GREGORY COUNTY, SOUTH DAKOTA

HAZARD MITIGATION PLAN

NOVEMBER 2020

Prepared by:

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CHAPTER I
PLANNING PROCESS

Background

This plan is an update of the Gregory County Pre-Disaster Mitigation Plan, which was approved by FEMA in November 2015. The purpose of the plan is to prevent or reduce losses to people and property that may result from future hazard events in Gregory 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 Gregory County in its efforts to mitigate against future disaster events.

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

- Gregory County
- City of Bonesteel
- City of Burke
- City of Gregory

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

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

Figure 1.1 – County Location

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

Development of Planning Team

The initial planning stages for this plan update began in 2019 when an application was submitted to FEMA for Hazard Mitigation Grant Program (HMGP) funds to help pay for the update. The HMGP funds were awarded to the County in June 2020. Following this, John Clem and the Gregory County Emergency Management Director began to develop the methodology and strategy to be used to update the plan.

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

- Gregory County (county commissioners, auditor, planning/zoning officials, floodplain administrator, GIS staff, director of equalization, highway superintendent, etc.).
- Municipalities (city council members, finance officer, public works staff, etc.).
- Other entities, including rural utility providers, the health care sector, and the U.S. Army Corps of Engineers.

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

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

Table 1.1 lists the planning team members, including their attendance at the planning meetings that were held as the plan was being developed. 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	Meeting Attendance	
			Mtg 1 09/23/20	Mtg 2 11/12/20
John Clem	Planning District III	Plan Author	X	X
Brad Christensen	Gregory County	Emergency Management Dir	X	X
Myron Johnson	Gregory County	Commissioner	X	
Jeff Johnson	Gregory County	Commissioner	X	
Julie Bartling	Gregory County	Auditor	X	X
Brad Ellwanger	Gregory County	Highway Superintendent	X	
Tammy Thompson	Gregory County	Highway Department	X	
Cody Spann	City of Bonesteel	Finance Officer	X	X
Thomas Glover	City of Burke	Mayor	X	
Vickie Dobesh	City of Burke	City Council	X	
Mike Glover	City of Burke	Finance Officer	X	X
Wade Broom	City of Burke	Public Works Director	X	
Al Cerny	City of Gregory	Finance Officer	X	X
Dick Warnke	Rosebud Electric Cooperative	Manager	X	

Outreach Effort

Throughout the plan's development, efforts were made to obtain involvement in the plan beyond just the planning team. Emails were distributed, a message was posted on the Gregory County website, and social media also was used to inform the public. Outreach also was made to emergency management directors in nearby counties, as well as the South Dakota Office of Emergency Management. At the end of the process, the plan was posted on the Gregory County website for the public to view. See **Appendix A** for documentation of the public outreach effort.

Planning Meetings

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

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

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

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

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

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

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

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

Jurisdictional Meetings – Develop Mitigation Strategy

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

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

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

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

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

Planning Team Meeting 2 – Plan Review and Plan Implementation

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

After the meeting, some additional information was added to the plan based on discussion at the meeting, and the plan was posted on the Gregory County website. After a short review period, the plan was submitted to the South Dakota Office of Emergency Management.

Acknowledgements

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

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

CHAPTER II
COMMUNITY PROFILE

Background

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

General Description

Gregory County is located in south-central South Dakota, as shown in **Figure 1.1**. The county covers approximately 1,045 square miles in area, and its population according to the 2010 Census was 4,271. There are six incorporated municipalities located within the county - Bonesteel (pop 275), Burke (pop 604), Dallas (pop 120), Fairfax (pop 115), Gregory (pop 1,295), and Herrick (pop 105). The county seat is located in Burke. Unincorporated communities within the county include St Charles (pop 19) and Lucas. **Figure 2.1** shows the county's communities and highway network.

There are also several recreational areas in the county that include a mix of public and private campgrounds. Many of these recreation areas are located along the Missouri River, as shown in **Figure 2.1**.

Physical Characteristics

Gregory County is very lightly settled, with most of the land devoted to grazing or the raising of such crops as corn, wheat, sunflowers, and sorghum. The landscape is quite open, and the terrain is uneven, especially along the Missouri River, which forms the county's eastern border. Many buttes rise prominently from the landscape. Other than the Missouri River, there are no prominent bodies of water in the county.

Figure 2.1 – Political Map

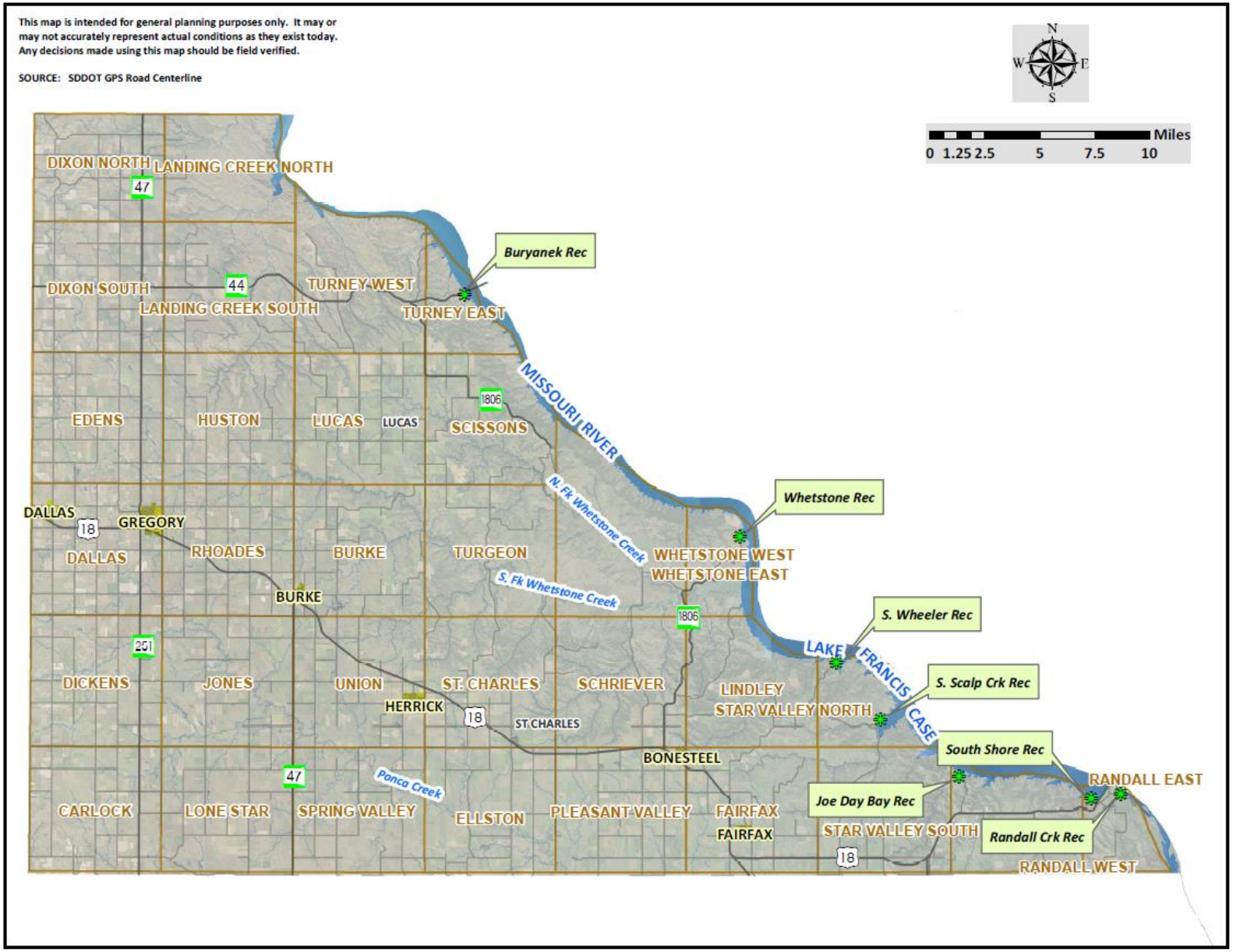


Table 2.1 provides a breakdown of the land cover in Gregory County. The table is based off satellite imagery from the United States Geological Service's National Land Cover Database, processed using ArcGIS computer mapping software. As the table shows, most of the county's land is grassland/herbaceous land; developed land makes up only a very small fraction of the land area. **Figure 2.2** is a graphic representation of the county's land cover.

Table 2.1 - Vegetative Land Cover

Cover Type	Square Miles	% of Total Area
Grassland/Herbaceous land	602.7	57.7
Cultivated crops	224.1	21.4
Forested land	86.9	8.3
Open water	42.1	4.0
Pasture land	35.0	3.3
Developed land (open space)	30.4	2.9
Wetlands	21.5	2.1
Developed land (low to high intensity)	2.6	0.1
Barren land, Shrub/Scrub	0.1	0.1
TOTAL AREA	**1,045.4**	

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

In general, most soil in the county is not particularly fertile, and the low amount of rainfall the county normally receives limits agriculturally production. Drainage is generally good, but there are many wetlands in the county, some of which are now used as waterfowl or wildlife production areas, while others have been drained for farming.

As in most of South Dakota, the climate of Gregory County is characterized as sub-humid and continental, with summers that are often very hot and winters that are very cold. There are no large bodies of water or mountain ranges to mitigate against these extremes. High temperatures in summer can exceed 100 degrees Fahrenheit [2], while winter lows can drop below -20 degrees. Precipitation averages about 23 inches per year, but during drought years the amount can be much less. Most of the precipitation occurs during the spring and early summer; winter snow is not frequent, but snow cover on the ground is fairly constant during many winters. Blizzards and other types of winter storms are a definite hazard. Following is climate data in the county as reported from the Gregory weather station.

Table 2.2 - Monthly Climate Conditions in Gregory County (1906 – 2013)

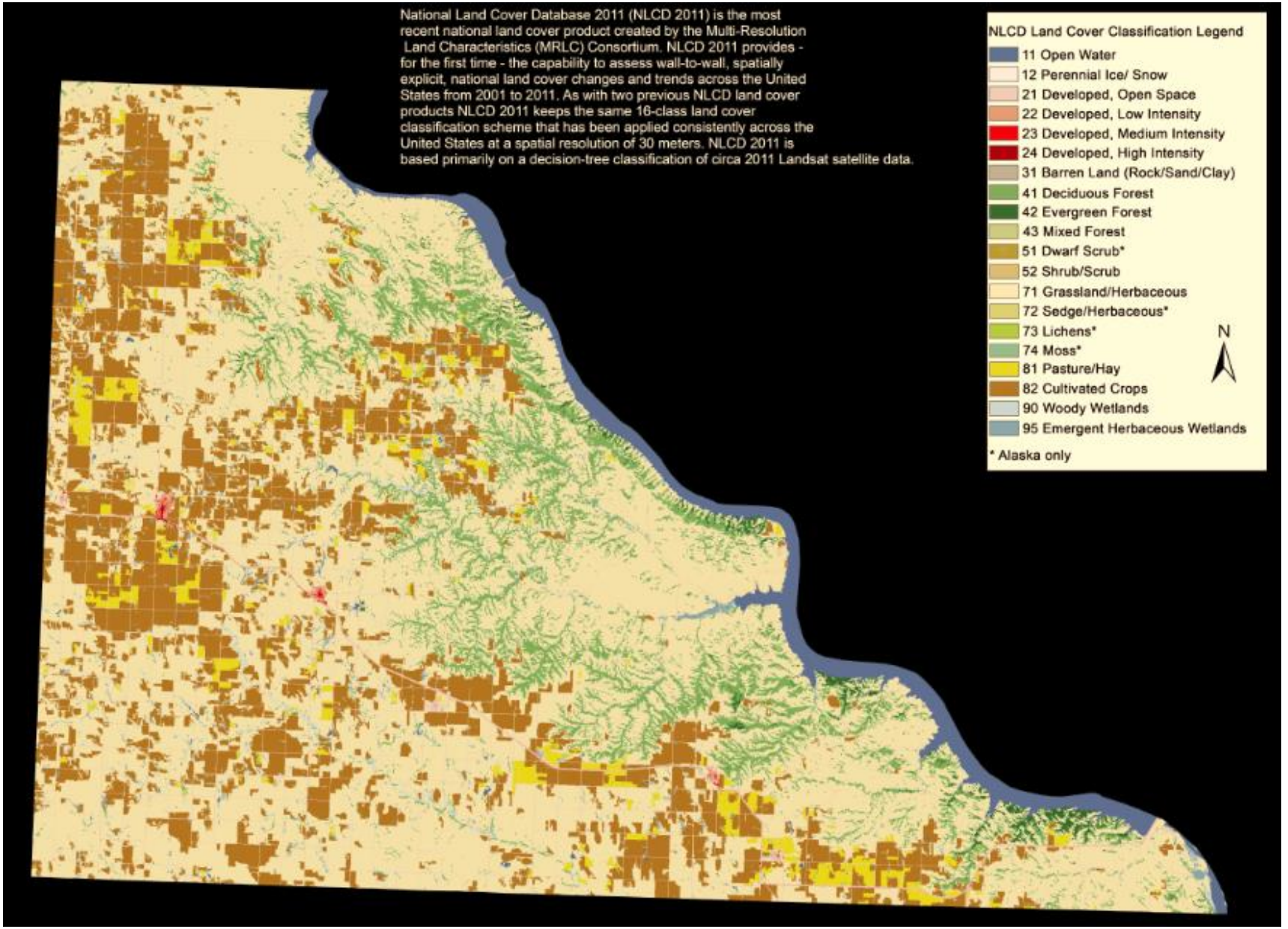
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Ave High	32.2	36.9	46.8	60.7	71.8	81.5	89.2	87.6	78.2	65.7	48.0	36.1	61.2
Ave Low	8.9	12.8	22.3	34.1	44.9	55.3	61.2	59.2	49.0	36.9	23.5	13.6	35.1
Ave Precipitation	0.5	0.7	1.5	2.7	3.4	4.0	2.7	2.4	2.1	1.7	0.9	0.6	23.3
Ave Snowfall	6.2	7.3	8.7	3.6	0.2	0.0	0.0	0.0	0.2	1.4	5.1	6.0	38.7
Ave Snow Depth	2	2	1	0	0	0	0	0	0	0	0	1	0.5

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

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

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

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

Socioeconomic Description

Gregory County is very sparsely populated. The county had a Census 2010 population of 4,271, and a population density of only 4.1 people per square mile. In comparison, the State of South Dakota, which is one of the least densely populated states in the nation, has a population density of about 10.5 people per square mile, and the national figure is 89.5. In addition to being sparsely populated, Gregory County has experienced a steady population decline during the last several decades, as **Table 2.3** shows. The county has declined in population by 50% since 1950, and further decrease is expected.

Table 2.3 – Gregory County Population Change

Pop 1950	Pop 1960	Pop 1970	Pop 1980	Pop 1990	Pop 2000	Pop 2010	Pop 2017 Estimate	Pop 2030 Projected
8,556	7,399	6,710	6,015	5,359	4,792	4,271	4,209	3,522

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

Table 2.4 provides basic demographic information for the county. The table shows that a relatively high percentage of the county's population is composed of whites, as compared to South Dakota and the rest of the nation. However, there is a significant Native American presence in Gregory County, many of whom live on Rosebud Sioux tribal trust land, which is scattered throughout the county in small parcels. The table also shows that the county's population is relatively old; in fact, the median age of the population is more than ten years higher than the national figure. This is a clear indication that many of the young people are

leaving the county to look for jobs and opportunities elsewhere, and also that the current declining population trend is likely to continue for the foreseeable future.

Table 2.4 - Racial and Age Characteristics (2010)

Entity	White Population	Black Population	American Indian Population	Asian Population	Other Racial Group	Population Under 20	Population 65 and Over	Median Age
Gregory Co.	89.6%	0.1%	7.7%	0.2%	2.4%	23.2%	24.1%	48.4
South Dakota	85.3%	1.5%	8.8%	1.1%	3.3%	27.6%	14.6%	36.8
United States	73.9%	12.6%	0.8%	5.0%	7.7%	26.3%	13.7%	37.4

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

Gregory County's economy is dependent to a large extent upon agriculture. Industry and manufacturing are not a significant part of the local economy. In part because of the lack of high wage occupations, income levels in the county are well below state figures, as shown in **Table 2.5**.

Table 2.5 - Socioeconomic Characteristics (2010)

Entity	Median Family Income	Family Poverty Rate	High School Grad or Higher	Bachelor's Degree or Higher
Gregory Co.	$45,109	12.3%	86.2%	15.8%
South Dakota	$62,967	8.7%	90.1%	26.0%
United States	$64,585	10.9%	85.7%	28.5%

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

Infrastructure and Utilities

Transportation

Gregory County's main transportation route is U.S. Highway 18, which connects all the municipalities in the county. Other important highways include SD Hwy 47, which runs north-south, and SD Hwy 44, which runs east-west. There is no railroad line in the county, and the only airport is a very small municipal airport in Gregory that is busiest during the fall hunting season.

Utilities

Water service is provided to most county residents by the Tripp County Water User District (TCWUD), which gets its water from wells located south of Winner, in neighboring Tripp County. The City of Gregory operates its own water system, although TCWUD can provide water to the city in emergency situations. Each municipality has its own wastewater collection and treatment system. Rural residences use individual septic tanks and drainfields.

Solid waste service is provided by the Southern Missouri Recycling and Waste Management District, which operates a landfill located near Lake Andes in Charles Mix County. Most of the

household waste generated within Gregory County ends up at the landfill. Designated rubble sites are located outside Bonesteel, Dallas, Fairfax, and Gregory.

Electric power is provided to most county residents by the Rosebud Electric Cooperative. The City of Burke operates its own municipal system, although Rosebud Electric provides maintenance. Natural gas service is not available anywhere within the county. The primary telecommunications provider serving the county is Golden West Communications. Cellular phone service is available throughout the county, but there are still some areas where signals are weak.

Services

Medical Services

The primary medical facilities in Gregory County are the Burke Community Memorial Hospital and the Avera-Gregory Health Care Center, both of which are considered critical access care facilities. The Burke hospital has 16 beds and the Gregory hospital has 25 beds. People needing serious medical attention can be transported to trauma center hospitals in Sioux Falls or elsewhere

Fire and Emergency Response

Several fire departments are based in Gregory County. Each department has basic firefighting and rescue equipment, and they all respond to structural fires, wildland fires, and to accident situations. Some of the departments have some capabilities regarding hazardous material (hazmat) response, but a serious incident likely would require assistance from outside the county. See **Table 3.5** for more information about the departments.

Education

In Gregory County, schools are located in Bonesteel, Burke, and Gregory. Post-secondary education is not available in the county.

CHAPTER III
RISK ASSESSMENT

Background

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

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

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

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

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

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

Identifying Hazards

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

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

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

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

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

- Geologic Hazards – these hazards, which include earthquakes and landslides, are given a limited level of planning analysis in the South Dakota Hazard Mitigation Plan, but the state is not particularly vulnerable to such events. For example, the plan states that earthquakes have never caused significant damage in South Dakota. A map generated through the U.S. Geological Service Earthquake Hazards Program website indicates that there is only about a two percent chance that a quake of at least magnitude 5 will occur in Gregory County in any 100 year period, and virtually no chance of a magnitude 6 or greater earthquake [3]. The largest earthquake recorded in the county was a 3.8 magnitude quake, which occurred in

[3] 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.

November 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 Gregory County along the Missouri River, but any such event likely would be localized and minor in scale. No landslide has ever caused substantial damage in the county, but minor land shifting occasionally causes problems to roads and other infrastructure in the bluffs along the Missouri River. In 2012, SD Hwy 44 near the Missouri River had to be repaired at a cost of approximately $2 million because of subsidence issues.

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

Hazard Profiles

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

- ***Location*** is the geographic areas within the county that are affected by each of the hazards. Some of the hazards - winter storms, summer storms, and drought - do not have a geographic definition at this level of analysis, since they impact all areas of the county more or less equally. Flooding and wildfires, however, do impact specific areas of the county more than others. The maps presented at the end of this chapter show locations vulnerable to flooding within each city.
- ***Extent*** is the strength or magnitude of the hazard, which is described in a variety of ways depending on the type of hazard. For example, tornado strength is measured on the Fujita Scale, high wind events are measured by speed, fire is measured in terms of acres affected, and certain hazards are measured in terms of the duration of the event.
- A brief section on the ***history*** of each hazard's occurrence in the county is presented, with a description of some of the most significant events. More information about the hazard events that have impacted the county is presented in **Appendix C**, including a comprehensive list of weather-related hazard events

recorded in the county since 1960, and records of hazard events that resulted in a major disaster declaration in the county.

- ***Probability*** of occurrence of a hazard impacting an area is the likelihood that such an event will occur. In this plan, a hazard with a "high" probability is one that is expected to occur at least five times over a ten year period, a "moderate" probability hazard is expected to occur from two to five times in any given ten year period, and a "low" probability hazard would be expected to occur no more than twice per ten year period. Determination as to the probability of hazard events occurring in the future was based largely on an analysis of the frequency of past hazard events in Gregory County and through discussions with members of the planning team.
- Information about the existing ***resources and capabilities*** to mitigate against each hazard is included. This includes plans and regulatory mechanisms, administrative and technical resources, financial resources, and education and outreach.

Winter Storm

Description

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

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

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

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

Location

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

Extent

Winter storms in South Dakota can pack quite a punch. The extent of such storms can be measured in many ways. In terms of snowfall, many winter storms in Gregory County have dropped several inches or more of snow. In terms of duration, some winter storms in the county have resulted in power outages of over a week in some locations, although typical outages last for no more than a few hours. Regarding wind speed, **Table C.2** in **Appendix C** shows numerous records of high wind events occurring during the winter months with wind speeds in excess of 50 miles an hour.

History

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

One of the most serious winter storms to occur in the state happened between October 22 and 24, 1995, resulting in FEMA Disaster Declaration 1075, which was declared in January 1996. As the storm moved eastward across South Dakota, ice and five to 15 inches of wet snow formed on electric lines, poles, and trees. Winds associated with the storm caused lines to slap together and poles to snap, producing widespread power outages to large portions of rural South Dakota, including Gregory 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.

Another very serious winter storm to impact Gregory County occurred in late November 2005 when heavy freezing rain coated roads and power lines with ice up to three inches thick throughout much of southeast South Dakota. The storm resulted in FEMA Disaster Declaration 1620. In the affected area, a total of 9,400 power poles were damaged, leaving approximately 56,000 people without electricity for varying amounts of time. The impact of the storm was much worse in areas east of Gregory County, but the Rosebud Electric Cooperative did suffer about $29,000 of damage to its infrastructure within the county.

Probability

Table C.2 shows numerous records of significant winter storm events in Gregory County since the mid-1990s, an average of over five per year. Therefore, based on the historic evidence, the probability of a significant winter storm affecting Gregory 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.

Resources and Capabilities

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

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

Table 3.1 – Shelter Facilities

Community	Facility	Capacity	Generator
Bonesteel	Community Room	≈ 50	No
Bonesteel	City Hall	≈ 125	No
Burke	Community center	≈ 100	No
Dallas	Dallas American Legion	≈ 100	No
Fairfax	*(None)*		
Gregory	Gregory Auditorium	≈ 300	No
Herrick	*(None)*		

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

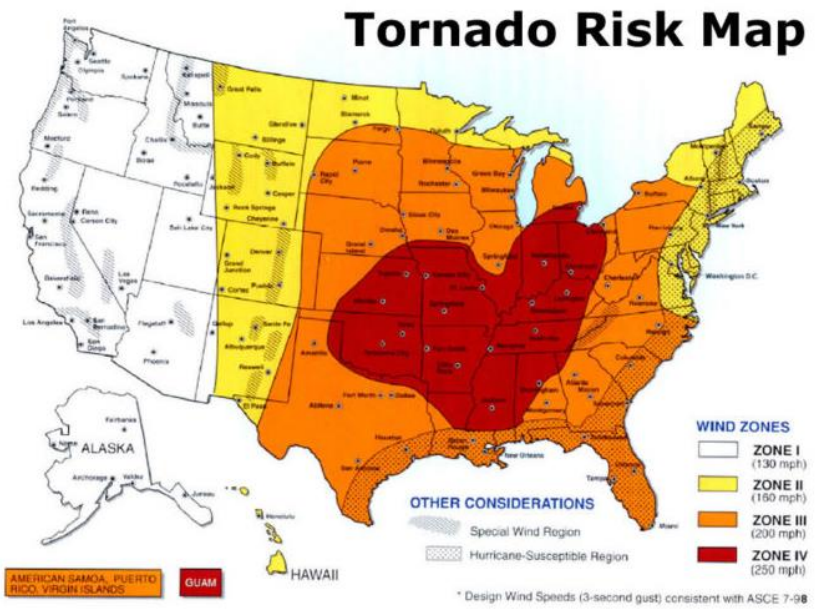
Summer storm

Description

Summer storms can include heavy rainfall, hail, tornadoes, and thunderstorm activity. These events usually are associated with unstable weather conditions. In Gregory 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 Gregory County reports some kind of hail damage to crops or property.

Tornadoes are the most dramatic type of summer storm experienced in Gregory County, and are a special source of concern. They are one of nature's most violent storms, capable of

tremendous destruction with wind speeds of 250 mph or more. Damage paths can be a mile wide and can extend for more than 50 miles. Tornadoes mostly occur in South Dakota during the months of May, June, and July. The greatest period of tornado activity is between 4 PM and 6 PM. Tornadoes present a difficult mitigation challenge, since few structures can withstand the violent winds of a twister.



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

Location

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

Extent

The extent of summer storms can be measured in many ways. In terms of wind speed, **Table C.2** in **Appendix C** shows numerous records of thunderstorms that produced wind speeds over 60 miles per hour, with several resulting in speeds over 80 miles per hour, as well as many high wind events in the summer with wind speeds over 50 miles per hour. **Table C.2** also shows many events with hail over one inch in diameter. In terms of onset, summer storms typically develop with a long warning time, although certain hazards associated with such storms, such as hail or tornadoes, can develop more suddenly.

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

Table 3.2 – Enhanced Fujita Scale

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

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

History

As shown in **Table C.2** in **Appendix C,** Gregory County has experienced many summer storms that have caused significant damage. **Table C.1** In **Appendix C** shows that several of these storms resulted in a major disaster declaration. Notable summer storms include a tornado that struck near Herrick in August 2002, and a tornado that touched down in the heart of Burke in August 2019, severely damaging several structures, including the Gregory County courthouse and the Burke school, and destroying other buildings, including the community center (see front cover photograph).

Probability

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

Regarding tornadoes, **Table C.2** shows 17 days in which a tornado was recorded in Gregory County since 1960, an average of one every three or four years. It is likely that other tornadoes occurred in the county during this period, but were unnoticed or unreported.

Resources and Capabilities

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

- At least one outdoor warning siren is located in each of the municipalities within the county. Each siren is tested regularly, and each can be activated remotely by local officials or from the 911 dispatch center in Winner. There are no sirens at the recreation areas, but rangers are available at the public campgrounds to warn the public of the possibility of adverse weather.
- Gregory County subscribes to the AlertSense alerting system. The emergency management director, fire chiefs in the county, the ambulance director, and law enforcement officers can send messages to all cell phones in the area. They also can send out public notices to groups of individuals that sign up for the service.
- Public facilities in Gregory County that can provide shelter from tornadoes include the basement of the Burke Community Memorial Hospital, and the basement of the Gregory Community Center.
- As described above under the Winter Storm profile section, the Rosebud Electric Cooperative maintains a list of priority projects in its work plan, and the Cooperative is a party to the South Dakota Electric Cooperatives Mutual Aid Plan.
- Weather spotters are in place throughout the county.
- The county participates actively in public awareness campaigns in conjunction with the State Office of Emergency Management and the National Weather Service, as well as sponsoring local awareness activities.

Flooding

Description

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

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

- Flash flooding, which results from several inches or more of rain falling in a very short period of time. This high intensity rainfall is commonly caused by powerful thunderstorms that cover a small geographic area. The flood that occurs as a result of this runoff happens very rapidly, and is generally very destructive, although usually only a small area is affected.
- Long-rain flooding, which results after several days or even weeks of fairly low-intensity rainfall over a widespread area. This is the most common cause of major flooding. The ground becomes "water logged," and the water can no longer infiltrate into the ground. The flooding that results is often widespread, covering hundreds of square miles, and can last for several days or many weeks.

- Flooding resulting from melting snow in the spring. This type has characteristics of both flash floods and long-rain floods. The area covered is generally not as large as that covered by the long-rain flood, but is typically larger than that covered by the flash flood. Generally, the flood lasts for several days, occurring when large amounts of snow melt rapidly due to warm temperatures. The flooding can be made worse if the ground remains frozen while the snow is melting, causing the melt water to run off to nearby rivers and lakes rather than infiltrating into the ground. Some of the largest floods in South Dakota have been the result of melting snow and ice.
- Dam failure, resulting from natural or man-made causes. Gregory County is vulnerable to this type of flood primarily because of the Fort Randall Dam, which impounds the Missouri River near the southeastern tip of the county, the upstream Missouri River dams, and the Ponca Dam, all of which are considered high hazard dams [4].

Location

In the past, the greatest flooding threat in Gregory 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 Fort Randall, was 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. The Fort Randall Dam impounds the Missouri River near the southeastern tip of Gregory County, forming Lake Francis Case (see **Figure 2.1**).

Because of the dams, the threat of flooding from the Missouri River has been greatly reduced, although it has not been entirely 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 Gregory County has rarely been truly significant, and even the Missouri River flooding in 2011 did not cause as much damage to Gregory County as it did to counties on the river's eastern shore. 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.

[4] 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.

History

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

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

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. The event caused over $56,000 of public assistance costs throughout the county, primarily due to flooding of county and township roads.

Flooding in the spring and summer of 2010 was the worst in a decade, resulting in FEMA Disaster Declaration 1915. The event caused over $192,000 of public assistance costs throughout the county, again primarily due to flooding of county and township roads.

The Missouri River flood of 2011 may have been the most notable flooding event ever to occur in the recorded history of South Dakota, resulting in FEMA Disaster Declaration 1984. Although Gregory County did not suffer as much damage as some other counties located along the river, the county definitely was impacted by the event, which is described in **Table C.2** in **Appendix C**.

Flooding in 2019 had a major impact throughout the year in Gregory County, starting in March when heavy rainfall fell on frozen ground, which led to considerable overland flooding. This event resulted in FEMA Disaster Declaration 4440, with over $1 million of public assistance costs in the county. Flooding continued during the summer, and became even more severe when heavy rainfall in September caused additional flooding. Considerable damage to county and township roads occurred due to the flooding of 2019, and agricultural producers also were heavily impacted.

Probability

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

Resources and Capabilities

Gregory County, the City of Burke, the Town of Dallas, and the City of Gregory participate in the National Flood Insurance Program (NFIP). Each entity is in good standing with the program, and each has a flood ordinance designed to reduce flood risk. The following table provides information on NFIP participation in the county.

Table 3.3 – National Flood Insurance Program Information

Jurisdiction	NFIP Participation Status	FIRM Effective Date	Insurance Policies in Force	Amount of Coverage	Number of Claims	Total Claims Paid
Gregory Co	Yes	(NSFHA)	2	$525,000	3	$167,335
Bonesteel	No					
Burke	Yes	(NSFHA)	0	$0	0	$0
Dallas	Yes	(NSFHA)	0	$0	0	$0
Fairfax	No					
Gregory	Yes	(NSFHA)	0	$0	0	$0
Herrick	No					

Sources: www.fema.gov/policy-claim-statistics-flood-insurance; Marc Macy, SD NFIP Coordinator

Following is a description of other local capabilities for mitigating damage from flooding, as well as projects recently undertaken or planned to address flooding.

- Recent drainage improvements have been made in Bonesteel (replacement of culverts in three locations), and are planned in Burke (curb and gutter to be installed along the western end of 8th and 9th Streets). A stormwater drainage study is being developed for the northeast section of the City of Gregory.

- Major repairs were made to the Fort Randall Dam following the 2011 flood. Several contracts were awarded for repairs to the gates, spillway, toe drain, and roadways.
- The U.S. Army Corps of Engineers has an emergency preparedness plan in place for the Fort Randall Dam. The Corps also has jurisdictional control over construction activity below the 1,365 foot elevation mark around Lake Francis Case, which is considered the ordinary high water (OHW) level. Any work below this elevation requires regulatory review and permitting, and in no case would the Corps issue a permit for a habitable structure.
- Inspection and maintenance of dams, culverts, and other drainage structures is performed regularly in the county.

Drought

Description

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

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

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

Location

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

Extent

Drought severity, the most commonly used term for measuring drought, is a combination of the magnitude and duration of the drought. In terms of magnitude, Gregory County has experienced many years of annual precipitation less than two thirds its average amount. In

terms of duration, it is not unusual for Gregory County to experience periods of below normal precipitation that last for several months. During the 1930s, drought conditions persisted for multiple years. In an area that is so highly dependent on agriculture, the impact of a major drought can be significant. Although most agricultural producers now have crop insurance and agricultural practices today are more advanced, the impacts of drought can still be serious.

History

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

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

Probability

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

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

Resources and Capabilities

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

In the agricultural sector, most farmers in Gregory County have crop insurance, which helps lessen the financial impact of drought. Furthermore, modern agricultural practices are more

advanced (such as no-till farming and the development of more drought-tolerant crops), so farmers can better withstand years of below average rainfall.

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

Wildfire

Description

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

Location

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

Extent

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

Table 3.4 – Wildfires in Gregory County (2000 - 2019)

1 to 10 Acres	10 to 49 Acres	50 to 99 Acres	100 to 249 Acres	250 + Acres
72	21	5	6	1

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

According to the database, the most common causes of wildfires in Gregory County are from debris that catches fire and equipment that ignites vegetation. Several fires caused by lightning also are noted. Information is not available on the dollar amount of damage caused by any of the wildfires, or whether any injuries or deaths occurred.

History

Some notable wildfires have occurred in Gregory County, but nothing on a truly destructive scale. The largest fire since 2000 occurred near Gregory in 2014, burning 800 acres. There are two wildfire records for Gregory County in the National Climatic Data Center's Storm Events Database. As shown in **Table C.2**, these events occurred in October 2011 and August 2012, burning 90 acres and 146 acres respectively.

Probability

Wildfires affecting less than ten acres are likely to occur somewhere in Gregory County most years, but large scale wildfires are much less common. **Table 3.4** shows only one wildfire over 250 acres in size between 2000 and 2019. Based on this period of analysis, the probability of a significant wildfire can be considered low. The probability of a wildfire causing serious damage also is low.

Resources and Capabilities

Each fire department based in the county has volunteer firefighters who have had training in fighting wildfires; the level of training varies from basic to advanced. The departments also have adequate equipment and protective gear for their volunteers to handle most of the wildfires they are likely to encounter. Various mutual aid agreements are in place to ensure that assistance is available during serious wildfires and other emergency events, and the County has an agreement through the State of South Dakota for the Black Hills Fire District to assist in the event of a serious wildfire along the Missouri River hills, which has a terrain similar to that found in the Black Hills. A summary of the capabilities of the local fire departments is presented in the following table.

Table 3.5 - Fire Department/Ambulance Service Resources and Capabilities

Department	Members	Number of Vehicles	HazMat Capability
Bonesteel	22	9	No
Burke	31	9	Awareness
Dallas	16	5	No
Fairfax	21	7	No
Gregory	30	11	Awareness

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

- A burn plan is required for landowners wanting to do a controlled burn. The plan must be filed with the sheriff's office or Emergency Management Office, and then the landowner must contact the E-911 dispatch center in Winner prior to the burn.
- The county enforces a ban on open burning when the National Weather Service fire alert reaches the Very High Danger level.
- The Mid Missouri River Prescribed Burn Association, a group formed by ranchers from Gregory County and Brule County, is helping with research projects on the

effects of prescribed fire on eastern red cedars and the land's ability to recover from cedar infestation. By combating the spread of cedar trees within Gregory County, the association is helping to reduce the threat of wildfires.

Community Assets

Hazards can affect all parts of the community, but their impact on certain community assets and facilities is particularly important to consider. This includes assets and facilities that would play a critical role in helping the community prepare for and respond to a hazard event. The section also includes a brief discussion of vulnerable populations in the county.

Government Offices

- Gregory County Courthouse, Burke
- Municipal Finance Offices in each community

Emergency Response

- Gregory County Emergency Management Office, Burke
- Gregory County Sheriff's Office, Burke
- Police departments in Bonesteel, Burke, and Gregory
- Fire departments in Bonesteel, Burke, Dallas, Fairfax, and Gregory
- Gregory County Highway Department, Burke

Medical facilities

- Burke Community Memorial Hospital
- Avera-Gregory Health Care Center

Educational Facilities

- South Central School (Bonesteel) (K-5)
- Burke School (K-12)
- Gregory School (K-12)

Other Important Facilities

- Rosebud Electric Cooperative, Gregory
- U.S. Army Corps of Engineers Fort Randall Dam

Shelters

- Disaster relief shelters are located in most of the municipalities within the county (see page 19). Residents of Fairfax can drive five miles to use shelters in Bonesteel, and Herrick residents can drive seven miles to Burke.

- Public facilities that can provide emergency shelter from a tornado or other severe storm include the Burke Community Memorial Hospital and the Gregory Community Center.

Notification

- Warning sirens are located in each municipality.

Vulnerable Populations

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

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

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

Vulnerability and Loss Potential

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

Potential Loss Methodologies

- There are no designated flood hazard zones anywhere in the county, so FEMA's

HAZUS loss estimation software was used to estimate potential losses from flooding. HAZUS produces a flood polygon and flood-depth grid that represents the 100-year floodplain, with losses calculated using national baseline inventories (buildings and population) at the census block level. The maps generated by HAZUS are not as accurate as FEMA's Flood Insurance Rate Maps, nor is the resulting data, but HAZUS is still a helpful planning tool for communities that have not been mapped by the National Flood Insurance Program [5].

- Data on the population living in wildfire threat zones was used to estimate potential wildfire losses.
- The value of buildings within the county was used to estimate potential losses due to winter storms and summer storms (building exposure).
- Population density within the county was used to estimate potential losses due to winter storms and summer storms.

Actual Loss Methodologies

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

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

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

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

the risk analysis. Following the summary, maps are presented showing the community assets discussed in the previous section, and areas of known risk.

Winter Storms

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

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

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

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

Prior Events:

Table C.2 in **Appendix C** shows that numerous winter storms have occurred in Gregory County, including blizzards, ice storms, heavy snows, and extreme cold events. The authors of the South Dakota Hazard Mitigation Plan found that there were 74 total winter storm events in the National Climatic Data Center's Storm Events Database between January 1993 and August 2016 for Gregory County, ranking the county 26th among the state's counties.

Past Damage Amounts:

Winter storms have the potential to cause significant amounts of damage. In recent years, substantial public assistance costs were recorded for the county and the Rosebud Electric Cooperative's infrastructure located within Gregory County following winter storms in 2005

and 2010, and many other winter weather events have caused significant amounts of damage in the county.

Another method to determine vulnerability is to look at the impact of winter storms on Gregory County's agricultural producers. Farmers typically protect themselves from the impacts of adverse weather and other natural hazards by insuring their crops against losses through multi-peril crop insurance, which is underwritten by the Risk Management Agency, a part of the U.S. Dept of Agriculture. Data on indemnity payouts for crop loss in Gregory County due to various types of winter weather events between 2000 and 2017 was obtained from the Risk Management Agency, and is presented in the following table. During this period of analysis, winter weather-related payouts represented just under 5% of all indemnity payouts in Gregory County.

Table 3.6 – Crop Loss Due to Winter Weather

Year	Frost	Freeze	Cold Winter	Cold Wet Weather
2000	$0	$0	$31,588	$0
2001	$0	$9,855	$345,981	$1,284
2002	$6,442	$0	$13,167	$3,803
2003	$0	$0	$3,229	$331
2004	$18,536	$8,724	$0	$0
2005	$5,805	$13,285	$438	$0
2006	$0	$1,043	$16,696	$0
2007	$4,830	$55,036	$67,775	$6,101
2008	$2,018	$845	$7,427	$1,263
2009	$6,336	$14,404	$429,199	$14,177
2010	$0	$0	$53,750	$5,049
2011	$0	$0	$11,540	$6,356
2012	$13,073	$2,498	$0	$0
2013	$0	$0	$257,797	$1,960
2014	$0	$10,864	$34,942	$27,126
2015	$0	$161	$866,427	$0
2016	$0	$0	$2,416	$9,877
2017	$0	$459	$18,761	$0

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

Building Exposure:

The total value of buildings in Gregory County is approximately $499,638,000, according to the South Dakota Hazard Mitigation Plan, which ranks the county 38th among the state's 66 counties. The median figure for South Dakota counties is approximately $605,000,000. The county's building exposure can be considered moderate.

Population Density:

Gregory County is very sparsely populated, with an average of only 4.1 people per square mile, below the state figure of 10.5 people per square mile, and far below the national figure of 89.5. Gregory County would have to be rated low in terms of population density.

Development Trends

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

Summer Storms

All areas of Gregory County are vulnerable to summer storms, especially those that are accompanied by tornadoes, lightning, or large hail. Typical damage from summer storms includes blown down power lines, crop damage from hail and high wind, and flooding as the result of heavy rain. Like the rest of the Great Plains, Gregory County is especially vulnerable to summer storms accompanied by high wind. This is because the landscape is open and there is little topographic relief to block the wind. Infrastructure and facilities located at higher elevations, such as the bluffs along the Missouri River and the various buttes scattered around the county, may be particularly vulnerable to high wind events.

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

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

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

Prior events:

Table C.2 in Appendix C shows many significant summer storms that have been recorded in Gregory County, including hailstorms, thunderstorms, lightning, and tornadoes. The table shows 21 recorded tornadoes. The authors of the South Dakota Hazard Mitigation Plan assigned a rating of 3 (out of 10 maximum) to Gregory County in terms of the frequency of tornadoes recorded between 1950 and 2016, and assigned a rating of 4 for tornadoes of magnitude F1 or greater.

Past Damage Amounts:

Summer storms have the potential to cause significant amounts of damage, especially when accompanied by tornadoes or hail. Recent events included a summer storm with an F2 tornado that caused over $1,000,000 damage in 2002, and a hailstorm that resulted in over $2,000,000 of property damage in 2009. These and many other summer storm events that have caused significant property and/or crop damage in the county are shown in **Table C.2**.

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

Table 3.7 – Crop Loss Due to Severe Summer Weather

Year	Hail	High Wind	Tornado		Year	Hail	High Wind	Tornado
2000	$94,122	$3,957	$0		**2009**	$940,879	$0	$0
2001	$16,020	$2,933	$0		**2010**	$12,886	$1,438	$6,771
2002	$666,012	$0	$0		**2011**	$10,696	$49,833	$0
2003	$55,836	$6,016	$0		**2012**	$0	$20,154	$0
2004	$10,746	$3,454	$0		**2013**	$64,473	$93,187	$0
2005	$31,884	$1,141	$0		**2014**	$0	$0	$0
2006	$1,943	$0	$0		**2015**	$112,912	$22,161	$0
2007	$534	$2,997	$0		**2016**	$0	$0	$0
2008	$400,526	$8,505	$0		**2017**	$267,105	$5,952	$0

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

Building Exposure:

The total value of buildings in Gregory County is approximately $499,638,000, according to the South Dakota Hazard Mitigation Plan, which ranks the county 38th among the state's 66 counties. The median figure for South Dakota counties is approximately $605,000,000. The county's building exposure can be considered moderate.

Population Density:

Gregory County is very sparsely populated, with an average of only 4.1 people per square mile, below the state figure of 10.5 people per square mile, and far below the national figure of 89.5. Gregory County would have to be rated low in terms of population density.

Development Trends

Looking ahead, the county's expected decline in population suggests that vulnerability to summer storms is not likely to increase in the future. However, climate change could have an impact on vulnerability. The South Dakota Hazard Mitigation Plan cites the Climate

Science Special Report from 2017, which states that damages from convective weather hazards, such as severe thunderstorms and tornadoes, have undergone the greatest increase relative to other extreme weather since 1980. The plan states that the tornado season is getting longer, and that an increase in potential days for severe thunderstorms is projected for the mid to late 21st century, although the largest increases are projected for neighboring regions of the Midwest and the southern plains. There is some uncertainty in these projections, but severe thunderstorms and tornadoes will remain a hazard in South Dakota.

Flooding

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

General Flood Vulnerability

There are no designated flood hazard zones located in the county. According to the HAZUS analysis that was run for the South Dakota Hazard Mitigation Plan (see Table 3-45 of that plan), the potential building damage loss from flooding in the county is only $474,000, whereas the median figure for all South Dakota counties is approximately $2,800,000. This ranks Gregory 64th among the state's 66 counties in this measure of vulnerability. The potential displaced population was determined to be 44 people, compared to the state median of 255 per county.

Currently, there are a total of two National Flood Insurance Program policies in Gregory County, with three losses having occurred since 1978 totaling $167,335 in payments. There are no repetitive loss properties in the county.

In addition to impacting buildings and other structures, a good deal of public infrastructure throughout the county is vulnerable to flooding. Flood damage frequently involves washed out or damaged roads and drainage culverts, often occurring in the spring, especially following winters with heavy snow.

Flooding also has a major impact on agriculture. Spring flooding can delay farmers getting into their fields to plant, and later in the growing season it can damage crops. Data on indemnity payouts for crop loss in Gregory County due to flooding, as well as excess moisture/precipitation, between 2000 and 2017 was obtained from the Risk Management Agency, and is presented in the following table. During this period of analysis, flood-related payouts represented approximately 7% of all indemnity payouts in Gregory County.

Table 3.8 – Crop Loss Due to Flooding

Year	Flooding	Excess Moisture/ Precipitation		Year	Flooding	Excess Moisture/ Precipitation
2000	$0	$22,974		**2009**	$0	$167,097
2001	$0	$205,688		**2010**	$0	$1,282,775

2002	$0	$27,718		**2011**	$0	$185,543
2003	$0	$46,456		**2012**	$0	$17,896
2004	$0	$13,991		**2013**	$0	$49,044
2005	$0	$80,660		**2014**	$0	$4,203
2006	$0	$3,835		**2015**	$0	$140,050
2007	$0	$135,776		**2016**	$8,669	$461,976
2008	$691	$411,183		**2017**	$0	$76,413

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

2019 was probably the worst year ever in terms of flooding's impact on South Dakota's agricultural producers. The state ranked first in the nation with almost 4 million acres of farmland prevented from being planted due to flooding, more than double the next nearest state. Gregory County ranked 41st in the state with a total of approximately 35,200 acres not planted.

Gregory County also is vulnerable to flooding due to dam failure, primarily because of the Fort Randall Dam and the other dams on the Missouri River. As mentioned earlier, it had once been thought that the system of dams on the Missouri River had essentially eliminated the threat of flooding along the river. However, flooding did occur along the Missouri in 2011, due to heavy snowmelt at the river's source in the Rocky Mountains and extremely high rainfall throughout the river's drainage basin in the spring of 2011. Mismanagement of dam releases - which can be considered a type of dam failure - exacerbated the situation. Gregory County was not affected as much as counties located on the river's eastern shore, but several residential properties did suffer flood damage.

There is also some flooding vulnerability associated with several smaller dams within Gregory County, including the Ponca Dam. Built in 1935 and owned by the Rosebud Sioux Tribe, the dam impounds Indian Lake, which has a maximum storage capacity of 1,190 acre-feet. There are two occupied structures located downstream of the dam, the nearest of which is about 4,300 linear feet away. It is unlikely that either structure would be damaged by floodwater resulting from dam failure, but farmland and perhaps some farm property would be affected.

Local Flood Vulnerability

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

Table 3.9 – HAZUS Base Flood Loss Estimation Results

Community	Building Structural Damage	Debris Generated	Households Displaced	People Needing Shelter
Bonesteel	$0	0	1	0
Burke	*No nearby stream network*			
Dallas	*No nearby stream network*			
Fairfax	*No nearby stream network*			

Gregory	*HAZUS generated stream networks in the area (see **Figure 3.6**), but failed to generate a hydraulic analysis.*
Herrick	*No nearby stream network*

Source: FEMA HAZUS loss estimation software

The following table shows the amount and value of property at risk of flooding. The analysis was done by using GIS software to overlay areas of known flood risk identified by HAZUS on parcel data supplied by the county.

Table 3.10 – Property in Flood Prone Areas

Community	Number of Housing Units	Assessed Value of Land and Improvements
Bonesteel	3	$298,780
Burke	0	$0
Dallas	0	$0
Fairfax	0	$0
Gregory	5	$361,400
Herrick	0	$0

Sources: HAZUS; Gregory County Director of Equalization

Development Trends

Looking ahead, the population of Gregory County has been declining for the last several decades, and no major development has occurred anywhere in the county since the current plan was developed. Little growth is expected in the future, indicating that the county's vulnerability to flooding is not likely to significantly increase in the future. Development at Whetstone Bay could increase vulnerability to flooding at that location, but the U.S. Army Corps of Engineers has regulations governing work activity below the ordinary high water, as described on page 26.

A factor likely to increase the county's vulnerability to flooding is the continuing conversion of wetlands and other marginal land to agricultural production. Farming these marginal lands is increasing the probability and severity of flooding in certain areas as the land's natural capacity to absorb excess surface water is decreased. The primary impact is on rural roads and infrastructure. Precise statistics on the amount of road damage that flooding has caused over the years in Gregory County are not available, but there appears to be little doubt that county and township roads are suffering more flood-related damage than they used to. Future updates to this plan could explore this trend in more depth.

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

Drought

Without question, Gregory County is vulnerable to drought. **Table C.2** in **Appendix C** shows 19 drought records for the county just since 1999, with many more droughts known to have occurred before then. The biggest impact of drought in Gregory County is in the agricultural sector, which is not surprising, given the county's heavy reliance on farming. Non-irrigated cropland is most susceptible to drought, and yield reductions due to moisture shortages can be aggravated by wind-induced soil erosion.

Data on indemnity payouts for crop loss in Gregory County due to drought and heat between 2000 and 2017 was obtained from the Risk Management Agency, and is presented in the table below. During this period of analysis, drought-related payouts accounted for over 76% of all indemnity payouts in Gregory County, far higher than any other type [6].

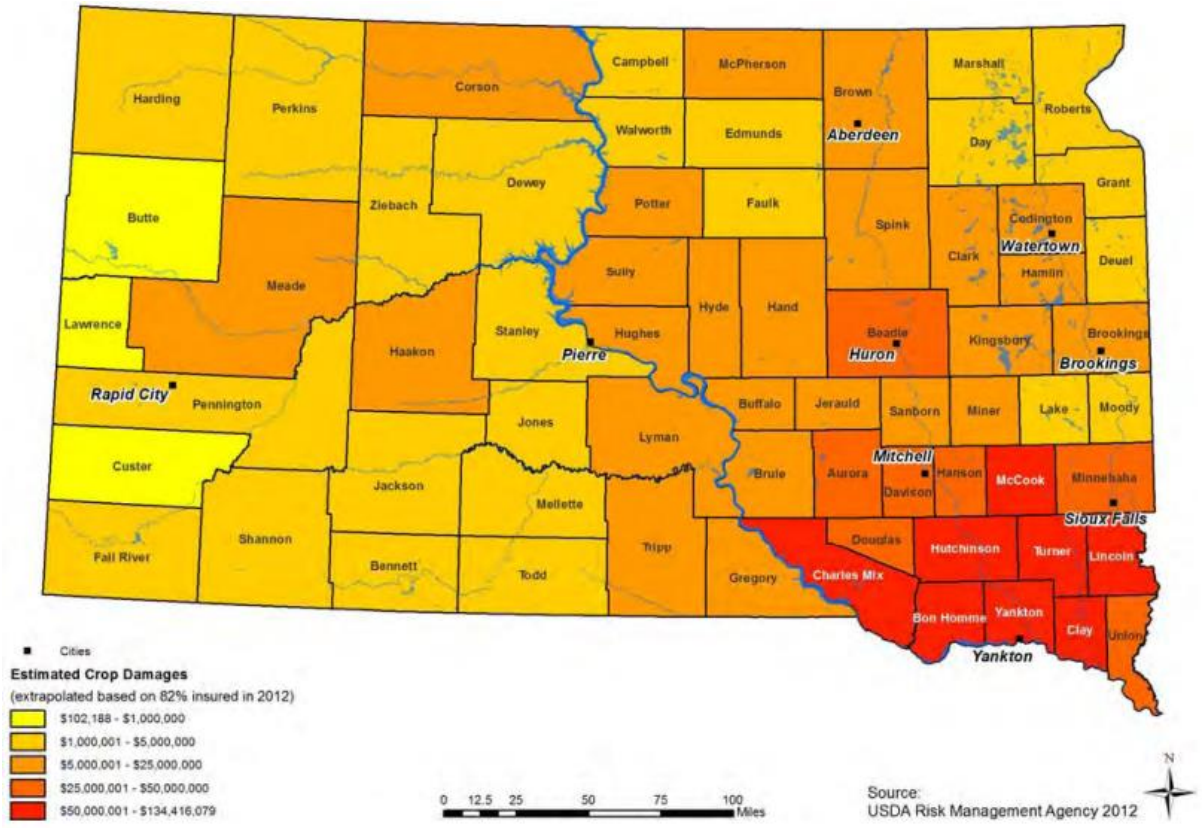
Table 3.11 – Crop Loss Due to Drought and Heat

Year	Drought	Heat		Year	Drought	Heat
2000	$1,629,064	$14,042		**2009**	$12,427	$0
2001	$329,349	$52,521		**2010**	$41,228	$0
2002	$4,700,874	$499,742		**2011**	$909	$20,122
2003	$1,716,481	$93,758		**2012**	$15,277,616	$2,322,974
2004	$4,610,499	$0		**2013**	$1,116,805	$1,177
2005	$1,003,157	$9,064		**2014**	$323,313	$3,365
2006	$2,947,110	$39,346		**2015**	$324,738	$0
2007	$424,974	$8,384		**2016**	$40,523	$909
2008	$215,889	$0		**2017**	$501,750	$16,453

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

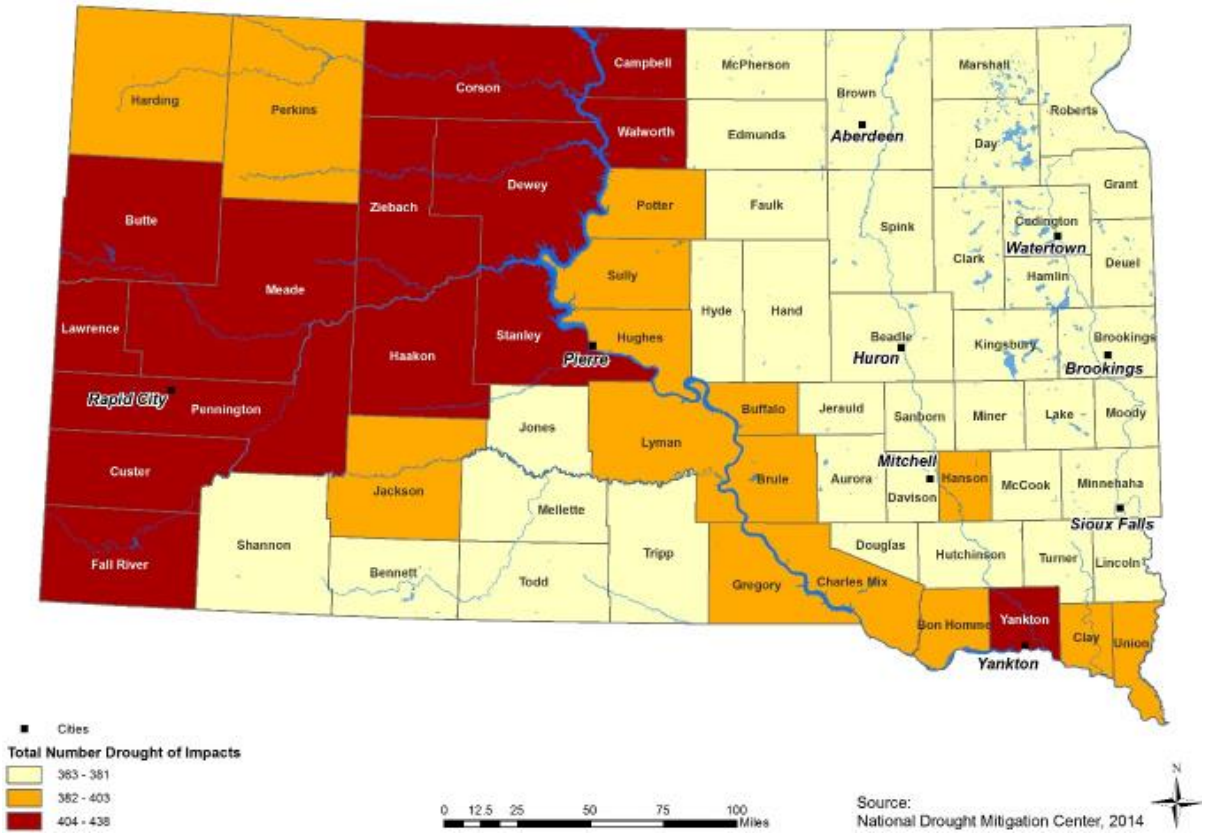
As the table shows, the 2012 drought had by far the biggest impact on the county's agricultural production. The figure below, as reproduced from the South Dakota Drought Mitigation Plan, shows the 2012 drought's impact statewide.

[6] From 2000 through 2017, drought payouts accounted for approximately 50% of all indemnity payouts in South Dakota.

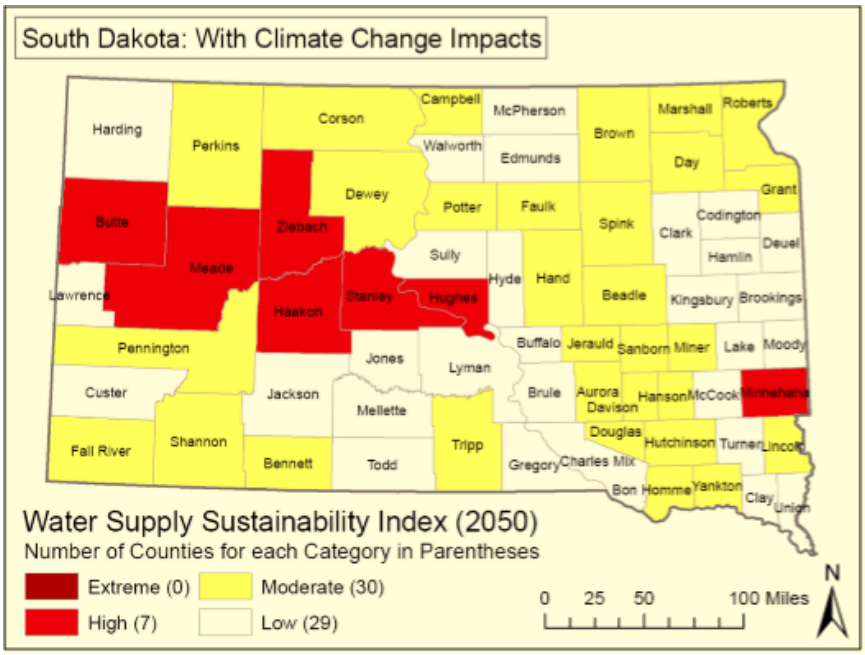


To determine which areas of the state are most vulnerable to the agricultural impacts of drought, the authors of the South Dakota Drought Mitigation Plan analyzed crop losses in each county compared to the total value of the county's crops. Crop value was taken from the 2012 Census of Agriculture, while crop loss was based on the Risk Management Agency's crop indemnity data for the period 2000 to 2014. The resulting loss ratio is the average annual loss divided by total crop value; the higher the ratio the higher the vulnerability. Gregory County's average annual loss from drought for the 2000 – 2014 period was $2,553,833, compared to a total crop value of $39,961,000, resulting in a loss ratio of 6.4%. In comparison, the average loss ratio figure for South Dakota counties was 3.1%. The authors of the South Dakota Drought Mitigation Plan assigned a "Moderate" vulnerability rating for Gregory County for this measure of drought vulnerability.

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



Development Trends



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

potential for drought due to climate change impacts. The figure shown on the previous page from the Natural Resources Defense Council, as reproduced from the South Dakota Drought Mitigation Plan, shows that Gregory County is not one of the counties expected to face water shortages in the future due to climate change.

Wildfire

Wildfire risk in Gregory County can be determined by analyzing historical records of actual wildfire losses in the county (see **Table 3.4** on page 29), or by estimating potential wildfire losses. To analyze potential wildfire loss in the county, information from the SILVIS Lab at the University of Wisconsin was used. The SILVIS webpage displays areas of Wildfire Interface and Wildfire Intermix, which are locations that have a combination of fairly dense housing and vegetation. Such areas are considered to be vulnerable to wildfires. In Gregory County, several small areas of risk were identified. The total population and number of housing units at risk to wildfire is summarized in the table below, which is based on 2010 Census Block data.

Table 3.12 – Population in Wildfire Risk Zones in Gregory County

Housing Units	Total Population	Median Home Value	Total Home Value
1,407	2,278	$56,100	$78,932,700

Source: State of South Dakota Hazard Mitigation Plan, based on data from the SILVIS Lab at the University of Wisconsin–Madison

The population of 2,278 living in a High or Moderate Risk threat zone ranks Gregory County 14th among the state's counties, and it represents about 53% of the county's total population. Putting things in perspective, in South Dakota as a whole approximately 25% of the population lives in a wildfire threat zone.

Development Trends

Looking ahead, the population of Gregory County is expected to continue to decline, so vulnerability to wildfires is not likely to increase. One factor that could increase wildfire vulnerability is the continued spread of cedar trees. These trees are spreading quickly in Gregory County, especially in the rugged 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 brush fire into a very serious situation.

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

Risk Assessment Summary

In this section, the vulnerability of Gregory County 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. Vulnerability to winter storms, summer storms, and drought is not mapped, as those hazards are likely to impact all areas of the county more or less equally.

- **Winter Storms**

Gregory County's vulnerability to winter storms can be considered high. All areas of the county are vulnerable to winter storms. Major winter storms accompanied by heavy snow or freezing rain contribute to the vulnerability of county residents by making roads dangerous for travel. The isolation of residents living outside the county's major communities puts them at increased risk. Some of these residents are more than 20 miles from the nearest place with groceries, medical service and supplies, or other important items. If roads are blocked by snow for an extended period of time, some rural residents, particularly the elderly, may be at risk. Winter storms accompanied by high winds have the potential to damage residential and commercial property in the county, as well as infrastructure. A major concern is the vulnerability of rural electric power infrastructure. When winter storms are accompanied by high winds and freezing precipitation, ice can build up on powerlines, which can cause the lines and poles to come down. The county will remain vulnerable to winter storms no matter what mitigation actions are taken.

- **Summer Storms**

Gregory County's vulnerability to summer storms can be considered moderate. All areas of the county are vulnerable to summer storms, and are highly vulnerable to summer storms that are accompanied by tornadoes or hail. Although the county's population density is low and infrastructure development is not extensive, a large amount of cropland in the county is vulnerable to the effects of hail and other violent summer weather. Vulnerability may be somewhat higher in Dallas and Fairfax, where over 20% of the housing stock consists of mobile homes, compared to 10% statewide.

- **Flooding**

The overall vulnerability of Gregory County to flooding can be described as low to moderate. Most of the vulnerability is to cropland and to rural county and township roads, but some vulnerability also exists in the communities and along the Missouri River due to the possibility of dam failure. The flooding that occurred in the county in 2019 was the worst in at least 30 years, with over $1 million of public assistance costs in the county. Roads throughout the county were impacted. Following is a summary of vulnerability to flooding in each of the communities:

Bonesteel: There is a minor degree of vulnerability here, as shown in **Table 3.9** and **Table 3.10**. The vulnerable area is on the southern edge of the city; no critical facilities or important infrastructure is at risk. Minor flood damage occurred in Bonesteel in 2019.

Burke: There is a minor degree of vulnerability here. Flood damage in Burke in 2019 was significant, with numerous houses receiving basement flooding, at least three of which suffered significant damage.

Dallas: There appears to be little vulnerability to flooding here, but an area along North Main Street near the grain elevator has suffered some minor flooding in the past. Minor flood damage occurred in Dallas in 2019.

Fairfax: There appears to be little vulnerability to flooding here. Minor flood damage occurred in Fairfax in 2019.

Gregory: There is a minor degree of vulnerability here, as shown in **Table 3.9** and **Table 3.10**. The Rosebud Electric Cooperative's office is located on property partially located within a flood prone area, but the facility has never suffered any flood damage. Flood damage in Gregory in 2019 was significant, with several houses receiving basement flooding.

Herrick: There is a minor degree of vulnerability to flooding here. Flood damage in Herrick in 2019 was fairly significant, with some houses receiving basement flooding. After the event, the Town received FEMA Public Assistance funding to help replace damaged culverts.

- **Drought**

Gregory County's vulnerability to drought can be considered moderate, and is certain to continue for the foreseeable future. All areas of the county are vulnerable. The impact is primarily to the agricultural sector, where serious losses have occurred. Residential and commercial impacts of drought are minor.

- **Wildfire**

The overall vulnerability to wildfire in Gregory County can be considered moderate. Although no truly destructive wildfire has ever been recorded in the county, and despite the fact that **Table 3.4** showed that only one wildfire over 250 acres in size has occurred in the county since 2000, 53% of the county's population is considered to be living in a High or Moderate Risk wildfire threat zone, well above the statewide figure of 25%.

Figure 3.1 - Gregory County

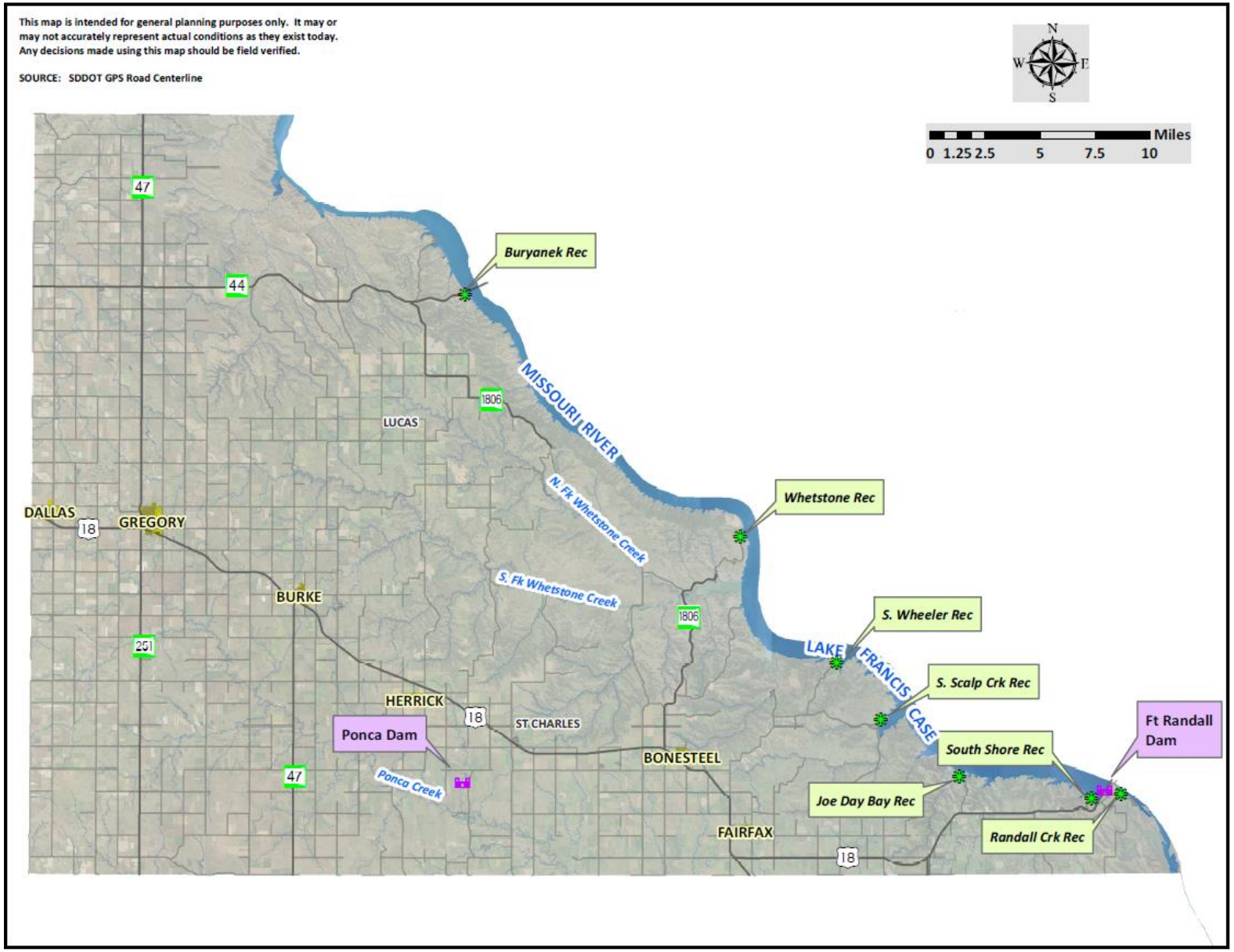


Figure 3.2 – Bonesteel

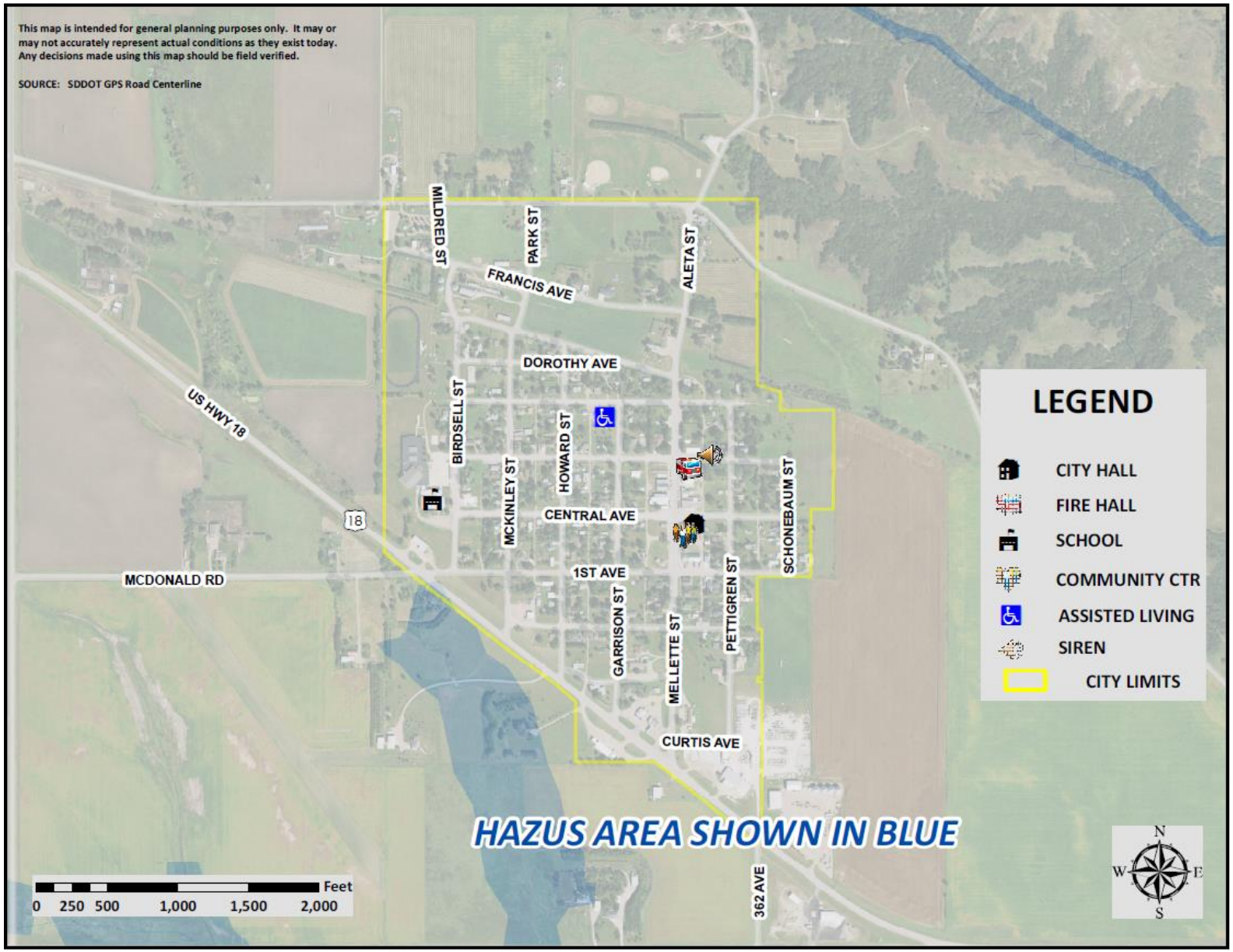


Figure 3.3 – Burke

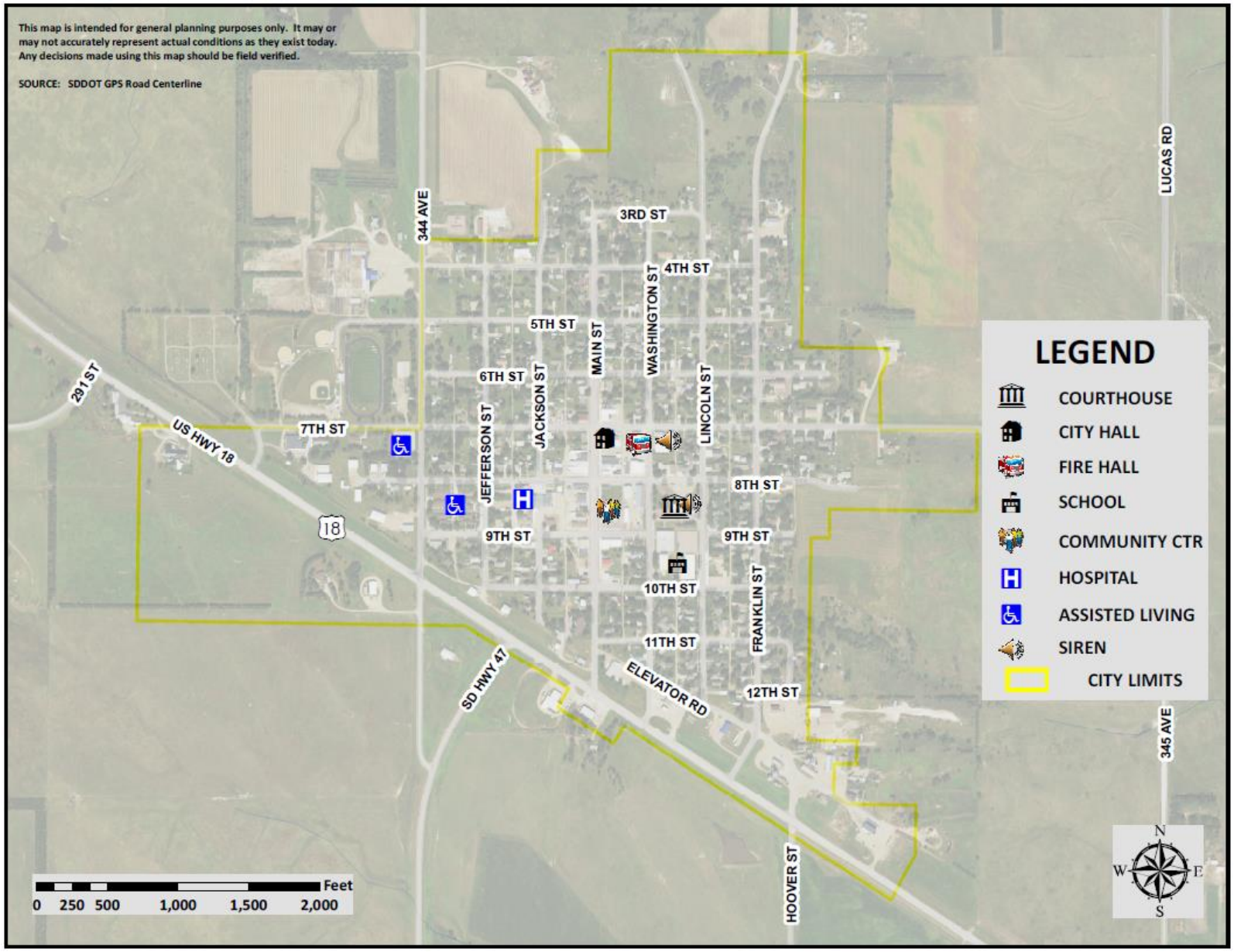


Figure 3.4 – Dallas

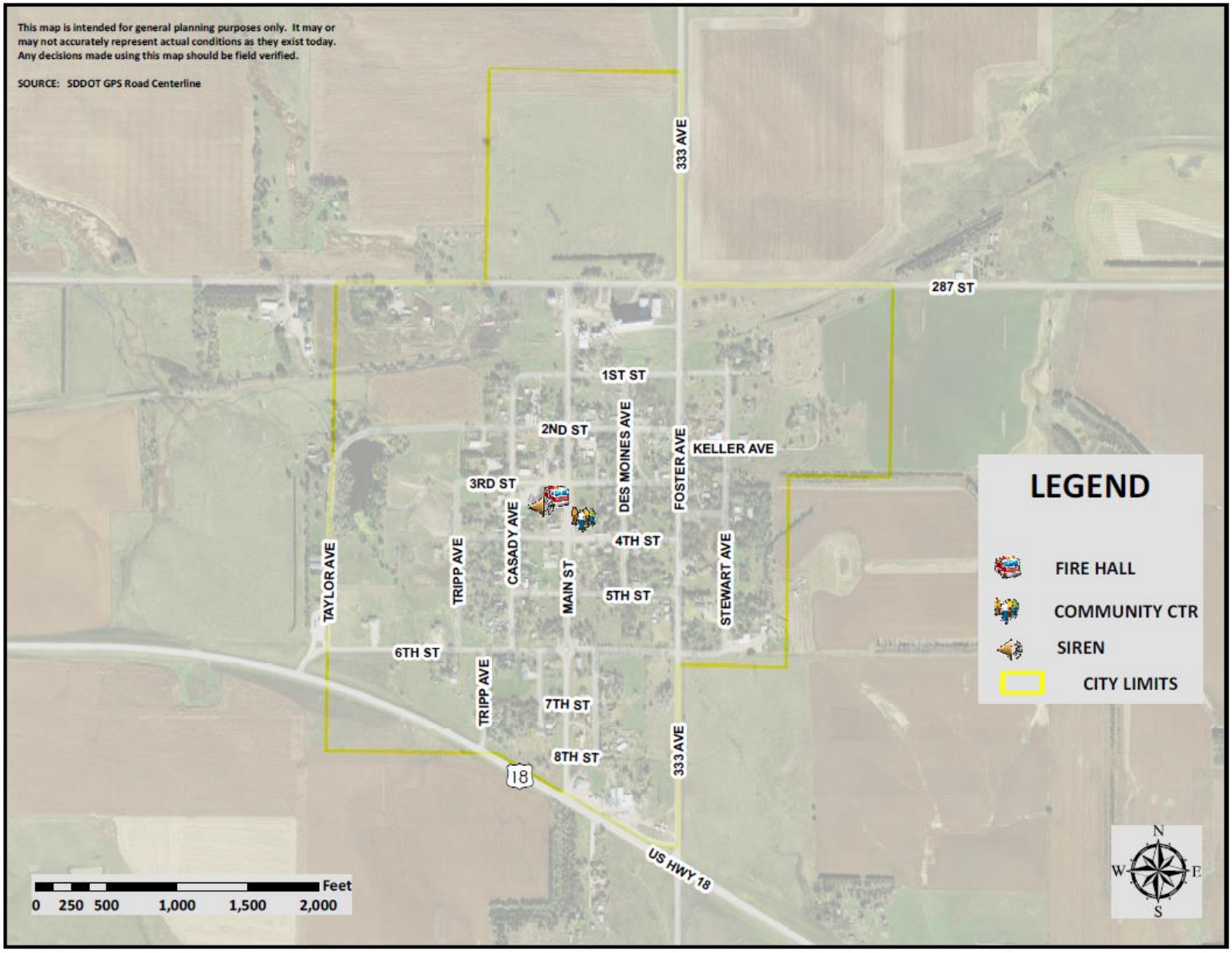


Figure 3.5 – Fairfax

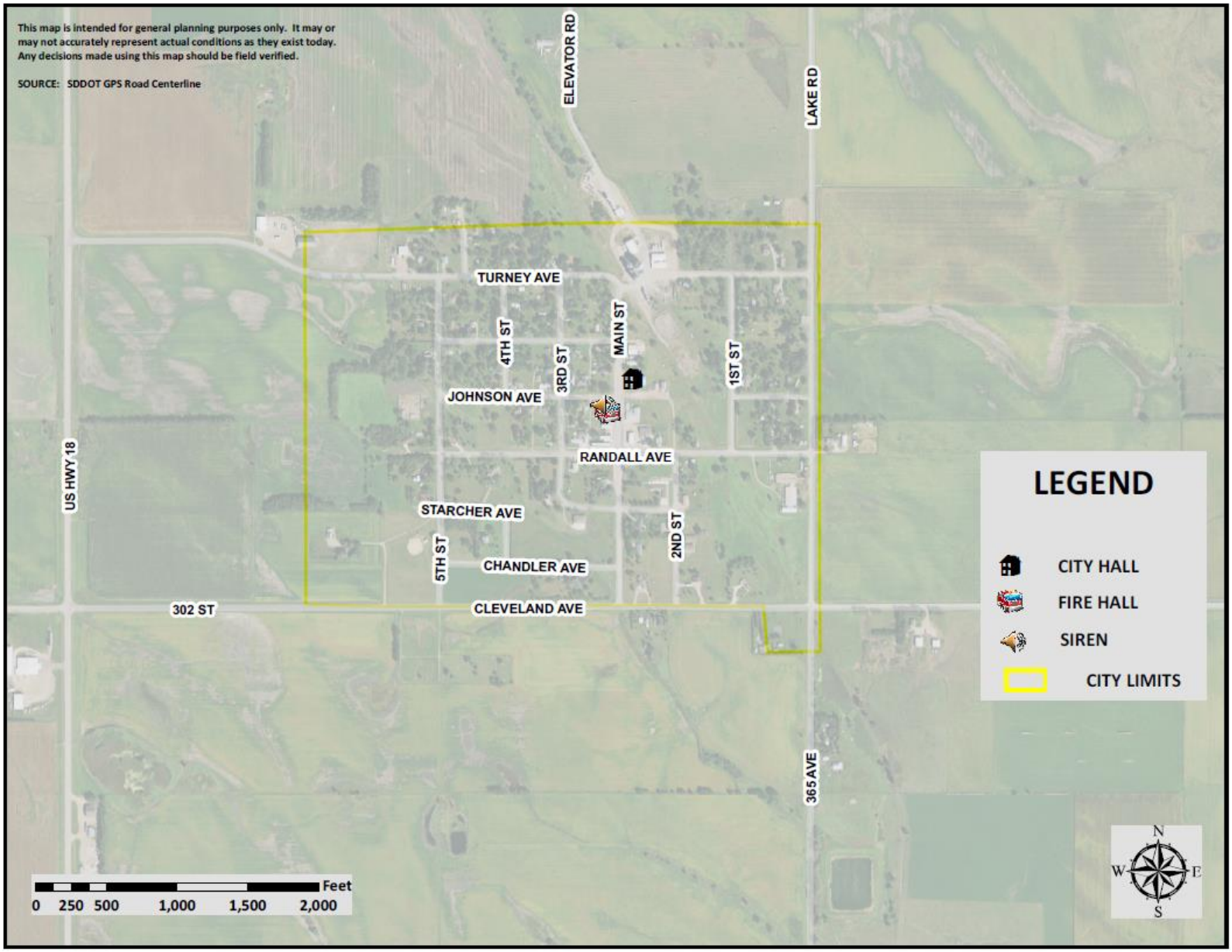


Figure 3.6 – Gregory

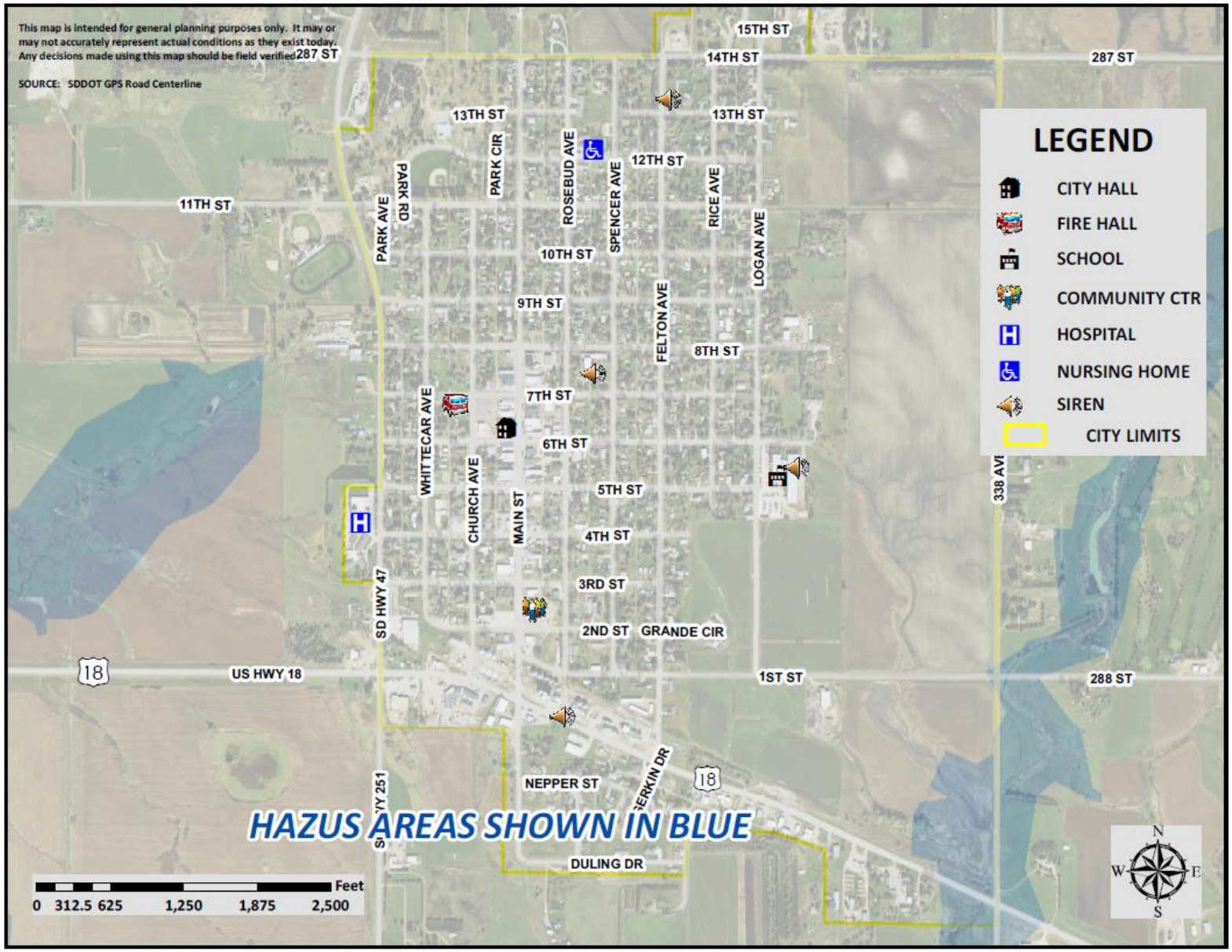
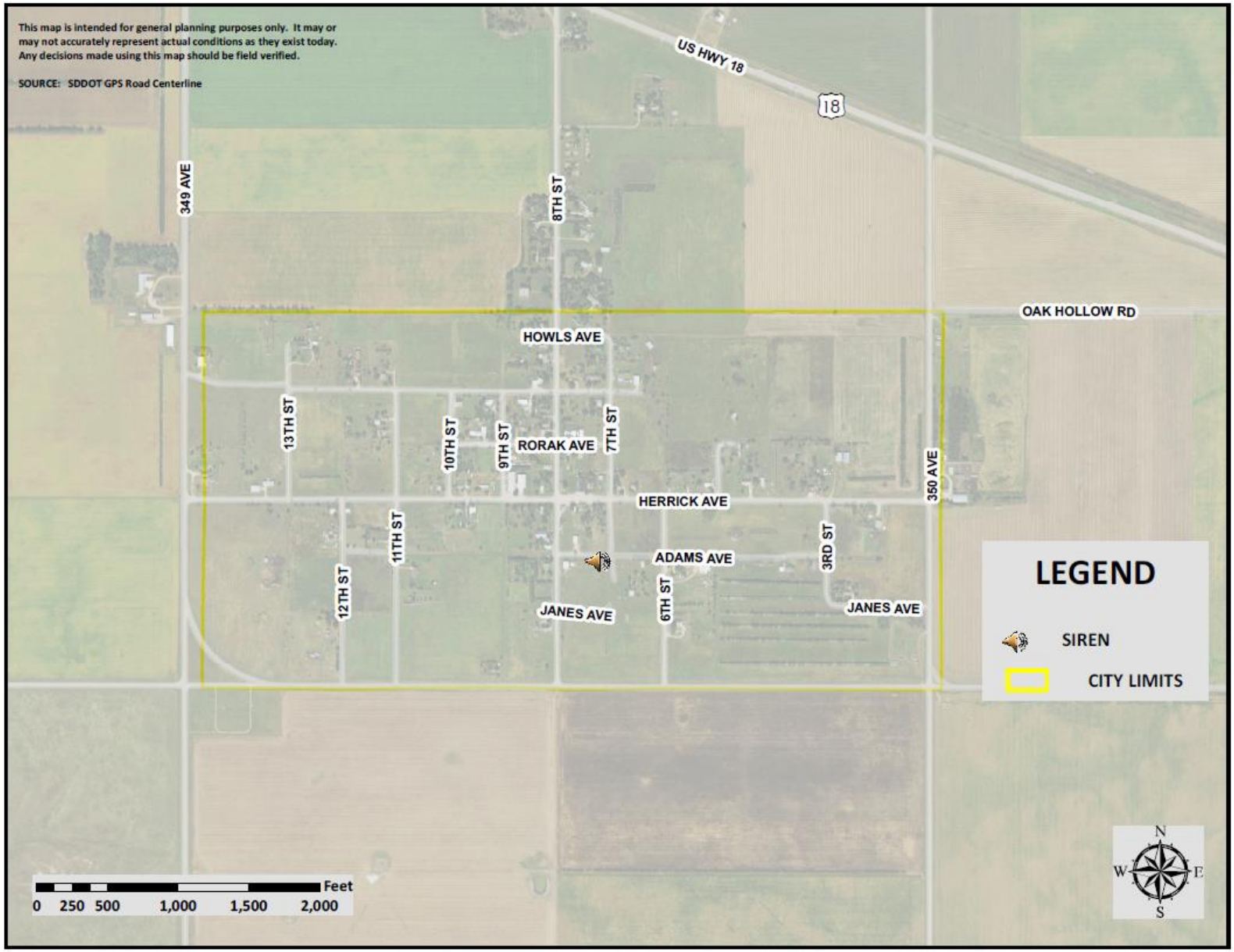


Figure 3.7 – Herrick



CHAPTER IV
RISK MITIGATION STRATEGY

Background

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

Mitigation Goals and Objectives

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

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

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

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

Winter storm

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

Summer storm

- Reduce property and infrastructure losses due to summer storms.
- Ensure that people are adequately protected from the effects of summer storms.
- Ensure that people have adequate warning when violent weather threatens.

Flooding

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

Drought

- Reduce economic and environmental impacts due to drought.

Wildfire

- Reduce property and infrastructure losses due to wildfires.

Mitigation Actions

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

Table 4.1 – Progress on Implementing Previously Proposed Actions

Mitigation Action	Hazard	Current Status
GREGORY COUNTY		
Continued National Flood Insurance Program compliance.	Flooding	Ongoing.
Implement drainage improvements along county roads.	Flooding	Some progress, but many of the sites were again impacted by flooding in 2019.
Continue enforcing burn bans when conditions warrant.	Wildfire	Ongoing.
Distribute information to those planning to build in areas that may be vulnerable to wildfires.	Wildfire	No progress.
Develop burning plan with landowners to reduce spread of cedar trees.	Wildfire	A landowners' association has been formed to address this problem.
Implement drainage improvements along 344th Avenue on the west side of Burke.	Flooding	Some work has been done.
Begin participating in StormReady Community Program.	Summer storm	No progress.

Mitigation Action	Hazard	Current Status
Install auto weather station at the Gregory airport.	All hazards	Completed.
Consider joining the Firewise Communities Program.	Wildfire	No progress.
CITY OF BONESTEEL		
Contact state NFIP coordinator regarding participation in National Flood Insurance Program.	Flooding	No progress.
Generator acquisition for fire hall.	Winter storm	No progress, but attempts are ongoing to acquire funding.
Begin participating in StormReady Community Program.	Summer storm	No progress.
Consider joining the Firewise Communities Program.	Wildfire	No progress.
CITY OF BURKE		
Continued National Flood Insurance Program compliance.	Flooding	Ongoing.
Acquire generator for community center.	Winter storm	No progress.
Begin participating in StormReady Community Program.	Summer storm	No longer a priority.
TOWN OF DALLAS		
Generator acquisition for fire hall.	Winter storm	No progress.
Continued National Flood Insurance Program compliance.	Flooding	Ongoing.
Make drainage improvements along North Main Street.	Flooding	No progress.
Begin participating in StormReady Community Program.	Summer storm	No progress.
CITY OF GREGORY		
Continued National Flood Insurance Program compliance.	Flooding	Ongoing.
Make drainage improvements in various locations.	Flooding	Some progress. Additional studies are being made to address stormwater issues.
Generator acquisition for community center.	Winter storm	No progress, but attempts are ongoing to acquire funding.
Replace two old warning sirens, and move the old sirens to serve areas on the outskirts of the city.	Summer storm	Completed.
Begin participating in StormReady Community Program.	Summer storm	No progress.

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

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

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

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

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

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

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

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

- The local priority rating – either High or Medium.
- The individual (party) primarily responsible for implementing the action.

- The estimated time frame needed to accomplish the action. Short term actions are those that can be completed within a few years, while Long term actions may take several years or more to accomplish due to cost or other factors.
- The estimated cost to implement the action.
- Resources that may be available to help fund the action.

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

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

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

Funding considerations also are critical, because neither Gregory 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)

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

Other grant and loan programs/sources

- US Economic Development Administration
- US Department of Agriculture Rural Development grant/loan program
- South Dakota Community Development Block Grant program
- South Dakota State Homeland Security Program
- South Dakota Dept. of Environment and Natural Resources
- South Dakota Dept. of Transportation
- Western States Wildland Urban Interface Grant Program

Table 4.2 - Proposed Mitigation Actions

GREGORY COUNTY	PRIORITY	RESPONSIBLE PARTY	TIME	COST	RESOURCES
Powerline burial.	HIGH	Rosebud Electric Coop	ONGOING	Unknown	FEMA
Implement drainage improvements along county roads.	HIGH	Hwy Superintendent	MID	Unknown	DOT; FEMA
Generator acquisition for courthouse.	HIGH	County Commission	SHORT	$35,000	FEMA
Install warning sirens in Lucas and St. Charles.	MED	County Commission	MID	$20,000	FEMA
Join StormReady program.	MED	County Commission	SHORT	Minimal	N/A
Join Firewise USA program.	MED	County Commission	SHORT	Minimal	N/A
CITY OF BONESTEEL	**PRIORITY**	**RESPONSIBLE PARTY**	**TIME**	**COST**	**RESOURCES**
Generator acquisition for fire hall.	HIGH	City council; Fire chief	MID	≈ $40,000	FEMA
Generator acquisition for community center/city hall.	HIGH	City council	MID	≈ $50,000	FEMA
Contact state NFIP coordinator regarding participation in National Flood Insurance Program.	MED	City council	SHORT	N/A	N/A
Join StormReady program.	MED	City council	SHORT	Minimal	N/A
Join Firewise USA program.	MED	City council	SHORT	Minimal	N/A
CITY OF BURKE	**PRIORITY**	**RESPONSIBLE PARTY**	**TIME**	**COST**	**RESOURCES**
Powerline burial.	HIGH	Utility Manager	ONGOING	Unknown	FEMA
Generator acquisition for community center.	HIGH	City council	MID	≈ $50,000	FEMA
Address water drainage on West 8th and 9th Streets.	HIGH	Utility Manager	LONG	Unknown	DOT; DENR
Join Firewise USA program.	MED	City council	SHORT	Minimal	N/A
CITY OF GREGORY	**PRIORITY**	**RESPONSIBLE PARTY**	**TIME**	**COST**	**RESOURCES**
Make drainage improvements in various locations.	HIGH	Public Works Dir	LONG	Unknown	CDBG; DENR; USDA
Generator acquisition for community center.	MED	City council	MED	≈ $50,000	FEMA
Join StormReady program.	MED	City council	SHORT	Minimal	N/A

Potential Resources for Funding Assistance:

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

Mitigation Action Plan

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

Plan Incorporation

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

Table 4.3 – Local Planning Mechanisms

	Capital Improvement Plan	Comprehensive Land Use Plan	Zoning ordinance	Building codes	Electrical Construction Plan	Housing Plan	Flood damage prevention ordinance	Drainage ordinance	Five Year Highway Improvement Plan	Fire Management Plan
Gregory County		X	X						X	
Bonesteel		X	X	X						
Burke		X	X	X			X			
Dallas							X			
Fairfax										
Gregory		X	X	X			X			
Herrick										

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

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

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

Plan Implementation

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

The availability of funding is critical to the success of this plan, and therefore the mitigation actions listed in **Table 4.2** should be considered when the jurisdictions begin the process of working on their annual budgets. In this way, the plan will not become a mere "wish list" of ideas for which there is no practical funding mechanism. For those jurisdictions that lack any other planning tools and mechanisms, this may be the only practical way for the plan to be implemented. To help ensure that this happens, the Emergency Management Director will attend at least one city council meeting annually in each community to discuss hazard mitigation, including the possibility of obtaining funds through FEMA or other sources for the projects they have identified [7].

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

[7] In 2020, the Emergency Management Director has had many visits with leadership in each of the communities, as well as the Rosebud Electric Cooperative, to discuss hazard mitigation.

CHAPTER V
PLAN MAINTENANCE

Background

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

Plan Monitoring and Evaluation

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

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

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

- Occurrence of a significant disaster event – Serious events can reveal flaws in local jurisdictions' disaster preparedness plans. The 9/11 terrorist strikes are a dramatic example of this type of event. The Missouri River flooding that occurred in 2011 is another example of an event significant enough to necessitate a reexamination of local mitigation strategies.
- Change in the nature or magnitude of risks – Changing environmental conditions, increased development in sensitive areas, and other factors can be significant enough to cause localities to rethink their mitigation strategies. As discussed earlier, climate change may increase the county's vulnerability to drought, and possibly other hazards.

- Change in funding availability – The availability of money often determines whether an action can be implemented. For example, local budget cuts can delay, or prevent altogether, a mitigation project's implementation. On the other hand, grant opportunities for specific types of mitigation actions may argue for their implementation.
- Change in local priorities – Local priorities regarding mitigation projects can change for a number of reasons. Regular meetings between the Gregory County commission and the local township boards are one way in which the county stays current on the townships' needs regarding their roads, bridges, and other infrastructure.
- Legal factors – Laws and regulatory requirements may change, which may make certain mitigation actions more or less feasible or desirable.
- Technological change – Advances in technology may make it possible in the future to address certain types of hazards more effectively or at lower cost.
- Other factors – There are many other factors that can have an impact on local disaster mitigation priorities and strategies. For example, a detailed engineering analysis may indicate that a proposed mitigation action may be much costlier than first estimated, which could make the action unpractical to pursue.

Updating the Plan

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

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

Public Involvement

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

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

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

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

APPENDICES

APPENDIX A: Outreach Effort

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

Meeting #1 - Email to Planning Team:

From: John Clem
Sent: Tuesday, September 8, 2020 10:22 AM
To: Brad Christensen <gregfire@gwtc.net>; Bartling, Julie <Julie.Bartling@state.sd.us>; City Of Burke <burkecc@gwtc.net>; gregcity@gwtc.net; mfo@gwtc.net
Subject: FW: Conference Call Invitation for 09/23/2020 01:00 PM

Good morning folks –

Below is the call in information for the September 23 conference call to start updating the Gregory County Pre-Disaster Mitigation (PDM) plan. This will be a toll-free call, and should take about an hour. **Please make sure your community is represented on the call, or else FEMA will consider your community as not participating in the plan and therefore ineligible to apply for hazard mitigation funding.**

One of the things we'll be discussing during the call is the status of the projects listed in Table 4.2 on pages 63 and 64 of the current plan, which is attached. We'll also discuss how hazards like summer storms, winter storms, and flooding impact the county and each community, with an emphasis on the flooding last year.

Also attached is a press release that I'd like to see uploaded on the county and/or city websites, or social media. I'm looking forward to talking to you all on the 23rd. Thanks, and be sure to let me know if there are any questions about the meeting, or the planning process in general.

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

Meeting #1 - Email to Emergency Management Directors in Other Counties:

From: John Clem
Sent: Friday, September 11, 2020 9:07 AM
To: Poppen, Jim <Jim.Poppen@state.sd.us>; Christopherson, Martin <Martin.Christopherson@state.sd.us>; Brent.Kolstad@state.sd.us; 'Jon Burdette' <jburdette@trippcounty.us>; Margo Mitchell <margo.mitchell@lymancoso.org>; Katheryn <brbufem@midstatesd.net>; Pat Harrington <douglascountyem@yahoo.com>
Cc: Brad Christensen <gregfire@gwtc.net>
Subject: Gregory County PDM Plan

Good morning folks –

This is just an FYI that **Gregory County** is beginning the process of updating its current Pre-Disaster Mitigation Plan. The first meeting will take place on **Wednesday, Sept 23 at 1:00 PM**. It will be conducted by phone. If you would like to participate, the call in number is 1 800 567-5900, and the access code is 2044505.

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

Meeting #1 Post on Gregory County Website:

Gregory County, South Dakota

Home | About | Directory | Commissioners | Planning Commission | Our Towns | Our Schools | Move Here!

Upcoming Events:

September 14th, 2020: Courthouse Hours Change. **New hours are 7:30am-noon 12:30pm-4:00pm**

September 16th, 2020: County Commissioner Meeting 9AM

September 23rd, 2020: Disaster Mitigation Meeting 1PM

The first meeting will be held via phone conference call on September 23 at 1:00 PM. Dial **1-800-567-5900** and use access code **2044505**. Agenda items for the initial meeting include a review of the county's current disaster mitigation plan and identifying and profiling the hazards that impact the county.

October 6th, 2020: County Commissioner Meeting 9AM

October 6th, 2020: Planning Commission meeting 1PM

Disaster Mitigation Meeting Sept 23rd, 2020

Ideas Welcomed!

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, Gregory County is beginning the process of updating its current Disaster Mitigation Plan.

A series of meetings will be held to obtain input as the plan is developed. These meetings are open to everyone. If you have an idea about what can be done to prepare for future disaster events occurring in Gregory County, you are urged to attend the meetings.

The first meeting will be held via **phone conference call on September 23 at 1:00 PM**. Dial **1-800-567-5900** and use access code **2044505**. Agenda items for the initial meeting include a review of the county's current disaster mitigation plan and identifying and profiling the hazards that impact the county.

GREGORY COUNTY LANDFILL

Days and Hours

Tuesday: 12:00-5:30

Saturday: 8:00-5:00

All loads **MUST** be either tarped or strapped!

Planning Commission Agenda

11.5.19 Planning Commission Agenda
12.03.19 Planning Commission Agenda
3.3.20 Planning Commission Agenda
5.5.20 Planning Commission Agenda
06.02.20 Planning Commission Agenda
7.7.20 Planning Commission Agenda
8.4.20 planning commission agenda
9.01.20 Planning Commission Agenda

Planning Commission Public Hearings

Planning Commission Minutes

11.5.19 Planning Commission Minutes
12.03.19 Planning Commission Minutes
3.3.20 Planning Commission Minutes
05.05.20 Planning Commission Minutes
06.02.20 Planning Commission Minutes

Meeting #2 - Email to Emergency Management Directors in Other Counties:

From: John Clem
Sent: Monday, November 9, 2020 8:58 AM
To: Poppen, Jim <Jim.Poppen@state.sd.us>; Christopherson, Martin <Martin.Christopherson@state.sd.us>; Kolstad, Brent <Brent.Kolstad@state.sd.us>; jburdette@trippcounty.us; Margo Mitchell <margo.mitchell@lymancoso.org>; Kotab, Michael <Miko@tntwagner.com>
Cc: Brad Christensen <gregfire@gwtc.net>
Subject: Gregory County PDM meeting

Good morning,

This is just an FYI that **Gregory County** will be holding its final meeting to update the county's current Pre-Disaster Mitigation Plan. The meeting will take place on **Thursday, November 12 at 1:00 PM**. It will be conducted via phone conference call, and you are invited to participate in the call. The number to call is 1 800 567-5900 and the access code is 2044505. Let me know if there are any questions.

Post-Meeting #2 Post on Gregory County Website:

APPENDIX B: Documentation of Meetings

The following pages show minutes from each of the participating jurisdictions' meetings as they discussed the mitigation actions they wanted to include in the plan. Also included here are the phone logs from the planning team meetings that were held.

PHONE LOG - PLANNING TEAM MEETING #1

Thank you for using FreeConference.com, a service of iotum. Here is a summary of your most recent Web-Scheduled conference call to assist you in tracking your business productivity.

Conference Summary **ID: Gregory PDM**

Conference Type:	Web-Scheduled Premium 800
Conference Date:	Wednesday, September 23, 2020
Reservation Start Time:	01:00 PM Central Daylight Time
Reservation End Time:	02:55 PM Central Daylight Time
Primary Dial-in Number:	1-800-567-5900
Access Code:	2044xxx

Conference Details

#	Start Time	End Time	Caller Number	Mins.
1	09/23/2020 12:52 PM	01:46 PM	605-830-1738	54
2	09/23/2020 12:53 PM	01:46 PM	605-665-4408	53
3	09/23/2020 12:53 PM	01:46 PM	605-835-9625	53
4	09/23/2020 12:54 PM	01:46 PM	605-775-2692	53
5	09/23/2020 12:54 PM	12:55 PM	605-830-0931	1
6	09/23/2020 12:54 PM	12:55 PM	605-830-1321	2
7	09/23/2020 12:57 PM	01:46 PM	605-775-2823	49
8	09/23/2020 12:57 PM	01:46 PM	605-830-0931	49
9	09/23/2020 12:57 PM	01:46 PM	605-775-2664	49
10	09/23/2020 12:58 PM	01:46 PM	605-835-8270	48
11	09/23/2020 12:59 PM	01:46 PM	605-831-9073	47
12	09/23/2020 01:00 PM	01:34 PM	605-831-9067	35
13	09/23/2020 01:08 PM	01:25 PM	605-835-8531	18

Total Calls:	13
Peak number of active lines:	11
Lines reserved:	20

Gregory County Commission Proceedings

The regular meeting of the Gregory County Commission was held Tuesday, October 6, 2020, at 9:00 a.m. in Burke with the following members present: Jeff Johnson, Myron Johnson, Jessy Biggins, Kelsea Sutton (via Zoom) and Bob Hausmann. Also present: Julie Bartling, Gregory County Auditor.

The meeting was opened and the Pledge of Allegiance was recited.

Approval of Agenda: Motion by Jessy Biggins, second by Myron Johnson to approve the agenda with the following additions:

9:15 a.m. Rachelle Norberg – ROD filing concerns
Adopt 5-year Road Plan
Discuss Hazard Mitigation Projects for 2021
FEMA Budget Supplements

All members present voted aye. Motion carried.

Approval of Minutes: Motion by Bob Hausmann, second by Myron Johnson to approve the minutes of the following meetings as read:

September 16, 2020 Regular Meeting
September 24, 2020 Special Meeting for bid letting
September 28, 2020 5-Year Road Plan Public Meeting
September 29, 2020 Special Meeting for acceptance of bids

All members present voted aye. Motion carried.

Conflicts of Interest: The Chair asked if there were any conflicts of interest from members present. Commissioner Bob Hausmann stated that he as a conflict with the Jensen Conditional Use Permit application that will be discussed as a Board of Adjustment. No other conflicts were notated.

Ex-Parte Communications: The Chair inquired if there have been any ex-parte communications by any member present. Commissioners Kelsea Sutton and Myron Johnson disclosed that they visited the Jensen Conditional Use Permit site with the Bakers to get a perspective on their concerns. No other communications were notated.

Public Input: The Commission opened the floor for public input. No one appeared before the Commission.

5-Year County Highway and Bridge Improvement Plan: Motion by Jessy Biggins, second by Bob Hausmann to approve the 2021 through 2025 Five-year County Highway and Bridge Improvement Plan as presented at the September 28, 2020 public meeting. The Commission also noted the following Annual Update of the Project List for 2020:

Project Location	Project Description	Year	Status
38475-341st Ave	CULVERT, BAND, SLURRY	2020	WEATHER

#27-030-081 Dixon Bridge	STRUCTURE AND APPROACH	2020	LACK OF EASEMENT
#27-169-280 Herrick Bridge	STRUCTURE AND APPROACH	2020	LACK OF FUNDS

Budget Supplements: Motion by Myron Johnson, second by Bob Hausmann to supplement the Road and Bridge budget as follows:

State of South Dakota - $92,327.59
State of South Dakota - $83,487.67

These funds are FEMA/State of SD reimbursements for expenses the County has paid for March 2019 Blizzard-Flood and July 2019 Flood disasters. All members present voted aye. Motion carried.

2021 Pre-Disaster Mitigation Projects: Motion by Jessy Biggins, second by Kelsea Sutton to approve the following projects for the Gregory County Pre-Disaster Mitigation Plan:

Flood mitigation along county roads - HIGH
Courthouse generator – HIGH
Warning sirens for Lucas and St. Charles townsites - MED
StormReady Program - MED
Firewise USA Program - MED

All members present voted aye. Motion carried.

Recording of Documents: Rachelle Norberg of Gregory County Abstract Company and Claire Marshall of Rosebud Title Company (via Zoom), met with the Commission to convey their concerns over the inability to have deeds and other important documents recorded in the Register of Deeds office while the Official is absent for personal matters. The Commissioners will meet with the Register of Deeds at the next meeting to discuss the need for the staff to adequately fulfill the required duties of the office.

Approval of Claims: Motion by Jessy Biggins, second by Myron Johnson to approve the following claims:

I hereby submit the following report of my examination of the cash and cash items in the hands of the County Treasurer of this County as of September 30, 2020.

Total Amount of Actual Cash……. $ 525.00
Checking Account……. $ 2,848,327.32
Insufficient Fund Checks……..$ 172.52
Cash Over……..$ 2,467.77
TOTAL……..$ 2,851,492.61

Julie Bartling, Gregory County Auditor
County of Gregory)
) SS
State of South Dakota)

Statement of fees collected in the Register of Deeds Office for the month ending September 30, 2020 in the amount of $5409.05.

Statement of fees collected in the Sheriff's Office for the month ending September 30, 2020 in the amount of $932.50.

Extension Office Equipment Purchase: Ashley Meyer, Assistant in the Gregory County Extension Office, advised the Commission that their office is purchasing a desktop computer at a cost of $1,300 from Don Bousek Consulting. The funds are available in their budget. The Commissioners expressed appreciation for the information.

Executive Session: Motion by Bob Hausmann, second by Myron Johnson to enter into executive session at 10:40 a.m. to discuss personnel. All members present voted aye. Motion carried.

Motion by Myron Johnson, second by Bob Hausmann to adjourn from executive session at 10:58 a.m. with no action taken.

All members present voted aye. Motion carried.

Salary Bonus: Motion by Kelsea Sutton, second by Bob Hausmann to approve a $2,500 one-time bonus for Brad Christensen, Emergency Management Director, for compensation for additional work during 2019-2020 disaster activities. The salary of the Director is reimbursable through COVID Cares Act Funding. All members present voted aye. Motion carried.

Board of Adjustment: Motion by Jessy Biggins, second by Myron Johnson to adjourn as a Board of County Commissioners and to convene as a Board of Adjustment. All members present voted aye. Motion carried.

Jensen Family Trust Conditional Use Permit: The Board once again discussed the permit application from the Jensen Family Trust.

Present to listen to the discussion were A.J. and Sherry Jensen, Julie Baker and Martin Lawler, as well as Casey Burrus, Planning and Zoning Administrator.

The Board inquired as to potential changes to the proposed campground to alleviate concerns of the Baker family. Mr. Jensen proposed the following: Move camper sites to east end of the field and no more than 10 camper sites on that side of the creek.

Mrs. Baker stated the proposal wasn't everything they were wanting, but it was better. Commissioner Sutton expressed her concerns that more should be done.

Motion by Jessy Biggins, second by Myron Johnson to approve the conditional used permit with the restrictions of the Planning and Zoning Board that wheels remain on the campers and that the renters must be transient. They also require that the Jensen Family Trust follow through with their proposals for the campground.

Upon call for votes: Voting aye were Myron Johnson, Jessy Biggins and Jeff Johnson. Voting naye was Kelsea Sutton. Abstaining was Bob Hausmann. Motion passed.

Adjourn as BOA: Motion by Kelsea Sutton, second by Bob Hausmann to adjourn as a Board of Adjustment and to reconvene as a Board of Commissioners. All members present voted aye. Motion carried.

Sidewalk Repair: The Commission was advised that no firm bids were received for repair of the side walks and east rear parking lot driveway pad. The Board once again reviewed the two quotes received earlier:

Divine Concrete - $7,578
Rosebud Concrete - $6,870

Motion by Myron Johnson, second by Jessy Biggins to accept the quote of Rosebud Concrete. All members present voted aye. Motion carried.

Surplus Office Furniture: Motion by Bob Hausmann, second by Myron Johnson to surplus the following office furniture:

Auditor's office:	Green metal desk - #747 - $0
	Workstation #1229 - $0
	Brown Computer Desk - #1080 - $0
Treasurer's office:	Workstation #1227 -$0
	Workstation #1228 - $0

All members present voted aye. Motion carried.

Property Values of Concerned Landowner: Mona Taggart met with the Commission to discuss the value and classification of her property, which has been valued as NA, but is used as Ag.

Mrs. Taggart has requested that taxes overpaid be refunded and unpaid be abated proportionately.

Casey Burrus, Director of Equalization, explained the process of classifying land under 20 acres in size, per statute. The property values for 2020 pay in 2021 are now Ag as Mrs. Taggart has now signed the form requesting the classification change.

Mrs. Taggart has concerns that attempts were not made to help her remedy the issue.

The Commissioners explained the appeal process that should be followed every year. Mrs. Taggart will need to follow the abatement process to move forward with her request.

Mrs. Taggart informed she would move forward and may retain an attorney for assistance.

Amendment to Agreement #614938: Motion by Jessy Biggins, second by Myron Johnson to authorize the Chair to sign an amendment to Agreement #614938 – Project No. ER6495(01)-limiting amount of $7,749.44. (Site 1 south of Merle Nelson's). All members present voted aye. Motion carried.

Salary Increase: Motion by Jessy Biggins, second by Bob Hausmann to approve a $.20 per hour increase to David Jaros as he has completed the six-month probationary period, with the raise to be effective 10/8/2020. All members present voted aye. Motion carried.

Gravel Crushing and Gravel Supply Bid Letting: Motion by Jessy Biggins, second by Myron Johnson to advertise for gravel crushing bids and gravel supply bids (per ton) to be opened at a special meeting to be held October 22, 2020 at 9:00 a.m. The meeting will be held at the Commissioners

room with telephonic and Zoom options available to all Commissioners and bidders. All members present voted aye. Motion carried.

Road Concern: The Commission received a letter from the law firm of Morgan Theeler from Mitchell, representing Jay and Carla Schmitz, concerning the condition of a stretch of road on 350th Avenue, between 298th and 299th Streets. The Schmitz' have issues that the road has not been maintained properly and is six feet below the approach to their property in several locations.

Motion by Myron Johnson, second by Jessy Biggins to recognize receipt of the letter and to advise Jay and Carla Schmitz, and their attorney, that the highway crew will take the proper equipment to the road to build up the road to remedy their concerns. All members present voted aye. Motion carried.

Deputy Auditor Retirement: Motion by Jessy Biggins, second by Bob Hausmann to accept a letter of retirement from Joan Lunn, Deputy Auditor, effective December 31, 2020. All members present voted aye. Motion carried.

Deputy Auditor Position Opening: Motion by Jessy Biggins, second by Bob Hausmann to authorize the Auditor to advertise for applications to fill the Deputy Auditor position. All members present voted aye. Motion carried.

Adjourn: Motion by Jessy Biggins, second by Bob Hausmann to adjourn. All members present voted aye. Motion carried.

ATTEST: _____ _____
Julie Bartling, Gregory Co. Auditor Jeff Johnson, Chair

CITY OF BONESTEEL
REGULAR MEETING OF COMMON COUNCIL, OCTOBER 5, 2020

Council President Shelly Jons called the meeting to order on October 5, 2020 at 6:30pm in the Community Room located at 402 Mellette Street. Present: Council members Sue Vogt, Shelly Jons, Maritta Brown, Ed Jons, Jeremy Wollman and John Moor. Absent: None; others present: City Administrator Cody Spann and Maintenance Supervisor Jason Jons. Public Present was Kelly Wollman, Diane Burke, Terry Burke, Jeannie Applebee, John Applebee, Kathy Divine, John Divine, Jerry Spitzenburger and Andy Divine

Agenda
Motion by Maritta Brown, seconded by Sue Vogt, to approve the agenda as presented, all stated aye; motion carried.

Previous Minutes
Motion by Ed Jons, seconded by Maritta Brown, to approve the minutes of the previous council meeting as read, all stated aye; motion carried.

Old Business
Discussion on the Community Center Project and how to proceed was conducted with the public. Questions were asked about the MGR Tax and what kind of revenue that might provide. City Administrator Cody Spann presented projected numbers which were less than what would be needed to pay for a new building. Andy Divine asked questions about the cost of repairing the old City Hall and what would all have to be done on it to maintain the building. The City Administrator discussed the current condition of the building and what possible cost would be. The City Administrator also presented numbers of the annual cost to maintain the City Hall in the condition it is currently in. Discussion was presented on the funding it would take to repair the current City Building; the City Administrator is to check with District III to determine if there is funding available for projects of this level and to work with the Architect to get better estimates on cost to repair the existing building. Discussion on having a lease with the school for certain events; Jeremy Wollman talked about what that might entail and what could and could not be done in the school. Motion by Sue Vogt, seconded by John Moor, to have the City Administrator speak with Jim Schramm about getting cost estimates on repairing the current building or to find an engineer that would be needed to run these numbers, and to work with District III on determining funding available to pay for it, all stated aye; motion carried. Discussion on the Stryker Power-load system grant for the Ambulance service; motion by Jeremy Wollman, seconded by Maritta Brown, to give the Ambulance Service $1,000.00 to help pay for the Power Load system for the Ambulance Service, all stated aye; motion carried. Discussion on replacing the old Park Picnic tables; Maintenance Superintendent Jason Jons presented cost on Aluminum ones that the state uses at parks. Motion by Ed Jons, seconded by Sue Vogt, to purchase 6 – 8-foot Aluminum Picnic tables through the state program, all stated aye; motion carried. Discussion on the Skid Steer that the City Purchased; it arrived and the Snow Blower has been ordered.

New Business
Discussion on the Municipal Gross Receipts Tax and what it would take to get it put into place. Discussion on the Hidden Hills Campground; the camp ground is zoned residential and should be zoned as commercial. The City Administrator will work with District III on getting this changed. Discussion on the Pre-Disaster Mitigation Plan from the county and what hazard mitigations that city wants to do for the next five years. Motion by Sue Vogt, seconded by John Moor, to continue to be part of the County Pre-disaster mitigation plan and to work on getting a Generator for the Fire Hall and Community Room/City Hall building and to look into other projects that might mitigate hazards around town, all stated aye; motion carried.

Streets Report
No report given.

Maintenance Report
Discussion on the Insurance Review and what corrections are needed.

Parks & Rec Report
Discussion on the park bathroom repairs. Discussion on the Pool Repairs.

Water & Sewer Report
Discussion on water loss. Discussion on Tripp County Rural Water increasing their rates from $2.25/1000gals to $2.47/1000gals. Discussion on different sewer issues that were located throughout town over the last month; the Maintenance Superintendent is monitoring them and looking into options on correcting the issues.

Zoning Report
Building Permits 2020-011, 2020-012 and 2020-013 were presented to the council for review and approval. Motion by John Moor, seconded by Maritta Brown, to approve the building permits as presented, all stated aye; motion carried.

Code Enforcement
Police report was given. The council requested notices to be sent out to residence with violations on their properties.

Finance Report
Claims and payroll were presented for the month as follows:

General Fund Claims
Bomgaars, Supplies…$140.43, Bonesteel Enterprise, Publications…$152.92, Cuzn's Corner, Equipment Fuel…$55.95, Department of Labor, Reemployment Insurance…$0.44, FFB, Payroll Tax…$252.16, Golden West, Phone/Internet...$115.06, Jason Jons, Reimbursement…$35.00, Jim's Garbage Services, Services…$100.00, Koenig Lumber, Supplies...$8.99, Mark's Machinery, Skid Steer…$33,000.00, Menards, Supplies…$344.82, Payroll, Salaries…$3,297.00, Rosebud Electric Coop, Utilities…$1,109.08, Schramm Architect, Services…$3,000.00, SDPAA, Insurance…$10,579.08, SDRS, Retirement Investment…$197.82

Water Fund Claims
Banyon Data Systems, Annual Support Fee…$595.00, Department of Labor, Reemployment Insurance…$0.13, FFB, ACH Billing Fee…$25.00, FFB, Payroll Tax…$81.03, Jason Jons, Reimbursement…$4.60, NRWA, Rural Water Loan Payment…$289.68, Payroll, Salaries…$1,059.00, Rosebud Electric Coop, Utilities…$44.16, SD Dept of Health, Water Testing fee…$165.00, SDPAA, Insurance…$792.79, SDRS, Retirement Investment…$63.54, TCWUD, Water…$3,416.25, US Postal Service, Postage...$35.00

Sewer Fund Claims
Banyon Data Systems, Annual Support Fee…$595.00, City of Burke, Jet Vac Services…$180.00, Department of Labor, Reemployment Insurance…$0.13, FFB, Payroll Tax…$81.03, Payroll, Salaries…$1,059.00, SDPAA, Insurance…$227.60, SDRS, Retirement Investment…$63.54, Stan Houston, Supplies…$116.75, US Postal Service, Postage...$35.00

Motion by Sue Vogt, seconded by Ed Jons, to approve payment of monthly bills and pay roll, all stated aye; motion carried.

Meeting Date
Discussion on the next council meeting date; Motion by Maritta Brown, seconded by John Moor to move the November Meeting date to November 5, 2020, all stated aye; motion carried. The next council meeting will be held on Thursday November 5, 2020 at 6:30pm at the community room located at 402 Mellette Street.

Adjourn
Motion by John Moor, seconded by Jeremy Wollman to adjourn at 8:25pm, all stated aye; motion carried.

_____
Shelly Jons, Council President

ATTEST: _____
Cody Spann, City Administrator

Gregory City Council
Regular Meeting Minutes
October 5, 2020

The Gregory City Council met in regular session at the Gregory Fire Hall at 620 Church Ave on Monday, October 5, 2020 at the time of 6:00 p.m. The following members were present: Mayor Scott Anshutz; Council Members, Seymour Studenberg, Guyla Husman, Kristi Drey, Ashley Lozano and Shana Flakus. Council member absent was Cory Graber. Also present were News Reporter Patty Connealy, Librarian Tara Engel, Public Works Supt. Alex Hamilton and Finance Officer Al Cerny.

Agenda
Motion was made by Guyla Husman to add dog complaints to the agenda and to approve the rest of the agenda as was posted, seconded by Ashley Lozano. All members voted aye.

Minutes
Motion was made by Seymour Studenberg to approve the September 21, 2020 council meeting minutes as written, seconded by Shana Flakus. All members voted aye.

Public Forum/Visitors
There was nobody present for the public forum portion of the meeting.

Department Head Reports
Librarian Tara Engel reported on the virtual meetings that she had the past two weeks. The Gregory Library was mentioned for applying for and receiving grants. She has been re-organizing some library books.

Public Works Supt. Alex Hamilton informed the council that the contractor should be seal coating 30 streets either on Tuesday or Wednesday of this week. The security system is being installed but is not completed yet. Alex had some quotes on new skid loaders but wanted to look at two of them before he presented the quotes to the council members.

New Business
Ordinance No. 2020-02
Ordinance No. 2020-02 was placed on its first reading. This ordinance would eliminate the 3-year time requirement to build on a lot purchased in Grandview addition. Three members from the BID group were present to show BID's support of the ordinance. The BID members were Doug Pochop, Rick Messerschmidt and Gregg Drees. Rick spoke about the recent grant application made to help fix up some of the housing in Gregory. After further discussion, motion was made by Guyla Husman to approve the first reading of Ordinance No. 2020-02, seconded by Ashley Lozano. All members voted aye.

Personnel Handbook
The council members were informed about some proposed changes to the employee handbook. The proposed changes were made to give employees who work a scheduled 32 hours per week, full time benefits that are prorated. The changes would give all employees working 32 hours per week, 80% of the benefits received by employees who work 40 hours per week. The proposed changes would affect the head librarian and chamber secretary. Motion was made by Kristi Drey to approve the changes in the handbook to allow 32 hour per week employees to receive 80% of the full time benefits of 40 hour

per week employees, seconded by Ashley Lozano. All members voted aye. It was also agreed that the library should be closed on holidays.

County Law Enforcement Contract
The council reviewed a law enforcement contract with the Gregory County Sheriff's Office for law enforcement coverage when the Gregory Police Department needs help. The County would charge $400 per day (24 hours) for the service. The council agreed to the contract.

Hazard Mitigation Prevention
The council members reviewed the 5-year hazard mitigation plan for Gregory County and in particular the plan as it pertains to the City of Gregory. The council agreed that drainage should remain the top priority along with a backup generator for the auditorium. The other items from the current plan would be left in place except for the fire sirens, which have been replaced.

Re-cycle Trailer
The city has received a $7,200 grant to help purchase a re-cycling trailer from the State of South Dakota. The trailer would cost $14,400. Motion was made by Ashley Lozano to pay the $7,200 for the match to purchase the re-cycling trailer, seconded by Shana Flakus. All members voted aye.

Purchase iPads
The council members were asked if they would be ok with iPads that just had the Wi-Fi hookup instead of models with both Wi-Fi and cellular. The council members agreed that the Wi-Fi iPads would work out. The iPads would be bought with the Cares Funds that the city has available. The iPads would be used for council meetings and if the meetings would be remote, they would come in handy.

COVID Resolution/Update
Mayor Anshutz reported that at this time, there were 36 active cases of COVID in Gregory County. The cases are down slightly. Everyone was encouraged to follow the CDC guidelines and there would be no changes made on the city level at this time.

Dog Complaints
A few of the council members reported that they had received complaints of dogs barking, running at large, and acting in a hostile manner. The council would like to have the city ordinances on dogs enforced and if there needs to be some changes made, the ordinance should be reviewed.

Claims
Motion was made by Kristi Drey to pay the following claims, seconded by Ashley Lozano. All members voted aye. (*DELETED*)

9/29/2020 Payroll: 3rd Cent Econ Dev., $988.80; Mayor/Council, $6,675.00; P & Z, $350.00; Finance Officer, $2272.80; General Government Bldg., $185.40; Police Dept., $3,600.91; Street Dept., $2,809.34; Water Dept., $3,132.80; Sewer, $480.00; Library, $1,358.00; Gross Amt, $21,853.05

Executive Session (Personnel)
Motion was made by Guyla Husman to go into executive session to discuss the hiring of a Police Chief, seconded by Ashley Lozano. All members vote aye. Council went into executive session at 7:00 p.m. At 7:16 p.m., Mayor Anshutz took the council out of executive session.

Results of the executive session

Motion was made by Ashley Lozano to offer the Chief of Police position to an applicant for the position, seconded by Kristi Drey. All members voted aye. (The applicant will be notified and if the offer is accepted, the details will be placed in the next council meeting minutes).

Adjourn
Motion was made by Guyla Husman to adjourn, seconded by Seymour Studenberg. All members voted aye.

_____
Scott Anshutz, Mayor

ATTEST: _____
Al Cerny, Finance Officer

Burke City Council
Regular Meeting
October 13, 2020

The regular meeting of the Burke City Council was called to order by Mayor Thomas Glover at 7:01 PM in the Civic Center Meeting Room. Council members present were Wyatt Reis, Tyler Van Metre, Vickie Dobesh, Megan Lindholm and Todd Halsne. Also present was Finance Officer Mike Glover, Supt of Utilities Wade Broome, City Attorney Rachelle Norberg, Chief of Police Mark Green, Mark Benter, Karla Johnson, Brady Pavel, Mary Reiser, Steve Anson, Rick Reed and Jack Gunvordahl.

Approve Agenda:
Motion by Todd Halsne, second by Wyatt Reis to approve the agenda as presented. Motion carried.

Oath of Office:
Mayor Glover administered the oath of office to Mark Benter – Ward III. The oath of office was signed by alderman Benter and he was officially seated as Councilman Ward III for the rest of the term. The term expires in May of 2021.

Conflict of Interest:
None.

Public Input:
None.

Approve Minutes:
Minutes of the September 14, 2020 Regular Meeting:
Motion by Tyler Van Metre, second by Todd Halsne to approve the minutes of the September 14, 2020 Regular Meeting. Motion carried.

Approve Reports:
Motion by Vickie Dobesh, second by Tyler Van Metre to approve the September, 2020 financial statement. Motion carried.

The September 2020 expense and revenue budget analysis were given for informational purposes.

Claims:
The claims were presented for approval. After some discussion motion by Wyatt Reis, second by Megan Lindholm to approve and authorize payment of claims presented by the Finance Officer and the Rosebud Electric and Missouri River Energy Services bills that have not come in yet. Motion carried.

Supt. of Utilities:
Building Permit:
Building Permit #2019-9-9C for Bruce Wiedeman was presented for an extension approval. Motion by Tyler Van Metre, second by Todd Halsne to approve the extension of building permit #2019-9-9C of Bruce Wiedeman to construct a 14'x34' addition to house at 833 Franklin St. Motion carried.

Public Hearing for Variance on Building Permit #2020-9-14A of Jean Duerfeldt:
Mayor Glover opened the public hearing at 7:10 pm. A description of what Jean would like to do was presented. Ms. Duerfeldt would like to construct a 12' x 16' deck on the

north side of her house. With no one appearing or in opposition to the building permit variance, Mayor Glover closed the public hearing at 7:12 PM.
Building Permit #2020-9-14A for Jean Duerfeldt was presented for approval. Having collected the required signatures for the variance motion by Wyatt Reis, second by Tyler Van Metre to approve Building Permit #2020-9-14A of Jean Duerfeldt to construct a 12' x 16' deck on north side of house at 145 W 4th St. Motion carried.

The water loss for September was 23.26%. With 1,243,720 gallons lost.

Skid Steer Loader:
Wyatt Reis presented a quote for a new Bobcat S76 Skid Steer Loader. The quote is for $50,000 depending on the options you pick. The current Skid Steer is 20 years old and showing its age. The quote is a government bid and is about $20,000 less than if someone from the public went to a dealership and tried to buy the same thing.
Motion by Wyatt Reis, second by Vickie Dobesh to purchase the S76 Bobcat with all the options. Motion carried.

Mayor Glover talked about the GIS Mapping that District III will do. The Council was in favor of having District III attend a meeting and explain what they do.

Next Superintendent of Utilities, Wade Broome informed the Council of the need for more product to be placed at the City Park playground. The current engineered wood fiber that is in place is not close to the level that is needed. Wade got 1 quote which was $4,000 for 90 yards. Wade thinks the City will need 180 – 200 yards of Engineered Wood Fiber. Wade is waiting on one other place to get a quote from. Motion by Tyler Van Metre, second by Megan Lindholm to authorize Wade to purchase some Engineered Wood Fiber for the City Park at the lowest price he can find. Motion carried.

Code Enforcement:
There were two letters sent to two properties that had unlicensed vehicles on them.

Golden West Agreement Renewal:
Rick Reed met with the Council to inform them that the current contract between the City and Golden West, that was made in 2010 is set to expire on December 31, 2020. The contract can be renewed by resolution. The council was in agreement to renew the contract for another 10 years.
Resolution 2020-10-13A, Resolution of the City of Burke, South Dakota Approving Renewal of Cable Television Franchise, was presented for approval. Motion by Vickie Dobesh, second by Tyler Van Metre to approve and pass Resolution 2020-10-13A, Resolution of the City of Burke, South Dakota Approving Renewal of Cable Television Franchise. Roll Call vote: Van Metre-aye, Lindholm-aye, Benter-aye, Reis-aye, Halsne-aye, Dobesh-aye. Resolution 2020-10-13A was passed and adopted on this 13th day of October 2020.

Health Insurance:
Motion by Tyler Van Metre, second by Wyatt Reis to go into executive session at 7:44 pm to discuss Health Insurance plans. Motion carried.
Mayor Glover declared the executive session over at 8:30 pm with the following action taken. Motion by Tyler Van Metre, second by Megan Lindholm to sign up for the Complete Blue 3500 WellMark plan for the month of December 2020. Motion carried.
A decision on a health plan for the 2021 year will be made at the November regular meeting.

Police:
New Chief of Police Mark Green met with the Council. Mark asked to purchase some

equipment and furniture that is needed. The Council was fine with Mark making the purchases and Finance Officer, Mike Glover stated that there was money left in the budget. Mark will be paid hourly in the month of October then go on salary starting in November. Hourly rate is $20.00 per hour.

Economic Development:
Jack Gunvordahl met with the council again to discuss the Burke Estates Development. A lengthy discussion was held about developing the lots for houses to be built on. The Council would like the developers to check into getting a price on having an engineer look at the project and getting their opinion on what needs to be done. The Council would be willing to help with the expense of the engineer. The Council thanked Jack for attending the meeting.

COVID-19:
There wasn't anything new on COVID-19. The numbers from last month to this month are better, but not as good as 2 months ago.

Liquor Operating Agreements:
After a brief discussion, motion by Todd Halsne, second by Wyatt Reis to renew the current operating agreements for 2 more years (2021 & 2022) with the same rates. Motion carried.

Bid Opening for Commercial Refrigerator:
There was only 1 bid submitted. The bid was from Brad & Tela Hutchison for $106. Motion by Wyatt Reis, second by Mark Benter to reject all bids and advertise the Commercial Refrigerator for sale at $400. Motion carried.

2021 Liquor Licenses:
The on-off sale license for Bill's Bar & Stella's and the on-sale license for the VFW for 2021 were presented for approval.
Motion by Tyler Van Metre, second by Todd Halsne to approve the following 2021 licenses:
2021 on-off sale liquor license for Stella's, 2021 on-off sale liquor license for Bill's Bar and
2021 on-sale liquor license for VFW. Motion carried.

2020 Audit:
Finance Officer Mike Glover gave each Council Member and the Mayor a copy of the audit report for the years 2018 & 2019 from Schoenfish & Co., Inc. There weren't any major findings other than the same one that is mentioned in every audit, the City has such a small staff, delegation of duties isn't adequate. Almost every small city in the state has the same issue. Overall, the city is in very good financial shape.

Gregory County Hazard Mitigation Plan:
Finance Officer, Mike Glover informed the Council that it was time to approve the Gregory County Hazard Mitigation Plan. In doing this District III is needing a list of mitigation projects to include in the plan. The list the Council came up with is powerline burial, consider joining the Firewise Communities Program, addressing water drainage on West 8th & 9th Streets and making sure the generator that would be used to run the Civic Center works.

Civic Center Front Doors:
Finance Officer, Mike Glover stated that the front double doors are in need of repair. The weather stripping is in bad shape and the closures are also in rough shape. Since we just did a major renovation of the Civic Center, Motion by Todd Halsne, second by Vickie Dobesh to approve replacing the double doors on the west side of the Civic

Center. Motion carried.

New Members to the Fire Department Roster for 2020:
Motion by Wyatt Reis, second by Vickie Dobesh to approve new Fire Department members, Chris Langford and Rhiley Ellwanger to the 2020 roster. Motion carried.

Water Rates:
Finance Officer, Mike Glover informed the Council that Tripp County Water will be raising their rates starting on January 1, 2021. Their rates will increase $.22 per 1,000 gallons. Which is about a 10% increase. After some discussion the Council agreed to the following, starting January 1, 2020 water rates will increase to $4.65 per 1,000 gallons and the minimum will increase to $16 per month. Then starting on January1, 2022 the water minimums will increase $1 per year for four consecutive years. The first reading of the new water rate ordinance will be held November 9, 2020.

Adjournment:
Mayor Glover declared the meeting adjourned at 10:10 pm.

ATTEST: _____ _____
Mike Glover, Finance Officer Thomas Glover, Mayor

PHONE LOG - PLANNING TEAM MEETING #2

We have charged your credit card for the following conference call. This e-mail will serve as your receipt. The charge will appear on your credit card bill as "Conference Call Services". If you have any questions, please contact customer support at conference-support@telephony.com or call 1-800-535-1005. Please refer to Support Authorization Number 1092493-17187669 in any correspondence regarding this transaction.

Your Conference ID: Gregory County PDM

Transaction Summary

Transaction Number:	37957489
Description:	Web-Scheduled Premium 800
Card Type:	Visa
Last Four Digits:	2403
Transaction Total:	$13.10

Transaction Details

Conference Date:	Thursday, November 12, 2020
Reservation Start Time:	01:00 PM Central Std Time
Reservation End Time:	02:25 PM Central Std Time
Total Calls:	6
Total Minutes:	103
Rate per Minute:	0.10
Web-Scheduled Premium 800	$10.30
FUSF Surcharge	$2.80

Conference Details

#	Start Time	End Time	Caller Nbr	Dialed Nbr	Mins.	Rate	Charge
1	12:50:41	13:16:41	605-775-2913	800-567-5900	26	0.10	2.60
2	12:57:50	13:16:50	605-665-4408	800-567-5900	19	0.10	1.90
3	12:58:22	13:16:22	605-830-0931	800-567-5900	18	0.10	1.80
4	12:58:54	13:16:54	605-830-1738	800-567-5900	18	0.10	1.80
5	12:59:44	13:16:44	605-775-2664	800-567-5900	17	0.10	1.70
6	13:00:46	13:05:46	605-835-8270	800-567-5900	5	0.10	0.50

APPENDIX C: History of Previous Hazard Occurrences

This appendix provides details about hazard events that have impacted Gregory County in the past. **Table C.1** below lists all of the events since 1970 that resulted in a major disaster declaration in which Gregory 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 Gregory County

Dec #	Date Disaster Declared	Type	Primary Damage Impact	Public Assistance To County
3015	Jun 1976	Drought		
999	Jul 1993	Severe storms; Tornado		
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		≈$40,000
1620	Dec 2005	Severe winter storm		
1702	May 2007	Severe storms; Tornado; Flood		≈$25,000
1774	Jul 2008	Severe storms; Flooding	Roads, bridges	≈$85,000
1886	Mar 2010	Severe winter storm	Emergency Protection	≈$180,000
1887	Mar 2010	Severe winter storm	Utilities	≈$70,000
1915	May 2010	Flooding	Roads, bridges	≈$195,000
1984	May 2011	Flooding	Roads	≈$40,000
4440	Jun 2019	Severe winter storms; Flooding	Roads, bridges	≈$1,380,000
4463	Sep 2019	Severe storms; Flooding	Roads, bridges	≈$120,000
4467	Oct 2019	Severe storms; Tornado; Flooding	Roads, bridges	≈$640,000
4469	Nov 2019	Severe storms; Tornado; Flooding	Roads, bridges	≈$225,000

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

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

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

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

The table includes the following information about the events:

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

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

DATE	EVENT TYPE	DESCRIPTION	MAG	PROP DAMAGE ($1,000s)	CROP DAMAGE ($1,000s)
8/9/1961	Hail		1.75 in.		
5/15/1962	Tornado		F3		
5/21/1962	Tornado		F1	2,500	
6/12/1962	Tornado		F0		
5/8/1965	Tornado		F3	2.5	
7/12/1965	Hail		3.00 in.		
6/4/1966	Tornado		F2	250	
7/4/1966	Thunderstorm Wind				
6/18/1967	Tornado				
6/18/1967	Tornado				
6/20/1968	Tornado		F2		
6/19/1975	Thunderstorm Wind				
5/16/1977	Hail		0.75 in.		
7/17/1978	Thunderstorm Wind				
7/29/1979	Hail		1.75 in.		
6/6/1980	Hail		1.75 in.		
5/28/1985	Tornado		F0		
5/28/1985	Hail		1.75 in.		

DATE	EVENT TYPE	DESCRIPTION	MAG	PROP DAMAGE ($1,000s)	CROP DAMAGE ($1,000s)
5/30/1985	Tornado		F0		
9/02/1985	Hail		0.75 in.		
9/4/1985	Tornado		F1	2.5	
6/6/1986	Thunderstorm Wind		69 kts.		
8/5/1987	Thunderstorm Wind		70 kts.		
8/15/1987	Hail		0.75 in.		
8/19/1987	Thunderstorm Wind		50 kts		
9/04/1987	Hail		0.75 in.		
7/29/1988	Hail		1.75 in.		
8/3/1988	Hail		2.75 in.		
8/25/1990	Hail		1.75 in.		
6/30/1991	Hail		2.75 in.		
6/16/1992	Hail		1.75 in.		
6/16/1992	Thunderstorm Wind		60 kts.		
9/1/1993	Hail		1.75 in.		
6/6/1994	Hail		1.75 in.		
6/6/1994	Thunderstorm Wind		69 kts.	50	
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. Power outages occurred, one due to a transformer exploding in Gregory County.		150	
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.			
2/10/1996	High Wind		58 kts.	10	
3/24/1996	Blizzard	Snow accumulating 3 to 8 inches was accompanied by winds over 50 mph at times, producing widespread whiteout conditions. Numerous vehicles slid into ditches and many people were stranded in vehicles. There were some rollovers and other accidents.		10	
4/25/1996	High Wind		62 kts.	80	
10/29/1996	High Wind		57 kts.		
11/14/1996	Ice Storm	Several periods of freezing rain caused widespread damage and paralyzed travel. Widespread damage occurred to electrical poles and lines, leaving thousands without power for up to four days. Numerous accidents occurred. Tree damage was widespread with tree debris blocking several roads and siedwalks. Some farm buildings and other small structures were damaged by the weight of ice and snow on roofs.		10	
12/16/1996	Blizzard				

DATE	EVENT TYPE	DESCRIPTION	MAG	PROP DAMAGE ($1,000s)	CROP DAMAGE ($1,000s)
12/25/1996	Heavy Snow				
1/4/1997	Blizzard				
1/9/1997	Blizzard				
1/15/1997	Extreme cold	Temperatures a few degrees below zero accompanied by wind gusts over 40 mph created wind chills as cold as 70 below zero. Drifting snow and areas of low visibility in blowing snow also occurred in open areas.			
2/3/1997	Heavy Snow				
3/12/1997	Flood				
4/1/1997	Flood				
4/6/1997	High Wind		63 kts.	10	
4/9/1997	Heavy Snow				
7/27/1997	Thunderstorm Wind		61 kts.	10	10
8/29/1997	Thunderstorm Wind		61 kts.	5	
9/8/1997	Thunderstorm Wind		61 kts.	50	
3/31/1998	Heavy Snow	Snowfall of 6 to 16 inches occurred over a large area, causing some damage to power lines resulting in power outages.			
5/14/1998	Hail		2.00 in.		
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	
5/10/1999	Hail		1.75 in.		
6/7/1999	Hail		1.50 in.		
6/22/1999	Tornado		F0		
6/22/1999	Hail		1.75 in.		
6/22/1999	Hail		1.75 in.		
6/22/1999	Hail		1.50 in.		
6/22/1999	Hail		1.25 in.		
7/2/1999	Hail		1.50 in.	500	1000
7/2/1999	Thunderstorm Wind		52 kts.	10	
7/18/1999	Hail		1.50 in.		
7/18/1999	Thunderstorm Wind		65 kts.		
11/1/1999	Drought	Generally dry weather that began in August continued through November. Dry surface and soil conditions became quite pronounced in November. Water levels fell, especially in small streams and lakes. Damage to winter wheat crops was feared. The area experienced the third driest fall (September through November) period on record. Unusually warm weather during the month contributed to the drying. The most noticeable manifestation of the dry conditions was the large number of grass fires across the area. While damage was mainly limited to the grasslands, considerable manpower and expense was needed to fight the fires.			

DATE	EVENT TYPE	DESCRIPTION	MAG	PROP DAMAGE ($1,000s)	CROP DAMAGE ($1,000s)
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				
4/5/2000	High Wind		56 kts. E	17	
5/11/2000	Hail		1.25 in.	5	
9/18/2000	Lightning	Lightning caused a grass fire which burned about 500 acres.			
11/11/2000	Winter Storm				
12/16/2000	Blizzard				
12/28/2000	High Wind		52 kts. E		
1/29/2001	Blizzard				
2/7/2001	Winter Storm				
2/24/2001	Winter Storm				
11/26/2001	Heavy Snow	Most areas of southeast South Dakota received at least 8 inches of snow, with Bonesteel receiving 16 inches. The snowfall closed many schools and businesses, closed some government offices, and severely hampered transportation. The wet and heavy nature of the snow made it difficult to clear away.			
2/11/2002	High Wind		50 kts. E		
3/14/2002	Winter Storm				
6/7/2002	Thunderstorm Wind		61 kts. E	10	
8/9/2002	Tornado	A tornado destroyed a church, a county highway shop, several garages, several small sheds, a mobile home, a camper, and a ten thousand bushel silo. The church was ripped from its foundation, with debris and contents blown over a wide area. Tree damage includes uprooted trees, and power lines were blown down. A resulting power outage lasted for several hours. Windows in many homes and some businesses were broken. The Herrick Honey House was severely damaged, and a honey truck was tipped over. Holes were punched in the walls of some houses by flying debris.	F2	1000	
8/9/2002	Hail		1.75 in.		
8/9/2002	Hail	Large hail, driven by severe winds, broke windows in vehicles and buildings. A man was slightly injured when he was hit by hail while sitting in his pickup, after the hail had broken the window.	1.50 in.	100	
8/9/2002	Hail		1.50 in.		
8/9/2002	Hail		1.50 in.		
8/9/2002	Thunderstorm Wind		65 kts. E		
8/21/2002	Hail		1.75 in.		
1/15/2003	Heavy Snow				
2/14/2003	Winter Weather				

DATE	EVENT TYPE	DESCRIPTION	MAG	PROP DAMAGE ($1,000s)	CROP DAMAGE ($1,000s)
3/3/2003	Winter Weather				
4/6/2003	Heavy Snow				
6/9/2003	Tornado		F0		
6/9/2003	Tornado		F0		
6/11/2003	Hail		1.50 in.		
6/24/2003	Thunderstorm Wind		61 kts. E	10	
8/19/2003	Thunderstorm Wind		61 kts. E	5	
11/22/2003	Winter Storm				
12/8/2003	Winter Storm				
2/11/2004	Winter Weather				
3/15/2004	Heavy Snow				
7/12/2004	Hail		2.75 in.		
7/12/2004	Hail		2.50 in.		
7/12/2004	Hail		2.50 in.		
7/12/2004	Hail		1.75 in.		
8/2/2004	Hail		1.75 in.		
10/29/2004	High Wind		52 kts. E		
1/4/2005	Heavy Snow				
3/10/2005	High Wind		52 kts. E	10	
6/7/2005	Hail		1.25 in.		
6/7/2005	Thunderstorm Wind		61 kts. E		
8/25/2005	Hail		1.75 in.		
8/25/2005	Hail		1.75 in.		
8/25/2005	Hail		1.25 in.		
9/18/2005	Hail		1.75 in.		
11/8/2005	High Wind		52 kts. E		
11/27/2005	Ice Storm	Heavy freezing rain coated roads, and power lines with ice up to 3 inches thick throughout SE South Dakota. Many roads were shut down for extended periods. Most schools and businesses were forced to close. Many miles of power lines and thousands of poles were brought down, resulting in power outages to thousands of households. In some rural areas, power was out for more than two weeks. Many people took shelter wherever they could. Damage to power poles and lines was so great that repairs required assistance from crews from eight states.		1000	
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		100	

DATE	EVENT TYPE	DESCRIPTION	MAG	PROP DAMAGE ($1,000s)	CROP DAMAGE ($1,000s)
		had been coated and weighted down by ice in the area hit by the ice storm.			
11/30/2005	Winter Weather				
2/16/2006	Winter Weather				
3/12/2006	Winter Storm				
3/19/2006	Winter Storm	A prolonged period of snowfall spread into the area from the west and south, and continued for over a day, with 24 inches recorded at Burke. Winds gusting over 35 mph 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				
8/10/2006	Thunderstorm Wind		69 kts. E		
12/20/2006	Winter Storm	Freezing rain caused significant icing of a quarter to a half inch, which caused branches and power lines to break in several places. The freezing rain was followed by 4 to 7 inches of snow, with the 7 inch report northwest of the town of Gregory. Travel was greatly slowed and was brought to a standstill in places. Several vehicles slid off roads. Classes for December 21st were cancelled at several schools.		40	
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.			
2/12/2007	Winter Weather				
2/24/2007	Winter Storm	Rain changed to freezing rain, causing light icing before the precipitation quickly changed to snow. Snow accumulated 5 to 7 inches. The icing and subsequent snow accumulation made travel very difficult, with several vehicle accidents and numerous vehicles sliding into ditches.			
2/28/2007	Winter Weather				
3/1/2007	Blizzard				
4/21/2007	Hail		2.50 in.		
5/5/2007	Tornado		EF0		
5/5/2007	Tornado		EF0		
5/5/2007	Thunderstorm Wind		65 kts. E	30	
6/21/2007	Hail		1.75 in.		
8/13/2007	Hail		1.50 in.		
12/1/2007	Winter Weather				
12/25/2007	Winter Weather				
1/20/2008	Winter Weather				
2/11/2008	Winter Weather				
3/31/2008	Winter Weather				
4/10/2008	Blizzard				
4/25/2008	Winter Weather				

DATE	EVENT TYPE	DESCRIPTION	MAG	PROP DAMAGE ($1,000s)	CROP DAMAGE ($1,000s)
5/23/2008	High Wind		52 kts. E		
6/5/2008	Flash Flood				
6/17/2008	Hail		1.75 in.	100	
6/17/2008	Hail		1.75 in.	100	
6/17/2008	Hail		1.75 in.	50	
7/10/2008	Hail		1.75 in.		
7/10/2008	Hail		1.50 in.		
7/28/2008	Thunderstorm Wind		69 kts. E	5	
8/11/2008	Hail		1.75 in.		
11/6/2008	Blizzard				
11/7/2008	Winter Weather				
12/14/2008	Blizzard				
12/20/2008	Winter Weather				
2/26/2009	Winter Weather				
3/30/2009	Blizzard	Snowfall of 4 to 12 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; and many roads not officially closed were impassable. The town of Gregory reported 10 inches of snow.			
4/4/2009	Blizzard				
6/17/2009	Hail		1.75 in.	100	
6/17/2009	Hail		1.75 in.		
8/3/2009	Hail	Large hail, up to two inches in diameter, fell in a swath a few miles wide from northwestern to south central Gregory County. The hail broke numerous windows, severely damaged siding and roofs of homes and other buildings, and severely damaged vehicles, while covering the ground in several places. Property damage was especially severe in the town of Gregory. Crop damage was also severe along the swath, with corn crops in some areas destroyed to the point of only small stubble left.	2.00 in.	2000	1000
8/3/2009	Hail		2.00 in.		
8/3/2009	Hail		1.75 in.		
8/3/2009	Hail		1.75 in.		
8/3/2009	Hail		1.75 in.		
8/3/2009	Hail		1.50 in.		
8/15/2009	Flash Flood				
12/8/2009	Winter Weather				
12/23/2009	Blizzard	Prolonged snowfall produced heavy accumulations over southeast South Dakota, ranging up to over 20 inches in several areas. The snowfall took place from two days before to the day after Christmas. The snowfall was accompanied by increasing north to northwest winds which caused widespread blizzard conditions on Christmas day and the start of the next day.			
1/6/2010	Blizzard	Snowfall of 2 to 5 inches, previously existing snow cover, and northwest winds gusting to over 40 mph produced widespread			

DATE	EVENT TYPE	DESCRIPTION	MAG	PROP DAMAGE ($1,000s)	CROP DAMAGE ($1,000s)
		blizzard conditions, with visibilities less than a quarter mile. New snowfall included 4 inches at the town of Gregory. Schools and businesses were closed, and travel became impossible in much of the area. The wind combined with cold temperatures to produce wind chills colder than 35 below zero during the latter part of the storm. This extreme cold continued into the next day, Friday, January 8th.			
1/7/2010	Extreme cold	Persistent north/northwest winds combined with very cold air to produce wind chill values that dropped to 35 below zero.			
1/25/2010	Winter Weather				
5/24/2010	Hail		1.75 in.		
5/24/2010	Hail		1.50 in.		
5/29/2010	Hail		1.50 in.		
6/1/2010	Flash Flood				
7/17/2010	Hail		2.00 in.		
7/23/2010	Tornado		EF0		
7/23/2010	Tornado		EF0		
8/30/2010	Thunderstorm Wind		61 kts. E		
10/26/2010	High Wind		52 kts. E		
12/10/2010	Winter Weather	Snowfall ranging from 2 to 8 inches was accompanied by sustained winds reaching 40 mph at times, with gusts as high as 55 mph. The snowfall, strong winds, and existing snow cover resulted in widespread blizzard conditions. Travel was impossible in much of the area, and businesses and schools were forced to close.			
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 many businesses were forced to close as travel became difficult to impossible.			
1/1/2011	Blizzard				
1/9/2011	Winter Weather				
2/1/2011	Extreme cold	North/northwest winds averaging 15 to 30 mph combined with temperatures dropping below zero to produce wind chills of 35 to 40 below zero.			
2/20/2011	Heavy Snow				
3/7/2011	Winter Weather				
4/15/2011	Heavy Snow				
6/1/2011	Flood	Flooding from upstream spring snowmelt and subsequent heavy rain, affecting mainly the east shore of the Missouri River, also came to effect the Gregory County shore as it increased. A few roads and recreation areas near the river were flooded.			
7/1/2011	Flood	Flooding from upstream spring snowmelt and subsequent heavy rain, affecting mainly the east shore of the Missouri River, also continued to affect parts of the Gregory County shore. A few roads and recreation areas near the river remained flooded.			
7/15/2011	Excessive Heat				
8/1/2011	Flood	Major impacts from Missouri River flooding continued into August, with flooding varying from minor to major, and			

DATE	EVENT TYPE	DESCRIPTION	MAG	PROP DAMAGE ($1,000s)	CROP DAMAGE ($1,000s)
		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. A few roads and recreational areas near the river remained flooded.			
10/4/2011	Wildfire	Several wildfires broke out during a four day period. Warm and dry weather, strong winds, and dry vegetation contributed to the fires starting and spreading. The fires affected grassland and cropland, including baled hay. Several wildfires damaged grassland and crops. No injuries to humans or livestock were reported. The largest fire started in a bean field 3 miles south and 1 mile west of Burke, and burned over a one mile stretch before it was brought under control by four fire departments. The amount of crop damage was not known.			
4/15/2012	High Wind		50 kts. M		
6/1/2012	Drought	Well below normal rainfall aggravated long term dry soil conditions, producing stress on crops which had been planted unusually early due to a warm late winter and early spring. The crops had begun their growth with ample mid spring rains, but the stress quickly developed with the return to dry conditions which had existed generally since the previous fall.			
6/26/2012	Excessive Heat				
7/1/2012	Drought	Drought conditions became established over the area. Stress on crops increased with no relief during the month. Hot weather added to the stress. Crop damage became certain. Severe non-ag water supply problems were not observed, but the long term dry conditions raised fears for the future.			
7/2/2012	Excessive Heat				
7/15/2012	Excessive Heat				
7/18/2012	Excessive Heat				
8/1/2012	Excessive Heat				
8/1/2012	Drought	Drought was generally listed as severe to extreme for the area, and was being compared to the worst of the dust bowl years, though not yet over as long a time period. Stress on crops continued, even though August was less hot than July. Crop damage was quite evident. Many local governments had water use restrictions in place.			
8/16/2012	Wildfire	A wildfire burned grassland and trees on and near the Karl E. Mundt Wildlife Refuge. No structures were burned. The fire burned 146 acres, including 112 acres on the refuge and 34 acres of private land.			
9/1/2012	Drought	Drought conditions continued over all of southeast South Dakota. Rainfall for the month varied from around half to less than a quarter of normal. Stress on crops that prevailed over the growing season became even more evident with the start of harvest. Local governments continued to use water use restrictions in an effort to prevent serious water supply problems.			
10/1/2012	Drought	Drought conditions continued over all of southeast South Dakota in October with well below normal rainfall keeping soil and vegetation dry.			
10/17/2012	High Wind		60 kts. M		
11/1/2012	Drought	Drought conditions continued over all of southeast South Dakota in November.			
12/1/2012	Drought	Drought conditions continued over all of southeast South Dakota in December. Although precipitation was generally			

DATE	EVENT TYPE	DESCRIPTION	MAG	PROP DAMAGE ($1,000s)	CROP DAMAGE ($1,000s)
		normal to above normal, the amount of excess over the low winter normals was not enough to relieve the dry conditions. The effects of the drought on farmers and ranchers continued. Hunting was also affected, with low pheasant numbers, and disease in the deer population.			
12/9/2012	Blizzard				
12/27/2012	Winter Weather				
1/1/2013	Drought				
2/1/2013	Drought				
2/10/2013	Blizzard	Variable snowfall of 2 to 8 inches, northwest winds gusting to 45 mph, and snow cover existing before the storm in part of the area, produced blizzard conditions with visibilities below a quarter mile in blowing snow in many areas. The low visibilities and drifting snow forced some businesses to close, and also forced several school closings on Monday February 11th.			
3/1/2013	Drought				
3/9/2013	Winter Weather				
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 10.5 inches at Burke. The winter precipitation made travel very difficult, resulting in schools and businesses being forced to close.			
4/22/2013	Winter Weather	Wet snow accumulated 3 to 6 inches, including 6 inches near Gregory.			
5/1/2013	Drought				
10/11/2013	High Wind		50 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.			
1/16/2014	High Wind		51 kts. M		
1/26/2014	High Wind		50 kts. E		
2/4/2014	Winter Weather				
11/15/2014	Winter Weather				
12/15/2014	Winter Storm				
12/26/2014	Winter Weather				
1/3/2015	Winter Weather				
1/31/2015	Winter Weather				
3/3/2015	Winter Weather				
6/20/2015	Thunderstorm Wind		52 kts. EG		
7/5/2015	Thunderstorm Wind		52 kts. EG		
8/6/2015	Thunderstorm Wind		61 kts. EG		
8/18/2015	Thunderstorm Wind		52 kts. MG		
11/20/2015	Heavy Snow				

DATE	EVENT TYPE	DESCRIPTION	MAG	PROP DAMAGE ($1,000s)	CROP DAMAGE ($1,000s)
11/30/2015	Winter Storm				
12/15/2015	Winter Weather				
12/25/2015	Winter Storm				
2/2/2016	Winter Weather				
2/19/2016	High Wind		58 kts. MG		
3/23/2016	Winter Storm				
5/25/2016	Hail		1.75 in.		
6/10/2016	Excessive Heat				
7/19/2016	Excessive Heat				
11/17/2016	Winter Storm				
12/16/2016	Winter Storm				
1/24/2017	Winter Storm				
2/23/2017	Winter Storm				
6/13/2017	Hail		1.50 in.		
7/9/2017	Thunderstorm Wind	A grain bin and outbuildings were damaged near Fairfax.	63 kts. MG		
7/11/2017	Thunderstorm Wind		52 kts. EG		
9/19/2017	Hail		1.25 in.		
12/21/2017	Winter Weather				
12/26/2017	Cold/wind Chill				
12/31/2017	Extreme Cold	Record low high temperature of -5 at Gregory.			
1/10/2018	Winter Weather				
1/15/2018	Cold/wind Chill				
1/21/2018	Winter Storm				
2/5/2018	Winter Weather				
2/8/2018	Winter Weather				
2/10/2018	Cold/wind Chill				
2/19/2018	Winter Weather				
2/22/2018	Winter Weather				
2/24/2018	Winter Weather				
3/5/2018	Blizzard				
3/16/2018	Winter Weather				
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. Brutal winds gusting over 50 mph whipped visibility to less than a quarter mile at times. Businesses and schools were closed. Travel was not recommended for a two day period. Total snowfall of 16 inches measured at Gregory and Bonesteel and 14 inches near Burke.			
4/18/2018	Winter Storm				

DATE	EVENT TYPE	DESCRIPTION	MAG	PROP DAMAGE ($1,000s)	CROP DAMAGE ($1,000s)
6/1/2018	Thunderstorm Wind		61 kts. EG		
6/24/2018	Thunderstorm Wind		56 kts. MG		
7/8/2018	Heat				
7/11/2018	Heat				
7/12/2018	Flash Flood				
1/1/2019	Extreme Cold				
3/3/2019	Extreme Cold				
3/9/2019	Winter Weather				
3/14/2019	Blizzard				
4/11/2019	Blizzard				
6/4/2019	Hail		1.75 in.		
6/19/2019	Hail		1.00 in.		
6/28/2019	Heat				
6/29/2019	Heat				
6/30/2019	Heat				
6/30/2019	Hail		1.00 in.		
6/30/2019	Hail		1.75 in.		
6/30/2019	Hail		2.00 in.		
6/30/2019	Thunderstorm Wind		52 kts. MG		
6/30/2019	Tornado		EF0		
7/9/2019	Thunderstorm Wind		56 kts. EG		
8/6/2019	Hail		1.75 in.		50
8/6/2019	Thunderstorm Wind		88 kts. EG	40	
8/6/2019	Thunderstorm Wind		65 kts. EG	25	
8/6/2019	Hail		2.75 in.	5	
8/6/2019	Thunderstorm Wind		61 kts. EG		
8/6/2019	Thunderstorm Wind		61 kts. EG		
8/6/2019	Thunderstorm Wind		64 kts. MG		
8/6/2019	Tornado	A tornado touched down in the heart of Burke near Washington and 7th Streets, which severely damaged several structures, including the Gregory County courthouse and the Burke school, and destroyed the civic center. The start of the school year was delayed by two weeks due to extent of the damage. Two people were directly injured by debris when a garage collapsed on them. Numerous power transmission poles and lines were destroyed by the tornado. Two miles southeast of Burke, the tornado struck a residence causing severe damage to the roof. The tornado's path width reached a maximum of 75 yards within the city of Burke. Up to 3000 trees were damaged by the tornado in and near Burke.	EF1	4000	
8/6/2019	Thunderstorm Wind		83 kts. EG	100	
8/9/2019	Flash Flood			5	

DATE	EVENT TYPE	DESCRIPTION	MAG	PROP DAMAGE ($1,000s)	CROP DAMAGE ($1,000s)
8/9/2019	Thunderstorm Wind		53 kts. MG		
8/9/2019	Thunderstorm Wind		56 kts. EG		
8/17/2019	Hail		1.50 in.		
9/12/2019	Flood			250	3
10/10/2019	Winter Weather				
11/26/2019	Winter Weather				
11/29/2019	Winter Storm				
12/1/2019	Winter Storm				
12/28/2019	Blizzard	**Heavy snowfall (over 12 inches in much of the county) and high wind resulted in white out conditions. Snow drifts to several feet were common.**			

Source: National Climatic Data Center's Storm Events Database

APPENDIX D: References

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