change may have on the county is difficult to predict. 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 in which South Dakota is located, especially in the winter, and notes a long-term trend of increasing annual precipitation across the state, among the highest in the country, much of it occurring in the spring and fall seasons.

By 2050, according to research from Headwaters Economics, Brule County is expected to experience 16 more days per year that reach above 95 degrees Fahrenheit (from 29 days to 45 days per year) and the average annual temperature is expected to increase from 50°F to 53°F. No significant change in average annual precipitation is expected.

There is no consensus on climate change science and it is difficult to make any definitive plans for climate change, but it appears likely that communities that are already vulnerable to weather and climate extremes will be stressed even further by more frequent extreme events occurring within an already highly variable climate system. Increased demand for water and energy may constrain development, stress natural resources, and increase competition for water, and new agricultural practices may be needed to cope with changing conditions.

Socioeconomic Description

Population Trends

Brule County has been experiencing a gradual population decline for the last several decades. The county's Census 2020 population of 5,247 is about 86 percent of the population that was recorded in 1950. As the table below shows, the county's population is expected to decrease slightly in the coming decades.

Table 2.3 - Brule County Population

Pop 1950	Pop 1960	Pop 1970	Pop 1980	Pop 1990	Pop 2000	Pop 2010	Pop 2020	Pop 2030 Projected	Pop 2040 Projected	Pop 2050 Projected
6,076	6,319	5,870	5,245	5,485	5,364	5,255	5,247	5,167	5,130	5,098

Source: U.S. Census; Projections based on analysis of past population records and current age and sex cohorts

Race and Age

The following table shows that Brule County is fairly homogenous in terms of racial breakdown, although the county does have a relatively high proportion of Native Americans. The median age of the population is slightly higher than the state and national figures.

Table 2.4 - Racial and Age Characteristics

	White Pop	Black Pop	American Indian Pop	Asian Pop	Other Race	Two or More Races	Hispanic Pop	Pop Under 18	Pop 65 and Over	Median Age
Brule Co.	83.2%	0.6%	9.9%	0.5%	0.5%	5.3%	2.0%	24.5%	19.1%	41.5
South Dakota	80.7%	2.0%	8.8%	1.5%	1.7%	5.3%	4.4%	24.1%	18.2%	38.5
United States	61.6%	12.4%	1.1%	6.0%	8.4%	10.2%	18.7%	21.7%	17.3%	39.0

Source: American Community Survey 2022 1-Year Estimates

Income and Education

Income levels in Brule County are below state and national figures, although poverty rates are similar. Educational attainment lags behind state and national averages.

Table 2.5 – Income and Education

	Median Household Income	Poverty Rate – All People	Poverty Rate – Under 18	Poverty Rate – Over 65	High School Grad or Higher	Bachelor's Degree or Higher	Graduate Degree
Brule Co.	$64,821	13.9%	19.4%	10.5%	85.8%	25.7%	6.3%
South Dakota	$69,728	12.5%	15.2%	10.9%	93.1%	31.6%	9.9%
United States	$74,755	12.6%	16.3%	10.9%	89.6%	35.7%	14.0%

Source: American Community Survey 2022 1-Year Estimates

Employment

The primary economic base of Brule County is agriculture. Much of the non-ag employment for people who work in the county is in education and health care. Industry and manufacturing are not significant.

Table 2.6 – Employment Sectors

	Brule County	South Dakota	United States
Agriculture, Forestry, Fishing, Mining	17.2%	6.4%	1.6%
Construction	3.8%	7.4%	6.9%
Manufacturing	3.7%	9.9%	9.9%
Wholesale Trade	2.1%	2.1%	2.2%
Retail Trade	9.2%	11.4%	11.1%
Transportation, Warehousing, Utilities	4.2%	4.4%	6.0%
Information	3.1%	1.5%	1.9%
Finance, Insurance, Real Estate	2.0%	6.0%	6.7%
Professional, Scientific, Management	6.6%	6.7%	12.6%
Education, Health Care, Social Assistance	29.7%	26.3%	23.1%
Arts, Entertainment, Recreation, Accommodation, Food Service	9.8%	8.8%	8.7%
Other Services	4.7%	4.3%	4.7%
Public Administration	3.9%	4.8%	4.6%

Source: American Community Survey 2022 1-Year Estimates

Vulnerable Populations

There are certain populations and social groups within Brule County that may be particularly susceptible to the adverse impacts of hazards, suffering disproportionate rates of death, injury, loss, or disruption of livelihood when hazard events occur. Various social, economic, demographic, and housing characteristics are considered here that may influence the community's ability to prepare for, respond to, cope with, recover from, and adapt to environmental hazards.

Available data indicates that Brule County has a fairly high proportion of vulnerable people. The Centers for Disease Control Social Vulnerability Index shows Brule County with a rating of .3872 (0 being least vulnerable and 1 being most vulnerable), which indicates a low to medium level of vulnerability. FEMA's Resilience and Planning Tool shows that the county's Income Inequality Index is .45, which is close to the state and national figures, and the Community Resilience Challenges Index (CRCI) percentile is 52 on a scale of 1 (lowest vulnerability relative to the rest of the United States) to 100 (highest). The county's top three drivers of CCRI value are Low Access to Communication, Lack of Economic Diversity, and a low rate of Owner-Occupied Housing.

Infrastructure and Utilities

Transportation

The primary transportation route in Brule County is Interstate 90. Other highways include SD Highway 45 and SD Highway 50. Railroad service is available in the county with the recent rehabilitation of a railroad line owned by the Mitchell-Rapid City Regional Railroad Authority, which runs through the county roughly parallel to Interstate 90. A small municipally owned airport that can accommodate small aircraft is located just south of Chamberlain.

Utilities

Water service to most of Brule County is provided by the Aurora-Brule Rural Water System, which gets its water from the Missouri River. Chamberlain has its own municipal system, which also draws from the Missouri. The Randall Community Water District serves a small area in the southeast part of Brule County. All the municipalities have their own wastewater collection and treatment system. Rural households in the county use individual septic tanks and drainfields.

Solid waste service is provided by the Tri-County Landfill, which operates a landfill located near Pukwana. Most of the household waste generated within Brule County ends up at the landfill. Designated rubble sites are located outside Chamberlain, Kimball, and Pukwana.

Electric power is provided to rural county residents by the Central Electric Cooperative. As of January 2024, a total of 177 miles of the cooperative's 702 miles of distribution lines in Brule County (approximately 25%) have been relocated underground. Northwestern Public Service provides electricity to Chamberlain and Kimball while Pukwana operates its own municipal electric system. Natural gas is not available anywhere in the county.

Services

Medical Services

The primary medical facility in Brule County is the Sanford Chamberlain Medical Center, which is classified as a critical access care facility. The hospital offers 24-hour access to

medical, pediatric, obstetric, and emergency services. Patients with more serious injuries are transported to trauma center hospitals in Sioux Falls or elsewhere. The Avera Access Health clinic in Chamberlain offers non-emergency care services to area residents.

Fire and Emergency Response

Fire departments are located in Chamberlain, Kimball, and Pukwana; the Grass Ranch Colony also has firefighting capabilities. Each department has basic firefighting and rescue equipment, and they all respond to structural fires, wildland fires, and to accident situations.

Education

K-12 education is available in Chamberlain and Kimball. The St. Joseph's Indian School in Chamberlain provides education from grades 1 through 8 to Native American children from the area. Post-secondary education is not available in the county.

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CHAPTER III

Risk Assessment

PLANNING & DEVELOPMENT DISTRICT III

CHAPTER III
RISK ASSESSMENT

Background

The risk assessment provides the foundation for the rest of the mitigation planning process. It sets the stage for identifying mitigation goals and actions to help Brule County become disaster resilient and keep county residents safe, and it answers the following questions: What are the hazards that could affect Brule 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?

Risk assessment is the process of measuring the potential loss of life, personal injury, economic injury, and property damage resulting from hazards. FEMA defines risk assessment terminology as follows:

- **Natural Hazard**—A source of harm created by a meteorological, environmental, or geologic event.
- **Assets** – This includes people, structures (e.g. homes, critical facilities, and infrastructure), systems and networks, other resources important to the community, and activities important to the community.
- **Risk**—The potential for damage or loss created by the interaction of natural hazards with assets.

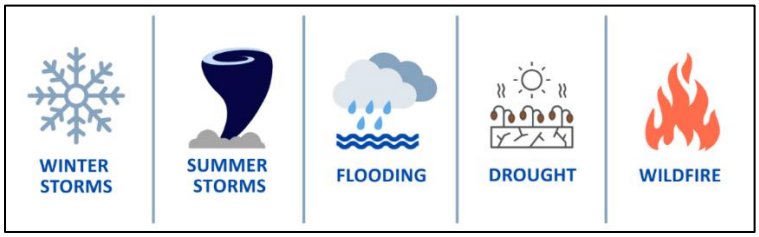
According to FEMA's mitigation planning guidance, the basic components of the risk assessment are: 1) identifying hazards that affect the community, 2) profiling the hazards, 3) conducting an inventory of community assets, and 4) analyzing impacts. This process measures the potential loss of life, personal 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. This determination was made because of the lack of population growth and development in the county and because no natural disasters have had a major impact on the county since the current plan was completed. However, many of the tables have been updated with more current information, including **Table C.2** in **Appendix C**, which lists significant hazard events that have occurred in the county through 2024.

Identifying Hazards

To determine which hazards to address in this plan, the planning team first reviewed the county's current mitigation plan. The team also considered the results of the survey that was conducted at the start of the planning process, especially the question about the hazards that most impact the county. 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**). At the end of this process, the planning team decided to focus on the following hazards:

- **Winter storms**
- **Summer storms**
- **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 – earthquakes and landslides are profiled in the South Dakota Hazard Mitigation Plan, but the overall significance of such hazards is rated as low. A map generated through the U.S. Geological Service Earthquake Hazards Program website indicates that there is only about a two to three percent chance that a quake of at least magnitude 5 will occur in Brule County in any 100-year period, and virtually no chance of a magnitude 6 or greater earthquake [4]. The largest earthquake known to have occurred in Brule County was a 4.2 magnitude quake in 1938. Regarding landslides, a review of the United States Geological Survey's Landslide Incidence and Susceptibility Map indicates the potential of a landslide occurring in Brule County along the Missouri River, but any such event likely would be localized, minor in scale, and located far from any populated areas. No landslide has ever caused significant damage in the county.
- Agricultural pests and diseases - this hazard is profiled in the South Dakota Hazard Mitigation Plan. However, despite the obvious importance of agriculture to the

[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.

local economy, the planning team considered the subject matter to be outside the intended focus of this plan.

- Technological and human-caused hazards – some of these hazards, including hazardous materials releases, are analyzed in the South Dakota Hazard Mitigation Plan. Again, the planning team considered the subject matter to be outside the scope 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 Brule County, its ***extent***, the ***history*** of the hazard's occurrence in the county, and the ***probability*** of future events occurring. 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 occur in all areas of the county with equal frequency. Flooding and wildfires, however, do pose a greater risk in specific areas of the county than in other locations.
- ***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 winter storms can be measured by snowfall accumulation or 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**, which includes a table of the major disaster declarations in Brule County, a table showing a comprehensive list of weather-related hazard events recorded in the county from the National Climatic Data Center's Storm Events Database, and tables showing crop loss to Brule County farmers.
- ***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 fewer than twice per ten years. Probability for some of the hazards was determined by reviewing the frequency of past hazard events in the Storm Events Database.

Winter Storm

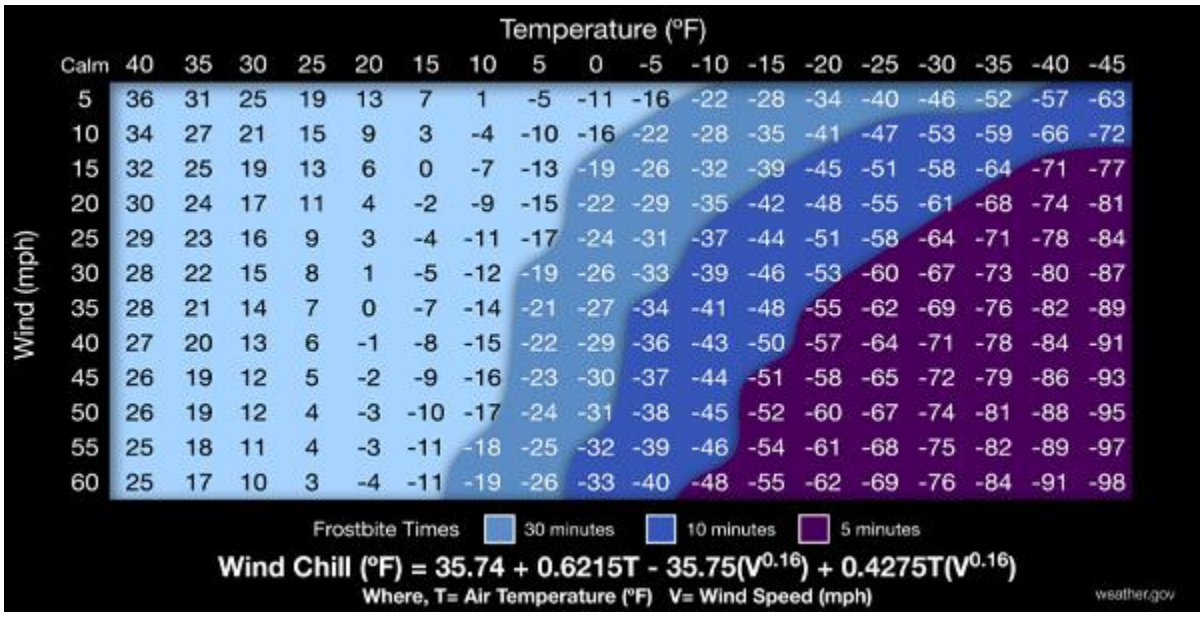
Description

Winter storms include snow events, freezing rain, and sleet, with some storms taking on the characteristics of these categories during distinct phases of the storm. They typically occur

from late fall to the middle of spring, varying in intensity from mild to severe. A long warning time is associated with most winter storms, giving people time to prepare, but they still have a major impact in South Dakota. They can immobilize a region by blocking transportation routes, thus disrupting emergency and medical services, hampering the flow of supplies, and isolating homes and farms. Heavy snow can collapse roofs and knock down trees and power lines. Unprotected livestock may be lost. Economic impacts of winter storms include the cost of snow removal, damage repair, and business losses. Respondents to the survey conducted for this plan considered winter storms to be the fourth most serious hazard facing the county.

The most dangerous of all winter storms are blizzards, which occur when snow is combined with winds of at least 35 mph reducing visibility to less than ¼ mile for at least three hours. 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. Freezing rain is also dangerous because it coats objects with ice and can make travel especially hazardous. Sleet does not generally cling to objects like freezing rain, but it makes the ground slippery, increasing the number of traffic accidents and injuries due to falls.

Extreme cold often accompanies winter storms or is left in their wake. Prolonged exposure to the cold can cause frostbite or hypothermia and can become life threatening. Infants and the elderly are most susceptible. Property damage is also possible when pipes freeze and burst in homes or buildings that are poorly insulated or without heat. The following chart shows how quickly frostbite can occur at a given combination of temperature and windspeed.



Winter storms can have a major 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 they can even snap the poles. As described earlier, approximately 25 percent of the powerlines within Brule County are now underground.

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 Brule County and most of the state, 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 Brule 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, blizzards and high wind events during the winter can be accompanied by winds over 50 knots (about 58 miles per hour).

History

Table C.2 in **Appendix C** lists many significant winter storms that have impacted the county. Following are details about the winter storms that resulted in a major disaster declaration (see also **Table C.1** in **Appendix C**).

A serious winter storm with ice hit Brule County in January 1995, causing damage to electric power lines, and resulting in FEMA Disaster Declaration 1045. Unusual foggy January weather resulted in a heavy crust of ice forming on many of the power lines in central South Dakota, including Brule County. The fog crust was three to five inches in diameter. The addition of high winds caused power poles to snap. Deep drifts of snow made it difficult for power company repairers to gain access to the damaged power lines, and in many areas county snow removal equipment was required to provide access. In the affected counties, at least 13,435 households were without electric power for varying periods of time, with some homes without power for 12 days. Statewide, more than 1,700 power poles had to be replaced, and the damage estimate was over $3.8 million.

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 Brule 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 was estimated at over $13 million, and approximately 30,290 households were affected by power outages.

A winter storm in 1997 resulted in FEMA Disaster Declaration 1156, which impacted every county in South Dakota. Statewide the event caused over $19,000,000 in reported damage.

A very damaging ice storm struck the area in January 2010, resulting in FEMA Disaster Declaration 1887. This event resulted in almost $500,000 of FEMA public assistance to the Central Electric Cooperative for damage to its infrastructure in Brule County.

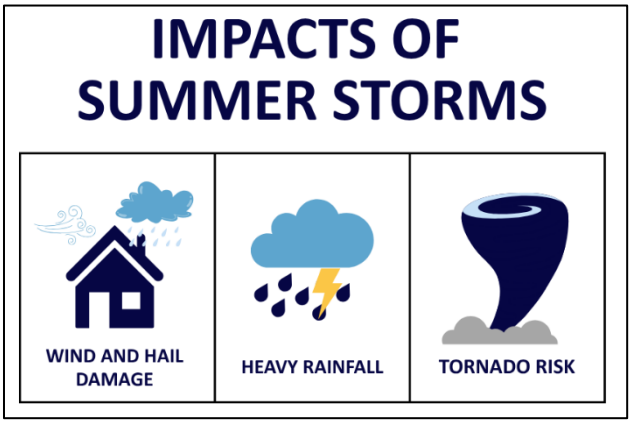
Probability

A total of 72 winter storm events, including blizzards, ice storms, and heavy snow, have been recorded in Brule County since the mid-1990s, an average of about 2.4 events per year (see **Table C.2 in Appendix C**). Therefore, based on the historic evidence, the probability of a significant winter storm affecting Brule 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.

Summer storm

Description

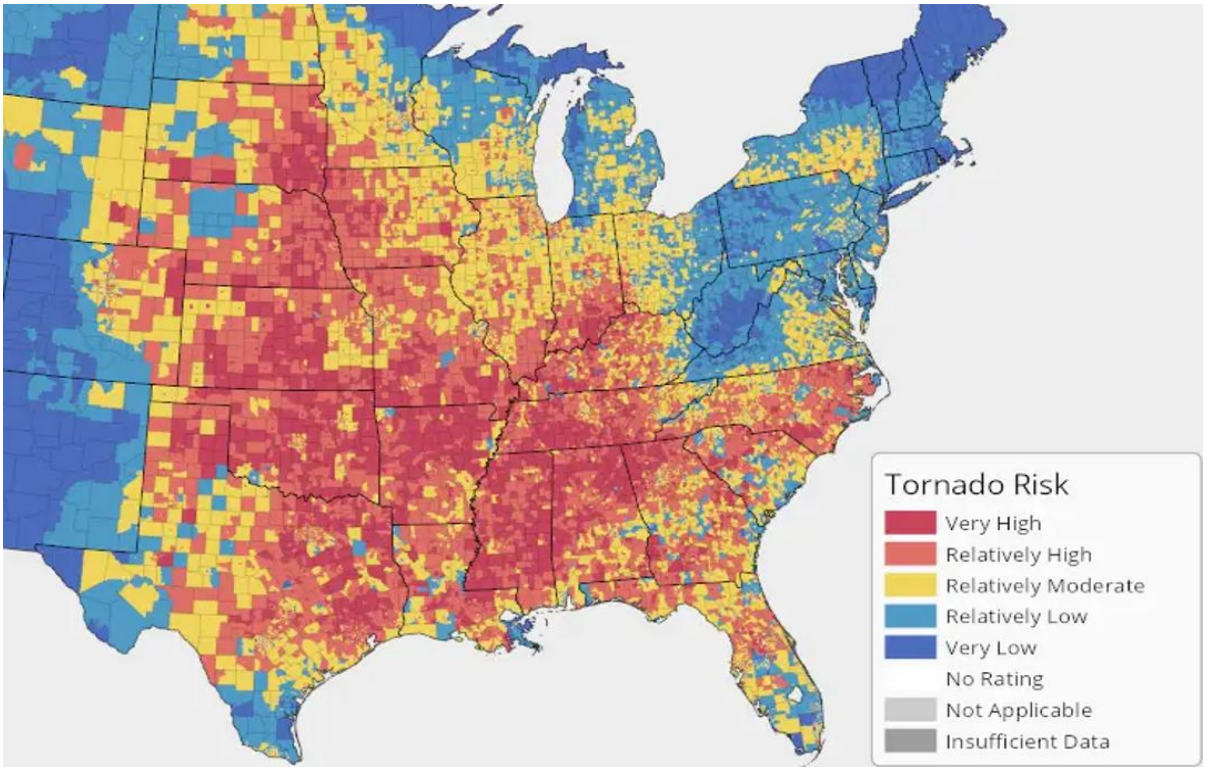
Summer storms can include heavy rainfall, hail, tornadoes, and thunderstorm activity. These events usually are associated with unstable weather conditions. In Brule County, most damage from summer storms occurs because of high wind events and/or hail. Hail is always closely connected with thunderstorms. 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 Brule County reports some kind of hail damage to crops or property. Survey respondents ranked hail as the third greatest hazard facing the county.



Tornadoes are the most dramatic type of summer storm experienced in Brule 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. Survey respondents considered tornadoes to be the fifth most serious hazard facing the county.

South Dakota is located near the northern edge of the core area of tornado activity in the United States, as shown in the image on the following page (it is difficult to tell at this scale, but Brule County is in the 'Relatively High' risk category). Often referred to as "tornado alley", this part of the country is susceptible to the conditions that favor the formation of tornadoes: warm air from the Gulf of Mexico coming in contact with cool Canadian air fronts and dry air

systems from the Rocky Mountains. 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.



Source: hazards.fema.gov/nri/tornado

Location

Summer storms are equally likely to occur in all parts of Brule 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 23 thunderstorms that produced wind speeds of at least 60 knots, four of which were over 70 knots. **Table C.2** also shows 54 events with hail at least one inch in diameter, including ten events with hail at least two inches in diameter, and four records of a tornado with a magnitude greater than F1. 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. The following tables show classifications of hail size, wind speeds, lightning activity, and tornado strength.

Table 3.1 - Hail Size Comparison

Size (Inches)	Object Comparison
0.5 “	Marble or moth ball
1.0”	Quarter
1.5”	Walnut or ping pong ball
2.0”	Hen’s egg
2.5”	Tennis ball
3.0”	Tea cup
4.0”	Softball
4.5”	Grapefruit

Table 3.2 - Beaufort Wind Scale

Force	Wind (Knots)	WMO Classification	Appearance of Wind Effects On Land
0	Under 1	Calm	Calm, smoke rises vertically
1	1 to 3	Light Air	Smoke drift indicates wind direction, still wind vanes
2	4 to 6	Light Breeze	Wind felt on face, leaves rustle, vanes begin to move
3	7 to 10	Gentle Breeze	Leaves and small twigs constantly moving, light flags extended
4	11 to 16	Moderate Breeze	Dust, leaves, and loose paper lifted, small tree branches move
5	17 to 21	Fresh Breeze	Small trees in leaf begin to sway
6	22 to 27	Strong Breeze	Larger tree branches moving, whistling in wires
7	28 to 33	Near Gale	Whole trees moving, resistance felt walking against wind
8	34 to 40	Gale	Twigs breaking off trees, generally impedes progress
9	41 to 47	Strong Gale	Slight structural damage occurs, slate blows off roofs
10	48 to 55	Storm	Trees broken or uprooted, much structural damage (seldom experienced)
11	56 to 63	Violent Storm	
12	64 +	Hurricane	

Table 3.3 - Lightning Activity Levels

Level	Description
LAL 1	No thunderstorms.
LAL 2	Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud to ground strikes in a 5 minute period.
LAL 3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a 5 minute period.
LAL 4	Scattered thunderstorms. Moderate rain is commonly produced. Lightning is frequent, 11 to 15 cloud to ground strinkes in a 5 minute period.
LAL 5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater than 15 cloud to ground strikes in a 5 minute period.
LAL 6	Dry lightning. This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with Red Flag Warning.

Table 3.4 – 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 may be overturned; heavy cars lifted off ground and thrown; structures with weak foundations badly damaged.
EF4	166 to 200	Devasting damage. Frame homes are completely destroyed and some may be swept away; cars and other large objects are thrown in the air.
EF5	Over 200	Incredible damage. Nearly all buildings aside from heavily built structures are destroyed; frame houses and brick homes are swept away; cars are thrown hundreds of yards.

Source: en.wikipedia.org/wiki/Enhanced_Fujita_scale

History

As **Table C.1** in **Appendix C** shows, several major disaster declarations involving a summer storm have affected Brule County. **Table C.2** in **Appendix C** lists many other significant summer storms that have impacted the county. A notable summer storm occurred in June 2015, causing substantial property damage and resulting in FEMA Disaster Declaration 4233. This microburst storm had winds estimated at 100 miles per hour.

Probability

A total of 103 summer storm events, including hailstorms, thunderstorms, lightning, and tornadoes, have been recorded in Brule County since 1960, an average of about 1.6 per year (see **Table C.2 in Appendix C**). Twenty-four of these storms involved a tornado. From this information, the probability of a summer storm affecting Brule County each year should be considered high, although the probability of a storm causing significant damage (e.g., damaging hail or a tornado) can be considered low to moderate.

Flooding

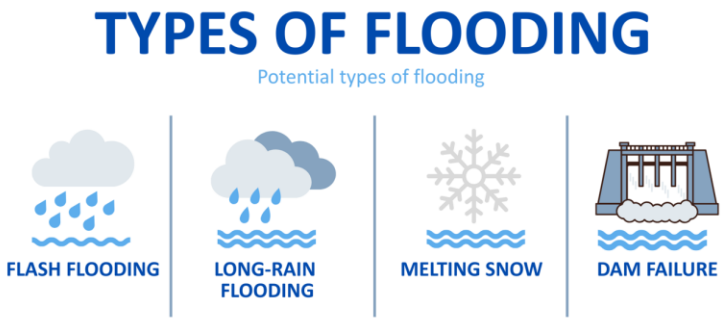
Description

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. Survey respondents considered flooding to be tied for the sixth most serious hazard facing the county.

Following is a description of the four types of flooding that have the potential of impacting South Dakota, 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. This high intensity rainfall is commonly caused by powerful thunderstorms that cover a small geographic area. The flood that occurs because 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 "waterlogged," 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. Brule County is vulnerable to this type of flood primarily because of the Big Bend Dam, which impounds the Missouri River 20 miles upstream of Chamberlain, and the Lake Wanalain Dam, which is located about three miles east of Chamberlain (see **Figure 2.1**). Both are classified as high hazard dams [5]. Several other smaller dams in the county also pose a threat.



[5] 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.

Location

In the past, the greatest flooding threat in Brule County was along the Missouri River, which flows south/southeastward across South Dakota in a deep, wide channel, draining almost the entire state. Flooding along the river used to be an annual threat until a series of huge dams along the river, including Big Bend, were constructed in the 1950s. Now, most of the Missouri River within South Dakota consists of a chain of reservoirs impounded by the dams. From north to south, these dams are Oahe, Big Bend, Fort Randall, and Gavins Point, which were built for flood control, to provide water for irrigation, and for the generation of hydroelectricity.

Because of the dams, the threat of flooding from the Missouri River has been greatly reduced, although it has not been eliminated. In 2011, significant flooding along the river did occur, with substantial damage. The primary cause of the flooding was very heavy snowmelt at the river's source in the Rocky Mountains, along with extremely high spring rains throughout much of the river's drainage basin. The complicated politics concerning river management also played a role in the disaster that unfolded over the next few months.

Extent

The extent of flooding in Brule 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.

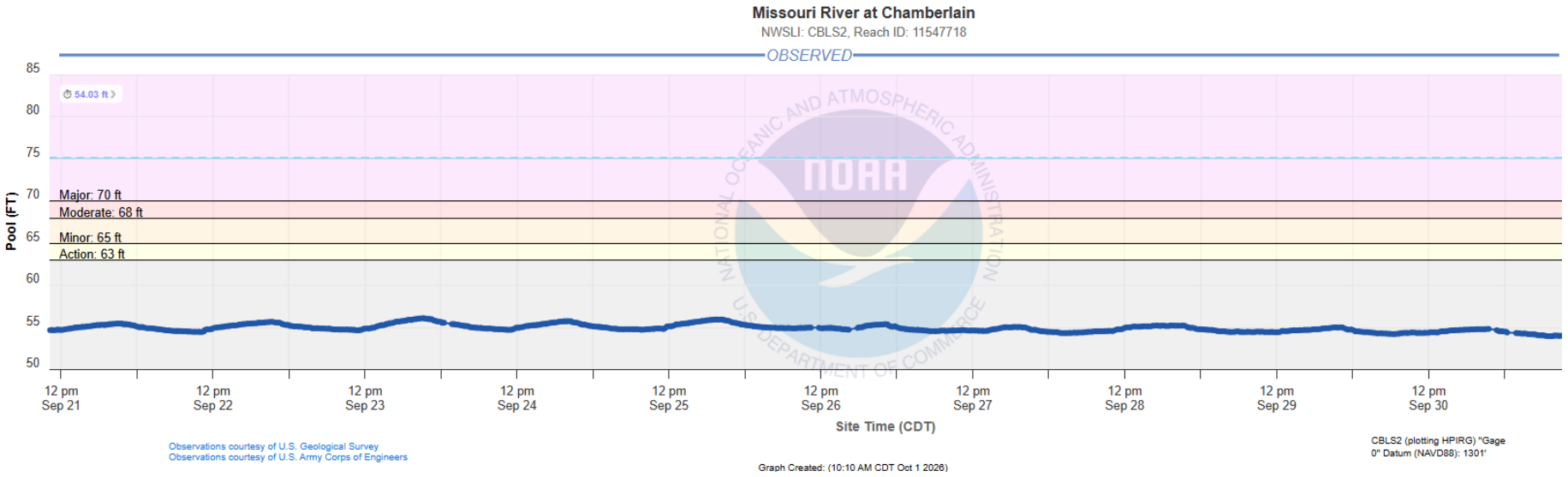
The most serious flooding the county has experienced was during the historic 2011 Missouri River flood when the river reached a record 10.1 feet above flood stage at Chamberlain in July, inundating land along the river. Flooding in 2019 also had a major impact in Brule County. Heavy rainfall in March falling on frozen ground caused major runoff into the Missouri River, which crested 2.36 feet above flood stage at Chamberlain, the fifth highest stage on record. The following table shows a description of the various stages of flooding.

Table 3.5 – Flood Stages and Associated Impacts

Flood Stage	Impact
Minor Flood	Minimal or no property damage, but possibly some public threat (e.g. road inundation).
Moderate Flood	Some inundation of structures and roads near stream, evacuations of people and/or transfer of property to higher elevations.
Major Flood	Extensive inundation of structures and roads, significant evacuations of people and/or transfer of property to higher elevation.

The image on the following page shows the current river gauge chart for the Missouri River at Chamberlain in comparison with the minor, moderate, and major flood categories.

River Gauge Chart – Missouri River



Graphic from: water.noaa.gov/gauges/CBLS2

History

Table C.2 in **Appendix C** lists many significant flooding events that have impacted the county. Following are details about some of the most notable events that resulted in a major disaster declaration (see also **Table C.1** in **Appendix C**).

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.

Flooding in 2008 resulted in FEMA Disaster Declaration 1774. In Chamberlain, three inches of rain in a short period of time caused basements to flood. Total public assistance costs from the flood in Brule County was approximately $25,000.

Flooding in the spring and summer of 2010 in eastern South Dakota was the worst in a decade, resulting in FEMA Disaster Declarations 1915 and 1938. Heavy rainfall caused widespread flash flooding of many county and township roads, residences, and fields.

Flooding in 2019 had a major impact in Brule County, which started when heavy rainfall drenched the area on March 13-14. With up to 3 inches of snow water equivalent still in the snow pack south of Interstate 90, and 3 to 6 inches of snow water equivalent north of Interstate 90, runoff into the Missouri River was tremendous. The river crested 2.36 feet above flood stage at Chamberlain on March 31, the fifth highest stage on record. Further

flooding occurred later in the year. The total public assistance cost in Brule County in 2019 due to flooding was over a half million dollars.

In June 2024, heavy rainfall across Brule County on top of an already wet spring caused overland flooding, with several township roads damaged by flood waters. The huge volume of water blew out some of the smaller dams in the county, which ended up causing significant property and infrastructure damage downstream. Pictured here is the Sharping Dam in Cleveland Township. This event resulted in FEMA Disaster Declaration 4807.



Probability

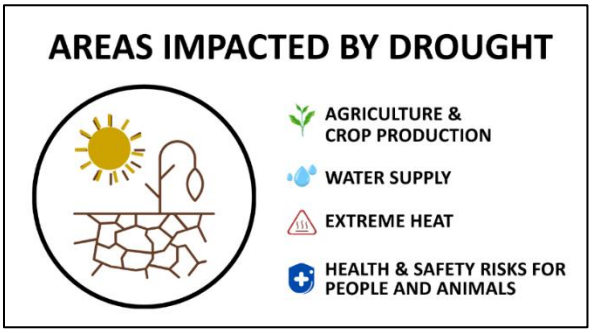
Table C.2 shows that 25 flooding events have been recorded in Brule County since the mid-1990s. Excluding the events that were a recording of ongoing flood conditions, it appears there have been about 14 separate flood events in Brule County since the mid-1990s, an average of about one every other year. Based on this analysis, the probability of flooding occurring somewhere in the county in a given year can be considered moderate to high. **Table C.1** shows that several floods were significant enough to result in a disaster declaration. It is certain that flooding will continue to impact the area to some degree, no matter what mitigation actions are pursued.

Drought

Description

Drought is a deficiency in precipitation over an extended period, 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 drought. Survey respondents ranked drought as tied for the greatest hazard facing the county [6].

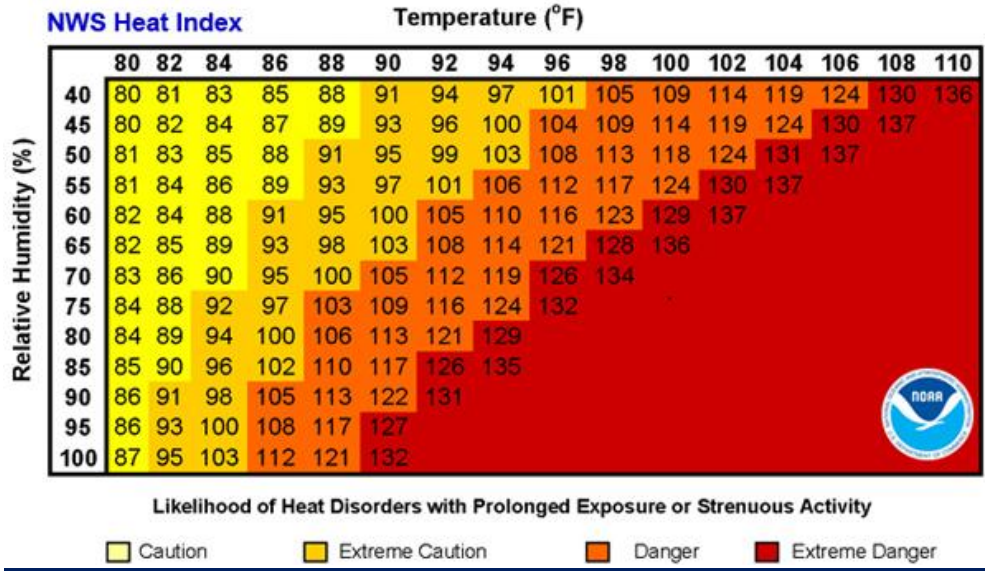
Droughts can occur at any time of the year, but the consequences are worse during the summer growing season, especially after dry winters. A small departure in normal precipitation during the months of June through August can have a significantly negative impact on crop production. The demand for water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



[6] It should be noted that the survey was taken during an extended regional drought, which may have influenced the results. Still, there is no doubt that drought is a serious hazard facing the county.

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, which is defined by FEMA as a condition in which the air temperature hovers at least 10° Fahrenheit above the average high temperature for the region and lasts for several weeks. Drought and extreme heat often exist together and compound negative effects. According to the National Weather Service, among natural hazards, only the cold of winter 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. Elderly people, small children, people with certain medical conditions, and those on certain medications are particularly susceptible to heat stress. The following table shows the likelihood of heat disorder given the combination of air temperature and relative humidity.



Location

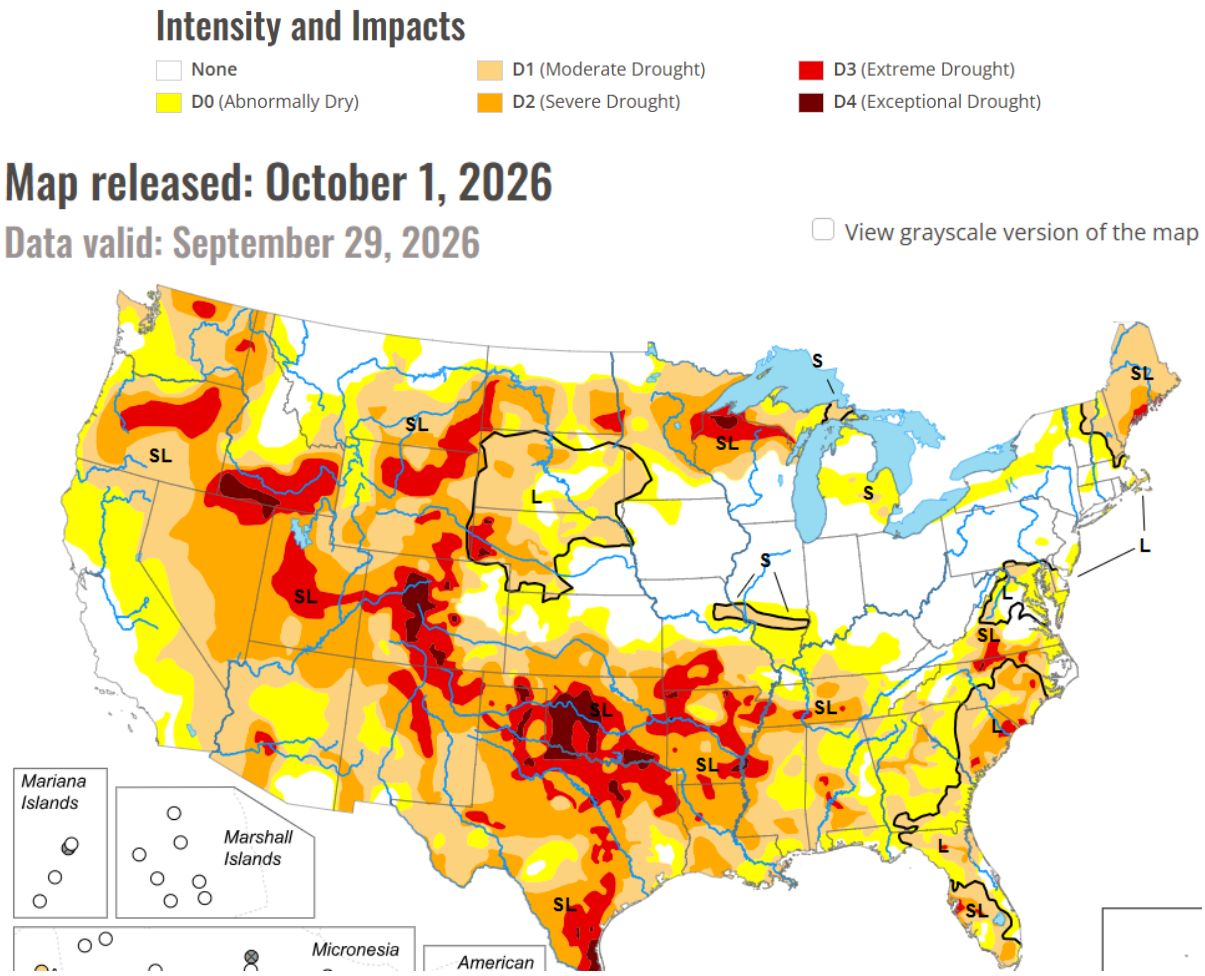
All areas of the county are equally likely to be impacted by drought.

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, Brule County has experienced many years of below average annual precipitation, including two years between 1981 and 2023 in which precipitation was less than two thirds of normal. In terms of duration, it is not unusual for Brule 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.

The U.S. Drought Monitor has established the drought scale shown on the following page, which is much like those that rate hurricanes and tornadoes. The "D-scale" speaks to the "unusualness" of a drought episode, with D1 conditions expected to occur about 10 to 20

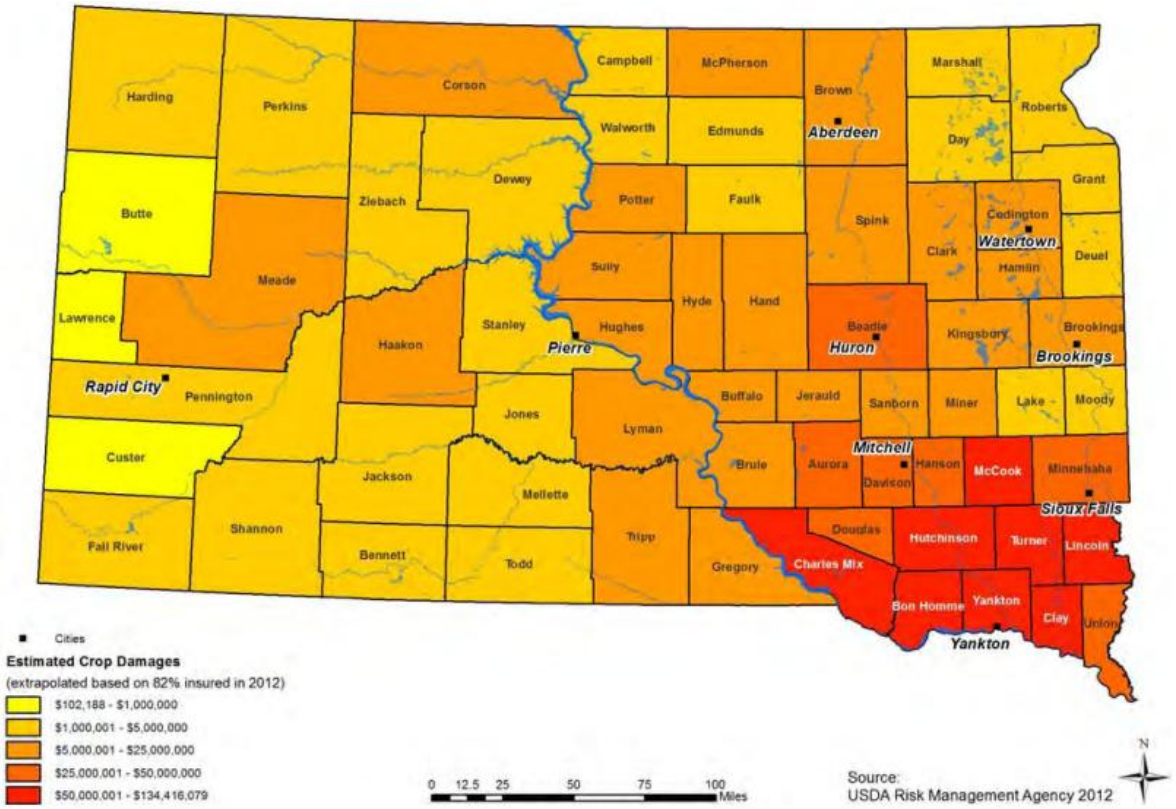
percent of the time and D4 conditions expected less than 2 percent of the time. Following the scale is the drought severity index map of the United States as of October 1, 2026.



History

Brule County has experienced many severe droughts, the most significant of which occurred in the 1930s, the so-called dust bowl years. 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 so thick they concealed the sun for several days at a time. The severity of the drought was compounded by years of land management practices that left topsoil susceptible to the forces of the wind.

The drought of 1976 was one of the most severe in recent years, 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. The Drought in 2012 was so devastating that the State of South Dakota activated a Drought Task Force. The statewide impact on agricultural producers was tremendous. The figure on the following page, as reproduced from the South Dakota Drought Mitigation Plan, shows the 2012 drought's impact statewide.



Probability

Table C.2 in **Appendix C** shows at least one drought record in Brule County in nine 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.

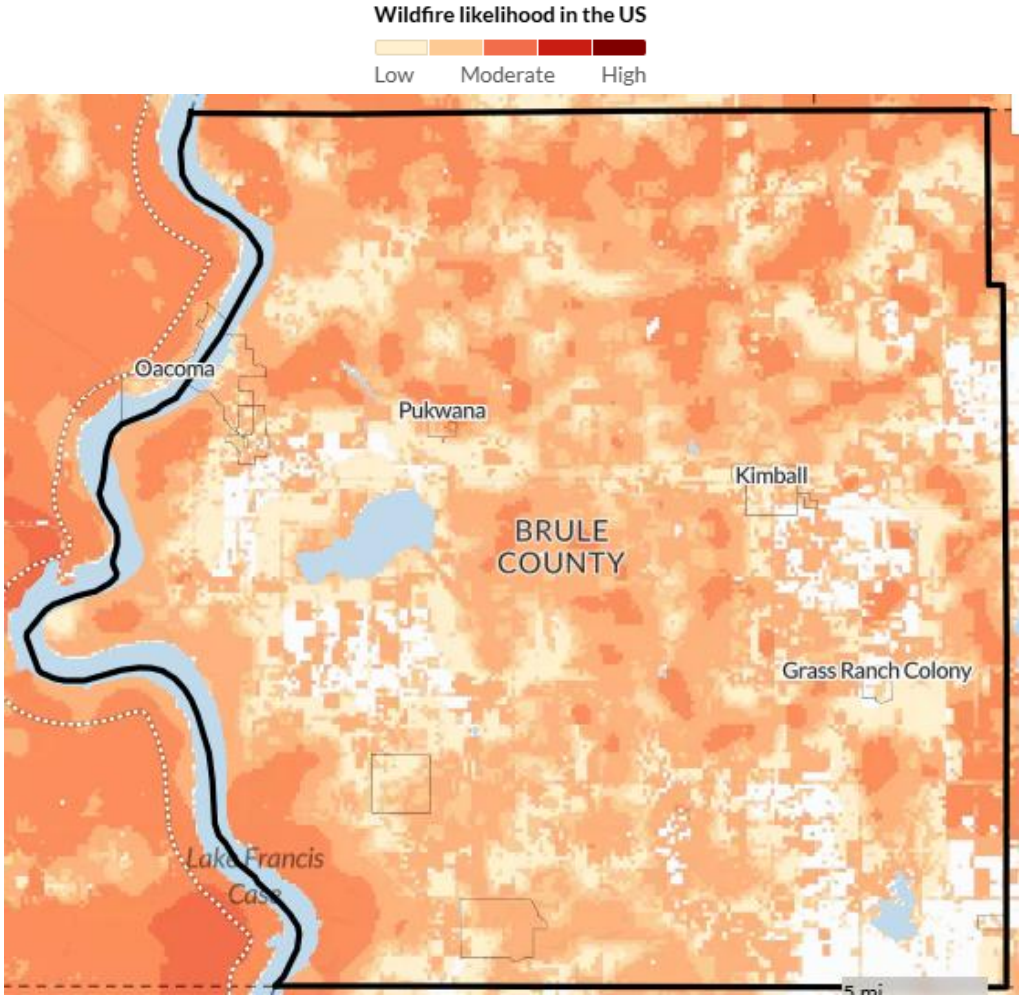
Wildfire

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. Wildfire is not as serious a concern in Brule County as it is 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. Survey respondents considered wildfire to be the least serious of the eight disaster types they could choose from.

Location

Wildfires in Brule County are most likely to occur in large areas of extensive brush or unmanaged vegetation, including pastureland and grassland, which together make up approximately 56 percent of the county's land base. The hills and draws along the Missouri River, which contain a significant amount of cedar trees and thick brush, experience wildfires rather frequently. Another concern is controlled burns that get out of control, which can occur almost anywhere in the county. The map below, from the U.S. Forest Service's Wildfire Risk to Communities website, shows where wildfires are most likely to occur in the county (it does not reflect the intensity of fire).



Extent

The following table shows the number of wildfires according to various size classes that have occurred in Brule County from 2000 through 2024 as reported to the South Dakota Department of Public Safety [7]. It shows that most of the fires have been fairly small, most impacting fewer than ten acres.

[7] Since the data is reported by volunteer fire departments, and not all wildfire incidents are reported to the Department, the table may not reflect all wildfires that have occurred in the county.

Table 3.6 – Wildfires in Brule County (2000 - 2024)

1 to 9 Acres	10 to 49 Acres	50 to 99 Acres	100 to 249 Acres	250 to 499 Acres	500 Acres or More	Average Annual Acres Burned
52	29	12	6	3	1	151.7

Source: South Dakota Department of Public Safety

History

Many notable wildfires have occurred in Brule County, but nothing on a truly destructive scale. The largest fire in recent years burned approximately 670 acres near Pukwana in September 2012, but actual damage resulting from the fire was not significant.

Probability

Wildfires affecting fewer than ten acres are likely to occur somewhere in Brule County most years, but large-scale wildfires are much less common. **Table 3.6** shows only one wildfire at least 500 acres in size occurred between 2000 and 2024. Based on this period of analysis, the probability of a significant wildfire occurring each year within Brule County can be considered low.

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 Brule County are identified, including those that would play an important role in helping the communities prepare for and respond to a hazard event.

Government Offices

- Brule County Courthouse, Chamberlain
- City offices in Chamberlain, Kimball, and Pukwana

Emergency preparedness and response

- Brule County Emergency Management Office, Chamberlain
- Brule County Sheriff's Office, Chamberlain
- Chamberlain Police Department
- Fire Departments in Chamberlain, Kimball, and Pukwana
- Brule County Highway Department, Chamberlain
- Disaster relief shelters (*see p.56*)
- Emergency storm shelters (*see p.56*)

Medical facilities

- Sanford Chamberlain Medical Center

Educational facilities

- Chamberlain school (K-12)
- Kimball School (K-12)
- St Joseph's Indian School (1-8)

Other important assets

- Brule County 4-H Center
- Chamberlain Community Center
- Pukwana Community Center
- Bunge USA Grain (east of Kimball)

Hazard Impact Analysis

This section assesses the vulnerability of Brule County and the participating jurisdictions to each of the hazards that have been profiled. Vulnerability is defined as the extent to which people and property are exposed to harm or damage 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'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. It is an especially helpful planning tool for communities that have not been mapped by the National Flood Insurance Program [8].
- 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.
- Data on the population living in wildfire risk zones was used to estimate potential wildfire losses.

Actual Loss Methodologies

- The National Climatic Data Center's Storm Events Database was consulted for historical data regarding weather-related events (see **Table C.2** in **Appendix C**).

[8] A limitation of HAZUS is the inadequacies associated with its hydrologic and hydraulic modeling, especially in sparsely populated areas. Also, HAZUS uses default national databases that may not be applicable at the local level.

- Records from FEMA were consulted for federal assistance provided to Brule County following major disaster declarations through FEMA's Public Assistance program.
- Data from the U.S. Dept of Agriculture Risk Management Agency was used to assess crop loss from natural hazards (see **Tables C.3 through C.6** in **Appendix C**).
- Information from the National Drought Mitigation Center's Drought Impact Reporter was used to assess the local impact of droughts.

At the conclusion of the vulnerability assessment for each hazard, an attempt is made to determine how vulnerability might change in the future. Census data and population projections were used in this analysis, as well as data on the volume of building permits that have been issued in the county in recent years and discussion with local officials about general development trends within the county. Other factors, including the possible impact of climate change, were also considered.

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.

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, trees falling, 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 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:

A total of 72 winter storm events, including blizzards, ice storms, and heavy snow, are shown in the National Climatic Data Center's Storm Events Database for Brule County through 2024 (see **Table C.2 in Appendix C**). In comparison, the average for South Dakota counties is 104 winter weather events, indicating that Brule County may be somewhat less prone to adverse winter weather than other counties in the state.

Past Damage Amounts:

It is not easy to determine how much damage winter storms have caused in the county. The National Climatic Data Center's Storm Events Database records winter storm damage by forecast zones, not by county, so the data does not lend itself to analysis at the county level. Nevertheless, **Table C.2** indicates that many winter storms have caused significant damage in Brule County.

Winter storms can have a major impact on agricultural production. Farmers typically protect themselves from the impacts of adverse weather 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. **Table C.3** in **Appendix C** provides information on indemnity payouts for crop loss to Brule County farmers due to various types of winter weather events between 2000 and 2023. During this period of analysis, winter weather-related payouts averaged approximately $491,810 per year in Brule County compared to the state average of $322,350 per year.

Building Exposure:

The total value of buildings in Brule County is approximately $599 million, according to the South Dakota Hazard Mitigation Plan, which ranks 34th among the state's 66 counties. The median figure for South Dakota counties is approximately $620 million. From this information, the county's building exposure can be considered moderate relative to other South Dakota counties.

Population Density:

Brule County is sparsely populated, with an average of just 6.2 people per square mile, less than the state figure of 11.7 people per square mile and far below the national figure of 93.8. Brule County would have to be rated low in terms of population density.

Future Vulnerability

No development has occurred anywhere in Brule County since the previous plan was approved to affect any of the jurisdictions' vulnerability to winter storms. Looking ahead, vulnerability to winter storms may actually decrease if the population continues to decline as expected.

One factor that could impact vulnerability is climate change. 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 Brule 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, property damage if a populated area is struck, and flooding as the result of heavy rain. Like the rest of the Great Plains, Brule County is especially vulnerable to summer storms accompanied by high wind because the landscape is open and there is very little topographic relief to block the wind.

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
- Housing stock characteristics in each community

Prior Events:

A total of 103 summer storm events (tornadoes, lightning, thunderstorms with wind gusts of at least 60 knots, and hail at least one inch in diameter) are shown in the National Climatic Data Center's Storm Events Database for Brule County through 2024 (see **Table C.2 in Appendix C**). In comparison, the average for South Dakota counties is 257 summer storm events, which indicates that Brule County may be somewhat less prone to summer storms than other counties in the state.

Past Damage Amounts:

Many summer storm events have caused significant damage in Brule County, as shown in **Table C.2**. According to the South Dakota Hazard Mitigation Plan, whose authors researched property damage from tornadoes in the state as reported in the National Climatic Data Center's Storm Events Database, the average annual loss from tornadoes in Brule County between 1950 and 2016 was $185,205. The average annual loss during this period for South Dakota counties was approximately $163,730, indicating that Brule County may be somewhat more vulnerable to suffering tornado damage than other counties in the state.

Brule County farmers are quite vulnerable to the impact of summer storms. **Table C.4** in **Appendix C** provides information on indemnity payouts for crop loss in Brule County due to severe summer weather between 2000 and 2023. During this period of analysis, summer storm-related payouts averaged approximately $438,820 per year in Brule County compared to the state average of $461,120 per year.

Building Exposure:

The total value of buildings in Brule County is approximately $599 million, according to the South Dakota Hazard Mitigation Plan, which ranks 34th among the state's 66 counties. The median figure for South Dakota counties is approximately $620 million. From this information, the county's building exposure can be considered moderate relative to other South Dakota counties.

Population Density:

Brule County is sparsely populated, with an average of just 6.2 people per square mile, less than the state figure of 11.7 people per square mile and far below the national figure of 93.8. Brule County would have to be rated low in terms of population density.

Housing Stock Characteristics

Differences in the local housing stock were analyzed to help determine vulnerability at the local level. The table below shows that the housing stock in the communities tends to be older than the typical house in South Dakota, and an assumption can be made that some of the older houses may not be as structurally sound as a newer home, putting the occupants at higher risk to a powerful summer storm, such as a tornado or other high wind event. The impact on human life might be especially bad in Pukwana given its high percentage of mobile homes, which are vulnerable to being overturned by tornadoes and other high wind events if not anchored properly.

Table 3.7 – Housing Stock Characteristics

Community	Houses Built Before 1940	Houses Built Since 2000	Mobile Homes
Chamberlain	13.8%	18.3%	4.4%
Kimball	28.0%	10.4%	3.7%
Pukwana	18.1%	6.9%	32.8%
South Dakota	*14.6%*	*31.5%*	*6.4%*

Source: 2020 US Census (DP04 Selected Housing Characteristics)

Future Vulnerability

No development has occurred anywhere in Brule County since the previous plan was approved to affect any of the jurisdictions' vulnerability to summer storms. Looking ahead, vulnerability to summer storms may in fact decrease if the population continues declining.

Regarding the impact of climate change, the South Dakota Hazard Mitigation Plan cites the Climate Science Special Report from 2017, which states that damage 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. The expected increase in the number of days above 95 degrees by midcentury could create conditions favorable to the formation of severe thunderstorms. There is some uncertainty in these projections, but severe thunderstorms and tornadoes will remain a hazard in the state.

Flooding

Like all counties in South Dakota, Brule County is vulnerable to flooding. Because of the specific nature of flooding, vulnerability 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, Brule County's potential building damage loss ratio from flooding (the percent of the total building inventory value that could be damaged by flooding in any given year) of 0.4 percent is well below the median statewide figure of 0.75 percent. Likewise, the 2.9 percent of the county's population potentially displaced by flooding is below the state figure of 4.6 percent.

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.

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. **Table C.5** in **Appendix C** provides information on indemnity payouts for crop loss in Brule County due to flooding and excess moisture between 2000 and 2023. During this period of analysis, flood-related payouts averaged approximately $1,215,830 per year in Brule County compared to the state average of $2,204,140 per year.

Approximately 38% of the flood-related indemnity payouts to Brule County farmers were due to the severe flooding that occurred in 2019, which may have been 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. In Brule County, approximately 47,650 acres of land were not planted, which was about 12% of land that would have otherwise been planted, ranking the county 32nd in South Dakota.

Local Flood Vulnerability

At the community level, vulnerability was determined by using FEMA's HAZUS loss estimation software to estimate potential losses during a 100-year flood event. Vulnerability was also assessed by using GIS software to overlay areas of flood risk on parcel data to determine the

assessed value of property at risk. The following table summarizes the results of the analysis (note that both analyses included some land outside the municipal boundaries).

Table 3.8 – Community Flood Loss Estimation

Community	Building Structural Damage	Debris Generated (Tons)	Displaced Households	People Needing Shelter	Assessed Value of Property at Risk
Chamberlain	$20,700	18	27	2	$2,128,000
Kimball	*(HAZUS FAILED TO RUN)*				
Pukwana	$87,800	42	28	4	$470,000

Sources: FEMA HAZUS loss estimation software; Brule County Director of Equalization

Future Vulnerability

No development has occurred in flood prone locations or anywhere else within Brule County since the previous plan was approved to affect any of the jurisdictions' vulnerability to flooding. Looking ahead, vulnerability to flooding may decrease if the population continues to decline as expected.

One factor that may increase vulnerability is the continuing conversion of wetlands and other marginal land to agricultural production. Farming these marginal lands can increase 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 Brule County are not available, but future updates to this plan could explore this trend in more depth.

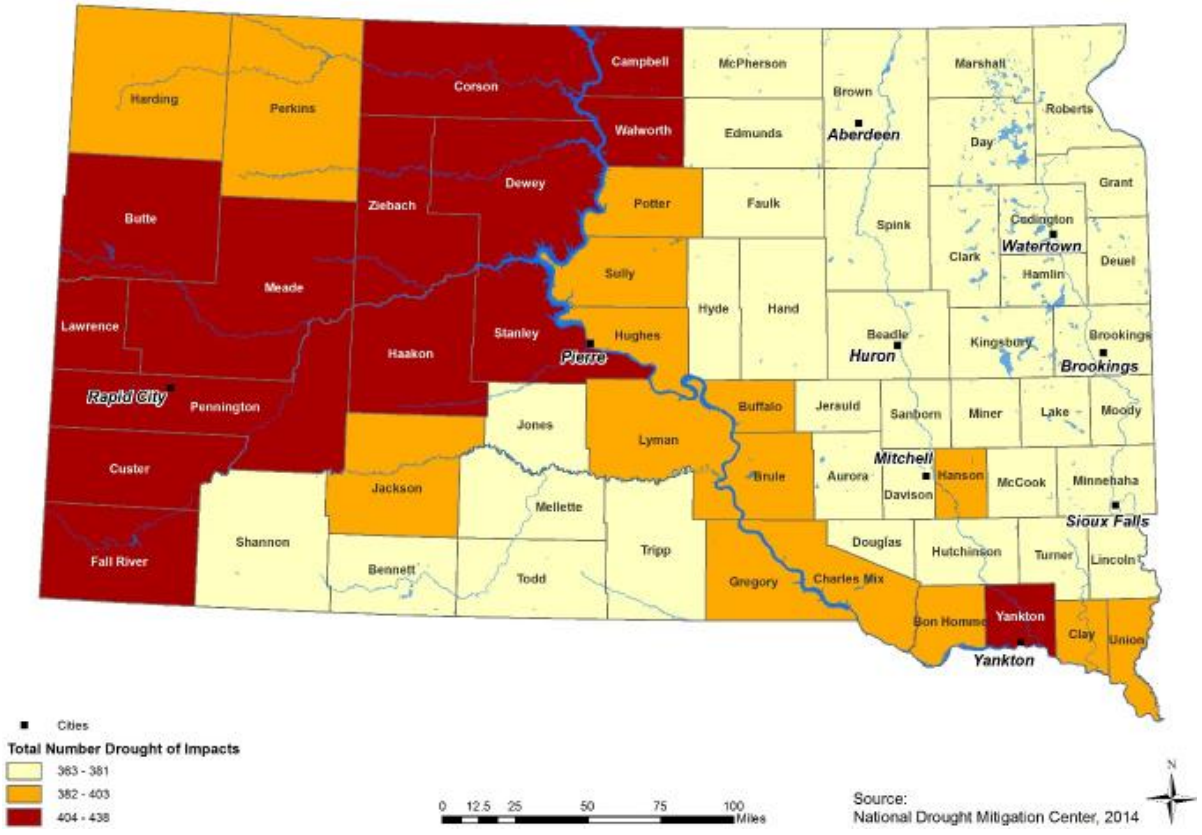
The nature and frequency of flooding also could be altered by climate change. The South Dakota Hazard Mitigation Plan notes a long-term trend of increasing annual precipitation across South Dakota, among the highest in the country, much of it occurring in the spring and fall seasons, and there is high confidence that precipitation extremes will increase in frequency and intensity that could exacerbate flooding.

Drought

Without question, Brule County is vulnerable to drought, with the biggest impact being in the agricultural sector. Non-irrigated cropland is most susceptible to drought, and yield reductions due to moisture shortages can be aggravated by wind-induced soil erosion. Fortunately, most farmers in Brule County have crop insurance, which lessens the financial impact of droughts. Modern agricultural practices, such as no-till farming and the development of drought-tolerant crops, also help farmers withstand years of low rainfall. **Table C.6** in **Appendix C** provides information on indemnity payouts for crop loss in Brule County due to drought and heat between 2000 and 2023. During this period of analysis, drought-related payouts averaged approximately $4,552,800 per year in Brule County compared to the state average of $2,942,115 per year. About 12 percent of the payouts were due to the 2012 drought.

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 conducted an analysis comparing crop losses in each county 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. Brule County's loss ratio of 5.7% was higher than the 3.1% average for South Dakota counties. The authors of the South Dakota Drought Mitigation Plan assigned Brule County a rating of "Moderate" 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, Brule County is in the medium range of counties in terms of the number of drought impacts.



Future Vulnerability

No development has occurred anywhere within Brule County since the previous plan was approved to affect any of the jurisdictions' vulnerability to drought. Looking ahead, vulnerability to drought may increase 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. The expected increase in Brule County's average annual temperature and the number of days over 95 degrees may lead to increased evaporation and drought frequency, which would compound water scarcity problems.

Wildfire

Wildfire risk in Brule County was analyzed using two different sources. According to the U.S. Forest Service's Wildfire Risk to Communities website, Brule County's overall risk is considered medium, with homes in the county having a greater wildfire risk than 32% of South Dakota counties and 52% of counties nationwide. Information from the SILVIS Lab at the University of Wisconsin shows that 1,175 housing units in the county are located in the Wildland-Urban Interface, which are locations vulnerable to wildfire because of a combination of dense housing and vegetation. The housing units at risk represent approximately 50% of the total housing stock in Brule County, well above the statewide figure of 26%.

Future Vulnerability

No development has occurred in areas prone to wildfire or anywhere else within Brule County since the previous plan was approved to affect any of the jurisdictions' vulnerability to wildfire. Looking ahead, vulnerability to wildfire may decrease if the population continues to decline as expected.

One factor that could increase wildfire vulnerability is the continued spread of cedar trees. These trees are spreading quickly in the county, especially in the hilly terrain along the Missouri River, and efforts to control their spread have met with only limited success. The fuel load they represent could turn an otherwise routine brushfire into a very serious situation.

The possible impact of climate change also needs to be considered. The South Dakota Hazard Mitigation Plan cites a U.S. Forest Service study that indicates a likely increase in 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 Brule County and each of the participating jurisdictions to each of the hazards profiled is summarized. Maps are presented at the end of the section to augment the analysis, showing areas vulnerable to flooding; the graphic on page 36 showed areas where wildfire is most likely to occur. Vulnerability to winter storms, summer storms, and drought is not mapped, as those hazards are likely to impact all areas of the county equally.

- **Winter Storms**

Brule County's vulnerability to winter storms can be considered high. The authors of the South Dakota Hazard Mitigation Plan assigned Brule a rating of High when considering prior winter storm events in the county, building exposure, and population density. 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, some of whom are more than 15 miles from the nearest place with groceries, medical service and supplies, and other important items, puts them at increased 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, especially when winter storms are accompanied by high winds and freezing precipitation that can cause ice to build up on powerlines, which can then cause the lines and poles to come down. Elderly residents who rely on home medical apparatus dependent on a constant supply of power are particularly vulnerable during these times and they are often less able to withstand extreme cold events.

- **Summer Storms**

Brule County's vulnerability to summer storms can be considered moderate to high. The authors of the South Dakota Hazard Mitigation Plan assigned Brule a rating of Moderate when considering prior tornado events in the county, building exposure, and population density. All areas of the county are vulnerable to summer storms. 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. Vulnerability may be somewhat higher in Pukwana, which has a high percentage of mobile homes.

- **Flooding**

The overall vulnerability of Brule County to flooding can be described as low to moderate. According to the vulnerability analysis conducted for the South Dakota Hazard Mitigation Plan, the county's estimated flood loss in terms of building damage and displaced people is below the average for the state. Much of the vulnerability is to cropland and to county and township roads. Flooding in 2019 and 2024 had a significant impact in the county with several miles of county roads impacted as well as some properties. Following is a summary of vulnerability to flooding in each of the communities:

Chamberlain: There is some degree of vulnerability to flooding in the city. As shown in **Table 3.8**, the total assessed value of property at risk in the city is over $2 million. The flood prone area lies along American Creek, where the American Creek marina and one home are affected. The marina used to suffer extensive flooding, but ongoing improvements have lessened the flood risk there. Flooding in 2019 caused some road damage in Chamberlain and several houses suffered minor flood loss

Kimball: There is some vulnerability to flooding here. Temporary, low-level flooding can occur after very heavy rains or during the spring snowmelt. Flooding in 2019 caused some road damage in Kimball and a small amount of property damage.

Pukwana: There is some vulnerability to flooding here. As shown in **Table 3.8**, the total assessed value of property at risk is $470,000. A few homes on the northern edge of Pukwana are located in an area identified by HAZUS as being flood prone, as is the local grain elevator, but no significant flood damage has ever been recorded in this area. Flooding in 2019 caused some road damage in Pukwana and a minimal amount of property damage.

- **Drought**

Brule County's vulnerability to drought can be considered high and is certain to continue for the foreseeable future. The impact is primarily on the agricultural sector, where serious losses have occurred. The South Dakota Hazard Mitigation Plan assigned a vulnerability rating of Moderate for Brule County in terms of drought's impact to crops between 2000 and 2014. Residential and commercial impacts of drought are minor; even during the severe drought of 2012 there were no water use restrictions anywhere in the county.

- **Wildfire**

The overall vulnerability to wildfire in Brule County can be considered low to moderate, with the greatest risk in the wooded draws along the Missouri River. Approximately 50% of the county's population lives in a location considered to be vulnerable to wildfire, well above the statewide figure of 26%, but no truly destructive wildfire has ever occurred in the county.

Figure 3.1 – Chamberlain

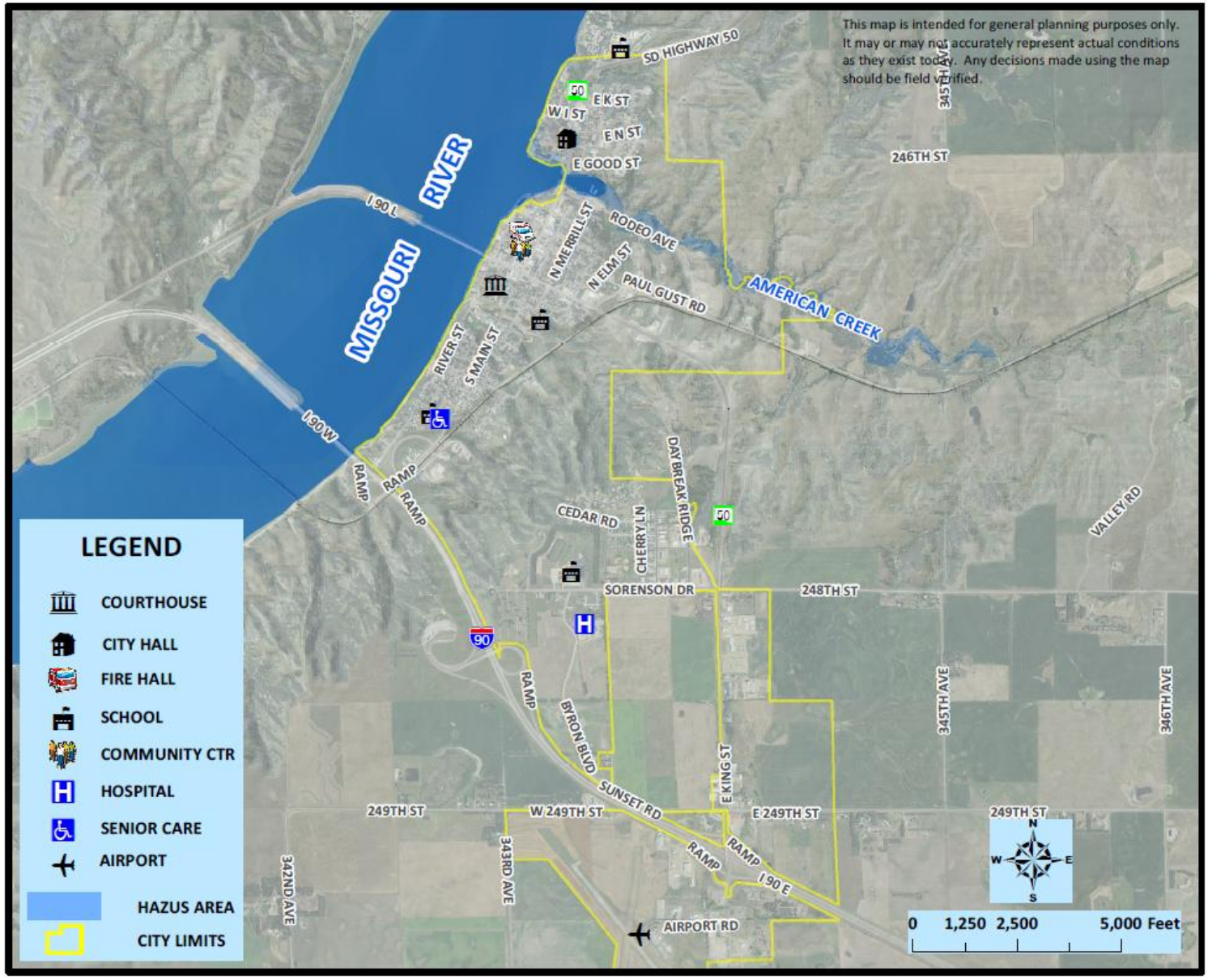


Figure 3.2 – Kimball

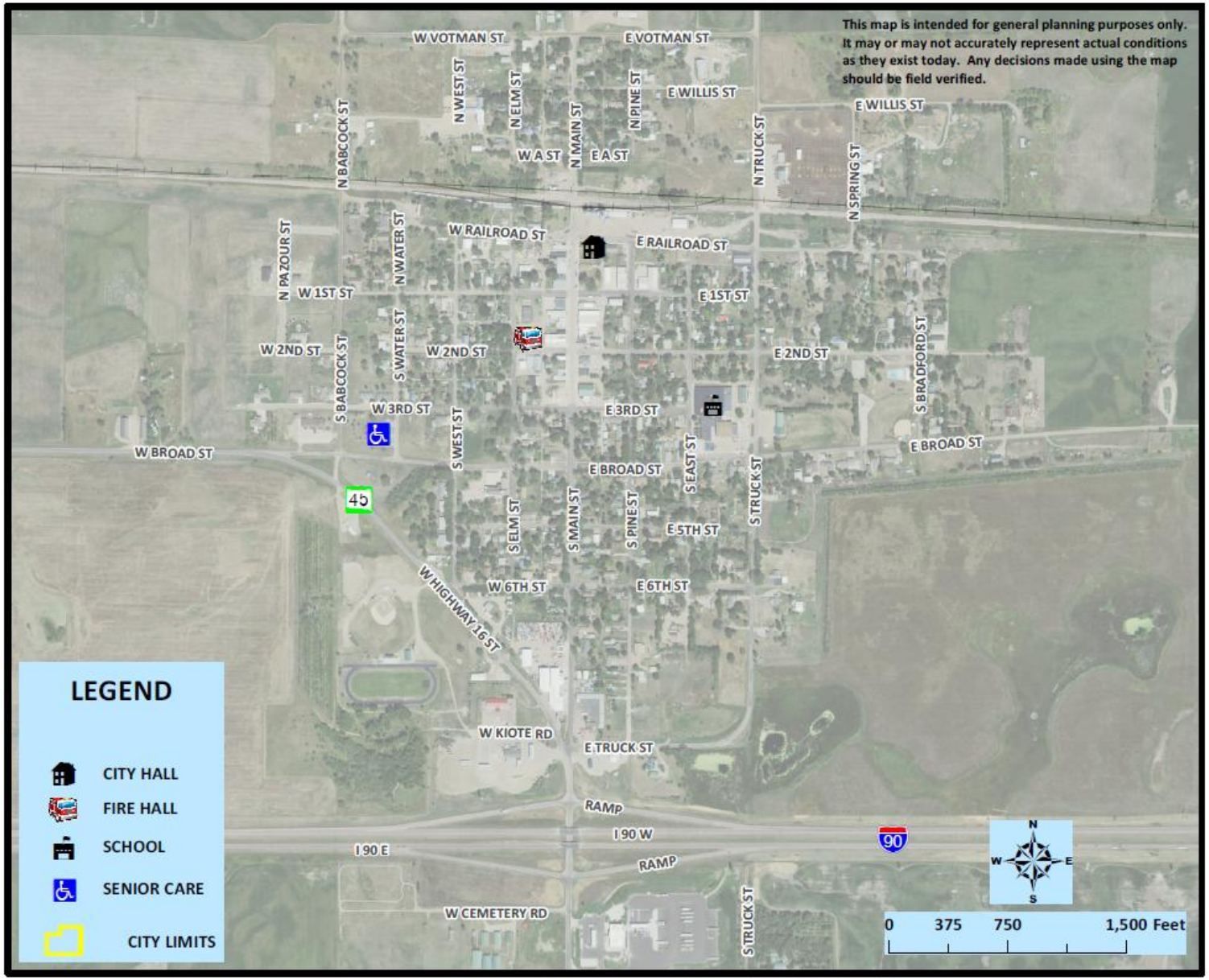
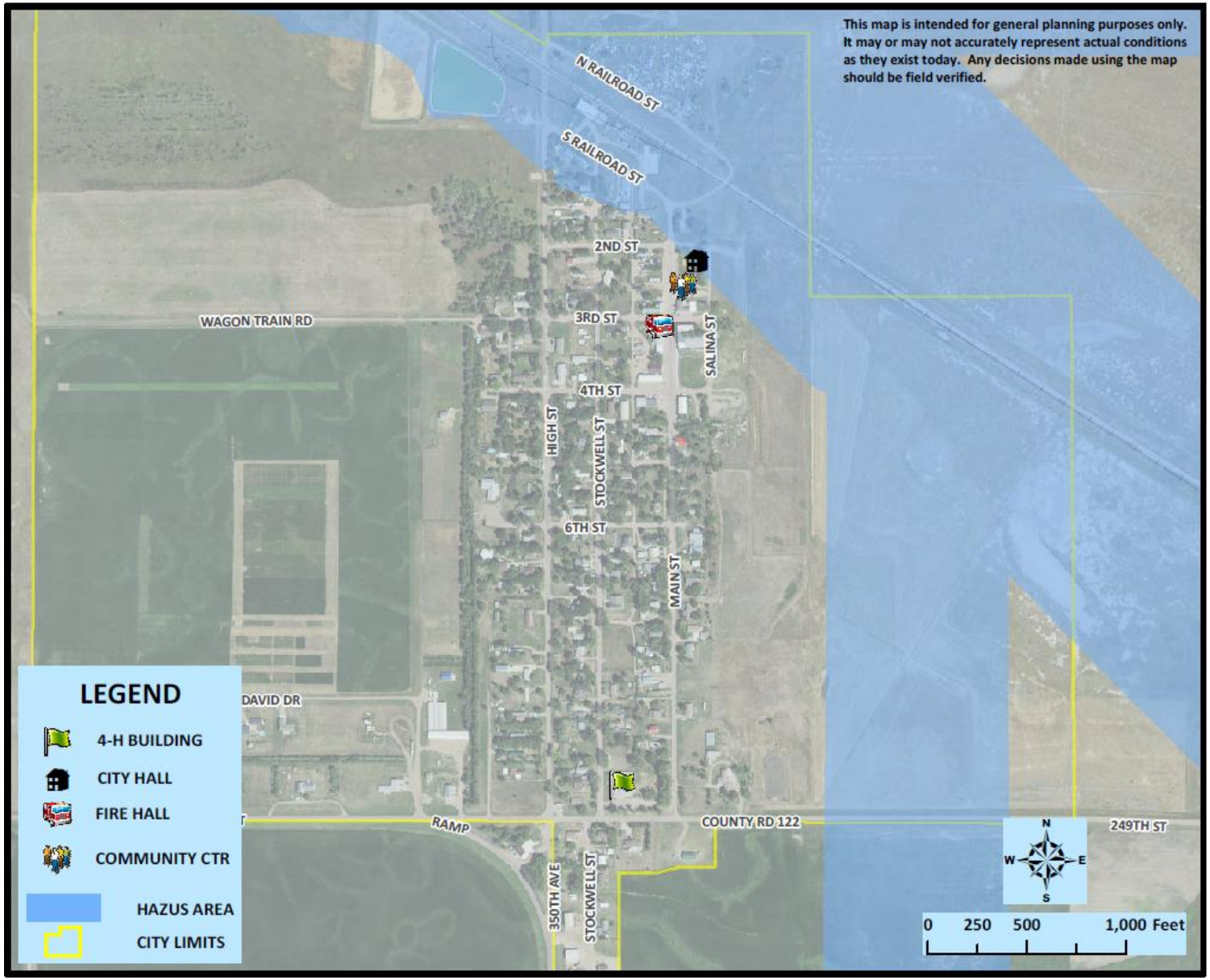


Figure 3.3 – Pukwana



2026 Brule County (SD)
Hazard Mitigation Plan



CHAPTER IV

Risk Mitigation Strategy

PLANNING & DEVELOPMENT DISTRICT III

CHAPTER IV
RISK MITIGATION STRATEGY

Background

The previous chapter described the types of hazards most likely to impact Brule County and discussed the county's vulnerability to each of the hazards. This chapter describes the local resources and capabilities available to support hazard mitigation, 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. **Table 4.5** at the end of the chapter provides information about each of the proposed actions.

Community Capabilities

Resources are available at the local level to support mitigation activities and efforts in Brule County. For the purposes of this plan, these resources are divided into regulatory mechanisms and other capabilities.

Regulatory Mechanisms

Regulatory mechanisms and authorities to mitigate the various hazards that impact Brule County are limited. For instance, none of the jurisdictions have adopted a building code ordinance [9]. The following table summarizes the formal regulatory policies within Brule County that can support the local mitigation strategy.

Table 4.1 – Regulatory Mechanisms

Item	Notes
Brule County Zoning Ordinance	The ordinance, which is based on the Brule County Comprehensive Plan, controls where growth and development can occur within the county.
Brule County Floodplain Ordinance	Regulates development within flood hazard areas (see **Table 4.2**).
Brule County Burn Ban	Brule County requires landowners wanting to conduct a burn to submit a request beforehand to the Emergency Manager. This requirement is in place at all times.
Chamberlain Zoning Ordinance	The ordinance, which is based on the City's comprehensive plan, controls where growth and development can occur in the community.
Chamberlain Floodplain Ordinance	Regulates development within flood hazard areas (see **Table 4.2**).
Kimball Zoning Ordinance	The ordinance, which is based on the City's comprehensive plan, controls where growth and development can occur in the community.

[9] By South Dakota state law, any local unit of government that has not adopted building codes is required to follow the most recent edition of the International Building Code. However, there is no local enforcement mechanism in any of the jurisdictions.

Regulatory authority also exists within Brule County to mitigate the impact of other hazards. For example, during times of severe drought, each community can enact regulations limiting residential and commercial water usage. To date, none of the communities have had to enact such regulations due to drought conditions, although requests have been made for residents to temporarily limit water use for other reasons.

As shown in the following table, only Brule County and the City of Chamberlain participate in the National Flood Insurance Program (NFIP), but neither has been mapped. Therefore, they do not have a Flood Insurance Rate Map and do not promote and enforce NFIP requirements since there is nothing to enforce or regulate. Furthermore, since there are no Special Flood Hazard Areas in Brule County or Chamberlain, they have no areas to regulate for substantial damage and improvement provisions.

Training and information on NFIP for the jurisdictions have not been passed down over the years as positions have turned over, which has resulted in a situation where current staff in some of the communities have little knowledge about the NFIP program. To address this issue, each jurisdiction has committed to improving its knowledge of and capacity to implement the NFIP program.

Table 4.2 – National Flood Insurance Program Participation

Jurisdiction	Current Effective Map Date	Reg-Emer Date	Appointed Designee	Floodplain Regulation Enforcement	Substantial Improvements Provisions
Brule Co	(NSFHA)	06/08/1998	Director of Equalization	There are no floodplain regulations to administer	Not applicable
Chamberlain	(NSFHA)	07/15/1985	City Administrator	There are no floodplain regulations to administer	Not applicable
Kimball	*(The community does not participate in the NFIP program)*				
Pukwana	*(The community does not participate in the NFIP program)*				

There are no active National Flood Insurance Program policies in Brule County, but seven claims totaling $174,857 have been paid for properties that are no longer insured. No repetitive losses or severe repetitive losses have ever been recorded anywhere in Brule County.

Other Capabilities

Other resources and capabilities exist within Brule County to support the mitigation strategy. This includes administrative and technical resources, financial resources, and education and

outreach efforts, as well as physical assets, which are summarized in the following table and discussed in further detail below.

Table 4.3 – Other Local Capabilities to Support Hazard Mitigation

	Brule County	Chamberlain	Kimball	Pukwana
ADMINISTRATIVE & TECHNICAL				
Emergency management	X			
Land use planning	X	X	X	
Public works		X	X	X
Municipal electric system				X
Floodplain management	X	X		
Building code enforcement				
FINANCIAL				
Budgeting process	X	X	X	X
Levy/Project surcharge for specific purposes		X	X	X
EDUCATION AND OUTREACH				
Internet/social media	X	X	X	
Emergency alerts to cellphones	X	X		
PHYSICAL ASSETS				
Relief shelter		X	X	X
Storm shelter		X	X	X
Warning siren		X	X	X

Administrative and technical staff to support hazard mitigation in the county are limited. For instance, Brule County has an emergency manager, but the position is less than full-time and there are no support staff. Planning and engineering staff within the county are also limited.

The availability of financial resources is critical to the success of this plan. Since there are no specific local funding sources available to support hazard mitigation in Brule County, the budgeting process is where the "rubber meets the road" if hazard mitigation is to be achieved. Therefore, the mitigation actions listed in **Table 4.5** should be considered when the jurisdictions begin developing 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. To help ensure this happens, the Emergency Management Director will continue reaching out to each community at least annually to discuss hazard mitigation, including the possibility of obtaining funds through FEMA or other sources for the projects they have identified.

Education and outreach to support hazard mitigation in Brule County is limited, but efforts are being made. The Brule County Emergency Management office participates in severe

weather public awareness campaigns in conjunction with the State Office of Emergency Management and the National Weather Service and communicates regularly with local officials regarding severe weather awareness and training opportunities. Hazard mitigation information is also available on the county and municipal websites.

There are many physical assets in Brule County that can help protect people prior to, during, or after a disaster event or other emergency situation. Outdoor sirens to warn people of impending severe weather are located in each community. Public facilities that can serve as emergency shelter from a tornado or other severe weather include the following:

- Chamberlain Community Center
- St. Margaret's Church, Kimball
- Pukwana City Hall [10]

Designated short-term relief shelters in the county are as follows:

- St. Joseph's Indian School, Chamberlain (capacity = 150; has blankets, cots, and a generator)
- St. Margaret's Church, Kimball (capacity = 75; has blankets and cots)
- Pukwana Fire Hall (capacity = 50; has blankets, cots, and a generator)

The ability of Brule County and the other jurisdictions to enhance their mitigation capabilities is limited. For instance, none of the jurisdictions have financial resources to hire specialized staff such as engineers to develop hydrology studies or do precise elevation measurements, professionals to enforce building codes, or grant writers to develop applications for hazard mitigation funds. However, through their membership in Planning & Development District III, each of these jurisdictions has become more familiar with hazard mitigation concepts, and their continued participation as this plan is updated in future years will allow them to further develop their knowledge and capabilities. District III staff, which have decades of experience working on various planning and community development activities within Brule County, wrote the county's current hazard mitigation plan and helped develop applications to fund hazard mitigation projects within the county.

Mitigation Goals and Objectives

For this plan update, there are no significant changes in Brule County's hazard mitigation strategy. The community priorities have not changed, and the planning team decided to keep all the goals and objectives from the current mitigation plan. This decision was based in part on the results of the survey, but even more so on the fact that there has been no significant

[10] A small tornado shelter with the capacity to hold about 15 people is located behind the Pukwana city hall. The structure was acquired with the help of FEMA hazard mitigation funds in 2017.

development anywhere in the county since the current plan was adopted and no changes in community vulnerability [11]. The following goals were identified:

- Minimize loss of life and injuries from hazards.
- Minimize damage to existing and future structures within hazard prone 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 turned their focus to each of the hazards facing the County. Following are the specific mitigation objectives identified 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, crop, and infrastructure losses due to wildfires.

Mitigation Action Plan

With the mitigation capabilities, goals, and objectives identified, the planning team began the process of selecting mitigation actions to accomplish the mitigation strategy. This followed up and built upon the earlier review of the progress being made to implement the actions

[11] The lack of development is shown by the fact that a total of only 143 building permits were issued throughout Brule County between 2010 and 2022, an average of about 11 per year.

listed in the county's current hazard mitigation plan. A list of the actions and a summary of the implementation status of each action is shown in the following table.

Table 4.4 – Progress on Implementing Previously Proposed Actions

Mitigation Action	Hazard	Current Status
BRULE COUNTY		
Continue NFIP compliance. Request more training and information from state NFIP coordinator.	Flooding	The County remains compliant, but little progress has been made on learning about the NFIP program.
Powerline burial.	Winter storm	The Central Electric Cooperative continues to bury overhead power lines as funding permits. As of January 2024, about 25% of their 702 miles of line in Brule County have been relocated underground.
Road drainage in vicinity of Red Lake (approx. 7 miles).	Flooding	No progress has been made due to lack of funds.
Road drainage in Pleasant Grove Township (approx. 8 miles).	Flooding	No progress has been made, although this is primarily a State of South Dakota issue.
Road drainage on 344th Ave by Chamberlain Airport.	Flooding	Project has been completed.
Mitigation for Aurora-Brule Rural Water System infrastructure, especially in Red Lake area.	Flooding	No progress has been made due to lack of funds.
CITY OF CHAMBERLAIN		
Continue NFIP compliance. Request more training and information from state NFIP coordinator.	Flooding	The City remains compliant, but little progress has been made on learning about the NFIP program.
Siren acquisitions (two).	Summer storm	No progress has been made due to lack of funds.
Generator acquisitions for water plant, senior center, and sewage lift stations.	Winter storm	No progress has been made due to lack of funds.
Deicing equipment for the airport.	Winter storm	No progress has been made due to lack of funds.
CITY OF KIMBALL		
Storm system upgrades, including storm water management plan.	Flooding	Work is in progress on Main Street and work has also been done in other areas of town.
Siren acquisition.	Summer storm	No progress has been made due to lack of funds.
Generator acquisition for the fire hall.	Winter storm	No progress has been made due to lack of funds.
TOWN OF PUKWANA		
Contact state NFIP coordinator regarding NFIP participation.	Flooding	No progress has been made.
Electric system upgrades, including powerline burial.	Winter storm	Some progress has been made but much more work is needed.
Digital radios for fire department.	All hazards	No progress has been made due to lack of funds.

The participants were encouraged to consider a broad range of mitigation actions, including measures designed to avoid, avert, or adapt to the hazards they face. To guide the

jurisdictions in this process, a list of potential mitigation actions based on FEMA guidance was distributed to the team and they were reminded that they should focus on hazard mitigation as opposed to preparedness. The actions discussed and considered can be grouped into the following general categories:

- Plans and regulations: Government authorities, policies, or codes 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.

- Structure and Infrastructure Projects: Modifying existing infrastructure to remove it from a hazard area or construction of new structures to reduce impacts of hazards. Examples include:
  - Upgrading stormwater infrastructure, such as culverts and storm sewer piping.
  - Replacing overhead utility lines with underground lines.
  - Building tornado safe rooms.

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

- Education and Awareness Programs: Programs to educate the public and decision makers about hazard risks and community mitigation programs. Examples include:
  - Developing a hazard 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 conserve water during droughts.

The final list of mitigation actions identified by the jurisdictions is shown in **Table 4.5**. The table contains the following information for each action:

- The local priority rating.
- The project lead primarily responsible for implementing the action.

- The estimated time frame needed to accomplish the action. Short-term actions can be completed within two years, Mid-term actions from two to five years, and Long-term actions will take more than five years to implement.
- The estimated cost to implement the action.
- Resources that may be available to help fund the action.
- Notes and details about the proposed action.

Prioritizing the actions is important because not all of them can be pursued simultaneously, especially when costly projects are considered. Actions providing the most 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 based on the following criteria helped guide the process:

- 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?

Of these criteria, financial considerations are especially important, because neither Brule 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:

<u>FEMA grant programs</u>

- Hazard Mitigation Grant Program (HMGP)
- Building Resilient Infrastructure and Communities Program (BRIC)
- Flood Mitigation Assistance Program (FMA)
- High Hazard Potential Dam Grant Program (HHPD)

<u>Other grant and loan programs/sources</u>

- US Economic Development Administration
- US Department of Agriculture Rural Development grant/loan program

- US Bureau of Reclamation WaterSMART program
- South Dakota Community Development Block Grant program
- South Dakota State Homeland Security Program
- South Dakota Dept. of Agriculture and Natural Resources
- South Dakota Dept. of Transportation
- Natural Resource Conservation Service
- Western States Wildland Urban Interface Grant Program

Table 4.5 - Proposed Mitigation Actions

BRULE COUNTY ACTIONS	HAZARD	PRIORITY	PROJECT LEAD	TIME	ESTIMATED COST	FUNDING	NOTES
Continue participation in the National Flood Insurance Program.	Flooding	High	Director of Equalization	Ongoing	Minimal	Staff time	The director of equalization will contact the South Dakota floodplain coordinator to learn more about the NFIP program and participate in future training sessions.
Continue to pursue flood mitigation and drainage work along county and township roads.	Flooding	High	Hwy superintendent	Ongoing	≈ $1 million to $5 million	Highway fund; FEMA; SDDOT	The County will continue to implement projects along county and township roads prone to flooding and may apply for funding for projects that pass a benefit-cost analysis. Roads in the Red Lake area are a high priority.
Make upgrades to Wanalain Dam	Flooding	High	County commission	Long	Up to $8.8 million	General fund; HHPD	The Brule County Stormwater Evaluation study recommends replacement of the dam at an estimated cost $8.8 million or repairing the spillway, the cost of which would be dependent on an in-depth inspection of the entire dam. The County may pursue grant funding.
Control the expansion of Red Lake	Flooding	High	County commission	Long	Up to $2.4 million	General fund; DANR; FEMA	The Brule County Stormwater Evaluation study recommends various alternatives to reduce the expansion of Red Lake. The County may pursue grant funding.
Reduce sedimentation in American Creek	Flooding	High	County commission	Short	Up to $4.9 million	General fund; DANR; FEMA	The Brule County Stormwater Evaluation study recommends various alternatives to reduce sedimentation in American Creek. Dredging is expected to begin in the fall of 2026, but more work may be needed in the future.
Bury overhead powerlines.	Winter storm; Summer storm	High	Central Electric Coop; Emergency Mgmt Director	Ongoing	≈ $3 million to $6 million	FEMA	The Coop plans to continue burying lines in the county and may work with Brule County to apply for mitigation funds as they are available. The Coop would be the lead in the development of any application for mitigation funds.
Acquire generator for the courthouse.	Winter storm; Summer storm	Medium	County commission	Mid	$100,000	General fund; FEMA	The facility is the center of emergency management operations in Brule County and reliable power must always be available. The County may pursue grant funding.
Participate in the Storm Ready Program.	Summer storm	Medium	Emergency Mgmt Director	Short	Minimal	Staff time	The Emergency Management Director will look into the program and would work with the towns to implement it.

Participate in the Firewise Program.	Wildfire	Medium	Emergency Mgmt Director	Short	Minimal	Staff time	The Emergency Management Director will look into the program and would work with the towns to implement it.
Develop a prescribed burning plan with landowners.	Wildfire	Medium	Emergency Mgmt Director	Short	$25,000	WUIGP; General fund	The Emergency Management Director will look into establishing a prescribed burn association to promote prescribed fire as a rangeland management tool to help control the spread of cedar trees. If County leadership approves moving forward, the County would pursue grant funding.
Conduct outreach to educate people about water conservation.	Drought	Medium	Emergency Mgmt Director	Short	Minimal	Staff time	The Emergency Management Director will work with the towns on public outreach, including school groups.
Educate farmers on soil and water conservation practices.	Drought	Medium	Emergency Mgmt Director	Short	Minimal	Staff time	The Emergency Management Director will work with the county extension office on outreach to local farmers.
CHAMBERLAIN ACTIONS	**HAZARD**	**PRIORITY**	**PROJECT LEAD**	**TIME**	**ESTIMATED COST**	**FUNDING**	**NOTES**
Continue participation in the National Flood Insurance Program	Flooding	High	City administrator	Ongoing	Minimal	Staff time	The city administrator will contact the South Dakota floodplain coordinator to learn more about the NFIP program and participate in future training sessions.
Upgrade storm sewer system.	Flooding	High	City council	Long	≈ $1 million to $3 million	General fund; DANR; FEMA	The City may pursue grant funding for a project focused on Main Street, which receives significant runoff from the hills to the east.
Dredge American Creek marina basin.	Flooding	High	City council	Short	$800,000	General fund; FEMA	Some dredging is expected to begin later in 2026, but the City may pursue grant funding to do additional work.
Acquire generator for critical infrastructure.	Winter storm; Summer storm	High	City council	Mid	≈ $75,000 to $250,000	General fund; FEMA	The City may pursue grant funding to acquire a generator for the water plant and/or some of the sewage lift stations, both of which must have a reliable source of power at all times.
Acquire additional warning siren(s).	Summer storm	High	City council	Mid	$50,000 (each)	General fund	The City may budget for the acquisition of one or more sirens. The highest priority location is the new Smokey Groves development.
Participate in the Storm Ready Program.	Summer storm	Medium	City council	Short	Minimal	Staff time	The City would work with the County to implement the program.
Construct a tornado safe room.	Summer storm	Medium	City council	Mid	≈ $250,000 to $500,000	General fund; FEMA	The City may pursue grant funding to build a tornado safe room. Possible locations include the marina or one of the city's mobile home parks.

Participate in the Firewise Program.	Wildfire	Medium	Fire chief	Short	Minimal	Staff time	The City would work with the County to implement the program.
Conduct outreach to educate people about water conservation.	Drought	Medium	City council	Short	Minimal	Staff time	The City will work with the County on outreach to the public, including school groups. Other methods might also be used, such as including information with utility bills.
KIMBALL ACTIONS	**HAZARD**	**PRIORITY**	**PROJECT LEAD**	**TIME**	**ESTIMATED COST**	**FUNDING**	**NOTES**
Participate in the National Flood Insurance Program	Flooding	High	City council	Short	Minimal	Staff time	The city council will direct the finance officer to contact the South Dakota floodplain coordinator to begin the process of applying to the program.
Upgrade storm sewer system.	Flooding	High	City council	Long	≈ $500,000 to $2 million	General fund; DANR; FEMA	The City may pursue grant funding for additional projects to build on the work in progress on Main Street and other drainage improvements that have been made.
Construct a tornado safe room.	Summer storm	High	City council	Short	$1.7 million	General fund; FEMA	The City has applied to FEMA for funding for a tornado safe room to be incorporated into a new bathhouse that will be built at the swimming pool park.
Acquire generator for fire hall.	Winter storm; Summer storm	Medium	Fire chief	Mid	$100,000	General fund; FEMA	The facility is the center of emergency operations in Kimball, and it needs a reliable source of power. The City may pursue grant funding.
Acquire additional warning siren.	Summer storm	Medium	City council	Mid	$50,000	General fund	The City may budget for this. The highest priority location is on the south side of the community.
Participate in the Storm Ready Program.	Summer storm	Medium	City council	Short	Minimal	Staff time	The City would work with the County to implement the program.
Participate in the Firewise Program.	Wildfire	Medium	Fire chief	Short	Minimal	Staff time	The City would work with the County to implement the program.
Conduct outreach to educate people about water conservation.	Drought	Medium	City council	Short	Minimal	Staff time	The City will work with the County on outreach to the public, including school groups. Other methods might also be used, such as including information with utility bills.
Enact restrictions on water usage when needed.	Drought	Medium	City council	Short	Minimal	Staff time	Under the direction of the Aurora-Brule Rural Water System, the City will take steps to minimize local residential and commercial water usage when needed.

PUKWANA ACTIONS	HAZARD	PRIORITY	PROJECT LEAD	TIME	ESTIMATED COST	FUNDING	NOTES
Participate in the National Flood Insurance Program	Flooding	High	Town board	Short	Minimal	Staff time	The town board will direct the finance officer to contact the South Dakota floodplain coordinator to begin the process of applying to the program.
Upgrade storm sewer system.	Flooding	High	Town board	Mid	$900,000	General fund; DANR	The Town intends to pursue grant funding for a project to extend storm sewer into the planned westside development.
Bury overhead powerlines.	Winter storm; Summer storm	High	Town board	Short	$1.5 million	General fund; FEMA	The electrical feed for the town needs to be relocated to the Central Electric Coop's underground line near the 4-H Building. The current overhead lines crossing the lakebed are prone to flooding and the soil there is corrosive to the poles. The Town will keep applying for funds.
Acquire generator for 4-H Building.	Winter storm; Summer storm	High	Town board	Mid	$75,000	General fund; FEMA	This facility would be ideal as an alternative short term relief shelter if it had a generator. The Town will consider working with Brule County to pursue grant funding.
Acquire additional warning siren.	Summer storm	High	Town board	Mid	$50,000	General fund	An additional siren will be needed in the planned westside development. The Town will budget for this.
Participate in the Storm Ready Program.	Summer storm	Medium	Town board	Short	Minimal	Staff time	The Town would work with the County to implement the program.
Participate in the Firewise Program.	Wildfire	Medium	Fire chief	Short	Minimal	Staff time	The Town would work with the County to implement the program.
Conduct outreach to educate people about water conservation.	Drought	Medium	Town board	Short	Minimal	Staff time	The Town will work with the County on outreach to the public, including school groups. Other methods might also be used, such as including information with utility bills.
Enact restrictions on water usage when needed.	Drought	Medium	Town board	Short	Minimal	Staff time	Under the direction of the Aurora-Brule Rural Water System, the Town will take steps to minimize local residential and commercial water usage when needed.

Potential Resources for Funding Assistance:

DANR	South Dakota Dept of Agriculture and Natural Resources	FEMA	FEMA Hazard Mitigation Assistance (BRIC or HMGP)
HHPD	High Hazard Potential Dam Grant Program	SDDOT	South Dakota Dept of Transportation
WUIGP	Wildland Urban Interface Grant Program		

2026 Brule (SD)
Hazard Mitigation Plan



CHAPTER V

Plan Maintenance

PLANNING & DEVELOPMENT DISTRICT III

CHAPTER V
PLAN MAINTENANCE

Background

Plan maintenance is a continuous process that requires long-term commitment and focused effort. The process involves evaluating the plan's effectiveness at achieving its goals, updating the plan as needed to keep it current, and making sure it is integrated into other local planning mechanisms. These activities provide the foundation for an ongoing mitigation program and will ensure that the plan remains relevant and effective. This chapter addresses how Brule County officials intend to implement the plan so that it remains a dynamic, useful tool for mitigating against the impacts of future hazard events.

Public Participation

The plan can be accessed on the Brule County, Chamberlain, and Kimball websites, and a copy is also available for review at the Brule County courthouse and in the finance office of each participating jurisdiction. Going forward, Brule County and each of the jurisdictions will continue their efforts to make the public more informed about the plan. Outreach efforts will likely evolve over time as different methods are used to get greater public participation in the mitigation planning process. Activities may include any of the following:

- Meetings of the Brule County Local Emergency Planning Committee.
- Press releases and social media posts.
- Surveys to get feedback from the public about mitigation priorities.
- Community visits by the Brule County Emergency Management Director to discuss mitigation planning (local schools, civic meetings, etc.).

Any comments and suggestions received from the public through any of the forums described above will be included in the public outreach section of the plan.

Monitoring, Evaluating, and Updating the Plan

The Brule County Emergency Management Director is ultimately responsible for implementing this plan. The director will work under the direction of the Brule County Commission and with the support of the Brule County Local Emergency Planning Committee (LEPC) to ensure that the plan's mitigation strategy is carried out, coordinating his/her activities with other county departments or the other participating jurisdictions as needed. The jurisdictions will also 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.

An important part of implementing the plan is plan monitoring and evaluation, which will be performed by the Brule County Emergency Management Director with the support of the LEPC. The plan will be evaluated at least annually by the LEPC, and it may also be reviewed at other times as the need arises, such as following a significant hazard event or as federal funding for hazard mitigation becomes available.

All major elements of the plan – the planning process, the risk assessment, and the mitigation strategy - will be evaluated. Following are the specific criteria that will be used to measure whether the plan is achieving its goals:

Planning Process

- Could anything from the initial planning process be done more efficiently?
- Has the public become more aware of the plan? How can public participation improve?
- Have there been any public outreach activities to promote awareness of the plan?

Risk Assessment

- Have any recent disaster events impacted any of the jurisdictions?
- Should any hazards be added or removed from the plan?
- Have there been any changes in the nature or magnitude of risks?
- Has any new development occurred that might impact risk?
- Are new data sources available to assess the risk for any of the hazards?
- Do any new critical facilities or infrastructure need to be added to the community asset list?

Mitigation Strategy

- Is the mitigation strategy being carried out as expected? How many of the proposed mitigation actions have been completed or are in progress?
- Have there been any changes in mitigation priorities in any of the jurisdictions?
- Are there any new mitigation actions to consider? Should existing actions be revised or removed from the plan?
- Have parts of the plan been integrated into other planning mechanisms?
- Have any jurisdictions adopted new policies, plans, or regulations that could support the plan?
- Has NFIP participation changed in the participating jurisdictions?
- Is progress being made in education and outreach? How many outreach events have taken place?

Future updates to this plan may occur at any time in response to a change in any of the criteria identified above. However, barring a significant change in any of these factors, Brule County

will begin the process of updating this plan approximately two years prior to the plan's expiration date. Led by the Emergency Management Director, the process will consist of the following general steps:

- Apply for funding assistance to update the plan
- Funding assistance obtained
- Hire contractor to write the plan
- Organize planning team
- Begin soliciting public participation and input
- Hold meetings of planning team 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

Plan Integration

The Brule County Hazard Mitigation Plan is the backbone for hazard mitigation planning within the county, but to remain useful the plan cannot exist in a vacuum. It is designed to work with the planning mechanisms and development regulations that exist within the county, and local officials and policy makers should therefore be familiar with this plan. Neither this plan nor any of the others will work effectively if they contain contrary goals or policy recommendations. Following is a description of the process by which integration will occur into the local planning mechanisms.

- Brule County Comprehensive Plan and Zoning Ordinance – the Planning & Development District III office developed the comprehensive plan and zoning ordinance working with the Brule County planning commission. The County and District III will integrate relevant information acquired through the development of this plan into the environmental constraints section of the comprehensive plan when it is next updated. The zoning ordinance will also be modified if needed. For example, if this plan identifies certain areas as unsuitable for development due to environmental hazards, this should be reflected in the zoning ordinance.
- Brule County Highway Plan – the highway plan is developed by the Brule County Highway Superintendent. It includes a table of significant county road projects scheduled to occur for the next five years. The South Dakota Dept of Transportation requires that the highway plan be updated annually and approved by the county commission. The highway superintendent will be able to utilize information learned during the development of this plan to identify and plan for road projects that may be eligible for FEMA funding, such as those that involve drainage improvements to mitigate flooding.

- Chamberlain Comprehensive Plan and Zoning Ordinance – the Planning & Development District III office developed the comprehensive plan and zoning ordinance working with the city planning board. The City and District III will integrate relevant information acquired through the development of this plan into the environmental constraints section of the comprehensive plan when it is next updated. The zoning ordinance will also be modified if needed. For example, if this plan identifies certain areas as unsuitable for development due to environmental hazards, this should be reflected in the zoning ordinance.
- Chamberlain Capital Improvements Plan – the plan, which is being developed at this time, prioritizes major capital projects in various areas of need, including the stormwater, water, sewer, and street systems. It will be reviewed annually. City staff responsible for the CIP will be able to utilize the knowledge gained during the development of this plan to identify capital projects that may be eligible for FEMA funding.
- Kimball Comprehensive Plan and Zoning Ordinance – the Planning & Development District III office developed the comprehensive plan and zoning ordinance working with the city planning board. The City and District III will integrate relevant information acquired through the development of this plan into the environmental constraints section of the comprehensive plan when it is next updated. The zoning ordinance will also be modified if needed. For example, if this plan identifies certain areas as unsuitable for development due to environmental hazards, this should be reflected in the zoning ordinance.
- Pukwana Electric System Mapping and Burial Analysis – the analysis, which was developed by an outside consultant working with Pukwana staff, describes the Town's electrical system and provides an estimate of the cost to convert the existing overhead electric facilities to underground. The Town will use the analysis when the next application to bury powerlines is developed.

Perhaps the best example to date of the county's current mitigation plan being incorporated into other planning mechanisms occurred during the most recent update of the Comprehensive Economic Development Strategy (CEDS) for the Planning & Development District III region, which includes Brule County. In particular, the risk analysis and mitigation strategy of the plan were utilized as the CEDS was updated in 2024.

Each jurisdiction will use this plan to help them as they prepare their annual budget each year. The process will be essentially the same in each jurisdiction, beginning with a review of the plan at the outset of the budgeting process, which typically begins in the summer. Each jurisdiction will especially note their list of proposed mitigation actions in **Table 4.5**. Those that are interested in seeking funds for a specific project listed in the table will be able to utilize knowledge gained during the development of this plan, including FEMA grant deadlines and the grant eligibility of specific types of mitigation projects, as they develop their budgets.

To expand on these efforts, each community should continue to participate in future updates to this plan. This will continue to expose them to the basic concepts of hazard mitigation,

which may be the only practical way for some of the jurisdictions to expand their capabilities. An important part in this process will be played by the Brule County Emergency Management Director, who will continue to reach out to each community at least annually to review their hazard mitigation needs and priorities.

2026 Brule County (SD)
Hazard Mitigation Plan



APPENDICES

- Appendix A: Outreach Effort
- Appendix B: Documentation of Meetings
- Appendix C: History of Previous Hazard Occurrences
- Appendix D: References

PLANNING & DEVELOPMENT DISTRICT III

APPENDIX A: Outreach Effort

A major effort was made to solicit input into this plan. Outreach included press releases that were printed in the local newspaper, information posted online, and surveys that were made available to the public.

Press Release in Central Dakota *Times* Prior to First Meeting:



ta Times Wednesday, July 8, 2026

ICE INC.
Vusten -
605-680-9935

RAUSCH BROTHERS MONUMENT COMPANY, INC.
Hickey Funeral Chapel
Phone 605-734-5272

IDER:
esidents, Oacoma
tree branches at the city's
privilege has been abused
iduals have been hauling
ches to the site.
branches only.
tree branches under
6 inches in diameter.
pen to commercial tree trimmers
sinesses.
uling items to the
anged by calling
t 605-734-4455.

Welcome Back!
The Chamberlain-Oacoma Chamber of Commerce welcomes Chamberlain alumni.
We hope you enjoy your weekend with us!

s Office Update
a new program statewide
, marriage). We have not
ogram. Please be patient.
ng in the last couple of years,
ar ago to not employ a deputy.
een a one-person show. It was
will be days the office could be
o. This was approved by the
ere happens to be an extended
d accordingly. With this deci-
unty/taxpayers $52,000 a year.
een instructions by the Regis-
r/pen to leave messages so I
need of a vital record immedi-
l occur in South Dakota, it can
ister of deeds office in South
tact me at 605-234-4434 or e-
if you have any questions.
ivigate a change.

Hazard Mitigation Meeting

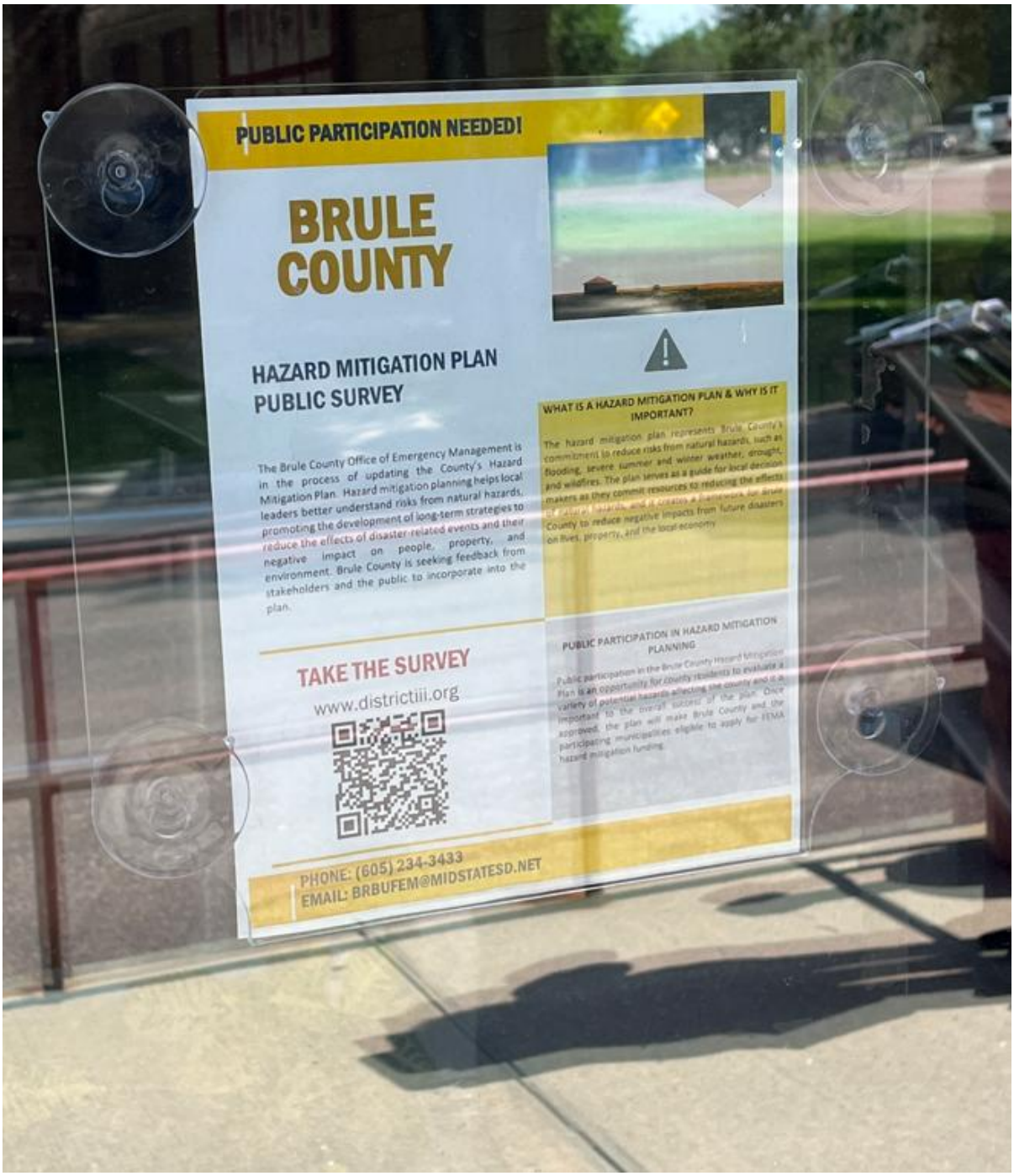
Blizzards, tornadoes and floods are a few of the natural hazards that strike this part of the country. Events like this have the potential of causing thousands of dollars annually in damage to property. To lessen the impact of these disasters in the future, Brule County is beginning the process of updating its current Hazard Mitigation Plan.

A series of meetings, which are open for the public to attend, will occur this year to obtain input as the plan is developed. **The first meeting will be held at the Brule County Courthouse on July 16, 2026, at 10 a.m.** Agenda items for this kickoff meeting will include a discussion of hazard mitigation concepts, a review of the county's current hazard mitigation plan and a discussion about the planning process going forward.

Another way to contribute to the planning process is to fill out a survey. A copy of the survey may be obtained at the Brule County Emergency Management Office, by going to www.districtiii.org or by scanning this QR code:

For more information, please contact the Brule County Emergency Management Office at brbufem@midstatesd.net or by calling 605-234-3433. You can also contact John Clem at 800-952-3562 or by e-mail at John.Clem@districtiii.org.

Survey Posted at Courthouse Entrance:



Survey Poster

PUBLIC PARTICIPATION NEEDED!

BRULE COUNTY



HAZARD MITIGATION PLAN PUBLIC SURVEY

The Brule County Office of Emergency Management is in the process of updating the County's Hazard Mitigation Plan. Hazard mitigation planning helps local leaders better understand risks from natural hazards, promoting the development of long-term strategies to reduce the effects of disaster-related events and their negative impact on people, property, and environment. Brule County is seeking feedback from stakeholders and the public to incorporate into the plan.

WHAT IS A HAZARD MITIGATION PLAN & WHY IS IT IMPORTANT?

The hazard mitigation plan represents Brule County's commitment to reduce risks from natural hazards, such as flooding, severe summer and winter weather, drought, and wildfires. The plan serves as a guide for local decision makers as they commit resources to reducing the effects of natural hazards, and it creates a framework for Brule County to reduce negative impacts from future disasters on lives, property, and the local economy.

TAKE THE SURVEY

www.districtiii.org

PUBLIC PARTICIPATION IN HAZARD MITIGATION PLANNING

Public participation in the Brule County Hazard Mitigation Plan is an opportunity for county residents to evaluate a variety of potential hazards affecting the county and it is important to the overall success of the plan. Once approved, the plan will make Brule County and the participating municipalities eligible to apply for FEMA hazard mitigation funding.

PHONE: (605) 234-3433
EMAIL: BRBUFEM@MIDSTATESD.NET

Survey Form with Responses

BRULE COUNTY HAZARD MITIGATION SURVEY (*WITH RESPONSES IN RED TYPE*)

The Brule County Office of Emergency Management is in the process of updating the County's Hazard Mitigation Plan. Hazard mitigation planning helps local leaders better understand risks from natural hazards and promotes the development of long-term strategies to reduce the effects of disaster-related events. Brule County is seeking feedback from stakeholders and the public to incorporate into the plan. We would greatly appreciate it if you would complete the survey. Participation is voluntary and anonymous.

GENERAL HOUSEHOLD INFORMATION

First, we would appreciate any information you are willing to share with us about your household. This information will remain confidential and is for survey use only.

1. What county do you live in? **Brule County (All)**

2. What town do you live in? **Chamberlain: 23; Kimball: 10; Pukwana: 5; Rural: 6**

3. How long have you lived in South Dakota?

   Less than 1 year: **0**
   1-5 years: **2**
   6-10 years: **1**
   More than 10 years: **41**

4. Before receiving this survey, were you aware of the county's hazard mitigation plan?

Yes: 19 **No: 25**

5. During the past 5 years, in the county you currently reside in, have you or someone in your household directly experienced a natural disaster? This could be a flood, severe windstorm, wildfire, or other type of natural disaster. **Yes: 20** **No: 24**

6. How concerned are you about the following natural disasters affecting your county? (Check the corresponding box for each hazard)

Natural Disaster	Very Concerned	Somewhat Concerned	Neutral	Not Very Concerned	Not Concerned		Weighted Results
Drought	21	13	5	3	2		48
Extreme Heat	10	13	15	4	2		25
Flood	9	19	8	4	4		25
Hail	12	23	7	1	1		44
Tornado	9	17	11	5	2		26
Wildfire	4	13	12	12	3		3
Winsdstorm	10	30	3	0	1		48
Winter storm/Blizzard	11	25	4	2	2		41

7. Which of the following community assets do you see as being vulnerable in your community? (*You may check more than one*)

Human (Loss of life and/or injuries) **17**
Economic (Business closures and/or job losses) **24**
Infrastructure (Damage or loss of bridges, utilities, schools, etc.) **32**
Environmental (Damage or loss of forests, rangeland, waterways, etc.) **12**
Government (Ability to maintain order and/or provide public amenities and services) **7**

8. Please check the box that best matches your opinion of the following strategies to reduce risk and loss associated with natural disasters.

Community- wide Strategies	Strongly Agree	Agree	Neutral/ Not Sure	Disagree	Strongly Disagree		Weighted Results
I support implementing government rules and regulations to reduce risk	4	22	14	4	0		26
I support policies to prohibit development in areas subject to natural hazards	9	23	10	1	1		38
I support enhancing the function of natural systems (e.g., streams, wetlands)	7	25	10	2	0		37
I support the use of tax dollars to compensate landowners for not developing in areas subject to natural hazards	1	18	18	5	2		11
I support the use of tax dollars to reduce risks and losses from natural disasters	5	24	11	2	2		28
I support the disclosure of natural hazard risks during real estate transactions	15	20	7	1	1		47

9. How important are each of these priorities to you in planning for natural hazards?

Statements	Very Important	Somewhat Important	Neutral	Not Very Important	Not Important		Weighted Results
Protecting private property	21	16	4	3	0		55
Protecting critical facilities (e.g., transportation networks, hospitals, fire stations)	33	8	3	0	0		74
Protecting utilities and infrastructure	31	10	3	0	0		72
Protecting historic and cultural landmarks	6	21	11	6	0		27
Strengthening emergency services (fire, police, etc.)	31	10	2	1	0		71

APPENDIX B: Documentation of Meetings

This appendix includes the following items:

- Signup sheets from the planning team meetings.
- Minutes from each of the participating jurisdictions' meetings as they discussed the mitigation actions they wanted to include in the plan.

SIGNUP SHEET – FIRST PLANNING TEAM MEETING:

Brule County Hazard Mitigation Planning Meeting

July 16, 2026

NAME	REPRESENTING
John Clem	Planning District III
Shannon Vigreck	Planning District III
Gary Ozark	Commissioner
Greg Mayhew	Commissioner
John DeBoer	Brule County Commission
Sharron Swanson	Brule County Commissioner
Monte Lejerman	Brule Cty. Comm.
Andrea Landon	Kimball Ambulance
Lydia Mody	City of Kimball - Finance Officer
Richard Two Two	Kimball Police Dept.
Brandon Buck	Kimball Fire Dept.
Lonnie Shaping	Town of Pukwana
Janet Petrak	Central Dakota Times
Jerri Vinzent	Pukwana Fire
Jim Koelbel	Brule Co. Commissioner Elect
Kathryn O'Connor	Brule Co EM
Clint Sinclair	City of Chamberlain
Steve Meyer	Brule County
Pam Petrak	Brule County
Mike Schlaffman	Brule County

SIGNUP SHEET – SECOND PLANNING TEAM MEETING:

Brule County Hazard Mitigation Planning Meeting

August 20, 2026

NAME	REPRESENTING
John Clem	Planning District III
Shannon Viereck	Planning District III
Lydia Morley	City of Kimball - Finance Office
Richard Two Two	Kimball Police Dept.
Jerry Wingert	Pukwana Fire dept
mike Soglaffman	Brule Co
Clint Sanlek	City of Chamberlain
Janet Petrak	Central Dakota Times
Bonnie Sharping	Pukwana Town
Gary Dogan	Brule Co comm
[illegible]	Brule Co comm
[illegible]	Brule Co Chair
[illegible]	Brule Co Vice Chairman
Steve Meyer	State's Attorney Office
Monte Leiferman	Brule County
Pamela Petrak	Brule County
[illegible]	Brule Co.
Katheryn Benton	Brule Co
Sheena Larsen	LFCDC

SIGNUP SHEET – FINAL PLANNING TEAM MEETING:

Brule County Hazard Mitigation Planning Meeting

October 1, 2026

NAME	REPRESENTING
John Clem	Planning District III
Shannon Viereck	Planning Dist III
Janet Petrak	Newspaper
mike Schlaffman	Brule Co
Kim Kontz	Brule CO
Steve Meyer	State's Attorney's Office
Kris Hedlicka	Brule Co. Register of Deeds
Pamela Petrak	Brule Co. Auditor
Lydia Morley	City of Kimball- Finance officer
Richard Two Two	City of Kimball PD
Greg Dzark	
Mitch Kaul	City of Okumberlain
Sheena Larson	Lake Francis Case Dev. Corp
Dan Hoglan	Brule Co Commission
Shawna Lacanda	Brule Co Commissioner
Monty Lefferman	Brule Co. Comm.
Jim Beedhart	Brule Co. Comm.
Greg Meidow	Brule Co Comm

REGULAR MEETING OF BRULE COUNTY COMMISSIONERS

September 1, 2026

The Board of Brule County Commissioners met in regular session at 9:00 a.m. at the Brule County Courthouse. Members present: DeBoer, Swanson, Leiferman and Mairose. Absent - Dozark. Also present: States Attorney Theresa Maule, Deputy States Attorney Steve Meyer, Janet Petrak – Central Dakota Times, Jim Ketelhut District 3 Commissioner Elect, Jona Ohm and Steve Smith. No conflicts of interest were declared.

ADOPT AGENDA

Commissioner Swanson moved and Commissioner Leiferman seconded to adopt the agenda. All members voted aye. Motion carried.

APPROVE MINUTES

Commissioner Leiferman moved and Commissioner Mairose seconded to approve the minutes of 8-20, 2026. All members voted aye. Motion carried.

PUBLIC COMMENTS

"James Bialota expressed concern and dissatisfaction with the State's Attorney Office.

Steve Smith expressed his opinion of James Bialota – stating that Bialota has been prosecuted and convicted of failure to leave and disorderly conduct. Smith also advised that if States Attorney Maule had violated any rules of the Court that the Commissioners would be notified and that the Contempt of Court is not happening. Smith also stated that as Lyman County State's Attorney he reviewed the file and found nothing done by the State was illegal or would subject the State to any kind of remedy favoring Bialota."

PERSONNEL

Commissioner Leiferman moved and Commissioner Swanson seconded to appoint Kris Hrdlicka to finish the term of Register of Deeds left vacate August 7, 2026. Hrdlicka's appointment is effective 9-1-2026 through 12-31-2026 at $56,000 annualized salary. All members voted aye. Motion carried.

2027 BUDGETS

A hearing was held at 9:30 am for the provisional budget of 2027. No one appeared.

HAZARD MITIGATION PROJECT SELECTION

Commissioner Swanson moved and Commissioner Leiferman seconded to include the following projects in our hazard mitigation plan:

Continue participation in National Flood Insurance Program (Director of Equalization as lead).
Implement drainage improvements in various locations, including the Red Lake area.
Powerline burial / system upgrades (Central Electric as lead).
Acquire generator for the courthouse.
Participate in the Storm Ready Program.
Participate in the Firewise Program.
Look into starting a Prescribed Burn Association with landowners.
Work with the communities on outreach to educate people about water conservation.
Work with county extension office to educate farmers on soil and water conservation practices

All members voted aye. Motion carried.

MRC RAIL REQUEST FOR FUNDS

Commissioner Leiferman moved and Commissioner Mairose seconded to send a request to the MRC Rail Authority for assistance in paying the cost of repairing the rail crossing at 356th Avenue (3/4 mile north of Highway 16). The County is responsible for 10% of the precast concrete being placed and the County wants to extend from the cement with asphalt and gravel to level out the crossing. All members voted aye. Motion carried.

NURSE

Commissioner Leiferman moved and Commissioner Mairose seconded to renew the contract with the State of South Dakota for Health Services for Brule County for the year 2027. All members voted aye. Motion carried.

LOCAL EMERGENCY MANAGEMENT PERFORMANCE GRANT

Commissioner Swanson moved and Commissioner Leiferman seconded to enter an agreement with South Dakota Department of Public Safety. The contract will provide 50% of the salary and benefits of the Emergency Management Office. All members voted aye. Motion carried.

COURTHOUSE SECURITY GRANT

Commissioner Mairose reported that there is money available for security for the Courthouse. An assessment was conducted showing discrepancies at the Courthouse. More meetings need to be held to determine what will actually be feasible and needed.

POOR RELIEF

Commissioner Swanson moved and Commissioner Mairose seconded to approve a burial for an individual that qualified for poor relief assistance. All members voted aye. Motion carried.

EXECUTIVE SESSION

Commissioner Swanson moved and Commissioner Leiferman seconded to enter executive session at 10:28 am am to discuss personnel. Executive session declared over at 11:00 am.

REPORTS AND CORRESPONDENCE

The following reports were received and placed on file in the County Auditor's office: Agenda for the SD Counties Convention

APPROVE CLAIMS

Commissioner Swanson moved and Commissioner Mairose seconded to approve the following payroll and bills. All members voted aye. Motion carried. (*DELETED*)

ADJOURNMENT

Commissioner Swanson moved and Commissioner Leiferman seconded to adjourn at 11:15 am with the next meeting being held on 9-17-2026 at 9:00 am. All members voted aye. Motion carried.

ATTEST:

_____	_____
PAMELA PETRAK	DONN DEBOER
BRULE COUNTY AUDITOR	BOARD OF BRULE COUNTY COMMISSIONERS

CHAMBERLAIN MINUTES

CHAMBERLAIN CITY COMMISSION
September 8, 2026

The Chamberlain City Commission held their first regular meeting on September 8 at 5:30 PM.

Present: Mayor Chad Mutziger, Commissioners Brown, Stone and Thomas, City Administrator Clint Soulek, Chief of Police Jason Handel and Finance Officer Nicky Gaulke.

Absent: Commissioner Hyland.

Pledge of Allegiance

Adopt Agenda
Motion by Brown second by Thomas, all ayes and approved the agenda as presented with eliminating the executive session.

Conflict of Interest
No conflicts of interest were noted.

Minutes
Motion Thomas second by Brown, all ayes and approved the minutes from the last regular meeting.

Bills
Motion by Thomas second by Brown, all ayes and approved to pay the bills as presented: (*DELETED*)

Public Comments
The floor was opened for public comments.

Electric Scooters/Bikes
Mike Weisz addressed the Council noting that he had seen previous discussions from the City about regulating the motorized scooters and bikes. He asked that the Council not put the e-bikes in the same category as the electric scooters as the population driving them are older adults and not the source of the problems. Weisz presented information to the Council and noted that he is aware that these scooters are flying through stop signs and intersections. Chief Handel stated that the safety issues we are having are mainly with the e-scooters.

CHS Parade
Motion by Brown second by Thomas, all ayes and approved to close Main Street between King and Kellam on September 18th for the CHS homecoming parade.

Speed Bump Request
The City received a request for speed bumps on Sale Barn Road near the Smoking Mule and Swenson Brothers. Discussion was held and it was noted that the area hasn't really been a problem area and our last resort would be to place speed bumps down. We will look into other options.

Sealed Bids – Smokey Groves Commercial Lots
The following bids were received: Craig Rosenburger for $47,000 for Lot 7, Block 1, Smokey Groves and Brian Juhnke for $32,250 for Lot 11, Block 6, Smokey Groves. The bids received do meet state law. Motion by Brown second by Thomas, all ayes and approved to award Craig Rosenburger for $47,000 for Lot 7, Block 1, Smokey Groves and Brian Juhnke for $32,250 for Lot 11, Block 6, Smokey Groves. It was noted that now that the roads are complete they will be held to the regular timeline as per the covenants.

Hazard Mitigation
Soulek informed the Council that we are working with District III, the County, Pukwana and Kimball on an updated hazard mitigation plan. He noted that the list includes national flood insurance, dredging the marina, a new siren, generators and storm water control. Motion by Thomas second by Brown, all ayes and approved the hazard mitigation plan as presented.

Airport
Soulek reported that the work on the apron at the airport has started and we do not foresee any problems with successfully completing on the project by the deadline.

Walt Nagel – Probationary Raise
Motion by Brown second by Mutziger, all ayes and approved to give Walt Nagel a $500 raise for successfully completing his six-month probation.

Citizen Recognition
The Council recognized Donna Kocer and Norm Farnsworth for both going above and beyond cleaning up trash on their daily walks.

Operating Transfer
Motion by Thomas second by Brown, all ayes and approved to transfer $11,200 from General Fund to Summer Recreation as budgeted.

City Administrator Report
Soulek reported that the fogseal has been postponed by the contractor and we do not have a date yet as to when they will be here.

The 10 benches that were donated by Jack Mueller have all been installed down Main Street up to Roam Free Park. Soulek also noted that we will be doing some curb and gutter work on Main Street along with getting bids for a large section by the Community Center.

2027 Budget Review
Gaulke noted that she spoke with Mayor Mutziger and made a couple changes that he recommended to the budget along with a few others. These included lowering debt payments by paying off the sweeper loan and not financing the loader, the pool slide, and paying for part of the mower out of the Douville Cemetery. The first reading will be held on September 8th at the regular Council meeting.

Police Report
Chief Handel presented the August police report and informed the Council that he has also been asked about adding a school zone or changing speed limit on Sorensen Drive by the school. This was previously discussed, we will place signs for the speed limit.

Other Matters
Commissioner Thomas asked if we have anything scheduled yet to repair the lift station and Soulek stated that he should be working on it here in September.

Discussion was held on ordinance updates and Gaulke stated that our city attorney is currently working on the rough draft that was given to us from American Legal.

Adjourn
Motion by Thomas second by Brown, all ayes and approved to adjourn at 6:32 PM.

_____
Chad Mutziger, Mayor

Attest:

SEAL

_____
Nicky Gaulke, Finance Officer

Published once at the total approximate cost of _____.

KIMBALL MINUTES

City of Kimball
PO Box 16, Kimball, SD 57355
Phone: 605-778-6277

The Kimball City Council met in regular session Tuesday September 8, 2026 at the city office. Mayor Bill Gough called the meeting to order at 7:30 p.m. Council members present by roll call were Harold Bickner, Angel Stellwag, Dayle Blasius, Janene Wingert, Shelly Janish, and Matt Bilben. Also present were Lydia Morley, Deb Kourt, Donnie Hamiel, Chelsey Johnson, Cully Assman, Gavin Reindl, Sami Pringle, Richard Two Two, and Spencer Gilk.

Motion by Blasius second by Janish to adopt the agenda. All aye, motion carries.

Motion by Stellwag second by Blasius to approve the August 24 regular meeting minutes as written. All aye, motion carries.

Sami Pringle, Gavin Reindl and Cully Assman representing the Kimball Student Council were present to discuss homecoming activities. Motion by Janish, second by Blasius to approve the Kimball School/Kimball Student Council special event application for the homecoming parade on October 9th and waive the fee. Under discussion, council noted school is to determine the final route and let the city office know to coordinate with city employees for street closures. All aye, motion carries. Motion by Stellwag, second by Wingert to approve the senior class white washing on Broad St between East St and Truck St on Oct 4th of 5th for homecoming. All aye, motion carries.

Chelsey Johnson representing Love's was present to request a Children's Miracle Network donation from the council. Motion by Janish, second by Wingert to table Children's Miracle Network donation request to the next meeting. All aye, motion carries.

Finance Officer Morley presented the finance reports and reconciliations for August. Motion by Janish, second by Stellwag to approve the finance reports and reconciliations. Roll call vote – Stellwag-aye; Blasius-aye; Wingert-aye; Janish-aye; Bilben-aye; Bickner-aye; vote of 6-0, motion carries.

Motion by Bilben, second by Bickner to pay the monthly bills. Roll call vote – Blasius-aye; Wingert-aye; Janish-aye; Bilben-aye; Bickner-aye; Stellwag-aye; vote of 6-0, motion carries.

Employee reports were shared by Two Two and Hamiel.

A portion of the meeting was reserved for public input, with none being shared.

Motion by Bickner, second by Stellwag to table Kimball Cemetery Association. All aye, motion carries. Kimball Cemetery:

Stellwag shared research on sidewalks as a follow-up from the last meeting. Council will continue looking into further information.

Motion by Janish, second by Stellwag to approve the Senior Center's request to add an air vent routed into the kitchen area of the building provided it is at no cost to the city. All aye, motion carries.

Hamiel shared information with council on comparisons between a backhoe or mini excavator for city projects. Council and Hamiel will continue to look into further information.

Motion by Bickner, second by Blasius to approve Main Street Construction Change Order #2 for geotextile fabric. Under discussion it was noted that this adds four additional days to the substantial completion deadline. Roll call vote: Wingert-aye; Janish-aye; Bilben-aye; Bickner-aye; Stellwag-aye; Blasius-aye; vote of 6-0, motion carries.

Motion by Bickner, second by Blasius to approve Main Street RFP#1 for removable sections in ramp railings. Roll call vote: Janish-aye; Bilben-aye; Bickner-aye; Stellwag-aye; Blasius-aye; Wingert-aye; vote of 6-0, motion carries.

Motion by Bickner, second by Stellwag to approve Main St Pay Request #4 for $181,760.61 but not release the check until the city receives notice that funding has been released from the state. Roll call vote: Bilben-aye; Bickner-aye; Stellwag-aye; Blasius-aye; Wingert-aye; Janish-aye; vote of 6-0, motion carries.

Motion by Stellwag, second by Bickner to approve Main Street RFP#4 for 2nd St. sidewalk/steps removal and bill the property owner for work outside the project limits. Roll call vote: Bickner-aye; Stellwag-aye; Blasius-aye; Wingert-aye; Janish-aye; Bilben-aye; vote of 6-0, motion carries.

Council discussed Main Street parking with no action taken.

Motion by Bickner, second by Janish to authorize Banner Engineering to survey for the school parking lot to determine boundaries for an approximate cost of $1,400. Roll call vote – Stellwag-aye; Blasius-aye; Wingert-aye; Janish-aye; Bilben-aye; Bickner-aye; vote of 6-0, motion carries.

Motion by Janish, second by Blasius to look into Onsite 24/7 camera options and costs. All aye, motion carries.

Council discussed playground edging with no action taken. Maintenance employees plan to work on this project for next summer.

No action was taken on Ditty's culvert.

Motion by Stellwag, second by Bickner to approve the following temporary special event liquor license for $100 – all aye, motion carries.

Council reviewed projects for inclusion in the updated Brule County Hazard Mitigation Plan. Motion by Stellwag second by Bickner to approve the proposed draft project list. All aye, motion carries.

No action was taken on culverts policy.

No action was taken on building permit requirements. Bickner will research and work on updating the existing building permit ordinance with Bilben and bring a proposal back to the council for consideration at a later date.

Motion by Stellwag second by Blasius to approve Resolution #2026-11 updating water/sewer rates and credit card payment fees with an effective date of January 1, 2027. Roll call vote: Blasius-aye; Wingert-aye; Janish-aye; Bilben-aye; Bickner-aye; Stellwag-aye; vote of 6-0, motion carries.

The next meeting was set for September 21st at 7:30 p.m.

No mayor's comments were shared by Gough.

Council discussed the 2027 budget.

Motion by Bickner, second by Stellwag to approve the first reading of the 2027 Budget – Ordinance# 2026-03 – 2027 Appropriations Ordinance. Roll call vote: Wingert-aye; Janish-aye; Bilben-aye; Bickner-aye; Stellwag-aye; Blasius-aye; vote of 6-0, motion carries.

Motion by Blasius, second by Bilben to adjourn at 10:00 p.m. All aye, motion carries.

_____ _____

Bill Gough, Mayor Attest: Finance Officer

PUKWANA MINUTES

TOWN OF PUKWANA

Sept 8th, 2026, Council Meeting

The Pukwana Town Council met on Tuesday Sept 8th, 2026, at 7:00 p.m. in the Pukwana Community Center. Council members present Larry McManus, Bill Hanson, Olivia Downs, Lonnie Sharping, Bonnie Luurs, LaDonna McManus, Mr. and Mrs. Steve Aldridge, Jayce Neilan, Greg Powell, James Jones and Gary Pierce.

President McManus called the meeting to order at 7:00 pm.

Greg Powell, representing South Central Water Development District presented council with a check for $30,000 to assist with the Pukwana Housing Development.

Motion by Hanson/Downs to approve the agenda. Motion passed.

Motion by Downs/Hanson to approve the regular monthly meeting minutes. Motion passed.

Public input, none noted. Disclosure of conflict of interest, none noted.

Motion by Hanson/Downs to approve the monthly bills. Motion passed.

Discussion on 2026 budget was held. Motion by Downs/Hanson to approve the 1st reading of the 2026 proposed budget. Motion passed.

Motion by Hanson/Downs approving a building permit for Tyler Wegs. Motion passed.

Discussion on the proposed Brule Co. Hazard Migration plan. Sharping has attended. Motion by Hanson/Downs to adopt the prosed mitigation actions. Motion passed.

Four roofing bids were presented for the Pukwana Community Center. After discussion, motion by Downs/McManus to award Bill's Handyman Service the bid for steel roofing. Motion passed.

Sharping reminded Board of the Sept 15th Central Electric annual meeting. Sharping also reminded Board of the SD Municipal League Annual Fall meeting dates.

Mosquitoes are a hot topic. Costly and is it helping! Town will continue to spray but waiting on repairs.

Chip seal was completed. A double coat was applied to David Drive to ensure an extended life and plans to chip seal in 2027. Heavy vehicle traffic is a concern. Board will consider a weight limit ordnance.

Motion by Down/Hanson appointing either the Board President or the Finance Officer to secure part-time employee if needed. Motion passed.

McManus projected a 4% utility rate increase for 2027, depending on what our suppliers do.

McManus expanded on the Pukwana Housing Project. Working to secure grants/loans for the project.

Motion by Down/Hanson to adjourn. Motion passed.

The next regular meeting of the Pukwana Town Council will be held on Monday October 5th, 2026, at 7 pm in the Pukwana Community Center.

_____

Larry McManus, President

_____

Lonnie Sharping, Finance Officer

APPENDIX C: History of Previous Hazard Occurrences

This section provides details about hazard events that have impacted Brule County in the past, beginning with the following table showing the major disaster declarations in which Brule County was part of the designated disaster area. The next several pages are a comprehensive list of weather-related hazard events recorded in the county from the National Climatic Data Center's Storm Events Database. The section ends with several tables showing crop loss to Brule County farmers.

Major Disasters

Table C.1 lists all the events since 1970 that resulted in a major disaster declaration in which Brule 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 Brule County

Dec #	Declaration Date	Type	Primary Damage Impact	Obligated Amount
3015	Jun 1976	Drought		
1045	Mar 1995	Severe winter storm		
1052	May 1995	Severe storms; Flooding		
1075	Jan 1996	Ice storm		
1156	Feb 1997	Severe winter storm; Blizzard		
1173	Apr 1997	Severe storms; Flooding		
1375	May 2001	Severe storms		
1702	May 2007	Severe storms; Tornado; Flood		$84,099
1774	Jul 2008	Severe storms; Flooding	Roads, bridges	$53,003
1886	Mar 2010	Severe winter storm	Emergency Protection	
1887	Mar 2010	Severe winter storm	Utilities	
1915	May 2010	Flooding	Roads, bridges	$107,840
1938	Sep 2010	Severe storms; Flooding	Roads, bridges	
1984	May 2011	Flooding	Roads	$328,529
4233	Jul 2015	Severe storms; Tornado; Flood	Utilities	$20,902
4440	Jun 2019	Severe winter storm; Flooding	Roads, bridges	$62,550
4463	Sep 2019	Severe storms; Flooding	Roads, bridges	$1,050,621
4469	Nov 2019	Severe storms; Flooding	Roads, bridges	$156,569
4807	Aug 2024	Severe Storms; Straight line Winds; Flooding		$2,928,062

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

Significant Hazard Events

Table C.2 is a list of significant hazard events reported for Brule County from 1960 through 2024, as recorded in the National Climatic Data Center's Storm Events Database. The National Climatic Data Center receives data from the National Weather Service, which gets 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 prior to 1996, the only event types recorded by the National Weather Service were tornadoes, thunderstorm winds, and hail. Another issue is that damage amounts in some cases are estimates and for larger-scale events, such as winter storms and drought, the data is collected by forecast zone and thus does not lend itself to analysis at the county level. The database also contains a preponderance of records from the last few decades. 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:

- 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 thunderstorms and high wind events, only events with wind speeds of at least 60 knots are included in the table and only hail of at least one inch diameter is shown. 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 Brule County

Date	Event Type	Event Description	Mag	Prop Damage ($1,000s)	Crop Damage ($1,000s)
5/8/1965	Tornado		F2	25	
6/20/1968	Hail		3.00 in.		
6/30/1968	Hail		1.75 in.		
7/24/1971	Tornado		F3		
7/1/1973	Tornado		F2	25	
5/6/1975	Tornado		F0	250	

Date	Event Type	Event Description	Mag	Prop Damage ($1,000s)	Crop Damage ($1,000s)
8/4/1975	Thunderstorm Wind		61 kts.		
8/2/1977	Hail		1.50 in.		
6/19/1979	Tornado		F1	2,500	
7/11/1979	Thunderstorm Wind		60 kts.		
7/13/1979	Tornado		F0		
6/6/1980	Hail		1.75 in.		
6/25/1980	Hail		1.75 in.		
8/6/1980	Thunderstorm Wind		60 kts.		
8/20/1980	Thunderstorm Wind		62 kts.		
5/20/1982	Tornado		F1		
7/8/1982	Thunderstorm Wind		64 kts.		
7/8/1982	Tornado		F0		
7/20/1982	Tornado		F0		
6/7/1984	Hail		1.75 in.		
6/15/1984	Hail		1.75 in.		
8/29/1985	Hail		1.75 in.		
7/28/1986	Tornado		F2	250	
6/18/1987	Hail		1.75 in.		
7/6/1987	Hail		1.75 in.		
8/2/1987	Thunderstorm Wind		60 kts.		
8/5/1987	Hail		2.75 in.		
7/16/1988	Tornado		F0		
4/26/1991	Hail		2.75 in.		
6/3/1992	Tornado		F0		
6/30/1992	Tornado		F0		
7/15/1994	Thunderstorm Wind		70 kts.		
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.			
1/24/1996	Heavy Snow				
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 was financial with greatly increased heating energy use, and purchase of supplies and services to ensure furnace operation.			
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		5	

Date	Event Type	Event Description	Mag	Prop Damage ($1,000s)	Crop Damage ($1,000s)
		stranded in vehicles. There were some rollovers and other accidents.			
4/25/1996	High Wind		62 kts.		
5/18/1996	Hail		1.75 in.		
7/21/1996	Thunderstorm Wind	Thunderstorm winds caused tree damage and some resulting vehicle damage from the debris. Some trees were uprooted...one of which damaged a wall and window of a house. A few storage buildings were destroyed and some power lines were blown down.	70 kts.	150	
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. Two men stranded in a car overnight near Pukwana froze to death.			
2/3/1997	Heavy Snow				
3/12/1997	Flood				
4/1/1997	Flood				
4/6/1997	High Wind		63 kts.	10	
4/9/1997	Heavy Snow				
6/20/1997	Hail	Large hail completely destroyed 50 thousand acres of crops in Brule County and caused 50 percent or greater crop damage to an additional 30 thousand acres.	2.75 in.		6,000
6/20/1997	Thunderstorm Wind		61 kts.		
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.			
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	
6/4/1999	Tornado		F0		
6/4/1999	Tornado		F0		
6/7/1999	Hail		1.75 in.		
6/7/1999	Tornado		F0		
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			

Date	Event Type	Event Description	Mag	Prop Damage ($1,000s)	Crop Damage ($1,000s)
		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.			
3/1/2000	Drought				
4/1/2000	Drought				
5/7/2000	Thunderstorm Wind		70 kts. E	5	
7/9/2000	Hail		1.75 in.	10	
11/6/2000	Winter Storm				
11/11/2000	Winter Storm				
12/16/2000	Blizzard				
1/13/2001	Winter Storm				
1/29/2001	Blizzard				
2/7/2001	Winter Storm				
2/24/2001	Winter Storm				
6/9/2001	Tornado		F0		
6/13/2001	Hail		1.75 in.		
7/28/2001	Thunderstorm Wind		61 kts. M	5	
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.			
3/14/2002	Winter Storm				
6/24/2002	Thunderstorm Wind	Thunderstorm winds caused tree damage, including some trees blown down. The winds also damaged signs, fences and roofs, and blew many loose items around.	69 kts. E	500	
8/6/2002	Hail		1.75 in.	100	
8/6/2002	Thunderstorm Wind		61 kts. E		
8/8/2002	Lightning	Lightning struck the corner of a house, blowing a hole in the siding of the attic's exterior wall, smashing a hole in the ceiling, destroying many appliances.		20	
8/8/2002	Flash Flood				
6/11/2003	Hail		1.75 in.		
6/24/2003	Thunderstorm Wind		65 kts. E		
11/22/2003	Winter Storm				
3/15/2004	Heavy Snow				

Date	Event Type	Event Description	Mag	Prop Damage ($1,000s)	Crop Damage ($1,000s)
8/1/2004	Thunderstorm Wind		61 kts. E		
8/2/2004	Hail		1.75 in.		
8/23/2004	Lightning	Lightning struck a grain elevator at Cedar Grove Colony, blowing out the sides and bottom of the elevator. The lightning also overloaded a transformer and damaged the electrical system at the mill, resulting in a small fire at a fertilizer storage bin.		20	
1/4/2005	Heavy Snow				
3/17/2005	Heavy Snow				
6/7/2005	Thunderstorm Wind		61 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	
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		
12/29/2006	Winter Storm	Freezing rain was followed by 3 to 6 inches of snow. The freezing rain caused significant icing of roads, with travel greatly slowed, and several vehicles sliding into ditches.			
3/1/2007	Blizzard				
4/21/2007	Hail		2.75 in.		
5/5/2007	Hail		1.25 in.		
5/5/2007	Tornado	A tornado destroyed a calf shelter, blew doen trees, and tore shingles off the roof of a house.	EF1		
5/5/2007	Flash Flood				
6/21/2007	Hail	Very large hail covered the ground in a few places. The hail broke windshields on and dented several vehicles, damaged the roofs, siding, and windows of homes and other buildings. The damage was scattered in nature due to the lightly populated area over which the hail fell. The hail also caused crop damage. Some crops	3.50 in.		

Date	Event Type	Event Description	Mag	Prop Damage ($1,000s)	Crop Damage ($1,000s)
		along a half mile wide strip were heavily damaged, although some of the hail fell over rangeland which did not suffer much damage.			
8/3/2007	Flash Flood				
8/6/2007	Flash Flood				
8/13/2007	Hail		1.50 in.		
3/31/2008	Heavy Snow				
4/10/2008	Blizzard				
6/5/2008	Flash Flood				
8/14/2008	Hail		1.50 in.		
11/6/2008	Blizzard				
12/14/2008	Blizzard				
3/30/2009	Blizzard	Snowfall of 8 to 13 inches, accompanied by northerly winds gusting over 45 mph, produced blizzard conditions that brought travel and commerce to a standstill. Numerous businesses, schools, and roads were closed, including Interstate 90; and many roads not officially closed were impassable. A report of 13 inches of snow was received from 8 miles south of Chamberlain.			
4/4/2009	Blizzard				
9/2/2009	Tornado		EF0		
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				
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.			
5/24/2010	Hail		1.75 in.		
6/14/2010	Flood				
7/1/2010	Flood				
7/6/2010	Hail		2.75 in.	10	
7/6/2010	Tornado		EF0		
7/6/2010	Tornado		EF0		
7/6/2010	Tornado		EF0		
7/10/2010	Hail		1.75 in.		
7/23/2010	Hail		1.75 in.		
7/23/2010	Thunderstorm Wind		70 kts. E		
7/23/2010	Tornado		EF0		
8/1/2010	Flood				
9/1/2010	Flood				
9/22/2010	Hail		1.75 in.		
12/31/2010	Blizzard	Snowfall of 6 to 10 inches and winds gusting to over 40 mph produced widespread blizzard conditions. Roads were closed and			

Date	Event Type	Event Description	Mag	Prop Damage ($1,000s)	Crop Damage ($1,000s)
		many businesses were forced to close as travel became difficult to impossible.			
1/1/2011	Blizzard				
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	Heavy Snow				
4/15/2011	Heavy Snow				
5/20/2011	Flood	Flooding along the Missouri River developed and then increased in late May as runoff from excessive upstream snowmelt and rain reached the area. Lowlands flooded included camping and other recreational facilities, as well as some roads.			
6/1/2011	Flood	Flooding from upstream spring snowmelt and subsequent heavy rain continued to worsen for most of June. Lowlands along the river including several roads and recreational areas were flooded. The highest stage at Chamberlain was a record 9.6 feet above flood stage at the end of the month.			
6/20/2011	Flash Flood	Very heavy rain falling on saturated ground caused flooding of roads, including South Dakota Highway 45, where flooding deposited logs and large branches.			
7/1/2011	Flood	Flooding from upstream spring snowmelt and subsequent heavy rain continued at major to record levels through July. Lowlands along the river including several roads and recreational areas remained flooded. The river began a very slow general fall late in the month. The highest stage at Chamberlain was a record 10.1 feet above flood stage on July 8th.			
7/15/2011	Extreme heat	An extended period of excessive heat produced daytime temperatures reaching the 90s and dew points in the 70s to lower 80s, with heat indices often reaching or exceeding 115 degrees. Nighttime temperatures often in the mid 70s to lower 80s with continued high humidity provided little if any relief. The heat and humidity caused prolonged stress on people and livestock. At least 10 livestock deaths were reported in the county.			
8/1/2011	Flood	Major impacts from Missouri River flooding continued into August, with flooding varying from minor to major, and evacuated areas remaining evacuated. Water levels receded very slowly during the month, and effects of the flooding slowly began to abate, but in many places the extent of damage to homes, businesses, and lowlands was beginning to become evident. The highest stage at Chamberlain was 5.5 feet above flood stage on August 1st.			
8/5/2011	Thunderstorm Wind		61 kts. E	25	
5/5/2012	Hail		1.75 in.	20	
6/13/2012	Hail		3.00 in.		
6/26/2012	Extreme 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	Extreme heat				
7/15/2012	Extreme heat				
7/18/2012	Extreme 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,			

Date	Event Type	Event Description	Mag	Prop Damage ($1,000s)	Crop Damage ($1,000s)
		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.			
8/1/2012	Extreme heat				
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				
11/1/2012	Drought				
12/1/2012	Drought	Drought conditions continued over all of southeast South Dakota in December. The effects of the drought on farmers and ranchers continued. Hunting was also affected, with low pheasant numbers, and disease in the deer population.			
12/9/2012	Blizzard				
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.			
3/1/2013	Drought				
4/1/2013	Drought				
4/9/2013	Winter Storm	An extended period of precipitation began with freezing rain and freezing drizzle producing light ice accumulations, then changing to sleet and then snow, with sleet and snow accumulations reaching 10 inches near Chamberlain. The winter precipitation made travel very difficult, resulting in schools and businesses being forced to close.			
5/1/2013	Drought				
5/27/2013	Thunderstorm Wind		61 kts. M		
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.			
6/16/2014	Hail		1.50 in.		
8/2/2014	Hail		1.25 in.		
12/15/2014	Winter Storm				
6/20/2015	Thunderstorm Wind	Thunderstorm winds severely damaged a large greenhouse. The winds also blew down several large trees.	61 kts. EG	700	
6/22/2015	Thunderstorm Wind		63 kts. MG		
7/1/2015	Hail		1.00 in.		
7/2/2015	Hail		1.50 in.		
7/27/2015	Thunderstorm Wind		60 kts. MG		

Date	Event Type	Event Description	Mag	Prop Damage ($1,000s)	Crop Damage ($1,000s)
11/30/2015	Winter Storm				
12/15/2015	Heavy Snow				
12/25/2015	Winter Storm				
2/19/2016	High Wind		62 kts. MG		
5/22/2016	Hail		1.00 in.		
5/25/2016	Hail		1.00 in.		
6/10/2016	Extreme heat				
7/6/2016	Hail		1.50 in.		
7/19/2016	Extreme heat				
11/17/2016	Winter Storm				
12/17/2016	Extreme cold				
1/24/2017	Winter Storm				
6/13/2017	Hail		1.25 in.		
8/21/2017	Hail		1.50 in.		
8/25/2017	Hail		1.50 in.		
9/19/2017	Hail		1.00 in.		
12/26/2017	Extreme cold				
12/31/2017	Extreme Cold	Record low high temperature of -8 in Chamberlain.			
1/15/2018	Extreme cold				
2/10/2018	Extreme cold				
3/5/2018	Blizzard				
4/2/2018	Winter Storm				
4/13/2018	Blizzard	Life threatening conditions developed, as a mix of rain, sleet and snow changed to all snow. Winds gusting up to 60 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. I-90 was closed from Chamberlain to Sioux Falls for two days. Total snowfall of 14 inches was measured at Chamberlain.			
6/27/2018	Hail		1.00 in.		
7/3/2018	Extreme heat				
7/8/2018	Extreme heat				
7/11/2018	Extreme heat				
7/18/2018	Flash Flood				
1/1/2019	Extreme Cold				
3/3/2019	Extreme Cold				
3/14/2019	Blizzard				
3/28/2019	Flood	A historic flooding event unfolded as heavy rainfall with a late winter storm drenched the area on March 13-14, 2019. With 1 to 3 inches of snow water equivalent still in the snow pack south of Interstate 90 and 3 to 6 inches of snow water equivalent north of Interstate 90, gradually warming temperatures, and the frozen impervious ground, runoff into the controlled Missouri River			

Date	Event Type	Event Description	Mag	Prop Damage ($1,000s)	Crop Damage ($1,000s)
		resulted in crests late in the month. The Missouri River at Chamberlain reached the fifth highest stage on record cresting 2.36 feet above flood stage on March 31.			
4/1/2019	Flood				
4/11/2019	Blizzard				
5/24/2019	Flood				
6/1/2019	Flood				
6/28/2019	Heat				
6/29/2019	Extreme Heat				
7/11/2019	Flood				
8/2/2019	Flood			5	
8/6/2019	Hail		2.00 in.		
8/16/2019	Hail		1.00 in.		
8/17/2019	Hail		1.75 in.		
9/12/2019	Flood	Heavy rain caused flooding in the area. Red Lake expanded and flooded cattle feedlots, which ontributed to an outbreak of Avian Botulism due to the contaminated water. Flooding resulted in crop losses and damage to public infrastructure including county and township roads, culverts, and some bridges.		224	27
11/29/2019	Winter Storm				
12/1/2019	Winter Storm				
12/28/2019	Blizzard	Mixed precipitation resulted in a minor glaze of ice accumulation, then heavy snowfall (8 inches at Chamberlain) and high wind resulted in white out conditions. I-90 was closed in Brule County for almost two days. Snow drifts to several feet were common.			
1/17/2020	Blizzard	Wind and snow reduced visibility, with travel not recommended. Snowfall reached 2.7 inches 8 miles near Chamberlain.			
4/11/2020	Winter Storm				
6/20/2020	Hail		1.75 in.		100
6/25/2020	Hail		1.00 in.		
7/6/2020	Hail		1.00 in.		10
8/30/2020	Hail		1.25 in.		
12/23/2020	Blizzard				
1/14/2021	High Wind		63 kts. MG		
2/14/2021	Extreme cold				
3/14/2021	Winter Storm				
6/1/2021	Drought				2,750
7/1/2021	Drought				1,090
7/5/2021	Hail		1.00 in.		7
8/1/2021	Drought				353
9/1/2021	Drought				159
10/1/2021	Drought				250

Date	Event Type	Event Description	Mag	Prop Damage ($1,000s)	Crop Damage ($1,000s)
10/9/2021	Hail		1.25 in.		
11/1/2021	Drought				
12/1/2021	Drought				
12/10/2021	Winter Storm				
12/31/2021	Cold/wind Chill				
1/1/2022	Cold/wind Chill				
1/6/2022	Extreme cold				
2/22/2022	Cold/wind Chill				
4/1/2022	Drought				
4/22/2022	Hail		2.50 in.		
5/1/2022	Drought				
8/2/2022	Thunderstorm Wind		61 kts. EG		120
8/5/2022	Excessive Heat				
9/13/2022	Drought				
10/1/2022	Drought				
11/1/2022	Drought				
12/1/2022	Drought				
12/8/2022	Winter Storm				
12/14/2022	Blizzard				
12/21/2022	Blizzard/Extreme Cold				
1/1/2023	Drought				
1/2/2023	Winter Storm				
2/1/2023	Drought				
2/21/2023	Blizzard				
2/23/2023	Cold/wind Chill				
6/13/2023	Drought				
7/1/2023	Drought				8,250
7/25/2023	Excessive Heat				
8/21/2023	Excessive Heat				
9/2/2023	Heat				
12/25/2023	Blizzard				
1/12/2024	Extreme cold				
1/20/2024	Cold/wind Chill				
3/24/2024	Winter Storm				
6/20/2024	Flood			259	
8/2/2024	Heat				
8/25/2024	Heat				

Date	Event Type	Event Description	Mag	Prop Damage ($1,000s)	Crop Damage ($1,000s)
10/29/2024	Drought				
11/1/2024	Drought				

Source: National Climatic Data Center Storm Events Database (www.ncdc.noaa.gov/stormevents)

Crop Loss

As described in **Chapter III**, farmers typically protect themselves from the impacts of adverse weather by insuring their crops against losses through multi-peril crop insurance, which is underwritten by the Risk Management Agency. The tables on the next few pages provide data on indemnity payouts to Brule County farmers for crop loss due to natural hazard events from 2000 through 2023.

Table C.3 shows indemnity payouts due to winter weather events. During the 2000 – 2023 period of analysis, winter weather-related payouts represented approximately 7% of all indemnity payouts in Brule County.

Table C.3 – Crop Loss Due to Winter Weather

Year	Frost	Freeze	Cold Winter	Cold Wet Weather
2000	$3,267		$56,162	
2001		$3,392	$2,344,566	$27,999
2002	$3,782	$60,704	$56,228	$24,696
2003		$13,433	$27,529	
2004	$634	$24,685	$34,073	$1,049
2005	$6,467			
2006	$5,924		$12,663	
2007	$2,439	$3,806	$209,426	
2008			$22,647	
2009	$374	$30,046	$1,119,663	$69,509
2010		$8,726	$2,085	$41,721
2011			$144,378	$42,565
2012	$31,583	$12,418	$1,267	
2013			$1,639,668	$29,636
2014	$2,174	$10,696	$1,467,977	$192,227
2015	$37,476	$21,694	$2,560,410	
2016				
2017		$33,056	$182,761	$103,782
2018			$51,286	$1,168
2019			$13,277	$248,631
2020				$48,410
2021			$12,934	
2022		$63,492	$72,242	
2023			$558,619	$1,982
Ave Payout =	**$3,922**	**$11,923**	**$441,244**	**$34,724**

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

Table C.4 shows indemnity payouts due to severe summer weather. During the 2000 – 2023 period of analysis, summer storm-related payouts represented approximately 6% of all indemnity payouts in Brule County.

Table C.4 – Crop Loss Due to Severe Summer Weather

Year	Hail	High Wind
2000	$102,114	
2001		$1,570
2002	$12,891	$4,881
2003	$12,019	
2004	$6,622	$1,783
2005	$187	
2006		$10,556
2007	$220,163	$25,514
2008	$34,146	$11,855
2009	$205,381	
2010	$725,443	$21,831
2011	$64,483	$2,882
2012	$642,371	$34,498
2013	$43,029	$119,767
2014	$80,699	
2015	$407,045	$13,019
2016	$1,495	$13,837
2017	$5,695,298	
2018	$667,067	$11,594
2019	$508,293	$12,537
2020	$229,480	$9,713
2021	$2,164	$58,138
2022		$165,312
2023	$269,811	$82,105
Ave Payout =	**$413,758**	**$25,058**

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

Table C.5 shows indemnity payouts due to flooding and excess moisture. During the 2000 – 2023 period of analysis, flood-related payouts represented approximately 17% of all indemnity payouts in Brule County.

Table C.5 – Crop Loss Due to Flooding and Excess Moisture

Year	Flooding	Excess Moisture
2000		$197,161
2001		$818,969
2002		$49,339
2003		$7,614
2004		$29,392
2005		$228,070
2006		$640
2007		$282,509
2008	$13,162	$1,762,219
2009		$434,551
2010	$3,149	$3,722,427
2011	$1,072	$1,915,019
2012		$432,771
2013		$166,659
2014		$10,066
2015		$79,670
2016		$738,440
2017		$43,045
2018		$150,435
2019		$11,189,744
2020		$6,130,396
2021	$986	$356,448
2022		$353,542
2023	$53,559	$8,780
Ave Payout =	**$2,997**	**$1,212,829**

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

Table C.6 shows indemnity payouts due to drought and heat. During the 2000 – 2023 period of analysis, drought-related payouts accounted for approximately 64% of all indemnity payouts in Brule County, far more than any other type of hazard [12].

Table C.6 – Crop Loss Due to Drought and Heat

Year	Drought	Heat
2000	$3,372,130	$1,991
2001	$1,213,483	$1,367
2002	$10,078,857	$138,687
2003	$5,058,523	$82,599
2004	$3,867,316	
2005	$2,016,833	$385,717
2006	$11,900,524	$28,891
2007	$267,196	$61,561
2008	$16,492	
2009	$47,794	
2010		
2011	$9,528	$45,157
2012	$12,247,681	$351,159
2013	$4,766,978	$8,099
2014	$2,137,749	$8,147
2015	$1,347,694	$50,172
2016	$2,174,280	$4,112
2017	$11,357,550	$164,696
2018	$179,982	$3,197
2019		
2020	$77,061	$9,258
2021	$6,887,861	$306,780
2022	$18,306,880	$646,556
2023	$9,418,395	$218,180
Ave Payout =	**$4,447,949**	**$104,847**

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

[12] Drought is the costliest natural hazard statewide for South Dakota farmers. From 2000 through 2017, drought payouts accounted for approximately 50% of all indemnity payouts in the state.

APPENDIX D: References

PRINT REFERENCES

- Brule County Comprehensive Plan. Planning & Development District III. 2020.
- Brule County Highway Plan. Brule County Highway Department. 2025.
- Brule County Storm Water Evaluation. Brosz Engineering. 2023.
- City of Chamberlain Comprehensive Plan. Planning & Development District III. 1997.
- Chamberlain Capital Improvements Plan. Planning & Development District III. 2026.
- Chamberlain Water Treatment, Water Main, & Sanitary Sewer Improvements Facilities Plan. SEH Engineering. 2022.
- City of Kimball Comprehensive Plan. Planning & Development District III. 2007.
- Pukwana Electric System Mapping and Burial Analysis. DGR Engineering. 2019.
- Central Electric Cooperative Construction Work Plan 2023-2026.
- Wanalain Dam Emergency Preparedness Plan. South Dakota Office of School and Public Lands. 1992.
- Evaluation of Spillway Repairs at Lake Wanalain. SPN & Associates. 2008.
- Emergency Action Plan, Big Bend Dam, Fort Thompson, South Dakota. U.S. Army Corps of Engineers, Omaha District. 2010.
- Big Bend Dam Inundation Study. U.S. Army Corps of Engineers, Omaha District. Jan 2015.
- Flood Repairs at Missouri River Mainstem Dam Projects & Bank Stabilization along the Missouri River. U.S. Army Corps of Engineers. Sept 2013.
- Comprehensive Economic Development Strategy. Planning & Development District III. 2024.
- NorthWestern Energy Wildfire Mitigation Plan. 2025.
- 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. May 2023.
- Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards. FEMA. January 2013.
- State of South Dakota Hazard Mitigation Plan. South Dakota Office of Emergency Management/Wood Environment & Infrastructure Solutions. 2019.
- State of South Dakota Enhanced Hazard Mitigation Plan. South Dakota Office of Emergency Management. 2024.
- 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: data.census.gov/cedsci/profile
- Building permit data: socds.huduser.gov/permits/
- Land cover information: www.mrlc.gov/index.php
- Historical climate data: www.weather.gov/wrh/climate
- Climate projections: headwaterseconomics.org/tools/neighborhoods-at-risk/tool-about/
- 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
- Tornado frequency: hazards.fema.gov/nri/tornado
- 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 risk: wildfirerisk.org/explore/
- Wildfire risk: 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/
- Resilience: experience.arcgis.com/experience/0a317e8998534c30a9b2d3861c814d42/
- Building code adoption status: stantec.maps.arcgis.com/apps/MapSeries/index.html?appid=a053ac48343c4217ab4184bc8759c350
- Social vulnerability: data.cdc.gov/Vaccinations/Social-Vulnerability-Index/ypqf-r5qs