Hand County
South Dakota

NATURAL HAZARD MITIGATION PLAN
EXPIRES:

PREPARED BY:
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I. INTRODUCTION

CHANGES/REVISIONS TO INTRODUCTION:

Minor changes were made in the language of this section. The overall format has not changed. Community lifelines and their impact on Hand County was added and discussed in this section.

INTRODUCTION

Hand County is located in central South Dakota. Hand County has determined that it is vulnerable to natural hazards that have the possibility of causing threats to the health, welfare, and security of its citizens. The cost of response and recovery from potential disasters in terms of potential loss of life, property or infrastructure can be reduced when planning efforts focus on mitigating the impacts of a natural hazard before an event occurs.

Mitigation planning is a process which identifies the county's vulnerabilities to natural hazards, identifies areas of potential risk, and then creates a plan for mitigating those risks, in efforts to reduce the likelihood of loss of life and loss of property caused by natural hazards. With increased attention to mitigating natural hazards, communities can reduce threats to existing developments and prevent creating new risks by limiting and/or regulating future development. Many mitigation actions can be implemented at minimal cost.

This is not an emergency response or emergency management plan. Certainly, the plan can be used to identify weaknesses and/or refocus emergency response planning. Enhanced emergency response planning is an important mitigation strategy. However, the focus of this plan is to support better decision making directed toward avoidance of future risks and the implementation of activities or projects that will eliminate or reduce the risks caused by natural hazards.

PURPOSE OF THE NATURAL HAZARD MITIGATION PLAN

In October of 2000, the Disaster Mitigation Act (DMA2K) was signed to amend the 1988 Robert T. Stafford Disaster Relief and Emergency Assistance Act. Section 322 of the Disaster Mitigation Act requires that local governments, as a condition of receiving federal disaster mitigation funds, have a pre-disaster mitigation (PDM) plan in place.

The plan must:

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

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

PURPOSE

The purpose of the Natural Hazard Mitigation plan is to fulfill federal, state, and local hazard mitigation planning responsibilities; to promote pre and post disaster mitigation measures; implement both the short and long term strategies that minimize suffering, loss of life, and damage to property resulting from hazardous or potentially hazardous conditions to which citizens and institutions within the county are exposed; and to eliminate or minimize conditions which would have an undesirable impact on the citizens, economy, environment, and the well-being of the County. This plan will aid city and county agencies and officials to be proactive instead of reactive in enhancing public awareness to the impact that natural hazards have on citizens, property and infrastructure. This plan provides a guide as to what can be done to help prevent or reduce the vulnerability to risks of each Hand County jurisdiction and mitigate for their effects in the future.

PLAN USE

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

SCOPE

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

LOCAL GOALS

Community commitment begins with local involvement and an emphasis on local lifelines in the event of a natural hazard. This is the basis for the Mitigation Plan. Priorities to stabilize the community's lifelines are at the top with a reduction in importance toward the bottom of the list. Protection of life before, during, and after the occurrence of a natural disaster.

- Protection of life before, during, and after the occurrence of a natural disaster by establishing safety and security for residents before, during and after a natural disaster.
- Protection of emergency response capabilities (critical infrastructure) and establishing supply for basic needs of residents such as food, water, and shelter.
- Establish and maintain communication and warning systems and establishing medical care and support process for residents requiring emergency care.
- Protection of critical facilities and providing for a reliable source of energy for residents.
- Government continuity by maintaining communications throughout the area as well as communications with entities outside of the area.

- Providing transportation in and out of the area to support all lifelines
- Protection of developed property, homes and businesses, industry, education opportunities and the cultural fabric of a community, by combining hazard loss reduction with the community's environmental, social, and economic needs; and
- Protection of natural resources and the environment, when considering mitigation measures.

LONG-TERM GOALS

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

WHAT IS HAZARD MITIGATION?

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

Hazard mitigation measures must be practical, cost effective, and environmentally and politically acceptable. Actions taken to limit the vulnerability of society to hazards must not in themselves be more costly than the value of anticipated damages.

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

Preparedness and response have generally been a point of focus for most emergency management programs. In the past, mitigation measures have seen less of a focus. Since the priority to implement mitigation activities is generally low in comparison to the perceived threat,

some important mitigation measures take time to implement. Mitigation success can be achieved, however, if accurate information is portrayed through complete hazard identification and impact studies, followed by effective mitigation management. Hazard mitigation is useful for eliminating long-term risk to people, property, and infrastructure in South Dakota. Successful hazard mitigation should be incorporated into other governmental planning and growth measures.

By utilizing the data and analysis of area hazards, most communities can prepare for hazards and reduce the long-term impact they will have on their community. Effective mitigation management is key to achieving success. This plan is the first step of the mitigation process. Proper use and planning, utilizing this plan, can reduce the potential impact that natural hazards can have on Hand County.

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

COMMUNITY LIFELINES

Mention has been given to Community Lifelines throughout the plan. These community lifelines are the focus of FEMA's response to natural hazards. The creation of Community Lifelines allowed FEMA to prioritize and deliver a concentrated response in the event of a natural hazard occurrence. These community lifelines are:

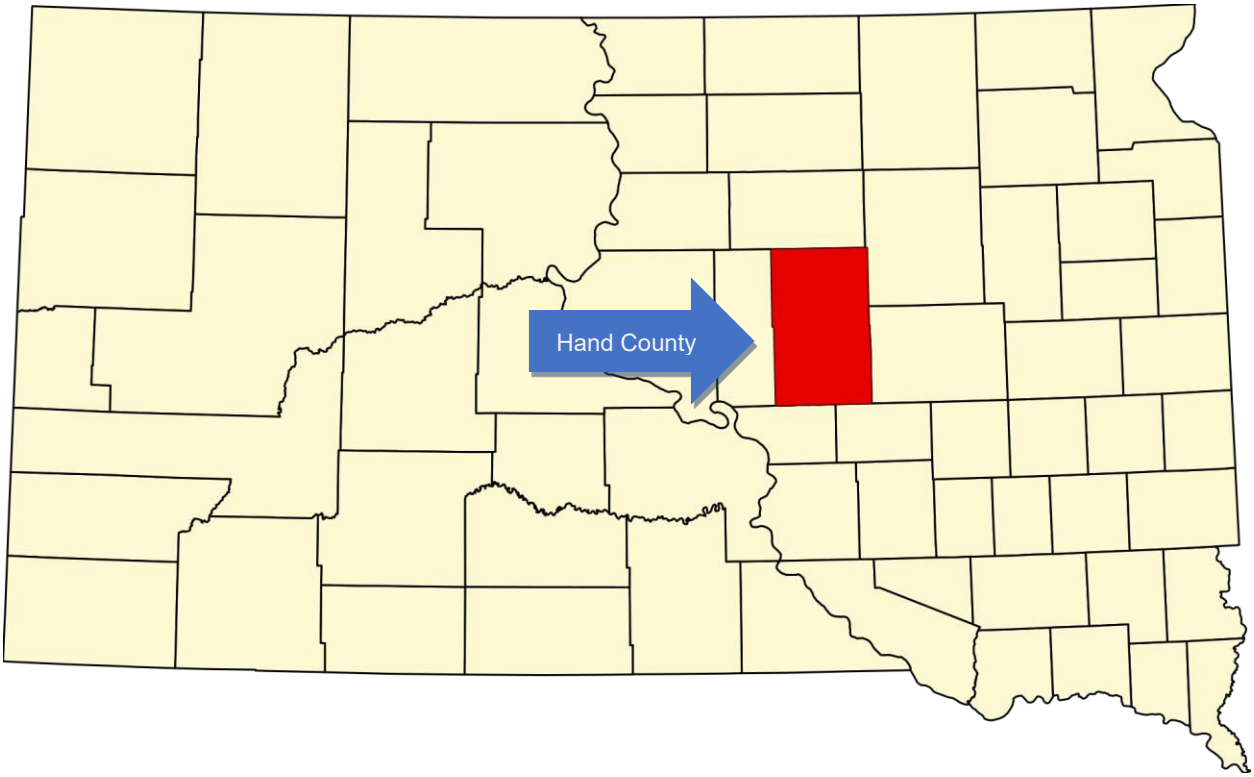
- Safety and Security: law enforcement/security, fire service, search and rescue, government services, community safety
- Food, Hydration, and Shelter: food, hydration, shelter, agriculture
- Health and Medical: medical care, public health, patient movement, medical supply chain, fatality management
- Energy: power grid, fuel
- Communications: infrastructure, responder communications, alerts, warnings, and messages, finance, 911 and dispatch
- Transportation: highway/roadway/motor vehicle, mass transit, railway, aviation, maritime
- Hazardous Materials: facilities, HAZMAT, pollutants, contaminants
- Water Systems: potable water infrastructure, wastewater management

These are recognized by FEMA as the basic services that a community needs to enable all other aspects of society to function. This prioritization of responses focuses FEMA's efforts in the immediate time. Each function is further broken into subcategories dedicated to response in an emergency during a natural hazard event. These community lifelines are essential to processing and mitigating natural hazards events and further focuses response. By ensuring stability of community lifelines through mitigation before a disaster, it allows the process of responding to a disaster to become more efficient.

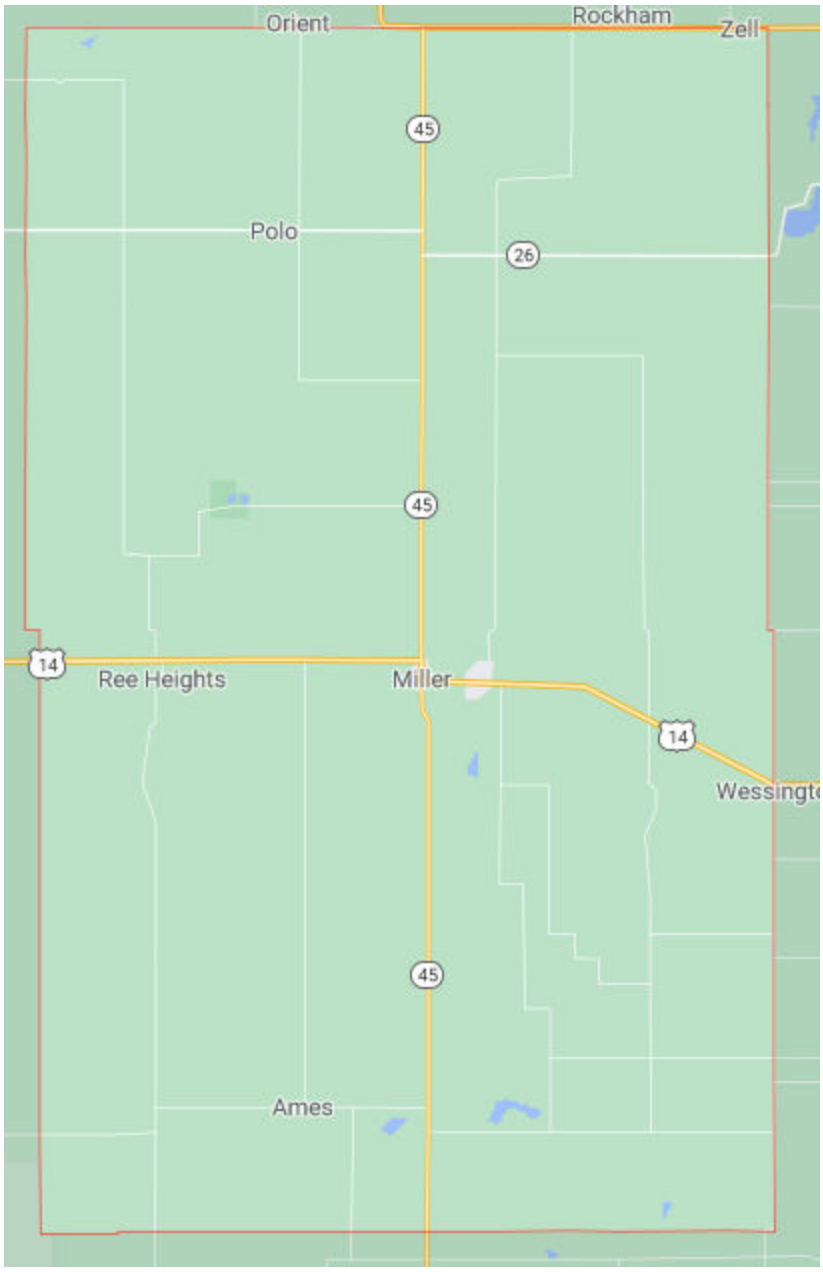
HAND COUNTY PROFILE

HISTORY

Hand County is located in the central portion of South Dakota (44°52'N, 98°99'W). Spink and Beadle Counties bound it on the east, on the west by Hyde County, on the south by Buffalo and Jerauld Counties and on the north by Faulk County. Until the railroad arrived in Hand County, its only occupants were a few scattered settlers on the slopes of the Wessington Hills where they found shelter for their families and grass and water for their livestock.



South Dakota Map Showing Hand County. Map By David Benbennick.



Hand County Map

GEOGRAPHIC BACKGROUND

Hand County has a geographic area of 1,437 square miles or 919,040 acres and an elevation of 1,578 feet. The county extends 48 miles from north to south and 30 miles from east to west. The water area within the county is four square miles.

Geographically, the county is relatively flat. A gentle westward rise in the land surface near Miller marks the shift from the James River basin to the higher, more rolling Missouri Hills. The elevated area south of Ree Heights shows more visibly the break between the James River lowland and the Missouri Hills. Land uses in the county include crop, hay and pasture lands.

Four major highways intersect the county. U.S. Highway 212, U.S. Highway 14, and SD Highway 26 run east-west across the county and SD Highway 45 runs north-south. At this point only one major railway is still in use in the county, The Dakota, Minnesota, & Eastern Railroad. It runs through St. Lawrence, Miller, and Ree Heights.

In Hand County, the topography ranges from nearly level in many areas of the eastern central portions of the County and on the Coteau du Missouri to steeply undulating on the margin between the two regions. Elevations in the County range from more than 2,200 feet in the Ree Hills to less than 1,350 feet in the northeastern portion of the County.

CLIMATE

Hand County is warm in the summer with frequent hot spells and occasional cool days. The county has very cold winters characterized by arctic air surging over the area. Snow is common but is usually blown into drifts and therefore much of the ground remains free of snow. Average annual snowfall is about 35 inches. Average maximum temperature in the winter months is 30 degrees Fahrenheit and the average daily minimum temperature during the winters is 9 degrees Fahrenheit. Most of the precipitation in the county falls during late spring and midsummer. Average annual precipitation is 21 inches, of which eighty percent (80%) falls between April and October. In the summer, the average daily maximum temperature is 82 degrees Fahrenheit and the average minimum temperature during the summer is 58 degrees Fahrenheit. The prevailing wind is from the west-northwest. [1]

There are weather extremes in Hand County, which is similar to many counties in South Dakota. Heat Indexes of 118 degrees have been recorded and on the opposite end of the extreme temperature spectrum, a wind chill reading of -42 degrees has been recorded. Winds have been recorded at 100 miles per hour on a few different occasions. These kinds of weather extremes make mitigating against natural hazards more difficult.

POPULATION DEMOGRAPHICS

Table 1.1 Hand County Demographics

Statistic	Location
Total area (sq miles)	1,437
2020 Population	3,145
< 20	25%
20 - 29	11%
30 - 49	21%
50 - 64	18%
> 65	25%
Population Density	2.19
Households	1,373
Avg Household Size	2.17
Percent with children under 18	22%
Race	
White	96%

[1] www.usclimatedata.com. Accessed 9/8/2025.

Asian	0%
Native American	0%
Black	0%
Two or More Races	2%
Other Races	1%
Hispanic or Latino	2%
Median Income	$72,054
From 2020 Decennial Census and 2023 American Community Survey 5-Year Estimates	

Table 1.2 Hand County Population

Town	**Population**		
	2020 Census	**2010 Census**	**2000 Census**
Miller*	1,349	1,489	1,530
Ree Heights	59	62	85
St Lawrence	163	198	215
Rural Population	1,574	1,682	1,911
Total	3,145	3,431	3,741
*** County Seat**			
from 2020 Decennial Census			

AGRICULTURAL PROFILE[2]

Agriculture is the principal enterprise in Hand County. Corn, soybeans, hay, wheat and sunflowers are the main crops while cattle make up the majority of the livestock raised in the county. About 25% of the population are agricultural producers.

In 1992 there were 542 farms in Hand County with the average size farm being 1,589 acres according to the 1974 USDA Census of Agriculture. In 2022 the USDA Census of Agriculture, the estimated number of farms in Hand County was approximately 399 with an average acreage of 2,289 per farm. The trend is toward fewer and larger farms. Although there is a decline in the number of small farms along with a continuous trend in declining population, Hand County's agriculture industry is surviving.

The Hand County economy has historically been very reliant upon the agriculture industry with about seventy-three percent (80%) of the farm income derived from the sale of crops and twenty-seven percent (20%) from the sale of livestock and related products.

GOVERNANCE

Hand County is governed by a five-member board of commissioners. The county seat is in Miller, which is also Hand County's largest city. The sheriff and three deputies provide law enforcement for the entire county. The City of Miller has its own police department with a Chief of Police and three Patrol Officers.

Several of the communities have volunteer fire departments including Miller, South Hand, Ree Heights, and Polo. The one Hutterite Colony (Millerdale) has a pumper truck and a brush truck

[2] 2022 USDA Census of Agriculture.

and is associated with the South Hand Fire Department. There are four other volunteer fire departments that cover parts of Hand County, but their station is located in another county. Those are: Orient, Redfield Rural, Tulare, and Wessington.

Due to the extremely rural nature of the county, it is important to note that many of the residents who serve in the public capacity are constantly stepping in and filling many other roles. The general attitude of the people in Hand County is to step in and help whenever and wherever necessary. In Hand County, being self-sufficient and resourceful *is* the way of life.

TRANSPORTATION

US Highway 14 runs from east to west while SD Highway 45 runs north and south through Hand County.

The Miller Municipal Airport is just outside of Miller. It is the only airport in Hand County. Due to the rural nature of Hand County, the Miller Municipal Airport has one runway which has a length of 3,500 feet. The airport itself is generally unattended. It also does not have full instrumentation. The airport generally services local pilots and crop sprayers.

II. PREREQUISITES

CHANGES/REVISIONS TO PREREQUISITES:

The plan participants table was updated to reflect the current participants in the Plan. Record of participation was moved to Section III – Planning Process.

ADOPTION BY LOCAL GOVERNING BODY

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

MULTI-JURISDICTIONAL PLAN PARTICIPATION

Requirement 201.6(c)(5) *For multi-jurisdictional plans, has the governing body of each jurisdiction officially adopted the plan to be eligible for certain FEMA assistance?*

> ***Element F1-a.*** *Does the plan include documentation of adoption?*
> ***Element F2-a****. Did each participant adopt the plan and provide documentation of that adoption?*

This plan is a multi-jurisdictional plan which serves the entire geographical area located within the boundaries of Hand County, South Dakota. Hand County has three incorporated municipalities. All of the municipalities located within Hand County participated in the planning process and the update of the existing Hand County Mitigation Plan. The participating local jurisdictions include the following municipalities:

Table 2.1: Plan Participants

New Participants	Continuing Participants	Not Participating
None	Hand County	None
	Miller	
	Ree Heights	
	Saint Lawrence	

All of the areas within Hand County will be covered under this plan.

The Hand County Commission and each of the listed participating municipalities will pass a resolution to adopt the updated Mitigation Plan.

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

Table 2.2: Dates of Plan Adoption by Jurisdiction	
Jurisdiction	**Date of Adoption**
Hand County Commission	
Miller	
Ree Heights	
Saint Lawrence	

All of the participating jurisdictions were involved in the plan update. Representatives from each municipality and the County attended the planning meetings and provided valuable perspective on the changes required for the plan. All representatives took part in the risk assessment by completing the risk assessment worksheets which are included as Appendix C and by profiling the risks. They also provided additional details on the process for development at the local level regarding building permits, regulations and oversight, which is documented in further detail in Chapter IV of the plan.

Representatives from the planning meetings also took information from the meetings back to their respective councils and presented the progress of the plan update on a regular basis.

III. PLANNING PROCESS

CHANGES/REVISIONS TO PLANNING PROCESS:

Additional information was added for county commissioners and city council members who participated and provided feedback during the planning process.
Table 3.2 Local Jurisdiction Participation was moved from Section II - Prerequisites

DOCUMENTATION OF THE PLANNING PROCESS

Requirement 201.6(b) *An open and public involvement process is essential to the development of an effective plan.*
Requirement 201.6(b)(1) *An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval.*
Requirement 201.6(c)(1) *The plan shall document the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.*

> ***A1-a.*** *Does the plan document how the plan was prepared, including the schedule or time frame and activities that made up the plan's development, as well as who was involved?*
> ***A2-a.*** *Does the plan identify stakeholders involved or given an opportunity to be involved in the planning process and how each stakeholder was presented with this opportunity?*

Hand County made an effort to reach a wide variety of stakeholders and individuals in the area, including vulnerable populations and underserved communities. Information about planning meetings was published in the local newspapers, posted on social media and included in public agendas, which are required to be posted 24 hours before a meeting; and sent out via email. Other methods used to inform and invite the public to meetings included direct outreach.

Specific entities that received notice of the meetings include: municipal and county entities, representatives from the local hospital and nursing home, rural water providers, rural electric cooperatives, school administrators, business leaders and others. The hospital and nursing home representatives were specifically invited because they work with vulnerable elderly populations.

Two planning meetings were held in Miller. At each planning meeting, attendees completed the risk assessment worksheets; discussed technical documents each jurisdiction had available; submitted information on crucial facilities/infrastructure; and developed mitigation actions among other information. Public representatives at the meetings then brought the information back to their respective councils/commissions and presented the progress of the plan, at which the public also had an opportunity to participate and comment on the plan. The second planning meeting was held in conjunction with the Hand County LEPC meeting.

Table 3.1 Hand County Meeting Dates

Date	Location	Meeting Type	Advertisement	Stakeholders Represented
3/4/2025	Hand County Courthouse	Hand County Commission Meeting	Agenda, Public Notice	Hand County, St Lawrence

9/16/2025	Hand County Courthouse	Planning Meeting	Newspaper, Email, Social Media, Website	Miller, Private Business, Miller, VFD, Ambulance, Rural Electric Coop, Hand County, State Govt, LEPC, Media
10/6/2025	Miller City Hall	Miller City Council Meeting	Agenda, Public Notice	Miller City Council, City Staff, Non Profit Organizations, Economic Development,
10/8/2025	St Lawrence City Hall	St Lawrence Board of Trustees Meeting	Agenda, Public Notice	Town Board, Mid Dakota Rural Water,
10/14/2025	Miller Fire Hall	Planning Meeting	Newspaper, Email, Social Media, Website	Miller, Private Business, Miller, VFD, Ambulance, Rural Electric Coop, Hand County, State Govt, LEPC, Ree Heights, Hospital, Media, Buffalo County, Sheriff's Office
11/3/2025	Miller City Hall	Miller City Council Meeting	Agenda, Public Notice	Miller City Council, City Staff, Students,
11/4/2025	Hand County Courthouse	Hand County Commission Meeting	Agenda, Public Notice	Hand County, Private Business
Agendas are required to be posted 24 hours before the meeting at the principal office of the jurisdiction and on the jurisdiction's website. The agenda must be visible, readable and accessible.				

Agendas, Minutes and Sign In Sheets from the above meetings are included in Appendix A.

A1-b. *Does the plan list the jurisdiction(s) participating in the plan that seek approval and describe how they participated in the planning process?*

Table 3.2 was derived to help define "participation" for the local jurisdictions who intend on adopting the plan. Out of nine categories, each jurisdiction must have at least six of the participation requirements fulfilled.

Table 3.2 Local Jurisdiction Participation

Nature of Participation	Hand County	Miller	St Lawrence	Ree Heights
Attended Meetings or work sessions (a minimum of 1 meeting will be considered satisfactory).	X	X	X	X
Submitted inventory and summary of reports and plans relevant to hazard mitigation.	X	X	X	X
Submitted Risk Assessment Worksheet.	X	X	X	X

Submitted description of what is at risk (including local critical facilities and infrastructure at risk from specific Hazards)	X	X	X	X
Submitted a description or map of local land-use patterns (current and proposed/expected).	X	X	X	X
Developed mitigation actions with an analysis/explanation of why those actions were selected.	X	X	X	X
Prioritized actions emphasizing relative cost-effectiveness.	X	X	X	X
Reviewed and commented on draft Plan.	X	X	X	X
Hosted opportunities for public involvement (allowed time for public comment at a city council/county commission meetings after giving a status report on the progress of the Plan update)	X	X	X	

The Hand County Emergency Manager and staff from Northeast Council of Governments led the development of the plan update. The core planning team members are listed in Table 3.3

Table 3.3: Plan Representatives for Local Jurisdictions

Jurisdiction	Name	Title
Hand County	Arlen Gortmaker	Emergency Manager
	Doug DeBoer	Auditor
	Nicole Gortmaker	Highway Superintendent
	Greg Palmer	County Commissioner
	Chris Schaefers	Hand County Highway Dept
	Rod Gortmaker	Hand County Highway Dept
	Steve Schroeder	Deputy Coroner
	Will Page	
	Edwin Alpizar	Deputy Sheriff
	Chelsea Price	Deputy Sheriff
	Brandon Fisher	Deputy Sheriff
Miller	Cindy Deuter	Finance Officer
	Allison Nelson	Office Administrator
	Terry Manning	Water/ Wastewater/ Airport Superintendent
	Dustin Graham	Electric Superintendent
	Ron Hoftiezer	Street Superintendent
St Lawrence	Terry Naber	Trustee
	Shirley Peck	President
	Christi Danburg	Finance Officer
Ree Heights	Renae Phinney	President
Dakota Energy Cooperative	Eric Hasart	

SD GFP and Hand County LEPC	Jon Dunlap	
The Miller Press	Jan Kittleson	
	SuAnne Meyer	
Miller Fire Department	Corey Resel	
	Stephan Resel	
	Nathan VanZee	
Avera Health	Thomas Lichty	
	Vance Caffee	
Buffalo County	Lee Pawlowski	
Hand County Ambulance	Marla Bertsch	

At stakeholder planning meetings/work sessions, the local jurisdictions were represented by city council members, finance officers and/or public works employees. The city councils and county commissions discussed the progress of the plan at their council meetings.

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

> ***Element A3-a.*** *Does the plan document how the public was given the opportunity to be involved in the planning process and how their feedback was included in the plan?*

PUBLIC INVOLVEMENT

The planning meetings were advertised in *The Miller Press* and on several social media pages including the Hand County Emergency Management Facebook page to inform the public about the required Mitigation Plan update. The City of Miller also posted information on their website. The Hand County Emergency Manager worked with NECOG staff to organize resources and email all the stakeholders, community organizations, municipalities, townships, and other interested parties.

See Table 3.1 Hand County Meeting Dates for a list of all meetings open for public involvement.

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

In addition, *The Miller Press* published a front page article about the Mitigation Plan Update process, furthering the planning team's efforts to inform the public about the update process.

SURVEY

In addition to the planning meetings, county commission and council meetings, the planning team decided to conduct a public survey requesting feedback. The surveys asked about people's experiences with natural hazards, how they have been impacted, ideas for

projects/actions that could reduce impacts from hazards. It also asked about storm shelters, surviving without power during a winter storm and who they trust to provide information on hazards.

The Hand County Emergency Management, City of Miller, Hand County and several others posted the survey link to their Facebook pages. To make the survey process equitable, paper copies of the survey were also made available in all towns for those who don't have access to the internet or preferred a paper copy. Paper copies were made available at planning meetings, they were also available at the City and County Offices. Results of the survey are included with the Risk Assessment for each hazard and a full summary report is included in Appendix D.

NEIGHBORING JURISDICTION PARTICIPATION [201.6(b)(2)]

Requirement 201.6(b)(2) Element A2. *An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities and agencies that have the authority to regulate development as well as businesses, academia and other private and non-profit interests to be involved in the planning process.*

A2-a. *Does the plan identify stakeholders involved or given an opportunity to be involved in the planning process and how each stakeholder was presented with this opportunity?*

At the beginning of the planning process, an email was sent to all neighboring emergency managers in the counties of: Faulk, Spink, Beadle, Jerauld, and Hyde Counties (Hand County's EM also serves as Buffalo County's EM) giving them opportunity to participate in Hand County's planning process and provide input on the plan's content. After the plan was drafted, it was emailed to all the participants and to the emergency managers in the neighboring counties. Everyone who received an email copy of the plan draft was allowed 30 days to comment on the draft.

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

201.6(b)(3) *Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.*

Element A4-a. *Does the plan document what existing plans, studies, reports and technical information were reviewed for the development of the plan, as well as how they were incorporated into the document?*

The review and incorporation of existing plans, studies, reports, and technical information was completed by the local jurisdictions with assistance from NECOG. Each of the communities were asked to provide a list of existing documents that they have available. Many of the smaller communities do not have such documents nor do they have staff employed to handle planning measures.

The 2020 Plan was used as a resource for the new plan because most of the natural hazard profile research had already been completed when it was drafted. A summary of the technical review and incorporation of existing plans is included below.

REVIEW OF THE 2020 PLAN

Plan participants reviewed and analyzed the risk assessment and mitigation strategy sections of the plan and new information was included wherever necessary. Much of the information from the 2020 plan was still relevant. The plan author also used the 2022 Local Mitigation Planning Policy Guide, the 2023 Local Mitigation Planning Handbook as well as recommendations from FEMA's review of the 2020 plan.

Each of the jurisdictions and all stakeholders at the planning meetings/work sessions were provided with information on previous risks, critical infrastructure, mitigation strategies and were asked to review the information and provide any updated information available.

Table 3.4: Hand County Record of Review (Summary)	
Existing Technical Documents	**Plan Incorporation**
Comprehensive Plan (Hand and Miller)	Development Trends; Intro-Profile
Local Emergency Operations Plan	Assessing Vulnerability
Bridge Plan	Mitigation Strategy
City and County Zoning Ordinances	Development Trends
Flood Damage Prevention Ordinance (Miller and St Lawrence)	NFIP Sections
Building Code	Development Trends
South Dakota State Hazard Mitigation Plan (2024)	Risk Assessment; Hazard Identification
South Dakota Hazard Identification and Risk Assessment (2022)	Risk Assessment; Hazard Identification
South Dakota Drought Mitigation Plan (2015)	Risk Assessment; Hazard Identification
NOAA Storm Events Database	Risk Assessment; Hazard Identification
National Inventory of Dams	Risk Assessment; Hazard Identification
U.S. Drought Monitor	Risk Assessment; Hazard Identification
Existing Land Use maps	Incorporated in Zoning Ordinance
Flood Insurance Rate Map (Miller and St Lawrence)	Risk Assessment, Hazard Identification, Mitigation Strategy
Capital Improvements Plan	Risk Assessment; Hazard Identification; Mitigation Strategy

Per South Dakota Codified Law, when any local unit of government in South Dakota has not adopted a building code ordinance, the design standard shall be based on the 2021 edition of the International Building Code as published by the International Code Council, Incorporated.

The use of existing policies and technical documents tends to be less involved than what might be seen in larger cities or communities. For instance, while State Law requires that a comprehensive plan be adopted prior to incorporating zoning ordinances, it is common for communities to have outdated comprehensive plans, some dating back to the late 1970's.

IV. HAZARD IDENTIFICATION AND RISK ASSESSMENT

CHANGES/REVISIONS TO RISK ASSESSMENT:
The section was streamlined to list each hazard and the following sub-sections were included under each hazard – hazard description, hazard history, future probability amidst a changing climate and a vulnerability assessment for each hazard.

Presidential disaster declarations were added.

Information on Vulnerable Populations, including social vulnerability was added.

IDENTIFYING HAZARDS

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

> ***Element B1-a.*** *Does the plan describe all natural hazards that can affect the jurisdiction(s) in the planning area, and does it provide the rationale if omitting any natural hazards that are commonly recognized to affect the jurisdiction(s) in the planning area?*
> ***Element B1-b.*** *Does the plan include information on the location of each identified hazard?*
> ***Element B1-c.*** *Does the plan describe the extent for each identified hazard?*
> ***Element B1-d.*** *Does the plan include the history of previous hazard events for each identified hazard?*
> ***Element B1-e.*** *Does the plan include the probability of future events for each identified hazard? Does the plan describe the effects of future conditions, including climate change on the type, location and range of anticipated intensities of identified hazards?*

IDENTIFYING HAZARDS
A comprehensive list of hazards was evaluated and placed into three separate categories depending on the likelihood of the disaster occurring in Hand County. Hazards that occur at least once a year or more were placed in the High Probability column; hazards that may have occurred in the past or could occur in the future but do not occur on a yearly basis were placed in the low probability column; and hazards or disasters that have never occurred in the area before and are unlikely to occur in Hand County any time in the future were placed in the Unlikely to Occur column.

Due to the topographical features of the area and the nature of the natural hazards that affect the geographical area covered by this plan, most areas of Hand County have similar likelihood of being affected by the natural hazards identified, unless otherwise noted. Only the natural hazards from the High Probability and Low Probability Columns will be further evaluated throughout this plan. Manmade hazards and hazards in the Unlikely to Occur column will not be further evaluated in the plan.

Hazards were identified for this plan in several ways, including: observing development patterns, receiving input from jurisdictions, holding public meetings, public survey, historical occurrences, evaluating previous disaster declarations and consulting the *2024 State Hazard*

Mitigation Plan and *South Dakota Hazard Identification and Risk Assessment 2022, NOAA Storm Events Database, National Inventory of Dams, U.S. Drought Monitor,* and direct outreach to the State Fire Marshal's Office. Other records that were utilized were the National Weather Service in Aberdeen, South Dakota State Fire Marshall's office, National Inventory of Dams, FEMA, and the United States Drought Monitor. Additional resources were provided from Hand County. These sources have accumulated information over time, yet there are instances where it seems that the data was not complete.

Plan participants considered the following hazards but decided not to include them in this analysis because they are unlikely to occur in the area and if they do occur, they rarely cause damage: Earthquakes and Subsidence. According to USGS, two minor earthquakes have occurred in Hand County in the past. However, on the rare occasions that earthquakes do occur in South Dakota, they rarely cause damage. Other hazards that have never occurred in South Dakota and were not part of this analysis are: avalanches, coastal erosion, coastal storms, hurricanes, tsunamis, and volcanoes.

The City of Miller, Ree Heights and Hand County have identified that landslides are not a hazard to their jurisdiction because there is no history of this hazard in these jurisdictions. St Lawrence has some issues with landslides along the creek, although the soil movement is directly related to flooding, so this issue will be discussed in the flooding Hazard Profile.

According to the public survey conducted, 83% of the people responding to the survey said they have been affected by a natural disaster in the last 10 years. Of those impacted, 56% said they have been impacted by Strong Winds, followed by Severe Winter Weather (50%); Severe Summer Storms (44%); Flood/Flash Flood (35%); Hail (27%); Drought (24%); Extreme Temperatures (18%); Wildfire (6%) and Tornado (3%). About 6% of respondents have not been impacted by a natural disaster in the last 10 years. Over 82% said that the natural hazard caused damage to personal property. Thirty eight percent (38%) had to take an alternate route to work, school, etc. and 6% were displaced from their primary residence for more than 3 days due to a natural disaster.

When asked which natural hazards were most likely to occur in their area, respondents ranked the hazards as follows: Strong Winds, Severe Summer Storms, Severe Winter Weather, Drought, Extreme Temperatures, Flash Flood/Flood, Hail, Tornados, Flooding and Wildfires.

When asked about mitigation strategies that could reduce impacts from natural hazards, respondents talked about the need for adequate storm sirens, larger culverts and other drainage projects to alleviate flooding, improving wildfire response and fire mitigation during harvest season, storm shelters, generators, and living snow fences. Many respondents stated that good preparation and pre planning are important to reduce the impacts from natural hazards.

Seventy seven percent (77%) of respondents know where a storm shelter was located in their area. Ninety-seven (97%) of respondents said they have a safe place to go in the event of a tornado – mainly their basement or a storm shelter.

About 31% of survey participants lived in rural Hand County, 37% were from Miller, 23% from St Lawrence, 6% from Ree Heights and 3% from other areas in the County. All ages were represented in the survey as well with 37% of respondents identifying that they were 19-44, 48% were from 45-64 and 14% were over the age of 65.

Table 4.1 is a comprehensive list of natural hazards completed by plan participants located within Hand County.

Table 4.1: Natural Hazards Categorized by Likelihood of Occurrence		
High Probability	**Low Probability**	**Unlikely to Occur**
Blizzards/Winter Storms	Dam Failure	Earthquake
Extreme Cold	Drought	Subsidence
Extreme Heat	Flood	
Flash Flood	Ice Jam	
Freezing Rain/Sleet/Ice	Landslide**	
Hail	Tornado	
Heavy Rain		
Heavy Snow		
Lightning		
Rapid Snow Melt		
Strong Winds		
Thunderstorm	* Utility interruptions are not a natural hazard but often occur as a result of natural hazards such as ice storms and strong winds. **Landslides are directly related to flooding. Miller, Ree Heights and Hand County has identified that Landslides are not a hazard to their jurisdiction.	
Urban Fire		
Utility Disruption*		
Wildfire		

Table 4.2: Significant Hazard Occurrences 2015-2024			
Type of Hazard	**# of Days with Event**	**# of Years with Event**	**Source**
Blizzards/Winter Storms	26	8	NOAA
Drought		19/26	NOAA and Drought Monitor
Extreme Cold	17	9	NOAA
Extreme Heat	7	4	NOAA
Flash Floods	4	3	NOAA
Flood	10	5	NOAA
Freezing Rain/Sleet/Ice	2	2	NOAA
Hail	35	10	NOAA
Heavy Rain	0	0	NOAA
Heavy Snow	14	10	NOAA
Lightning	58	1*	NOAA
Strong/High Winds	28	10	NOAA

Thunderstorms	29	10	NOAA (Thunderstorm Wind)
Tornado (incl. Funnel Cloud)	7	5	NOAA
Wildfire			
* Data from Earth Networks was only available for 2020			

Weather patterns can increase in magnitude and frequency due to climate change and its effects on weather patterns. According to Laura Edwards, State of South Dakota Climatologist, weather extremes will become more common as climate change shifts with average temperatures climbing upwards. The swings from high to low precipitation will not be as gradual. Winters will become warmer on average as the climate continues to shift.

NATURAL HAZARDS IN THE PLAN JURISDICTION

Descriptions of the natural hazards likely to occur in the Plan Jurisdiction have not been changed from the 2020 version of the Hand County Natural Hazard Mitigation Plan. For the purpose of consistency throughout the plan, additional definitions were included to reflect all of the hazards that have a chance of occurring in the area and all of the hazards are alphabetized. Information in the plan has been re-organized to include the hazard description, hazard history, future probability, vulnerability assessment under each hazard subheading.

HAZARD PROFILE [§201.6(c)(2)(ii)]

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

Most of the hazards identified, such as tornados, severe wind, thunderstorms, hail, winter storms, blizzards, wildfires, etc. have the potential of occurring anywhere in the County. However, certain hazards, such as flooding and dam failure are site specific. Previous occurrences are listed individually by location in Appendix C.

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

There have been 3 presidential disaster declarations related to natural hazards in the last 10 years. They were all either related to severe winter storms, severe summer storms and flooding. There were also 2 presidential disaster declarations related to the COVID-19 pandemic. Table 4.3 has more detailed information on the disaster declarations.

Table 4.3 Presidential Disaster Declarations in Hand County

Declaration Date	Incident Period	Disaster Dec #	Type	Public Assistance Cost	Individual Assistance Cost
6/7/2019	3/13/2019 - 4/26/2019	4440	Severe Winter Storm, Snowstorm and Flooding	$60,762,752	$2,154,577
3/13/2020	1/20/2020 - 5/11/2023	3475	Covid-19 Pandemic		
4/5/2020	1/20/2020 - 5/11/2023	4527	Covid-19 Pandemic	$39,679,727	$9,820,077
7/6/2023	4/9/2023 – 5/5/2023	4718	Flooding	$2,305,362	$0

8/15/2024	6/16/2024 – 7/8/2024	4807	Severe Storms, Straight-line Winds and Flooding	$19,122,256	$2,419,564

DAM FAILURE

Dam breach or failure is of lesser concern for the citizens of Hand County than flooding due to the location of the dams in the County. Dam Failure is usually associated with intense rainfall or a prolonged flood condition (rainy day), or it can occur anytime (clear day).

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

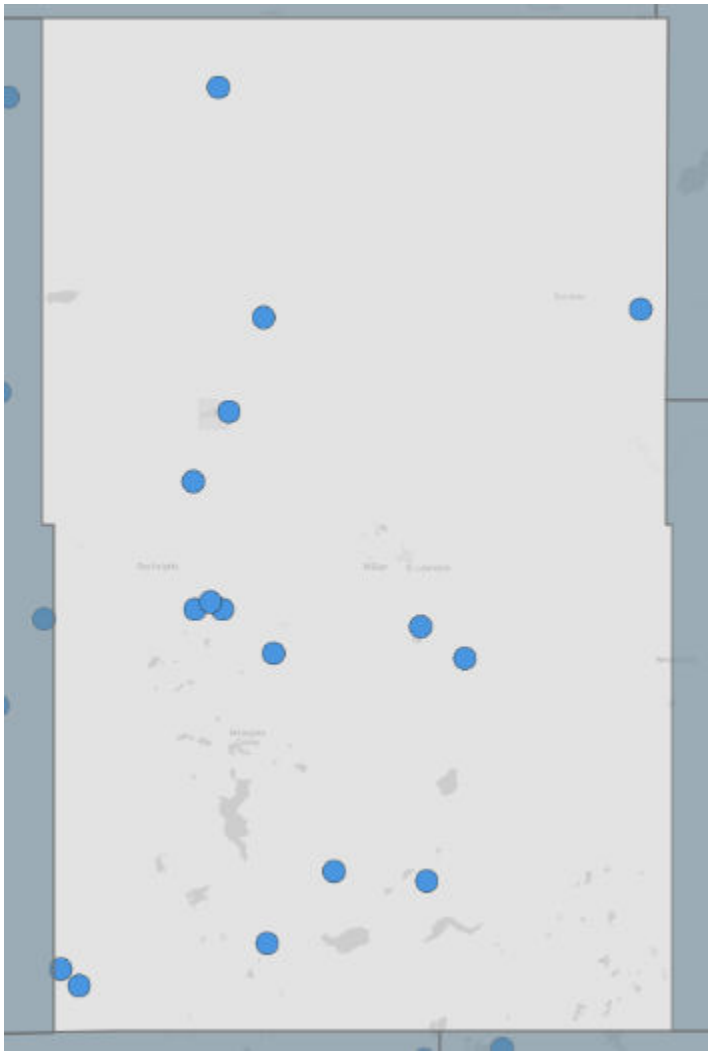
The County has 16 dams and only 1 is listed as a high hazard. The National Inventory of Dams identifies the Jones Lake Dam as high risk. The Jones Lake Dam is owned by South Dakota Game, Fish and Parks. It has a height of 21 feet and maximum storage capacity of 1,260 acre-feet. It is located three two Miles from Saint Lawrence and 3 miles from Miller.

The locations of the dams are found in Table 4.4:

4.4 Dam Locations in Hand County

Name	Owner	Inspection Date	Hazard Potential	Condition Assess-ment	Height (ft)	Storage (acre-feet)	Distance to Nearest City
Jones Lake Dam	GF&P	7/28/2022	High	Fair	21	1,260	2 miles to St Lawrence
Lake Louise	GF&P	10/18/2022	Low	N/A	34	1,200	N/A
C. Mcgillvrey	Private	N/A	Low	N/A	27	27	N/A
W. Venjohn	Private	N/A	Low	N/A	17	95	N/A
R. Paine	Private	N/A	Low	N/A	28	90	N/A
B. Deuter	Private	N/A	Low	N/A	25	70	N/A
R. Allgaier	Private	N/A	Low	N/A	23	55	N/A
Lake Dakotah	GF&P	10/18/2022	Low	N/A	31	211	N/A
Pearl Lake	Private	6/20/1995	Low	N/A	23	184	N/A
A. Heezen	Private	N/A	Low	N/A	20	59	N/A
M. Fisher	Private	N/A	Low	N/A	25	70	N/A
Joy Dam	Private	11/3/1999	Low	N/A	18	332	N/A
Bushong Dam	Private	10/31/2006	Low	N/A	13	221	N/A
Werdel West Dam	Private	N/A	Low	N/A	40	265	N/A
Werdel East Dam	Private	N/A	Low	N/A	28	478	N/A
Ray Martinmaas Dam	Private	N/A	Low	N/A	17	86	N/A
National Inventory of Dams							
Condition Assessment Definitions							
Satisfactory	No existing or potential deficiencies are recognized						

Fair	No existing dam safety deficiencies are recognized for normal loading conditions. Rare or extreme hydraulic and/or seismic events may result in a dam safety deficiency.
Poor	A dam safety deficiency is recognized for loading conditions which may realistically occur. Remedial action is necessary.
Unsatisfactory	A dam safety deficiency is recognized that requires immediate or emergency remedial action.
Not Rated	This dam has not been inspected or has been inspected but not rated.
Hazard Potential Definitions	
High Hazard dams are those where failure or mis-operation will probably cause loss of human life.	
Significant Hazard dams are those where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities or other impacts.	
Low Hazard dams are those where failure or misoperation results in no probably loss of human life and low economic and/or environmental losses.	



Map of Hand County Dam Locations. National Inventory of Dams.

Hazard History

According to the National Inventory of Dams and the Association of Dam Safety Officials, there has been one dam failure and one non-failure incident in Hand County.

On July 30, 2010, the Rose Hill Dam failed when six to ten inches of rain fell in the Wessington area. The dam was originally constructed in the 1930's and became a very popular place for camping and recreation. Two campers were taken to the hospital after being rescued from a tree. The overnight rainfall flooded roads and culverts. Many of the roads that were damaged were actually located in neighboring Beadle County. The dam was owned by the GF&P and has not been rebuilt.

On June 13, 2019, the conduit spillway of the dam's two primary spillways had a sinkhole with seepage develop around it on the downstream side. The county emergency manager notified residents downstream of the dam of the situation. The owner used pumps to lower the water level and put in a temporary berm across the conduit inlet. A very wet spring and early summer likely contributed to the issue. A permanent repair was done in Fall of 2019.

Future Probability Amidst A Changing Climate

Heavy rainfall is increasing in intensity and frequency across the United States and globally and is expected to continue to increase.[3] These heavy rainfall events increase the risk of dam failure. Flooding caused by heavy rains could create situations such as overtopping. Future climate variations could have a greater impact on older dams, whose construction wasn't designed for more intense wet and dry weather patterns.

Vulnerability Assessment

Most of these dams are in areas where if failure occurred, there would be little damage to property. High-risk dams have the risk of not only property damage, but more importantly loss of life. The classification is based on the potential of downstream consequences of the dam failing, not the condition of the dam. It is due to this reason that these dams are required to have an emergency action plan in the event of a failure. In addition, there is a requirement by the state of South Dakota that all high-risk dams are inspected every five years.

Vulnerable populations would be those with potential to be impacted by the downstream hazard, such as homeowners or travelers on roadways. Crops and/or pastureland are also vulnerable to a dam failure.

During the risk assessment, all of the jurisdictions indicated that dam failure has a low probability of occurrence in the County. However, the town of St Lawrence is within two miles of Jones Lake Dam, which does make them somewhat vulnerable to dam failure.

The towns of Miller and Ree Heights have identified that dam failure is not a hazard to their jurisdictions. They've determined this because there are no dams near either of their towns.

DROUGHT

According to the 2015 South Dakota Drought Mitigation Plan, drought is a complex and a gradual phenomenon in South Dakota. Although droughts can be characterized as emergencies, they differ from other emergency events in that most natural disasters, such as floods or forest fires, occur relatively rapidly and afford little time for preparing for disaster response. Droughts typically

[3] Wuebbles, D.J., et. Al. 2017: Executive summary. In: Climate Science Special Report: Fourth National Climate Assessment, Volume I U.S. Global Change Research Program, Washington, DC.

occur slowly, over a multi-year period, and it is often not obvious or easy to quantify when a drought begins and ends.[4]

Drought is an extended period of months or years when a region notes a deficiency in its water supply. Generally, this occurs when a region receives consistently below average precipitation. A decrease in the amount of precipitation can adversely affect stream flows and reservoirs, lakes, and groundwater levels. Crops and other vegetation are harmed when moisture is not present within the soil. It can have a substantial impact on the ecosystem and agriculture of the affected region. Although droughts can persist for several years, even a short, intense drought can cause significant damage and harm the local economy. Drought can have a widespread impact on agriculture.

According to the National Weather Service, “Drought is a deficiency in precipitation over an extended period, usually a season or more, resulting in a water shortage causing adverse impacts on vegetation, animals, and/or people. It is a normal, recurrent feature of climate that occurs in virtually all climate zones, from very wet to very dry. Human factors, such as water demand and water management, can exacerbate the impact that drought has on a region.” [5]

Generally, this occurs when a region receives consistently below average precipitation. It can have a substantial impact on the ecosystem and agriculture of the affected region. Although droughts can persist for several years, even a short, intense drought can cause significant damage and harm the local economy.

The fact that South Dakota's economy is closely tied to agriculture only magnifies the potential loss which could be suffered by the state's economy during drought conditions. Table 4.5 identifies drought occurrences from the past 23 years.

The U.S. Drought Monitor measures the extent of a drought using the Drought Intensity on a Scale:

Drought Category System
D0 – Abnormally Dry
D1 – Moderate Drought
D2 – Severe Drought
D3 – Extreme Drought
D4 – Exceptional Drought

Hazard History

Table 4.5 25 Year Drought History 2020-2024 Number of Years with at least One Drought Category					
Location	**D0**	**D1**	**D2**	**D3**	**D4**
Hand	22	14	10	3	0

US Drought Monitor Time Series. 2025.[6]

[4] South Dakota Drought Mitigation Plan. 2015.
[5] https://www.weather.gov/safety/drought. September 2024.
[6] https://droughtmonitor.unl.edu/DmData/TimeSeries.aspx

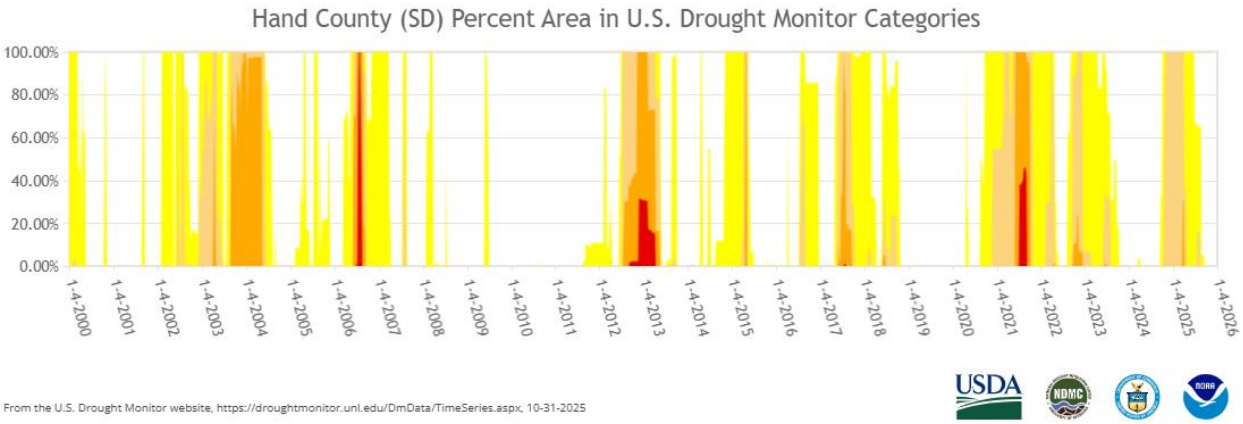


Table 4.6 Hazard History and Future Probability					
Event Type	**Abnormally Dry**	**Moderate Drought**	**Severe Drought**	**Extreme Drought**	**Exceptional Drought**
Number of Years with Event	22	14	10	3	0
Years of Data	25	25	25	25	25
Probability of Future Event in Any Given Year	88%	56%	40%	12%	0%
Probability Calculation	22/25 = 88%	14/25 = 56%	10/25 = 40%	3/25 = 12%	0/25 = 0%

In the public survey, Drought was ranked as the 4th most likely hazard to occur in Hand County and 24% of respondents had been negatively affected by drought in the past ten years.

A strong possibility exists for simultaneous emergencies during droughts. Wildfires are the most common.

Major Drought occurrences in Hand County in the Past 10 years:

May - September 2017 - With an extremely dry May across the region, drought conditions expanded across central and north central South Dakota from abnormally dry to moderately dry by the end of the month. Hot and dry conditions continued all summer with Hand County experiencing severe drought for several weeks. Many locations had their top ten warmest first half of June which only exacerbated the stress on the crops and pastures. Much of central and northern South Dakota had only received 50 to 75 percent of normal precipitation. Stream flow conditions were also below normal across most of the region. Stock water supplies became very low. Cattle were sold due to the poor grazing conditions along with feed shortages. There was also an increase in the number of sick or dead livestock due to nitrate poisoning from the drinking water. The majority of the crops including spring wheat, oats, barley, corn, alfalfa, along with pasture and range land conditions were rated at poor or very poor. Most of the counties across central and north central South Dakota had enacted burn bans due to the very high to extreme fire danger. Many counties issued drought declarations with the Governor declaring a statewide drought emergency. The South Dakota Drought Task force was also activated. CRP lands were opened up for grazing and haying to many farmers and ranchers.

Most of the counties across the region had lifted their burn bans by the end of August. Stream flows were also up to at or above normal due to the heavier rainfall by the end of the month along with better topsoil and subsoil moisture.

There was some improvement towards the end of September. Periodic episodes of precipitation across the region had prevented widespread worsening of the drought conditions. Crops and pastureland continued to suffer from the long term dryness. The spring and winter wheat production was at its lowest in years and more than 60 percent below long-term norms. Only 670,000 acres of spring wheat were harvested in the state in 2017, the lowest since the big drought year of 1936 when only 550,000 acres were harvested.

June-July 2018 - Rapid drying of the topsoil due to hot temperatures in May along lack of rainfall resulted in severe drought conditions developing in the James Valley in the first week of June. In fact this area received a few dust storms when strong winds moved into the region. Major crop damage occurred mainly to soybeans in the severe drought area as a result of the dust storm and dryness. With the lack of rainfall throughout June, the severe drought expanded some south by the end of the month. Hand County remained abnormally dry all summer.

June - September 2021 - Severe to extreme drought conditions continued from May through September due to much above average temperatures and much below average rainfall. Statewide, South Dakota recorded its 4th warmest and its driest June since record keeping began in 1895. Impacts from the ongoing and worsening drought include below to much below normal stream flows, entirely dry or very low stock ponds, creeks and marshes, and fire danger increased due to fuels that had begun to be or had already completely cured. Additionally, crop and pasture and range conditions had been rated poor to very poor across the board, many wheat fields had been cut for silage, and cattle producers had been strained as well. South Dakota governor declared a statewide state of emergency for drought conditions, and the USDA designated several counites as primary natural disaster areas.

Above-average temperatures were observed across South Dakota during July, with several days in the 90s to the lower 100s. The drought conditions significantly impacted crops. Agriculturally, these conditions mimic those of the drought in 1988, when all central and northeast South Dakota counties were assigned a drought disaster designation. A shortage of pastureland and feed caused a growing concern for the lack of feed for the winter months. Many cattle producers were forced to sell off some of their cattle. Stock ponds and creeks remained very low or completely dry. Drought conditions contributed to several grassland fires across central and northeast South Dakota throughout July as well. Historically dry fuels were observed in central and north central South Dakota, with ERC/Energy Release Components above the 90th percentile (ERC-measure of the fuel moisture related to potential fire intensity).

High to very high fire danger was noted frequently across central and north central South Dakota and fires continued to be an issue with widespread dry fuels for the first half of the month.

Much of Central South Dakota benefited from above average rainfall and thus a slight improvement in drought in September and October.

A ten year history of Drought conditions can be found in Appendix C.

Future Probability Amidst A Changing Climate

The intensity of droughts is projected to increase. Droughts are a natural part of the climate system, and because the projected precipitation increases are expected to occur during the cooler months, South Dakota will remain vulnerable to periodic drought. Increases in evaporation rates due to rising temperatures may increase the rate of soil moisture loss and the intensity of naturally occurring droughts.[7]

Vulnerability Assessment

South Dakota's economy is closely tied to agriculture which magnifies the potential loss which could be suffered by the state's economy during drought conditions. The agriculture sector is severely affected by the lack of vegetation and water for livestock. Crop and pasture yields can be greatly diminished during periods of drought. All of Hand County is very dependent on agriculture, both livestock and crop production.

South Dakota's Drought Mitigation Plan states that a decrease in the amount of precipitation can adversely affect stream flows and reservoirs, lakes, and groundwater levels. With the lower levels of moisture caused by drought, the chance of wildfire increases. Drought can also impact many factors, both directly and indirectly. These factors include higher water and food prices, water restrictions, air and water quality, and restricted access to recreational areas.

Increased dust is associated with droughts. Older adults (25% of Hand County residents are 65 or older) are more susceptible to air pollution such as dust, making them more vulnerable to drought than the general population.

During the risk assessment activity at the planning meetings, participants identified that there is anywhere from a high to a low vulnerability to drought. While it may not occur every year, drought can be devastating to the agricultural economy, damaging crops and grass available for livestock, as well as the local economies that depend on agriculture and farmers/ranchers to keep the economy growing. Small businesses in rural areas can be greatly impacted by drought if farmers/ranchers aren't spending money at these small businesses.

EXTREME TEMPERATURES

Hazard Description

Extreme temperatures in Hand County are common occurrences.

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

Extreme Cold temperatures often accompany a winter storm, so power failures and icy roads are common occurrences. Whenever temperatures drop decidedly below normal and as wind speed increases, heat can leave the body more rapidly. These weather-related conditions may lead to serious health problems.

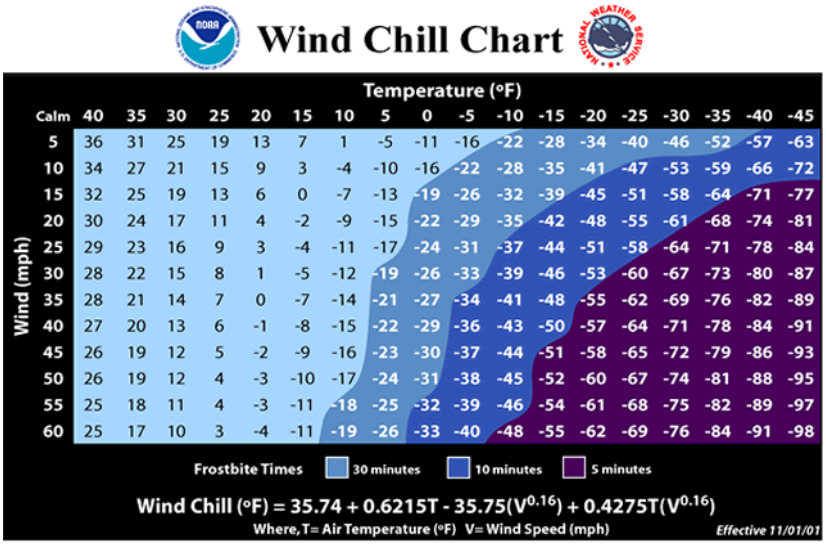
[7] State Climate Summaries. 2022. NOAA National Centers for Environmental Information. HTTPS://STATESUMMARIES.NCICS.ORG/CHAPTER/SD/

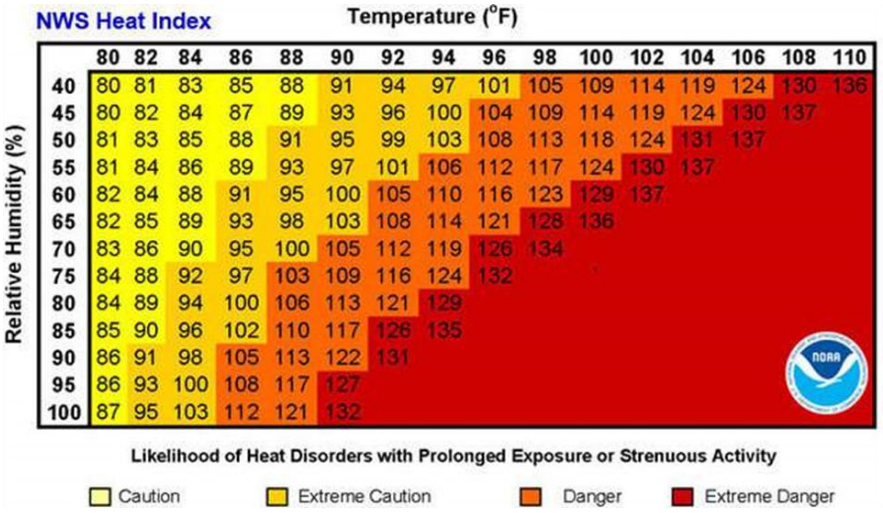
Extreme Heat, also known as a heat wave, is a prolonged period of excessively hot weather, which may be accompanied by high humidity. According to information provided by FEMA, extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks. Temperatures in Hand County have a very wide range typically between zero to 100 degrees Fahrenheit, therefore anything outside those ranges could be considered extreme. The term is applied both to routine weather variations and to extraordinary spells of heat which may occur only once a century.

It is possible that people in the area have adapted to this type of extreme temperatures and thus such weather events are not reported as often as they occur. It is also possible that the information has only in recent years been tracked or reported.

The counterpart to extreme cold is extreme heat which also has dangerous implications to humans, livestock, and critical structures and facilities if certain conditions are present.

Extreme weather event occurrences are included in Appendix C. The locations may not be specific to Hand County due to the vast area across the State of South Dakota that can be affected by extreme temperatures at the same time.





Hazard History

Table 4.7 Hazard History and Future Probability		
Event Type	**Extreme Cold**	**Extreme Heat**
Number of Days with Event	17	7
Number of Years with Event	9	4
Years of Data	10	10
Possible Number of Days with Event per Year	1.7	.7
Occurrence Calculation	17/10 = 1.7	7/10 = .7
Probability of Future Event in Any Given Year	90%	40%
Probability Calculation	9/10 = 90%	4/10 = 40%

In the public survey, Extreme Temperatures were ranked as the 5th most likely hazard to occur in Hand County and 18% of respondents had been negatively affected by Extreme Temperatures in the past ten years.

Extreme Cold History

December 2016 - After the fresh snowfall from the day before, bitter cold Arctic air built into the region Saturday and Sunday bringing record low temperatures along with extreme wind chills to all of the region. Record lows in the 20s and 30s below zero occurred on both Saturday night before midnight and Sunday Morning at several locations. This Arctic air combined with 10 to 20 mph winds brought wind chills to 35 to 60 degrees below zero across the region. Many church services were cancelled on Sunday.

December 2017/January 2018 - Extreme wind chills which began on December 30th, 2017 across central and northeast South Dakota continued into January 1st. Wind chills of 35 to near 55 degrees below zero occurred off and on during this time. Record lows set on the morning of January 1st were in the 30s below zero with even some 40s below zero. Temperatures did not respond well for daytime highs on January 1st as several record low highs in the single digits below zero occurred.

January 2019 - Following in behind a high wind/blizzard event, bitter cold arctic air along with northwest winds brought extreme wind chills to north central and northeast South Dakota. The

extreme wind chills began during the morning hours of the 29th and continued through the morning hours of the 31st. Many record lows and record low maximums were set mainly on the 30th. Highs were in the teens below zero on the 30th across the east.

Most schools along with college campuses and businesses across the region had late starts or cancelled classes for two days. Mail service was also cancelled. Extreme wind chills from 35 degrees below to near 60 degrees below zero occurred.

February 2021 – A potent and persistent outbreak of Arctic air affected the entire region from February 6th through the 17th. The coldest days of the outbreak for many occurred Valentine's Day weekend, when high temperatures averaged around ten below zero, in northeastern South Dakota, to the single digits above zero, in central South Dakota. On February 14th, low temperatures dropped into the 20s to the 30s degrees below zero range. Extreme wind chills of 35 degrees to 55 degrees below zero also occurred on several days during the outbreak. The magnitude of the cold during this outbreak was fairly rare compared to the past 50 years, at least in terms of the persistence of the Arctic air. This was especially impressive considering the lack of deep, fresh snow cover across most of the area. If there had been widespread deep, fresh snowpack ahead of this Arctic outbreak, low temperatures would have been more severe and more often approaching record territory.

Impacts from this extreme and persistent cold include many frozen and/or broken water pipes (the limited snow depth did not help in this regard) and froze-over home sewer vents, dead vehicle batteries, school delays, and church cancellations. The prolonged cold caused significant strains to the power grid as demand spiked both locally and across several other states. Thousands of customers were at least briefly without power locally, particularly during the morning of Feb 16th. Concerns for rolling blackouts lingered for several days in this regard due to the continued extreme demand/strain, and people were repeatedly asked to conserve energy however possible.

December 2022 - A series of Arctic air masses crossed the region over period of 6 days beginning on Sunday, December 18th. Temperatures failed to even reach 5 degrees above zero during this period, with temperatures consistently dropping into the teens below zero at night. An unusually potent blast of cold air for December followed in behind a reinforcing Arctic front Tuesday night, December 20th, into Wednesday, December 21st, along with a trace to as much as 2 to 3 inches of new snowfall on top of the pre-existing snowpack. Wind gusts of 35 to 55 mph behind this front impacted the region from the 21st through the 23rd, resulting in an extended period of life-threatening wind chills in the -35 to -60 degree F range and ground blizzard conditions for many.

The extreme cold made the threat to stranded motorists even more dangerous, as numerous roads became impassable. Nearly the entire state was shut down, for the second time this December, as roads were either deemed No Travel Advised or closed by the SDDOT. Numerous vehicle accidents and rescues occurred, and numerous schools closed throughout the event.

January 2024 - Expansive high pressure out of Canada followed a clipper system resulting in high winds, arctic cold and dangerous wind chills on January 11th. A second system from the south followed close behind enhancing winds overnight January 12th into the 13th. Extreme cold with dangerous wind chills lingered through January 15th after which temperatures began to moderate.

Most of the area witnessed a low of 15 below or colder on that morning as well. The main impact wasn't the cold however, it was the high winds that accompanied the cold which resulted in some extreme wind chill values. The morning of the 13th would see the most extreme of these wind chills, with 65 weather stations across north central, central and northeast portions of the state registered a wind chill between 45 and 65 below on that morning thanks to wind speeds anywhere between 45 and 55 mph. Additionally, wind chills would again dip below 45 degrees for much of north central and central South Dakota on the morning of the 15th. The extreme cold was responsible for at least one exposure death.

Extreme Heat History

July 2016 - A very warm and abnormally large upper level high pressure area along with high dew points brought high heat indices to central and northeast South Dakota. High temperatures were in the upper 80s to the 100s with overnight lows in the upper 60s to the mid 70s. A few of the highest heat index values include: 110 degrees at Miller.

August 2022 - Hot and humid air with highs in the 90s and dewpoints around 70 degrees set up across central and eastern South Dakota during the day Friday. This was just ahead of a front that was slowly migrating southeast, though the frontal passage brought little relief as temperatures on the north side of the front still topped out close to the century mark, with dewpoints remaining in the 60s. Morning lows both Friday and Saturday remained in the 70s for most of the area. Over 70 weather stations in central, north central and northeast South Dakota reporting a heat index of 100 degrees or higher at some point during the day.

August 2023 - A heat dome to the south resulted in temperatures topping out in the 90s to just over 100 degrees, with dewpoints in the 70s to low 80s, generating heat index values in excess of 100 degrees for a three day period. During this timeframe, most weather stations reported heat index values falling below 75 degrees for at least a few hours in the morning, however. During the afternoon on Monday, moisture pooling along a weak warm front resulted in the highest heat index values across central South Dakota. Heat index values again topped above 100 degrees for much of central and northeast South Dakota on Tuesday as that weak warm front shifted northeast slightly. The heat and humidity eased slightly for Wednesday with a broader coverage of 100 to 112 degree heat index values. Even north central South Dakota, which had seen cloud cover during the two days prior, witnessed heat index values above 105 degrees. This period of excessive heat wasn't alleviated until a cold front moved through Wednesday night.

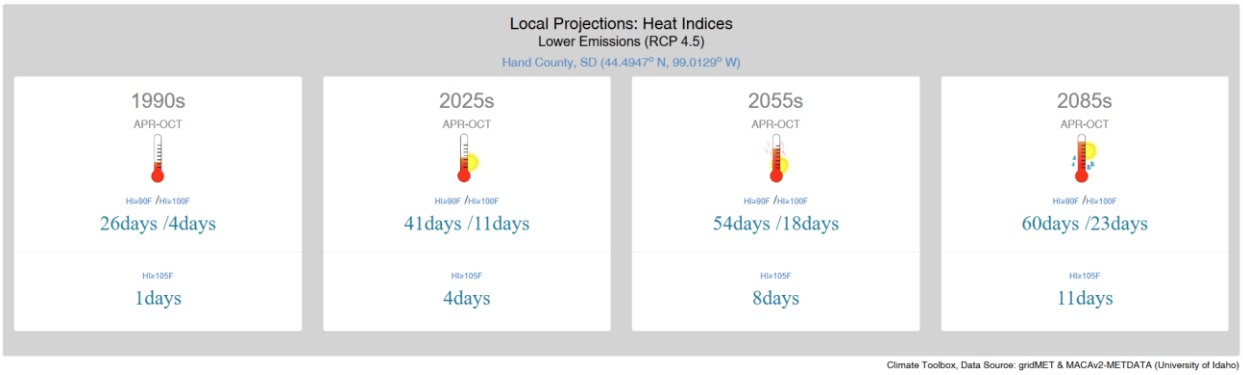
September 2023 - Heat and humidity developed across the area on Saturday September 2nd and continued through Monday, September 4th. Temperatures on Saturday exceeded 100 degrees across central and north central South Dakota. On Sunday, 100 degree heat and heat index values over 100 degrees were more broadly spread across central, north central and northeast South Dakota. Again on Monday, a broad expanse of 100 plus degree heat and heat index values were observed from central to northeast South Dakota. While this 3-day period experienced both abnormal heat and humidity, for the most part temperatures and heat index values dropped below 75 degrees for at least a few hours in the morning.

Future Probability Amidst A Changing Climate

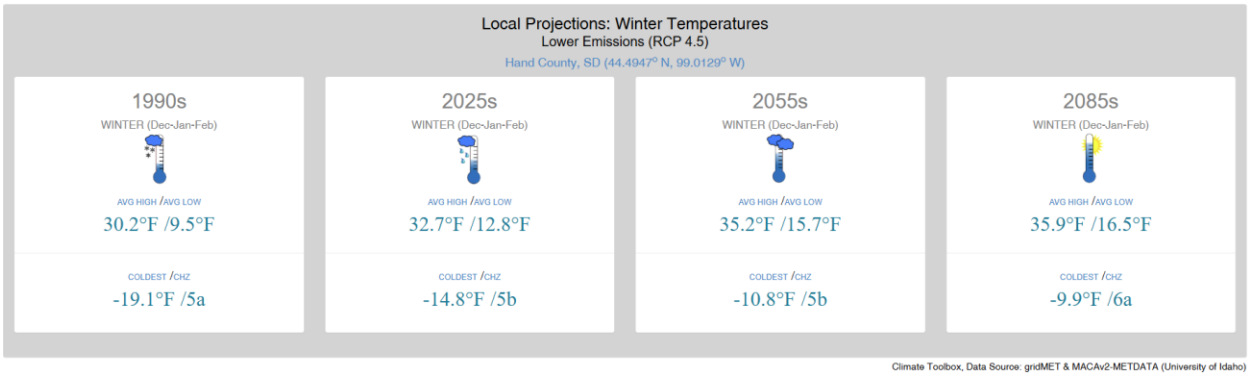
Extreme temperatures in the contiguous United States are projected to increase even more than average temperatures (very high confidence). Both extremely cold days and extremely warm

days are expected to become warmer. Cold waves are predicted to become less intense while heat waves will become more intense.[8]

According to The Climate Toolbox, the number of days with a Heat Index over 105F is expected to increase in the future. [9]



The Climate Toolbox also predicts that average winter temperatures will also increase and that the average coldest temperature will also increase in the future. [10]



Vulnerability Assessment

Extreme cold is a dangerous situation that can bring on health emergencies for susceptible people, such as those without shelter or who are stranded, or who live in a home that is poorly insulated or without heat. Extreme cold can burst water pipes, down electrical lines, freeze livestock, stall vehicles and create power outages resulting in the danger of people losing heat in their homes. Cold combined with wind can be a dangerous combination making temperatures outside much colder and more dangerous than they would be otherwise. Exposure is the biggest threat/vulnerability to human life; however, incidences of exposure are isolated and thus unlikely to happen.

Severe heat waves have caused catastrophic crop damage, thousands of deaths from hyperthermia, and widespread power failures due to increased use of air conditioning. Loss of power, crop damage and harm to livestock are the largest vulnerability to the county during

[8] Wuebbles, D.J., et. Al. 2017: Executive summary. In: Climate Science Special Report: Fourth National Climate Assessment, Volume I U.S. Global Change Research Program, Washington, DC.
[9] The Climate Toolbox. https://climatetoolbox.org/tool/Future-Climate-Dashboard. Accessed 11/4/2025.
[10] The Climate Toolbox. https://climatetoolbox.org/tool/Future-Climate-Dashboard. Accessed 11/4/2025.

extreme heat. All have an effect on quality of life, however, neither are detrimental to the existence of the population in Hand County.

During the risk assessment activity at the planning meetings, participants identified that extreme temperatures are highly likely to occur and that they have a low to high vulnerability to extreme temperatures.

The elderly and those without central air conditioning or adequate furnaces can be the most vulnerable to extreme temperatures. Twenty five percent (25%) of Hand County's population is over 65. According to Headwaters Economics *Populations at Risk*, age is the single greatest risk factor related to illness or death from extreme heat.[11]

The agricultural sector, especially livestock, can be particularly vulnerable to extreme temperatures. However, cattle do have the ability to acclimate to changing environmental conditions. During periods of extreme cold, livestock can be particularly impacted during heavy snow or freezing rain conditions where their hides get and remain wet. Heat stress in livestock is dependent on nigh time temperatures. Animals that don't cool sufficiently at night are candidates for increased heat loads the following day.[12]

FEMA's National Risk Index shows that there is a Relatively Moderate Risk Index for Cold Waves and a Very Low Risk Index for Heat Waves.

FLOOD

Flooding is a temporary overflow of water onto lands not normally covered by water producing measurable property damage or forcing evacuation of people and resources Flooding submerges land, produces measurable property damage or forces evacuation of people and resources. Floods can result in injuries and even loss of life when fast flowing water is involved. Six inches of moving water is enough to sweep a vehicle off a road. Disruption of communication, transportation, electric service, and community services, along with contamination of water supplies and transportation accidents are very possible. Floods can develop slowly as rivers swell during an extended period of rain, or during a warming trend following a heavy snow. Even a very small stream or dry creek bed can overflow and create flooding. Two different types of flooding hazards are present within Hand County.

1. Inundation flooding occurs most often in the spring. The greatest risks are realized typically during a rapid snowmelt before ice is completely off all of the rivers. Flooding is a longer event than flash flooding. Flooding can last for days to weeks.

2. Flash Flooding typically occurs during the summer months. This flooding is primarily localized, though enough rain can be produced to cause inundation flooding in areas along rivers and streams or in town if the storm sewer system cannot handle the rainfall. Heavy, slow-moving thunderstorms often produce large amounts of rain. The threat of flooding is increased during times of high soil moisture. In addition, debris carried by water can significantly compromise the effectiveness of otherwise adequately designed bridges, dams, culverts, and other structures. Flash flooding is typically a shorter event than inundation flooding.

[11] Headwaters Economics. Populations at Risk. 2024.

[12] SDSU Extension: Cold Stress Impacts on Cattle and Heat Stress Impact on Cattle

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

Floods present a risk to life and property, including buildings, their contents, and their use. Floods can affect crops and livestock. Floods can also affect lifeline utilities (e.g., water, sewer, and power), transportation, jobs, tourism, the environment, and the local and regional economies. The impact of a flood event can vary based on geographic location to waterways, soil content and ground cover, and construction. The extent of the damage of flooding ranges from very narrow to widespread based on the type of flooding and other circumstances such as previous rainfall, rate of precipitation accumulation, and the time of year.[13]

Table 4.8 Flood Recurrence Intervals	
Intervals	**Percentage**
10 years	10% probability of occurring in any given year
25 years	4% probability of occurring in any given year
50 years	2% probability of occurring in any given year
100 years	1% probability of occurring in any given year
500 years	0.2% probability of occurring in any given year

Flood recurrence intervals: statistical expectation of inundation frequency (SD Enhanced Mitigation Plan 2024).

Hazard History

Table 4.9 Hazard History and Future Probability		
Event Type	**Flash Flood**	**Flood**
Number of Days with Event	4	10
Number of Years with Event	3	5
Years of Data	10	10
Possible Number of Days with Event per Year	0.1	1.0
Occurrence Calculation	4/10 = 0.4	10/10 = 1.0
Probability of Future Event in Any Given Year	30%	50%
Probability Calculation	3/10 = 30%	5/10 = 50%

In the public survey, Flooding was ranked as the 6th most likely hazard to occur in Hand County and 35% of respondents had been negatively affected by Flooding in the past ten years.

Most flood events are overland flooding that result from heavy rainfall and spring thaw combined with a high ground water table which absorbs less water than normal. Flood events in Hand County are not usually a result of an overflowing body of water.

June 2018 - Severe thunderstorms developed along a stationary front and brought large hail, damaging winds, flooding, along with a few tornadoes to parts of central and northeast South Dakota. Two tornadoes and large hail caused the most damage near Burdette in Hand county.

Very heavy rains of 2 to 5 inches brought some flooded fields and pastures along with a few roads north of Miller and Ree Heights.

[13] 2024 State of SD Enhanced Hazard Mitigation Plan

July 2018 - Numerous thunderstorms developed along a stationary front extending from west to east across eastern South Dakota. Large hail up to tennis ball size, wind gusts to near sixty-five mph, along with flash flooding occurred during the late evening and overnight across parts of central and northeast South Dakota. The training of the thunderstorms over the same area brought extreme rainfall amounts of 4 to 11 inches across parts of northern Hand County. Some rainfall amounts included: 7.05 inches in Polo, 8.40 inches 2 miles southwest of Polo, 10.50 inches 2.5 miles southeast of Polo, and 11 inches 3 miles south southwest of Polo.

Township and county roads were underwater from very heavy rainfall.

Spring 2019 - Much above normal winter snowfall and melt water/ice jams along with heavy rains in the middle of March brought flooding across parts of central and northeast South Dakota for late March. Rivers and creeks flooded across much of the area along with many fields and roads. The flooding damaged many of the roads and culverts across the region. Some structures were also flooded. Many counties issued emergency declarations for the flooding to include the mid-March snowstorm. South Dakota's governor also declared a state of emergency. Much of this flooding continued into early April as the snowmelt continued with the high water delaying planting. This declaration was followed by a disaster declaration by the President of the United States. As a result, 24 of the 26 counties across central and northeast South Dakota were able to have access to public property damage assistance. Overall, damage estimates from the blizzards and floods for the state were at 43 million dollars.

Snowmelt brought flooded roads with many of them damaged along with culverts throughout the county. A travel advisory was issued for all county roads. There was flooding of homes near/in the cities of Miller and Saint Lawrence along with other rural homes throughout the county.

June 2020 - Very heavy rainfall of 3 to 5 inches brought widespread flooding to east central Hand County. Many roads were flooded with some roads washed out. Many acres of cropland were also flooded for a time.

July 2020 - Two rounds of severe thunderstorms developed across central and north central South Dakota along a weak surface low pressure trough. One round was in the early morning hours while the other round was in the late afternoon and evening. These storms brought large hail, severe winds, along with some isolated flooding and funnel clouds.

Heavy rain brought flooding of several homes in Miller with water in basements.

April 2023 - The snowfall during the season in northeast and central South Dakota exceeded normal levels, with many locations ranking among the top 10 for the snowiest seasons. Additionally, the late spring conditions were unusually cold, resulting in a persistent and exceptionally deep snowpack until early April. The depth of the snowpack ranged from 15 to 30 plus inches, containing approximately 4 to 8 inches of snow water equivalent. However, the weather pattern shifted to abnormally warm conditions in the middle of April. Starting from April 9th, temperatures rapidly rose into the 40s and 50s in areas with deep snowpack and occasionally reached the 60s and 70s thereafter. The rapid snowmelt that followed resulted in extensive overland flooding in the region between April 10th and 18th.

Flooding resulted in severe damage to public infrastructure. Several reports surfaced of county and township roads being washed out or submerged in water across central and northeastern South Dakota. A Presidential Disaster Declaration was approved for Brown, Clark, Codington,

Day, Faulk, Grant, Hand, Marshall, Potter and Roberts Counties, as well as for the Lake Traverse Indian Reservation.

June 2024 - Thunderstorms with heavy rainfall produced flooding across a broad swath of Lyman, Buffalo and Hand counties. Damage with this round of flooding was assessed at $191,004 in Hand County. This flooding was part of a broader event that resulted in a Presidential Disaster Declaration, which covered Hand and Buffalo counties.

Hand County emergency management and Sheriff's office has posted numerous photos of water in basements, water over roads and significant ponding in agricultural areas. Water was widespread across the southern half of the county.

A complete flood history can be found in Appendix C.

Future Probability Amidst A Changing Climate

The *South Dakota State Hazard Mitigation Plan 2019* points out that the special flood hazard areas are expected to increase nationwide by as much as 40%-50% over the next 100 years. This is attributed not only to the increase in precipitation but also to the increased urbanization of areas.

The frequency of extreme precipitation events has increased. Since 1990, South Dakota has averaged 22% more 2-inch rain events compared to the long-term average.[14]

The Northern Great Plains region is expected to see an increase in less frequent but more extreme precipitation events accompanied by longer periods without precipitation. Flooding is more likely to occur when drier soils are inundated with heavy amounts of water. As the region sees drier conditions with periods of extreme precipitation, it is more likely the amount of flash flooding events will also increase. Precipitation amounts vary from season to season. Over the past decades, general precipitation has increased throughout the United States. The season with the greatest increase was fall, which has had an increase of 15% since the twentieth century. The winter months and summer months have shown a negative percentage change over time, in some areas as much as -5% to -10%.[15]

Vulnerability Assessment

During the risk assessment activity at the planning meetings, there were varying results about vulnerability to flooding within the County, most participants said the area has a low to moderate vulnerability to flooding. Participants also listed varying probabilities of the likelihood of flooding and flash flooding occurring in the County.

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

The flooding of township and county roads is a concern at times for certain areas of the county.

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[14] State Climate Summaries. 2022. NOAA National Centers for Environmental Information. HTTPS://STATESUMMARIES.NCICS.ORG/CHAPTER/SD/

[15] Wuebbles, D.J., et. Al. 2017: Executive summary. In: Climate Science Special Report: Fourth National Climate Assessment, Volume I U.S. Global Change Research Program, Washington, DC.

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

NATIONAL FLOOD INSURANCE PROGRAM PARTICIPATION

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

> ***Element C2-a.*** *Does the plan contain a narrative description or a table/list of their participation activities?*

To be a participating community in the National Flood Insurance Program (NFIP), the community must complete an application, adopt a resolution of intent to participate and cooperate with FEMA, and adopt and submit a floodplain management ordinance that meets or exceeds the minimum NFIP criteria. The floodplain management ordinance must also adopt any Flood Insurance Rate Map (FIRM) or Flood Hazard Boundary Map (FHBM) for the community.

Hand County, Miller and St Lawrence participate in NFIP. Ree Heights does not participate in NFIP. While no floodplain maps currently exist for Hand County, both Miller and St Lawrence have old Flood Hazard Boundary Maps, issued in 1976 and 1975, respectively. Maps are included in Appendix G.

Floodplain Management Regulations

The Cities of Miller and St Lawrence have adopted floodplain management regulations to comply with NFIP requirements. These regulations include building codes, substantial damage/improvement provisions, and land use guidelines that regulate development in known flood prone areas.

Hand County does not have mapped flood zones and therefore does not enforce specific floodplain management regulations beyond general land-use considerations.

NFIP Compliance and Oversight

In Miller, the Finance Officer is designated as the Floodplain Manager. In St Lawrence, the Town President is designated as the Floodplain Manager. In both communities, the designee ensures that new developments follow flood resistant construction standards, where applicable.

Hand County does not have a designated floodplain administrator, as it is not mapped for flood zones by FEMA. However, the County Commission remains informed about flood risk and mitigation efforts.

Neither Miller or St Lawrence have had to enforce substantial damage or substantial improvement provisions due to a lack of NFIP claims.

Limitations and Future Considerations

All jurisdictions in Hand County face limitations due to the absence of updated FEMA floodplain mapping. Future mitigation efforts may include an assessment of flood-prone areas and consideration of participation in FEMA's Community Rating System (CRS) to enhance flood resilience.

Table 4.10 NFIP Participation				
Community Name	**Curr Eff Map Date**	**Entry Date**	**Flood Zone or NSFHA**	**Implementation Designee**
Communities Participating in the National Flood Program				
Hand County	NSFHA	06/08/98	NSFHA	None Required
Miller	10/15/85(M)	10/15/85	Zone A and C	Finance Officer
St Lawrence	07/18/75	11/30/22(E)	Partially Zone A	Town President
Communities Not in the National Flood Program				
Ree Heights				
NSFHA – No Special Flood Hazard Area (M) No Elevation Determined – All Zone A, C and X				

NFIP Policies and Claims

Element B2-C. *Does the plan address NFIP-insured structures within each jurisdiction that have been repetitively damaged by floods?*

There is one NFIP policy in place in Hand County. There have been six claims ever paid out for a total of $77,210.

Repetitive loss properties are those for which two or more losses of at least $1,000 each have been paid under the National Flood Insurance Program (NFIP) within any 10-year period since 1978. Hand County has had two repetitive loss properties or severe repetitive loss properties under the NFIP program in any jurisdiction in Hand County for a total of $75,763 in losses.

Community Rating System Program

The National Flood Insurance Program's (NFIP) Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS:

1. Reduce flood damage to insurable property;
2. Strengthen and support the insurance aspects of the NFIP, and
3. Encourage a comprehensive approach to floodplain management.

CRS is voluntary and up to each community. None of the jurisdictions within Hand County participate.

SUMMER STORMS (including Hail, Lightning, Thunderstorm Winds)

Hazard Description

Summer Storms are generally defined as atmospheric hazards resulting from changes in temperature and air pressure which cause thunderstorms that may cause hail, lightning, strong winds, and tornados.

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

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

Thunderstorms are formed when moisture, rapidly rising warm air, and a lifting mechanism such as clashing warm and cold air masses combine. The three most dangerous items associated with thunderstorms are hail, lightning, and strong winds. Thunderstorms and high wind occurrences in the County are also very common. Appendix C denotes the extent and severity of such hazards. The County continues to educate residents of the dangers of such storms through public service announcements and other printed media.

The NWS classifies hail by diameter size, and corresponding everyday objects to help relay scope and severity to the population. Table 4.10 below shows the hailstone measurements utilized by the NWS.

Table 4.11 Hail Severity

Hail Diameter (inches)	Description	Severity
1/4”	Pea	Non-Severe Hail Does not typically cause damage and does not warrant severe thunderstorm warning from NWS.
1/2”	Marble/mothball	
3/4”	Penny	
7/8”	Nickel	
1” (severe)	Quarter	Severe Hail Research has shown that damage occurs after hail reaches around 1” diameter and larger. Hail of this size will trigger a severe thunderstorm warning from NWS.
1 1/4”	Half Dollar	
1 1/2”	Walnut/Ping Pong Ball	
1 3/4”	Golf Ball	
2”	Hen Egg/Lime	
2 1/2”	Tennis Ball	
2 3/4”	Baseball	
3”	Teacup/Large Apple	
4”	Softball	
4 1/2”	Grapefruit	

Source: 2024 State Mitigation Plan and NWS.

Lightning is measured by the Lightning Activity Level (LAL) scale, created by the NWS to define lightning activity into a specific categorical scale. The LAL is a common parameter that is part of fire weather forecasts nationwide. All areas of Hand County are at risk of experiencing lightning in any of these categories. The LAL is reproduced in Table 4.11.

Table 4.12 Lightning Activity Level	
Scale	**Description**
LAL 1	No thunderstorms
LAL 2	Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud to ground strikes in a five-minute period
LAL 3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a five-minute period
LAL 4	Scattered thunderstorms. Moderate rain is commonly produced. Lightning is frequent, 11 to 15 cloud to ground strikes in a five-minute period
LAL 5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater than 15 cloud to ground strikes in a five-minute period
LAL 6	Dry lightning (same as LAL 3 but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag warning

Hazard History

Table 4.13 Hazard History and Future Probability			
Event Type	**Hail**	**Lightning**	**Thunderstorm Wind**
Number of Days with Event	35	0 from NOAA 58 (Earth Networks)	29
Number of Years with Event	10	1	10
Years of Data	10	1 (2020)	10
Possible Number of Days with Event per Year	3.5	58	2.9
Occurrence Calculation	35/10 = 3.5	58/1 = 58	29/10 = 2.9
Probability of Future Event in Any Given Year	100%	100%*	100%
Probability Calculation	10/10 = 100%	1/1 = 100%	10/10 = 100%

Lightning

Lightning is common in this county. NOAA only counts lightning strikes that were significant enough in some way to be reported; the actual number of lightning strikes is undoubtedly far higher.

Earth Networks prepared a 2020 Lightning Report that included lightning data for South Dakota throughout 2020. A lightning pulse is a surge of electric current in lightning usually accompanied by a burst of light. Pulses are classified as In-cloud (IC) or Cloud-to-Ground (CG). Total number of thunder days in each county (the total number of days in the year when lightning was

detected by ENTLN) are also included. The period covered is January 1, 2020 to December 31, 2020.

Table 4.14 Total Lightning Pulses		
County	**Total Lightning Pulses**	**Total Thunder Days**
Hand	250,461	58

The extent or severity of lightening can range from significant to insignificant depending on where it strikes and what structures are hit. Water towers, cell phone towers, power lines, trees, and common buildings and structures all have the possibility of being struck by lightning. People who leave shelter during thunderstorms to watch or follow lightning also have the possibility of being struck by lightning.

In the public survey, Summer Storms were ranked as the 2nd most likely hazard to occur in Hand County and 44% of respondents had been negatively affected by Summer Storms in the past ten years.

Hail
Hail is common for this region during the spring, summer, and fall and causes thousands of dollars of damage every year. There have been several storms in the past 10 years with hail greater than 1” in diameter.

August 2020 - Large hail up to 2 inches in diameter occurred along with a fatal tornado in northern Hand county.

July 2021 - Thunderstorms developed near an area of low pressure across central South Dakota during the afternoon of July 25th, quickly intensifying to severe limits. These storms produced, at times, large to significantly large hail as they tracked to the east and southeast. The hail caused structural, vehicle, and crop damage. One of the more prolific storms produced hail continuously over a 3-hour window of time, extending about 125 miles from Faulk to Codington counties. The hail was up to nearly 4 inches in diameter at one location along the way.

August 2023 -
A cold front brought the threat of severe thunderstorms to northeast South Dakota on the afternoon and evening of August 10th. Initially, individual storms presented both a hail and wind threat in the James Valley, with reports of golf ball sized hail in Brown and Hand counties.

A member of the public reported that the storm generated quarter to golf ball sized hail, enough to completely cover the ground.

June 2024 - Low pressure crossing from west to east across the state provided the support for numerous, widespread severe thunderstorms. The main threat from these storms was large hail, with several reports of hail at or greater than golf ball size hail to the size of baseballs was observed at multiple locations in Hand County. In addition to the large hail and winds, heavy rain produced overland flooding, with water reported over the roads in Hand, Hamlin, Codington and Clark counties.

Future Probability Amidst A Changing Climate

As the atmosphere warms further due to climate change, the increased heat in the atmosphere provides more energy for severe storms. The frequency of severe weather events has increased steadily over the last century. The number of weather- related disasters during the 1990s was four times that of the 1950s and cost 14 times as much in economic losses. Historical data shows that the probability for severe weather events increases in a warmer climate.[16]

Vulnerability Assessment

During the risk assessment activity at the planning meeting, participants identified that they have a medium to high vulnerability to summer storms and corresponding hazards such as hail, heavy rain, lightning, and thunderstorms.

Warning time for summer storms is normally several hours, sufficient for relocation and evacuation if necessary. However, tornadoes may occur with little or no warning.

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

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

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

Often associated with summer storms are utility problems. Electrical transmission lines are susceptible to breaking during high winds and hail. Tall trees located near electrical lines can be broken in wind or by lightning strikes and land on electrical lines, severing connections. Any electrical complications bring associated risk of food spoilage, appliance burnout, loss of water, and potential harm to in-house life support dependents. Limited loss of power is common on an annual basis. Typical power interruptions last around 1 to 3 hours. Most residents are prepared to deal with this.

TORNADOS

Hazard Description

Tornados are violent windstorms that may occur singularly or in multiples as a result of severe thunderstorms. They develop when cool air overrides warm air, causing the warm air to rapidly rise. Many of these resulting vortices stay in the atmosphere, though touchdown can occur.

[16] State of South Dakota Hazard Mitigation Plan. 2024.

Tornados occur most often in South Dakota during the months of May - August. The greatest period of tornado activity (and actually all of the tornadoes in the last ten years) is from 12:00 pm to midnight. Within this time frame, most tornadoes occur between 2 pm and 10 pm.

The Enhanced Fujita Tornado Damage Scale categorizes tornadoes based on their wind speed:

Table 4.15 Enhanced Fujita Tornado Damage Scale	
EF Rating	**3 Second Gust (mph)**
F0	65-85 mph
F1	86-110 mph
F2	111-135 mph
F3	136-165 mph
F4	166-200 mph
F5	Over 200 mph

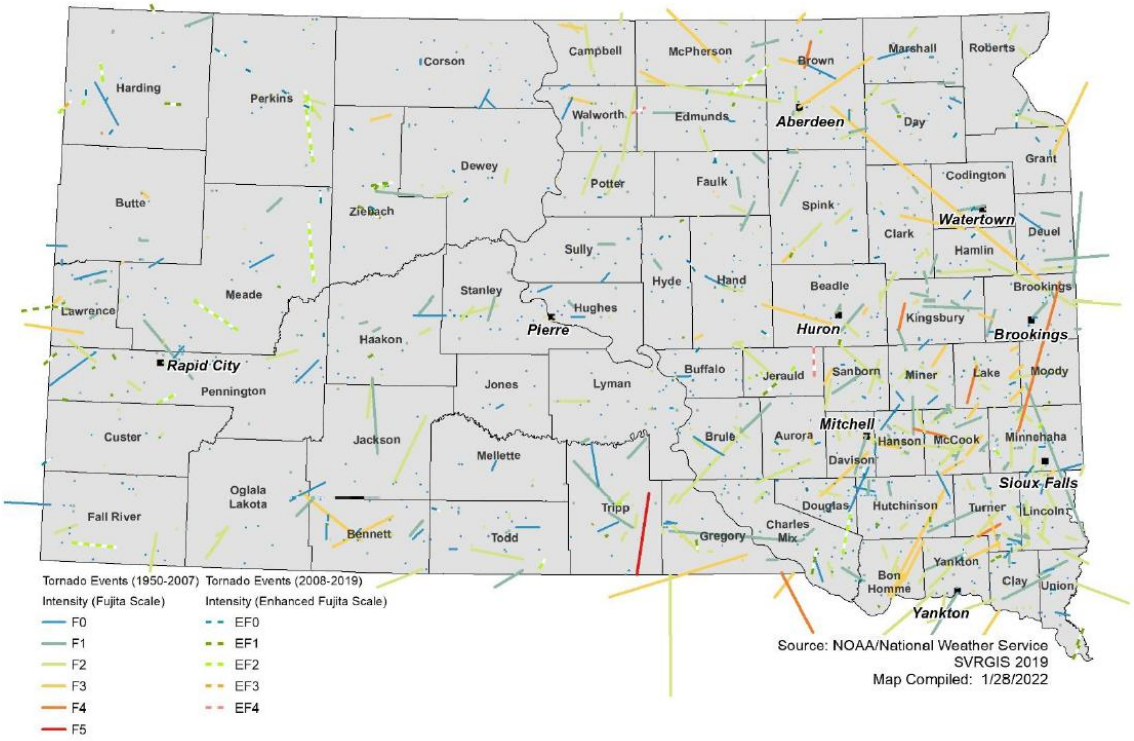
National Weather Service

Hazard History

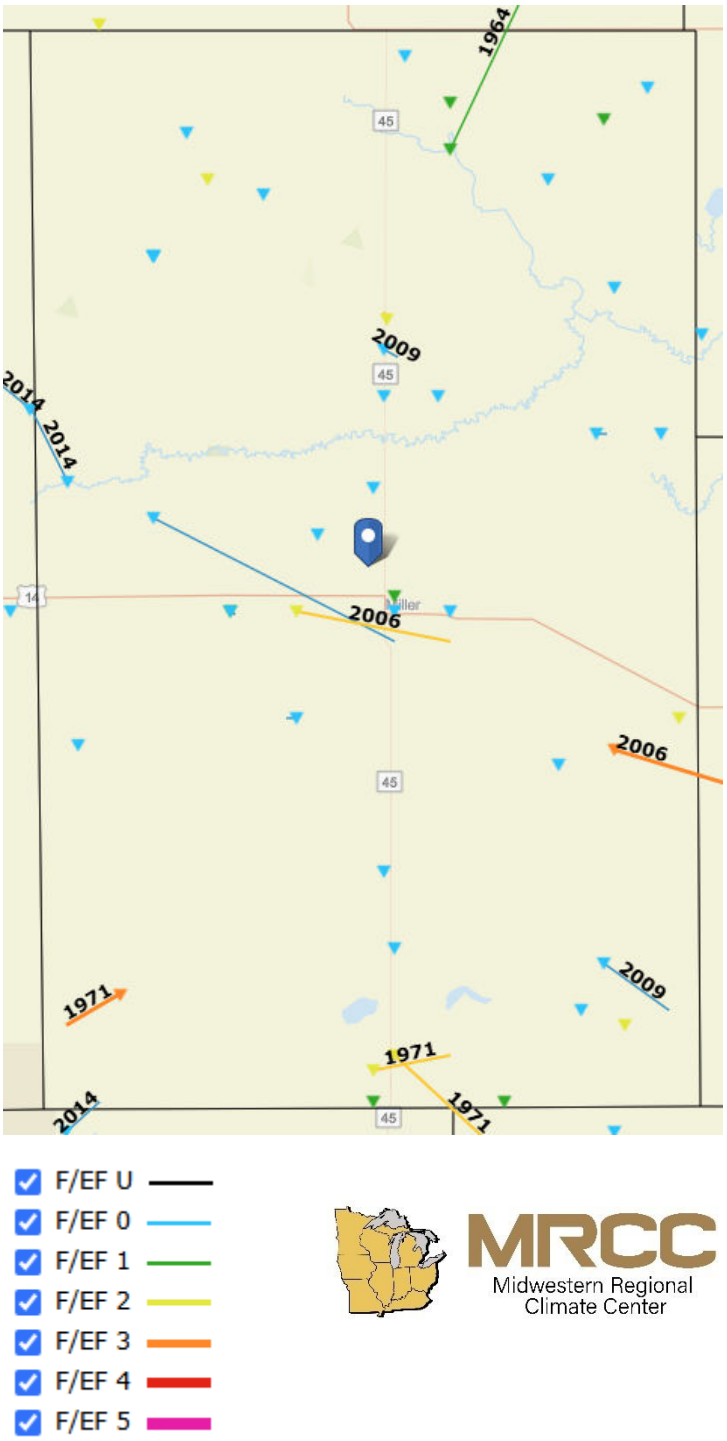
The annual risk for intense summer storms is very high. All of Hand County is susceptible to tornados. While warning time for summer storms is normally several hours, sufficient for relocation and evacuation if necessary. However, tornadoes may occur with little or no warning. Appendix C includes the tornado history in Hand County over the course of the past 10 years. There have been four occurrences of tornados or funnel clouds in Hand County in the last ten years.

Table 4.16 Hazard History and Future Probability			
Event Type	**Funnel Cloud**	**Tornados**	**Magnitude**
Number of Days with Event	2	7	All EF0, EF1 or EF2
Number of Years with Event	2	4	
Years of Data	10	10	
Possible Number of Days with Event per Year	.20	.70	
Occurrence Calculation	2/10 = .20	7/10 = .70	
Probability of Future Event in Any Given Year	20%	40%	
Probability Calculation	2/10 = 20%	4/10 = 40%	

Figure 3-64 Tornado Paths in South Dakota 1955-2019



From the 2024 South Dakota State Mitigation Plan



June 2017 - A large upper level low pressure trough lifting northeast over the region along with a surface cold front interacting with a warm and very humid air mass brought severe thunderstorms to the region. During the mid afternoon hours, storms rapidly developed over central and eastern South Dakota, between Pierre and Aberdeen. These storms quickly strengthened and produced large hail, damaging winds, and eventually tornadoes. The storms evolved into mainly a wind and tornado event around 7 pm. Widespread wind damage occurred across northeast South Dakota

as the storms formed a line and moved northeast. Many tornadoes occurred across the region, causing EF-0 and EF-1 damage. One tornado touched down briefly in an open field. No damage was reported.

June 2018 – Severe thunderstorms developed along a stationary front and brought large hail, damaging winds, flooding, along with a few tornadoes to parts of central and northeast South Dakota. Two tornadoes and large hail caused the most damage near Burdette in Hand county.

A tornado touched down south of Burdette taking down some large tree branches and tossing them 25 to 30 feet in all directions. Some of the corn crop was also bent and flattened in areas.

A second tornado touched down picking up a substantial calving barn and rolling and tossing it about 100 feet to the northeast. The calving barn destroyed a fence line and severely damaged a chicken coop and large tree in the process. Sheet metal was removed from the top side of a separate barn. Additional debris was tossed to the southeast about 150 to 200 feet, bending a fence. Chemical and water storage tanks were tossed about 50 feet to the north. Hay bales were removed from stacks and tossed/rolled to the east with a bale in a feeder picked up and destroyed. Large hail dented the siding and broke windows on both houses on the farmstead.

August 2020 - The tornado initially touched down in the pastureland east of South Dakota Highway 45, roughly 0.8 miles south of 184th Street. It continued to track north for roughly 0.6 miles, damaging a tree grove and fence line. The track then turned west northwest and crossed South Dakota Highway 45, roughly 0.2 miles south of 184th street. A southbound RV pulling an enclosed trailer was struck. The trailer detached from the RV and the RV was lofted and rolled roughly 200 yards into a corn field on the west side of South Dakota Highway 45. The driver was pronounced dead at the scene. The tornado track continued west northwest through the corn field for an estimated 0.4 miles. The tornado was at its peak width and intensity at this point. Corn was completely flattened in some areas with a distinct convergent pattern. As the tornado weakened and roped out the path took a southwest turn and persisted for roughly another 0.6 miles before coming to an end in the corn field.

July 2023 - Two areas of thunderstorms brought severe weather to central and northeast South Dakota on the evening of July 25th. A warm front across northeastern South Dakota provided the focus for storms that generated at least one observed wind gust of 63 mph. A secondary area of thunderstorms developed over central South Dakota near a surface low-pressure system. The thunderstorms that developed over Hand County resulted in quarter-size hail, winds in excess of 60 mph, and a brief tornado that produced EF0 damage.

A brief tornado resulted in the collapse of the walls of a 25X50 shed. The debris from the shed was spread roughly 75 yards to the southeast. There was no other visible damage to the property or shelterbelt. A neighbor to the southeast witnessed clear rotation extending from the cloud base in the direction of where the damaged occurred.

A complete list of tornado events can be found in Appendix C.

In the public survey, Tornados were ranked as the 8th most likely hazard to occur in Hand County and 3% of respondents had been negatively affected by Tornados in the past ten years.

Future Probability Amidst A Changing Climate

There presently is not enough data or research to quantify the magnitude of change that climate change may have related to tornado frequency and intensity. NASA's Earth Observatory has

conducted studies which aim to understand the interaction between climate change and tornadoes. Based on these studies meteorologists are unsure why some thunderstorms generate tornadoes and others do not, beyond knowing that they require a certain type of wind shear. Tornadoes come from about 1 percent of thunderstorms, usually supercell thunderstorms that are in a wind shear environment that promotes rotation.[17]

Vulnerability Assessment

During the risk assessment activity during the planning meetings, jurisdictions had different views on how likely a tornado was to occur in their area. There were also different views on how vulnerable jurisdictions where – anywhere from medium to high vulnerability. The National Risk Index rates Hand County as Very Low Risk Index for tornados.

Often associated with summer storms are utility problems. Electric services have historically buried powerlines in the county. High voltage electrical transmission lines run the length of Hand County. These lines are susceptible to breaking during high winds and hail. Tall trees located near electrical lines can be broken in wind or by lightning strikes and land on electrical lines, severing connections. Any electrical complications bring associated risk of food spoilage, appliance burnout, loss of water, and potential harm to in-house life support dependents. Limited loss of power is common on an annual basis. Typical power interruptions last around 1 to 3 hours. Most residents are prepared to deal with this.

When evaluating new methods of warning systems, the county and towns should evaluate that warning systems consider different vulnerable populations, such as those without access to technology, language barriers, and cognitive disabilities.

According to Headwaters Economics' *Populations at Risk* report, in Hand County, only 5% of all occupied housing units are mobile homes, which are highly vulnerable to tornados and other extreme weather events.[18] During planning meetings, it was confirmed that there are not many areas of the County where mobile homes are common. Most homes in the County have basements for residents to seek shelter. However, there are several campgrounds around the County. Campers are highly vulnerable to tornados.

WILDLAND FIRES

Hazard Description

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

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

[17] State of South Dakota Hazard Mitigation Plan. 2024.
[18] Headwaters Economics. Populations at Risk. 2025.

Wildfires occur primarily during drought conditions. Wildfires can cause extensive damage, both to property and human life and can occur anywhere in the county. Even though wildfires can have various beneficial effects on wilderness areas for plant species that are dependent on the effects of fire for growth and reproduction, large wildfires often have detrimental atmospheric consequences, and too frequent wildfires may cause other negative ecological effects.

A large part of the county is comprised of pasturelands. Wildfires that occur on this land type can spread quickly, especially during periods of high winds. There are no urban interface areas in Hand County, so the likelihood of occurrence is not more prevalent in any part of the County. Property at risk includes all public and private land and structures in the fire's path. Most fires occur in the summer months, but wildfires can occur at any time of the year. Major fire events are more likely to occur during or after conditions of prolonged drought, high winds, widespread tree damage often caused by severe storms, and insect infestations. The magnitude of wildfires depends upon several different factors such as base fuel, terrain, and weather conditions.

Compared to the rest of the country, FEMA's National Risk Index scores Hand County with a relatively low risk. The occurrence of major fire events is heightened when there is prolonged drought or severe storms affiliated with widespread tree damage. With a predicted decrease in precipitation and an expected higher frequency of drought conditions, the intensity and frequency of wildfire events are expected to increase.

Hazard History

Information on past events was taken from two primary sources – the State Fire Marshal's Office and the National Interagency Fire Council.

The State Fire Marshal's information is derived from the reports submitted by the local fire departments who respond to the fires. For the purpose of this plan, we have used the numbers provided by the State Fire Marshal's Office as a point of reference in determining the likelihood of fire hazard occurrence within the jurisdictions. The cause of the other fires is not listed, so it is not known for certain whether all or some of these fires are result of a natural occurrence or as a result of human behavior. Additionally, information was provided about the number of injuries and fatalities reported as a result of these fires and total dollars lost. A summary of the fire incident reports is provided by county in Table 4.16.

Table 4.17 Summary of Fire Incident Reports for Hand County between 2015-2024	
Structure Fire	34
Vehicle Fire	40
Other Fire	74
Total Fires	148
Civilian Injuries	28
Civilian Fatalities	6
Fire Service Injuries	0
Fire Service Fatalities	0
Total Fire Losses	**$6,316,200**

Data from State Fire Marshal's Office

Table 4.18 Summary of Fire Incident Reports for Hand County between 2015-2025		
		Size
Human Caused	1	

Lightning	0	
Undetermined	1	159 acres
Total Fires Reported	2	

National Interagency Fire Council

Information from the State Fire Marshal's Office does not indicate the extent (size) of the fires. Only one of the fires reported from the National Interagency Fire Center noted the extent of the fires. The other one did not indicate the size.

USDA Forest Service wildfire class include the following:

Table 4.19 Extent of Wildfire Classes and Occurrence in Hand County between 2015-2025

Wildfire Class	Size	Number of Occurrences
Wildfire Class A	<1 acres	0
Wildfire Class B	1-9.9 acres	0
Wildfire Class C	10-99 acres	0
Wildfire Class D	100-299 acres	1
Wildfire Class E	300-999 acres	0
Wildfire Class F	1,000-4,999 acres	0
Wildfire Class G	5,000-9,999 acres	0
Wildfire Class H	10,000-49,999 acres	0
Wildfire Class I	50,000-99,999 acres	0

Table 4.20 Hazard History Future Hazard Probability based on National Interagency Fire Council Data

County	Hand
Number of Days with Event	2
Number of Years with Event	2
Years of Data	11
Possible Number of Days with Event per Year	.27
Occurrence Calculation	3/11 = .27

In the public survey, Wildfires were ranked as the 9th most likely hazard to occur in Hand County and 6% of respondents had been negatively affected by Wildfires in the past ten years.

Future Probability Amidst A Changing Climate

Wildfire conditions across South Dakota and the western United States in general are likely to worsen in the future due to climate change. This is due to increasing temperatures, an increase in annual precipitation, and drought as a regular occurrence. The increase in temperatures can dry out fuels more rapidly. The increase in moisture can provide favorable conditions for fuel (vegetation) growth.[19]

Vulnerability Assessment

During the risk assessment activity during the planning meetings, jurisdictions had different views on how likely a wildfire was to occur in their area – ranging from low to high probability. However, most everyone agreed that if a wildfire does occur, their area has a medium

[19] State of South Dakota Hazard Mitigation Plan. 2024.

vulnerability to wildfires. The National Risk Index rates Hand County as Relatively Low Risk Index for wildfires.

Older adults (25% of Hand County residents are 65 or older) are more susceptible to air pollution such as dust, which is associated with wildfires, making them more vulnerable to drought than the general population.

Since there are no remote forested regions in Hand County, wildfires can be easily spotted and are capable of being maintained. Fire interference with traffic on highways is not a major concern.

Moisture amounts have the biggest impact on fire situations. During wet years, fire danger is low. More controlled burns are conducted and less mishaps occur. During dry years, severe restrictions are placed on any types of burns.

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

The most important factor in mitigating against wildfires continues to be common sense and adherence to burning regulations and suggestions disseminated by the County.

Hand County has an open burning ordinance. The ordinance reads that during times when a burn ban is declared, all open burning of any substances shall be prohibited within any or all of the unincorporated areas of Hand County until such time as the Open Burning Advisory Board cancels said burn ban. A burn ban is declared by a majority vote of the members of the Open Burning Advisory Board. The Open Burning Advisory Board shall consist of the representatives from following fire departments: Wessington, South Hand, Ree Heights, Polo, Orient, Redfield Rural, Tulare and Miller so long as they have recognized protection districts within Hand County. In addition to the various fire officials, the sheriff, the emergency manager and the chairperson for the Board of Commissions are members de facto.

See Appendix F for a copy of the ordinance.

WIND – HIGH/STRONG

Hazard Description

Strong winds are usually defined as winds over 40 mph, which are not uncommon in the area. Strong winds can cause destruction of property and create a safety hazard resulting from flying debris. Strong winds also include severe localized wind blasting down from thunderstorms. These downward blasts of air are categorized as either microbursts or macrobursts depending on the amount of geographical area they cover. Microbursts cover an area less than 2.5 miles in diameter and macrobursts cover an area greater than 2.5 miles in diameter.

The magnitude and severity of wind events can be measured by the Beaufort Wind Scale. The replication of the scale only reflects land-based effects. Beaufort Level 12 events have occurred in Hand County.

Table 4.21 Beaufort Wind Scale

Force	Speed (mph)	Description	Specifications (for use on land)

0	0-1	Calm	Calm; smoke rises vertically
1	1-3	Light Air	Direction of wind shown by smoke drift, but not by wind vanes
2	4-7	Light Breeze	Wind felt on face; leaves rustle; ordinary vanes moved by wind
3	8-12	Gentle Breeze	Leaves and small twigs in constant motion; wind extends light flag
4	13-18	Moderate Breeze	Raises dust and loose paper; small branches are moved
5	19-24	Fresh Breeze	Small trees in leaf begin to sway; crested wavelets form on inland waters
6	25-31	Strong Breeze	Large branches in motion; whistling heard in telegraph wires; umbrellas used with difficulty
7	32-38	Near Gale	Whole trees in motion; inconvenience felt when walking against the wind
8	39-46	Gale	Breaks twigs off trees; generally impedes progress
9	47-54	Severe Gale	Slight structural damage occurs (chimneypots and slates removed)
10	55-63	Storm	Seldom experienced inland; trees uprooted; considerable structural damage occurs
11	64-72	Violent Storm	Very rarely experienced; accompanied by widespread damage
12	72-83	Hurricane	

Hazard History

Table 4.22 Hazard History Future Hazard Probability		
Event Type	High Wind/Thunderstorm Wind	Magnitude
Number of Days with Event	56	57-100 mph
Number of Years with Event	10	
Years of Data	10	
Possible Number of Days with Event per Year	5.6	
Occurrence Calculation	56/10 = 5.6	
Probability of Future Event in Any Given Year	100%	
Probability Calculation	10/10 = 100%	

It is universally agreed that high winds are highly probable in Hand County and NOAA data confirms that agreement. Severe wind events are common in eastern South Dakota. At least a few times a year the residents of Hand County can expect to experience strong winds in excess of 40 mph. There were reports of winds of 100 mph near Polo in 2017 that damaged grain bins, several structures, along with downing many trees. NOAA shows 56 reports of high wind/thunderstorm winds during the last ten years. Many of the storm reports state that there was property and tree damage, but no value is placed on the damage.

In the public survey, Strong Winds were ranked as the 1st most likely hazard to occur in Hand County and 56% of respondents had been negatively affected by Strong Winds in the past ten years.

A complete 10-year history of High Winds/Thunderstorm Winds can be found in Appendix C.

Future Probability Amidst A Changing Climate

According to the Fourth National Climate Assessment, there presently is not enough data or research to quantify the magnitude of potential change that climate change may have on windstorms. Future updates to the mitigation plan should include the latest research on how the windstorm hazard frequency and severity could change.[20]

Vulnerability Assessment

During the risk assessment activity at the planning meetings, participants agreed that high or strong winds are highly likely to occur in the area. Participants viewed their area as having a moderate to high vulnerability to high or strong winds.

Strong Winds can be detrimental to the area. Trees, poles, power lines, and weak structures are all susceptible and vulnerable to strong winds. When strong winds knock down trees, poles, power lines, and structures it creates additional traffic hazards for travelers and commuters. Strong winds are a common occurrence in all parts of Hand County. Another area of vulnerability would be those areas with dense tree growth where dead or decaying trees lose their stability and can be blown over or knocked down easily. The farming community tends to be vulnerable because many old farm sites have weak, dilapidated, or crumbling structures or structures such as grain bins which can easily be blown over.

According to Headwaters Economics' *Populations at Risk* report, in Hand County, only 5% of all occupied housing units are mobile homes, which are highly vulnerable to strong winds, tornados and other extreme weather events..[21] During planning meetings, it was confirmed that there are not many areas of the County where mobile homes are common. Most homes in the County have basements for residents to seek shelter.

WINTER STORMS (including Blizzards, Freezing Rain/Ice, Heavy Snow, Sleet, Snow, Winter Storms and Winter Weather)

Hazard Description

Generally winter weather can range from freezing rain to blizzard conditions and can occur between October and April. Because of the multiple categories NOAA has for winter weather, the probability of winter storms combines several hazards including blizzards, heavy snow, ice storms, winter storms and winter weather.

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

[20] State of South Dakota Hazard Mitigation Plan. 2024.
[21] Headwaters Economics. Populations at Risk. 2025.

Winter storms in South Dakota are known to cover large geographical areas, often an entire county or multiple counties can be affected by a single storm. All of the storms identified in Appendix C were considered to have occurred countywide. Due to the multiple occurrences of winter storms each year, an exhaustive compilation is not possible.

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

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

Severe Winter Storms deposit four or more inches of snow in a 12-hour period or six inches of snow during a 24-hour period. Such storms are generally classified into four categories with some taking the characteristics of several categories during distinct phases of the storm. These categories include freezing rain, sleet, snow, and blizzard. Generally winter storms can range from moderate snow to blizzard conditions and can occur between October and April.

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

Snow is a common occurrence throughout the County during the months from October to April. Accumulations in dry years can be as little as 5-10 inches, while wet years can see yearly totals up to 80 inches. Snow is a major contributing factor to flooding, primarily during the spring months of melting.

Heavy Snow is snowfall accumulating to 4 inches or more in 12 hours or less. Or snowfall accumulating to 6 inches or more in 24 hours or less.

The extent rating of winter storms that cause issues in South Dakota includes storms forecasted to be Winter Storm Warnings or Blizzard Warnings. The NWS issues a Winter Storm Warning when conditions that can quickly become life threatening and are more serious than an inconvenience are imminent or already occurring. Heavy snows, or a combination of snow, freezing rain or extreme wind chill due to strong wind, may bring widespread or lengthy road closures and hazardous travel conditions, plus threaten temporary loss of community services such as power and water. Deep snow and additional strong wind chill or frostbite may be a

threat to even the appropriately dressed individual or to even the strongest person exposed to the frigid weather for only a short period.

NOAA's National Centers for Environmental Information is now producing the Regional Snowfall Index (RSI) for significant snowstorms that impact the eastern two thirds of the U.S. The RSI ranks snowstorm impacts on a scale from 1 to 5, similar to the Fujita scale for tornadoes or the Saffir-Simpson scale for hurricanes (see table below). The RSI is a regional index; a separate index is produced for each of the six NCEI climate regions in the eastern two-thirds of the nation. South Dakota is included in the Northern Rockies and Plains Region, along with Nebraska, North Dakota, Wyoming, and Montana. RSI ratings from 1 to 5 are possible in South Dakota.

Table 4.23 Regional Snowfall Index	
Category	**Description**
1	Notable
2	Significant
3	Major
4	Crippling
5	Extreme

Hazard History

Table 4.24 Hazard History and Future Hazard Probability					
Event Type	**Blizzard**	**Heavy Snow**	**Ice Storm**	**Winter Storm**	**Winter Weather**
Number of Days with Event	14	14	2	5	7
Number of Years with Event	7	10	2	3	3
Years of Data	10	10	10	10	10
Possible Number of Days with Event per Year	1.4	1.4	.20	.50	.70
Occurrence Calculation	14/10 = 1.4	14/10 = 1.4	2/10 = .2	5/10 = 0.5	7/10 = 0.7
Probability of Future Event in Any Given Year	70%	100%	20%	30%	30%
Probability Calculation	7/10 = 70%	10/10 = 100%	2/10 = 20%	3/10 = 30%	3/10 = 30%

Complete Winter Storm History taken from the NOAA website can be found in Appendix C.

In the public survey, Severe Winter Weather was ranked as the 3rd most likely hazard to occur in Hand County and 50% of respondents had been negatively affected by Severe Winter Weather in the past ten years.

December 2016 - A surface low pressure area moved across the Central Plains and brought heavy snow to parts of central and northeast South Dakota from the morning hours of the 16th to the morning hours of the 17th. Snowfall amounts of 6 to 10 inches occurred across the

region. Travel was significantly affected with many roads snow covered or drifted over. Some snowfall amounts included: , 7 inches at Miller.

December 2016 - An intense surface low pressure area moved from northeast Colorado to South Dakota from the 24th through the 26th. This storm was unusually warm for the region for late December and produced record breaking heavy rain along with flooding in some cases. Significant icing occurred across areas at or just below the freezing point, which resulted in widespread tree and power pole and line damage to the area. Some downed branches and trees fell onto homes across the region. This storm also brought high winds along with snow and blizzard conditions to the region. This significant storm resulted in massive power outages, stranded motorists and closed roads. Ice accumulations were significant across central and northeastern South Dakota with over an inch accumulation for some locations. High winds during this event increased the amount of power pole, line, and tree damage. Those who did not see freezing rain accumulations had to deal with ice as well. The ponding of the heavy rain froze overnight once much colder air moved in. Roads and walkways became treacherous ice rinks and remained as such for many days. There were numerous injuries from slips on the ice, as well as several vehicular accidents and flight cancellations. Livestock was also affected, though most made it through the storm. Dairy operations dealt with frozen drinking water tanks. Precipitation amounts were very impressive for late December. Rain or freezing rain was the predominant precipitation type for those roughly east of the Missouri River on the 25th. Some of the heaviest rainfall amounts include: 1.05 inches at Miller. From this rainfall, ice accumulation amounts ranged from a quarter inch to nearly an inch and a half in places. Twenty-one counties encompassing 30 communities and 3 Indian reservations were impacted. Entire communities, thousands of homes and businesses, and ultimately over 12,000 people went without power. For some, power was not restored for 10 days despite tireless efforts. Due to widespread significant impacts, the Governor of South Dakota declared a State of Emergency on the 26th which helped facilitate the movement of out-of-state crews to aid with power restoration. There was also a Presidential Disaster Declaration for damage to public property. The total estimated damage was near 8 million dollars for central and northeast South Dakota.

January 2017 - A surface low pressure area moving across the region brought heavy snow to central South Dakota from the morning of the 24th to the morning of the 25th. Six to 10 inches of snowfall occurred across the region. Interstate-90 was closed from 6 pm on the 24th to 7 am on the 25th with no travel advised on other roads across the region. Some snowfall amounts included: 8 inches at Ree Heights and Miller.

March 2018 - An intense surface low pressure area brought scattered showers and thunderstorms along with heavy snow to much of central and north central South Dakota from the 5th to the 6th. Northwest winds gusting to 40 to 60 mph brought near whiteout conditions. The blizzard and heavy snow resulted in closed businesses, schools, government offices, nearly impossible travel with several accidents reported, along with closed highways and Insterstate-90. Many activities and events were also postponed or cancelled. Some snowfall amounts from across the region include: 8 inches at Miller.

April 2018 - A rare mid-April blizzard affected most of central and northeast South Dakota from April 13th into April 15th. Heavy snowfall along with high winds brought widespread blizzard conditions to the region. Snowfall amounts from 6 to as much as 20 inches along with wind gusts to over 60 mph brought hazardous, if not impossible travel. Dozens of schools were closed on the 13th along with many state government offices. Many activities and events were also postponed or cancelled. Despite the cancellations and delays, the South Dakota Highway patrol still responded to hundreds of calls for service to assist stranded motorists. The wet

conditions/mud, snow, and wind greatly affected cattle producers trying to protect newborn calves. As a result of the blizzard there were some calf losses across the region. The winds subsided on the 14th for many locations, leading to improved visibility, while periods of snow continued into the 15th across eastern South Dakota. Snowfall amounts include 13 inches at Miller. The highest measured wind gust was 66 mph at Danforth in southern Hand county.

April 2019 - A historic blizzard affected all of central and northeast South Dakota from April 11th into the 12th. The storm came in two waves. The first wave brought a band of moderate to heavy snow and thunder as it lifted from south to north across the region during the early morning hours of the 10th. The thunder snow with this first wave brought snowfall rates of 2 inches or more an hour with initial snowfall accumulations of 2 to 10 inches. There were some areas of light freezing rain from Pierre to Watertown in the early morning hours of the 10th. The second wave of heavy snow and strong north winds were with the main surface low pressure area moving across the central plains. The heavy snow in combination with winds gusting to 35 to 50 mph brought widespread blizzard conditions along with heavy drifting. At the storm's end, most locations received anywhere from 4 to 15 inches of snowfall with some locations reporting extraordinary snowfall amounts of 16 to 30 inches. The blizzard had wide ranging impacts across the region, mainly to cattle producers and roadways. Countless roads were blocked or impassable. Thousands of ranchers were affected. There were stranded herds of cows with countless calves buried in the snow (many lost). There were also some spotty power outages. Interstates 29 and 90 were closed, and most other area roads were designated by the DOT as no travel advised. Many vehicles became stuck across the region with several rescues taking place. There were also several accidents reported. Schools were closed for two days along with state offices throughout central and northeast South Dakota. With the ongoing flooding across the region from the expansive snowmelt from the winter, the additional snowmelt water from this blizzard would only exacerbate the widespread flooding across the region. Many counties declared disasters in March with several more counties declaring disasters in April for the flooding and the March blizzard. Snowfall amounts included; 25 inches at Miller.

January 2020 - Icy roads contributed to a fatal two-vehicle crash on U.S. Highway 14 three miles west of Wessington in Hand county. One person died and another was seriously injured. A pickup was westbound on U.S. Highway 14 when the driver lost control due to icy conditions and slid into and eastbound pickup.

December 2022 - A strong low pressure system produced snow and heavy snow prior to the onset of strong northwesterly winds and periods of additional snow, which resulted in blizzard or ground blizzard conditions across much of central and northeastern South Dakota for extended periods of time from the morning of December 14th through the afternoon of December 16th. Heavy snow of at least 6 inches in 12 hours was recorded from December 15th into the 16th in conjunction with the blizzard conditions across Marshall, Day, Codington, Grant and Roberts Counties. Eight inches of snow was recorded by 8am on the 14th 11 miles east of the Sunshine Bible Academy. Additional accumulating snowfall occurred thereafter. Winds gusted generally between 45 and 60 mph. The South Dakota Department of Transportation placed nearly the entire state under No Travel Advised or had road closures by Thursday, as numerous roads had become impassable. Additionally, power outages were reported across the area, and school was cancelled at numerous locations for multiple consecutive days. The blizzard was just one component of a highly impactful, major winter storm. This storm was severe, widespread and prolonged in nature, and produced freezing rain, heavy snow and/or blizzard conditions from December 12th through 16th across the region. A Major Disaster Declaration was declared on February 27th by Governor Noem for several counties across central and northeastern South Dakota for winter weather from December 12-25th.

December 2022 - An unusually potent blast of cold air for December followed in behind a reinforcing Arctic front Tuesday night, December 20th, into Wednesday, December 21st, along with a trace to as much as 2 to 4 inches of new snowfall on top of the pre-existing loose snow pack. Wind gusts of 35 to 55 mph behind this front impacted the region from December 21st through December 23rd, resulting in an extended period of life-threatening wind chills in the -35 to -60 degree F range and ground blizzard conditions. The extreme cold made the threat to stranded motorists even more dangerous, as numerous roads became impassable. Nearly the entire state was virtually shut down, for the second time this December, as roads were either deemed No Travel Advised or closed by the South Dakota Department of Transportation. Additional impacts included numerous vehicle accidents and rescues, as well as numerous school closures. Governor Noem declared a Winter Storm Emergency on December 22nd, which activated the SD National Guard and allowed assistance from the state to county governments as needed. Furthermore, a Major Disaster Declaration was declared on February 27th by Governor Noem for several counties across central and northeastern South Dakota for winter weather from December 12-25th.

April 2023 - Just 4 days after a major winter storm at the end of March, a strong low pressure system developed across the western Great Plains and strengthened as it tracked northeast into Iowa on the afternoon of April 4th and into northeastern Minnesota by noon on April 5th. This system produced heavy snow from late in the evening on April 3rd through early in the morning on April 5th across central and northeastern South Dakota, along with northeast winds of 15-30mph. The initial snow over east central South Dakota transitioned to a freezing rain or wintry mix for a period of time during the late afternoon and evening hours before switching back to snow. A storm total 8 inches of snow was observed in Miller. Visibilities were frequently reduced to between a mile and a quarter mile in heavy snow, with localized blizzard conditions at times. Winds shifted to the west-northwest on April 5th and gusted to between 30 and 45 mph, which led to continued significantly reduced visibilities at times through the day despite the lack of new falling snow. Ditches were full of snow from this and previous snowfall events, which allowed for significant drifts to develop on roadways. Many US and state highways were either impassable, closed or under no travel advised statements from the South Dakota Department of Transportation. Governor Kristi Noem ordered the closure of state government executive branch offices from April 4th through 5th for numerous counties. Additionally, there were several reports of power outages, and ranchers were severely impacted due to the storm's overlap with the calving season. Following this storm, many locations had observed a top-10 winter season for total snowfall. All the snow and much below average temperatures to start April set the stage for significant spring flooding.

Future Probability Amidst A Changing Climate

The winter season is warming at a faster rate than any other season in the Northern Plains Region, and this is also true for South Dakota. Winter storms and blizzards, however, will continue to be a severe weather hazard in the State. Warmer winter temperatures could mean more ice and freezing rain events, which often impact electrical utilities and communication systems, but can also affect agricultural livestock and roads and transportation. A warmer winter climate could reduce energy consumption for heating in the long run, but there will still be some periods of exceptional cold temperatures. The northern U.S. has experienced an increase in the frequency of large snowfall events, where other places in the country have been decreasing. Some analyses have shown an increase in winter storm frequency and intensity, with storm tracks moving northward since 1950. There remains some uncertainty in projections for the coming decades, but the rising trend of extreme precipitation events in general (including winter season) will continue to be a hazard. According to the Fourth National Climate Assessment,

rising temperatures in the Northern Great Plains have resulted in shorter snow seasons and rapid melting of winter snowpack.[22]

Vulnerability Assessment

During the risk assessment activity at the planning meetings, participants agreed that severe winter weather is highly likely to occur in the County. Participants viewed their area as having a high vulnerability to severe winter weather.

FEMA's National Risk Index scores winter weather risk in Hand County as Relatively Moderate.

While virtually all aspects of the population are vulnerable to severe winter weather, there are segments of the population that are more vulnerable to the potential indirect impacts of a severe winter storm than others, particularly the loss of electrical power. As a group, the elderly or disabled, especially those with home health care services that rely heavily on an uninterrupted source of electricity. Resident populations in nursing homes or other special needs housing and those with inadequate housing or inadequate heating. may also be vulnerable if electrical outages are prolonged.

People that live in Hand County are especially vulnerable to these conditions because people tend to leave their homes to get places such as work, school, and stores rather than staying inside. One of the greatest dangers during winter weather is traveling because people often get stuck, stranded, and lost when driving their vehicles, which usually prompts others such as family and or emergency responders to go out in the conditions to rescue them. Many individuals venture out in inclement weather because they need to get to work or school; want to observe the weather, or to rescue stranded family or friends. While it is difficult to quantify or find historical data on those that have accidents or get stranded during severe weather events, severe winter driving conditions raise the vulnerability of the commuting population.

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

Heavy snow can immobilize transportation, down power lines and trees and cause the collapsing of weaker structures. Livestock and wildlife are also very vulnerable during periods of heavy snow. Most storms can be considered to have occurred countywide.

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

[22] State of South Dakota Hazard Mitigation Plan. 2024.

Populations at highest vulnerability for this type of hazard are rural homeowners, which account for approximately 50% of the county and the elderly, which is 25% of the total population in Hand County. As with any weather event, those dependent upon healthcare supplies and other essentials will also bear the brunt of highway closures and slowed transportation due to snow and ice. Emergency services will also be delayed during winter storms. Some of the critical facilities that could be utilized in disaster situations do not have backup generators. Also, some facilities have generators that only power a portion of operations.

Severe Winter Storms have a high risk of occurrence. Heavy snow can immobilize transportation, down power lines and trees and cause the collapsing of weaker structures. Livestock and wildlife are also very vulnerable during periods of heavy snow.

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

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

ASSESSING VULNERABILITY: OVERVIEW

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

VULNERABLE POPULATIONS

Natural hazards can take a hard toll on vulnerable populations such as the elderly, young children, individuals with low incomes and individuals with disabilities.

The National Risk Index is a dataset and online tool to help illustrate the United States communities most at risk for 18 natural hazards. It was designed and built by FEMA in close collaboration with various stakeholders and partners in academia; local, state and federal government; and private industry.

Social Vulnerability

Social Vulnerability refers to a community's capacity to prepare for and respond to the stress of hazardous events ranging from natural disasters, such as tornadoes or disease outbreaks to human cause threats such as toxic chemical spills. The CDC's Social Vulnerability Index (CDC/ATSDR SVI 2022) groups sixteen factors into four themes that summarize the extent to which the area is socially vulnerable to a disaster. The factors include economic data as well as date regarding education, family characteristics, housing, language ability, ethnicity and vehicle access. Overall Social Vulnerability combines all of the variables to provide a comprehensive assessment.

Table 4.25 CDC/ATSDR Social Vulnerability Index 2022					
County	**Overall Social Vulnerability**	**Socioeconomic Status**	**Household Characteristics**	**Racial and Ethnic Minority Status**	**Housing Type/ Transportation**
Hand	Low – Moderately Low	Low	Low – Moderately High	Low – Moderatel y Low	Low - High

Socioeconomic Status: Below 150% Poverty, Unemployed, Housing Costs Burden, No High School Diploma, No Health Insurance. According to the 2022 American Communities Survey, 9.7% of individuals in Hand County are in poverty.

Household Characteristics: Aged 65 and Older, Aged 17 and Younger, Civilian with a Disability, Single-Parent Household, English Language Proficiency.

Race/Ethnicity: Hispanic or Latino (of any race); Black and African American, Not Hispanic or Latino; American Indian and Alaska Native, Not Hispanic or Latino; Asian, Not Hispanic or Latino; Native Hawaiian and Other Pacific Islander, Not Hispanic or Latino; Two or More Races, Not Hispanic or Latino; Other Races, Not Hispanic or Latino

Housing Type/Transportation: Multi-Unit Structures, Mobile Homes, Crowding, No Vehicle, Group Quarters.

Headwaters Economics' *Populations at Risk* report explains that race and ethnicity are strongly correlated with vulnerability to natural hazards.

According to Headwaters Economics *Populations at Risk,* older adults also are at increased risk of compromised health related to environmental hazards and climate change. Age is the single greatest risk factor related to illness or death from extreme heat. The elderly are more likely to have pre-existing medical conditions or compromised mobility, which reduces their ability to respond to natural disasters. Older adults are more susceptible to air pollution such as ground level ozone, particulate matter, or dust. Increased dust is associated with drought, wildfires, and high wind events.[23]

Racial and Ethnicity are self-identified by Census respondents who choose the race or races they most closely identify with. Ethnicity has two categories: Hispanic and Latino or Non-Hispanic and Latino. Hispanics and Latinos can be of any race. 4% of people in Hand County self-identify as a race other than white. Only 2% of the people in Hand County identify as Hispanic ethnicity.

According to Headwaters Economics' *Populations at Risk* report, minorities tend to be particularly vulnerable to disasters and extreme heat events. This is due to language skills, housing patterns, quality of housing, community isolation, and cultural barriers.

Housing Type/Transportation includes multi-unit structures, mobile homes, crowding, no vehicle, group quarters. Almost 36% of all occupied housing units in Hand County are rental units and mobile homes make up 5% of all occupied housing units.

[23] Headwaters Economics. Populations at Risk. 2024.

According to Headwaters Economics' *Populations at Risk* report, Mobile homes are more likely to be damaged in extreme weather, which poses a risk for both the structure and the occupants.

***Requirement B2-a**. Does the plan provide an overall summary of each jurisdiction's vulnerability to the identified hazards?*

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

Hand County Overall Summary of Vulnerability
Hand County has identified that they are particularly vulnerable to blizzards/winter storms, flash floods, floods, freezing rain/sleet/ice, heavy rain, heavy snow, rapid snow melt, strong winds, tornados, urban fires and wildfires. These hazards were given a rating of "H" for high risk or "M" for moderate risk in Table 4.1.

Many of these hazards pose the risk of knocking down utility lines which results in loss of power. The weather in northeast South Dakota can be extreme, especially during the winter months when the threat of losing power for even a few days can be deadly. During the winter months, an event that causes disruption of utilities can take hours to a few days to repair. Sometimes ice storms take out several miles of power lines and it takes several days to repair the line and get them up and running again. With no power, many people are left without a source for heat. There are also several people in the county that have life-preserving medical devices that require power for operation.

In the public survey, 71% of people have an alternative source of power if the heat goes out, many others said they would go to a neighbor's or family's house if they were without power. People identified backup generators and woodburning stoves/fireplaces as their backup sources.

Miller Overall Summary of Vulnerability
Miller has identified that they are particularly vulnerable to blizzards/winter storms, extreme cold, flash flood, flood, freezing rain/sleet/ice, hail, heavy rain, heavy snow, rapid snow melt, strong winds, thunderstorms, tornados, urban fires, and utility interruptions. These hazards were given a rating of "H" for high risk or "M" for moderate risk in Table 4.1.

There are parts of Miller that flood during heavy rain events. The City has done extensive upgrades to their storm sewer system which has helped reduce the vulnerability of residents to flooding. They also have flooding due to debris in Ree Creek. In the past, the City has burned out the brush in the creek to alleviate this problem. However, weather conditions have to be near perfect in order to safely burn out the debris and it must be done on a regular basis to maintain effectiveness.

The City of Miller has installed a summer storm shelter in the City Park which also reduces the vulnerability of residents to tornados, high wind events and other summer storms.

There are backup generators at the lift stations, water tower, water pump house in Miller and a generator that can run part of City Hall in the event of a power failure. The storm sirens are also on a backup generator.

Ree Heights Overall Summary of Vulnerability

Ree Heights has identified that they are particularly vulnerable to drought, extreme cold, extreme heat, flash flood, flood, freezing rain/sleet, hail, heavy rain, heavy snow, lightning, rapid snow melt, strong winds, thunderstorm, tornado, urban fire, utility interruption, and wildfire. These hazards were given a rating of “H” for high risk or “M” for moderate risk in Table 4.1.

During the Spring thaw or periods of rapid snow melt, Ree Heights has had flooding issues in town. There is no storm shelter in Ree Heights so some residents may be more vulnerable to tornados, high wind events and summer storms, though many residents do have basements in their homes.

The drinking water in Ree Heights is provided by Mid Dakota Rural Water System. There are no fire hydrants in the town, so the fire trucks rely on water from Mid Dakota for fire suppression. They do ask Mid Dakota to keep the water tower full during the summer so that water is available for fire suppression, if needed.

St Lawrence Overall Summary of Vulnerability
St Lawrence has identified that they are particularly vulnerable to dam blizzards, drought, extreme cold, extreme heat, flood, freezing rain/sleet/ice, hail, heavy rain, heavy snow, lightning, rapid snow melt, strong winds, thunderstorms, urban fires, utility interruptions and wildfires. These hazards were given a rating of “H” for high risk or “M” for moderate risk in Table 4.1.

There is a backup generator for City Hall and the Fire Hall, which would allow the City to continue operating and respond to emergencies in the event of a power outage.

ASSESSING VULNERABILITY: IDENTIFYING STRUCTURES

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

One of the primary purposes of this plan is to identify people, structures, systems natural, historic & cultural resources, critical facilities and community events and determining which are particularly at risk of damage due to natural hazards or exposure to natural hazards. In the event of a disaster as a result of severe summer or winter storms, Hand County and participating entities will have the ability to prevent further loss of life by generator powered critical facility shelters.

The jurisdictions within Hand County want to ensure they have the ability to mitigate future disasters. Plan participants were asked what community facilities and assets are important or critical to their communities. The following tables identify critical structures and if they serve vulnerable populations. It is also noted whether those assets are Economic or Historical assets. Areas of overlap between vulnerable structures/people and potential natural hazards are then identified as “vulnerable” areas that should be mitigated whenever possible.

Participants acknowledged that determining what is “critical” can mean something different to every community and that the information provided in the table is not comprehensive. However, the information provided by the plan participants was used as a baseline and can be supplemented in future years during the annual plan review and/or during the 5-year update. By using information provided by the representatives from each community, it also helps establish a sense of ownership in the mitigation plan.

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

The County’s bridges and culverts were mentioned as critical infrastructure but are not listed in their entirety. These records are kept with the South Dakota Department of Transportation. Additionally, bridge inspections take place once a year and are reported to the South Dakota Department of Transportation.

Finally, the plan participants were asked to identify which of the critical structures or facilities are particularly vulnerable to natural hazards and future hazards due to climate variations. All facilities share the same risk for most all hazards, unless otherwise noted.

The City of Miller has many structures that are vital to emergency operations including the County’s only hospital, a nursing home and the Hand County Courthouse which also serves at the local emergency operations center when needed. Table 4.25 is a list of critical facilities that would cause the greatest distress in the county if destruction occurred.

Table 4.26: Critical Structures in Hand County								
FEMA Lifeline	**Location**	**Structure Name**	**Owner**	**Vulnerable Populations**	**Economic**	**Historic**	**Hazard Vulnerability**	**Notes**
Hand County								
Safety and Security	Miller	Courthouse	County	X		X	All	
Transportation	Miller	County Highway Shop	County	X			All	
N/A	Miller	Library	County	X			All	
Hazardous Materials	Miller	Weed & Pest	County				All	
City of Miller								
Health and Medical	Miller	Hospital	Private	X	X		All	
N/A	Miller	Miller School	School	X			All	
Food, Hydration, and Shelter/ Energy/ Hazardous Materials	Miller	Agtegra	Private		X		All	3 locations
Safety and Security	Miller	City Hall	City	X			All	
Energy; Transportation Water Systems	Miller	City Shop	City	X			All	3 city shops – Electrical, Street, Water and Sewer Departments
Water Systems	Miller	Pump House	Public	X			All	
N/A	Miller	Community Center	City	X			All	

Water Systems	Miller	Water Tower	City	X			All	
Water Systems	Miller	Lift Stations	City	X			All	2 lift stations
Energy	Miller	Electrical Sub Stations	City	X			All	3 sub stations
Safety and Security	Miller	Fire Hall	Private	X			All	
Town of Ree Heights								
Food, Hydration and Shelter	Ree Heights.	City Hall/Auditorium	City	X			All	
Safety and Security	Ree Heights	Fire Hall		X			All	
Town of St Lawrence								
Safety and Security	St. Lawrence	City Hall/Community Center/Fire Hall	City	X			All	City Hall, Community Center, and Fire Hall all in the same building
Water Systems	St. Lawrence	Water Tower	City	X			All	
N/A	St. Lawrence	Park Hall	City				All	
Energy	St Lawrence	Bob's Gas	Private		X		All	Propane provider
Other								
Energy		Dakota Energy	Coop		X		All	3 electrical sub stations
N/A		Sunshine Bible Academy	Private				All	Private school
Energy		Northwestern Energy	Private	X	X		All	2 substations – one for Ree Heights; one for St Lawrence
Safety and Security		South Hand Fire Hall	Private	X			All	
Safety and Security	Polo	Fire Hall	Private	X			All	
N/A	Polo	Community Building		X			All	
N/A	Polo	Church	Private				All	

Water Systems		Mid Dakota Rural Water	Coop	X	X		All	2 water towers in Hand County
Energy		Resel Oil Co	Private		X		All	Provides propane in Hand County

The information provided in Table 4.25 was taken from the 2020 Mitigation Plan and all jurisdictions were asked to update the list as needed. The participants were instructed to think of structures that would cause the most devastation to their communities if the structures were to be lost in a natural hazard event, “In other words, list those structures that you cannot live/operate without.” Plan participants were then instructed to determine value of those structures. The plan author acknowledges that determining what is “critical” can mean something different to every community and that the information provided in the table is not comprehensive. However, the information provided by the plan participants was used a baseline and can be supplemented in future years during the annual plan review and/or during the 5-year update. By using information provided by the representatives from each community it also helps establish a sense of ownership in the mitigation plan. Finally, the plan participants were asked to identify which of the critical structures or facilities are particularly at risk of natural hazards.

While the information may not be comprehensive it does give FEMA, SDOEM, and any other readers of the Plan an idea of how communities in rural South Dakota feel about certain structures. For example, FEMA may not view private businesses or local bars as “critical,” however, in many small communities the local businesses and public spaces are the hub of where activities take place and people meet. Likewise, places like city pools and parks give residents places to go and attracts people from outside the community. These public spaces such as bars, restaurants, and shops give local residents places to go and meet with others. These structures also help support the town financially through taxes, permit payments and participant fees. This may be one of the few sources of revenue for the town. These community lifelines provide shelter and communication in the event of an emergency. Loss of these structures can be used to illustrate how fragile the balance can be in a local area and that a natural hazard can impact much more than just the building or structure.

ASSESSING VULNERABILITY: ESTIMATING POTENTIAL LOSSES

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

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

> ***Element B2-b.*** *For each participating jurisdiction, does the plan describe the potential impacts of each of the identified hazards on each participating jurisdiction?*

The population of every jurisdiction in Hand County is decreasing. According to the 2020 Census, the total population in the county was 3,145; in 2010, the Census reported 3,431 people and the 2000 Census recorded 3,741 people. The population has dropped by 16% in the last 20 years. That trend is expected to continue, leading to fewer people in the county at risk of natural hazards and fewer occupied dwellings and other assets at risk to natural hazards. Any future developments that occur in the county will also be relatively small and won't impact the overall vulnerability to natural hazards.

The table below shows results from the public survey conducted by the planning team. One of the questions on the survey asked residents if they had been negatively affected by natural hazards in the past five years. The table also shows climate change projections and the potential impact that could have on the County. It is reasonable to assume that these natural hazards will continue to impact the people that live in these five counites in the future.

Table 4.27 Climate Change Projections and Impacts

Natural Hazard	% of People Negatively Affected by Hazard	Climate Change Projection	Potential Impact
Dam Failure		Heavy rainfall is increasing in intensity and frequency which could increase the risk of dam failure.	There is one high hazard dams in Hand County, which is the dam at Jones Lake, located 2 miles from St Lawrence.
Drought		Intensity of droughts is projected to increase due to rising temperatures and increased soil moisture loss	The agriculture sector is most vulnerable – including crops, pastureland and livestock.
Extreme Temperatures		Extreme temperatures are expected to increase. Extremely warm days are expected to become warmer.	Population without air conditioning or adequate furnaces. Agriculture sector is also vulnerable. Elderly population is also at risk.
Floods		Heavy rainfall is increasing which could lead to more flooding.	Most of the County is in a NSFHA. Occasional basement flooding due to groundwater seepage. Buildings and infrastructure can be impacted by flash flooding after heavy rainfall or due to rapid snowmelt.

Summer Storms (Hail and Lightning)		As the atmosphere warms, increased heat provides more energy for severe storms.	Hail can damage structures, vehicles and crops. Lightning can start wildfires. Summer storms can also impact the electrical grid.
Tornados		Unknown how climate change can impact the frequency and intensity of tornados.	Tornados can be destructive to nearly all community assets.
Wildland Fires		Due to increasing temperatures, wildfires could become more common.	Wildland fires affect pasture and crop land.
Winds – High/Strong		Unknown how climate change can impact the magnitude of windstorms.	Winds can impact trees, power lines, mobile homes and weak structures.
Winter Weather		Winters are expected to become warmer overall. This could lead to more ice and freezing rain events or large snowfall events.	Most impacts are to populations in regard to electrical outages, and decreased travel (or riskier travel).

The planning team also collected information from the Hand County Director of Equalization about the number of properties and values in each jurisdiction. All properties with structures, whether owner occupied or not were included in the valuations provided in Table 4.27 through 4.31. The reports provided by the assessor's office did not include the type of structure (for example, a residential structure may be a house or an unattached garage). It's also important to note that this only includes structures and not ag land, which has a considerable value ($1.8 billion) but isn't typically permanently impacted by natural hazards.

4.28 Hand Estimated Potential Dollar Losses to Vulnerable Structures (not including any municipality figures)

Type of Structure	Number of Structures	Value of Structures	Number of People
Residential	808	$65,897,031	
Mobile Home	77	$3,299,045	
Commercial	60	$42,542,067	
Agricultural	687	$31,632,745	
Other	0	$0	
Total	**1,632**	**$143,370,888**	**1,574***

*Rural Population

4.29 Miller Estimated Potential Dollar Losses to Vulnerable Structures

Type of Structure	Number of Structures	Value of Structures	Number of People
Residential	822	$70,352,563	
Mobile Home	36	$1,044,968	
Commercial	144	$17,294,624	
Agricultural	2	$1,194,052	
Other	0	$0	
Total	**1,004**	**$89,886,207**	**1,349**

4.30 Ree Heights Estimated Potential Dollar Losses to Vulnerable Structures			
Type of Structure	Number of Structures	Value of Structures	Number of People
Residential	53	$740,059	
Mobile Home	9	$74,638	
Commercial	12	$342,278	
Agricultural	4	$5,370	
Other	0	$0	
Total	**78**	**$1,162,345**	**59**

4.31 St Lawrence Estimated Potential Dollar Losses to Vulnerable Structures			
Type of Structure	Number of Structures	Value of Structures	Number of People
Residential	115	$7,030,168	
Mobile Home	9	$185,108	
Commercial	18	$2,211,107	
Agricultural	3	$55,586	
Other	0	$0	
Total	**145**	**$9,481,969**	**163**

4.32 Wessington Estimated Potential Dollar Losses to Vulnerable Structures			
Type of Structure	Number of Structures	Value of Structures	Number of People
Residential	6	$403,042	
Mobile Home	0	$0	
Commercial	2	$1,030,593	
Agricultural	2	$30,423	
Other	0	$0	
Total	**10**	**$1,464,058**	

Values for Hand County based on values of structures throughout the county and townships, not including the cities of Miller, Ree Heights, St. Lawrence and Wessington.

The town of Wessington lies on the county line of Hand County and Beadle County. They participate in the Beadle County Natural Hazard Mitigation Plan. However, the structures in Wessington that are located in Hand County are included above.

ASSESSING VULNERABILITY: ANALYZING DEVELOPMENT TRENDS

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

Requirement 201.6(c)(3) *The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs, and resources, and its ability to expand on and improve these existing tools.*

> ***Element C1-a.*** *Does the plan describe how the existing capabilities of each participant are available to support the mitigation strategy? Does this include a discussion of the existing building codes and land use development ordinances or regulations?*

Element C1-b. *Does the plan describe each participant's ability to expand and improve the identified capabilities to achieve mitigation?*

Requirement 201.6(d)(3). *A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five years in order to continue to be eligible for mitigation project grant funding.*

Element E1-a. *Does the plan describe the changes in development that have occurred in hazard-prone areas that have increased or decreased each community's vulnerability since the previous plan was approved?*

The land use and development trends for each jurisdiction were identified by the representatives from each of the jurisdictions. None of the communities in Hand County are experiencing growth at this time as all of the jurisdictions have experienced declining populations over the past 10 years and at this time are just trying to maintain the population they have. Additionally, most of the jurisdictions are not developing with the exception of Miller where there has been some change in the local businesses over the past 5 years. Due to the declining populations the smaller jurisdictions do not maintain plans for growth and development.

CURRENT DEVELOPMENT TRENDS

Hand County

The Hand County Assessor/Zoning Department handles all building permits located outside of city limits. They ensure structures are built in accordance with the zoning regulations. A demolition permit is required before any structures are demolished. As mentioned before, Hand County only has one zoning district which is Agricultural. The zoning has a list of both permitted and conditional uses for the district. The only types of development that have specific performance standards or additional regulations are wind towers, commercial feedlots and animal feeding operations.

On Hand Development Corporation is a private, non-profit corporation dedicated to improving the economic health of Miller, SD, and the surrounding area. They work with new businesses starting up or existing businesses in the area that are looking to expand.

City of Miller

The Finance Office at the City of Miller handles all building permit applications. Once a building permit application is submitted, the City looks at lot lines, zoning ordinances and other pertinent factors before being considered by the City Council. The City Council makes all decisions on building permit applications. Work must start within 60 days of a building permit approval and be completed within one year from the date of approval. The City of Miller adopted the International Building Code for use in issuing building permits, life-safety code, building code, inspections and code enforcement. Electrical and plumbing codes are regulated by the State of South Dakota and are inspected by State inspectors.

Ordinances in Miller address regulations on manufactured homes/mobile homes. In areas of special flood hazard, manufactured homes be elevated and anchored to resist flotation, collapse or movement.

The City of Miller has been aggressively updating their water, sewer and storm sewer systems in town over the last several years. By the end of 2025, 95% of those systems will be new and/or updated.

Many new businesses have been built or expanded in Miller in the last five years. The school has been remodeled after a fire in the ag shop in 2022. The school is also contemplating adding some additional classrooms.

Town of Ree Heights
Ree Heights does not have a building permit process and building is unregulated. Ree Heights has turned their drinking water system over to Mid Dakota Rural Water. Mid Dakota provides the water, performs system maintenance, and provides billing to all water users. The Town of Ree Heights is no longer involved in the drinking water system at all. However, they have requested that the water tower stays full during the summer months for fire suppression purposes.

Ree Heights has no storm shelters or backup generators available to the public. Some individuals do have backup generators for their own use.

Town of St Lawrence
The Town of St Lawrence has a building permit process similar to the City of Miller. The City Hall/Fire Hall is a designated storm shelter and has a backup generator available.

As far as development, St Lawrence has made updates to their water and wastewater systems in the last five years.

UNIQUE OR VARIED RISK ASSESSMENT

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

> ***Element B1-f.*** *For participating jurisdictions in a multi-jurisdictional plan, does the plan describe any hazards that are unique to and/or varying from those affecting the overall planning area?*

Hand County
Hand County has a few areas that are more prone to heavy rain and high-water events. Many county and township roads are impacted by heavy rain and/or rapid snow melt events.

Farmers and other rural residents are more impacted by drought than residents of municipalities. Farmers' livelihoods, by nature, are dependent on the weather and drought can cause a reduction in crop yields and also impact livestock.

At the stakeholder meetings, it was identified that some of the outdoor storm siren systems throughout the county need work. Not all of them are able to operate reliably. If a siren system fails to alert residents or others in the area, those people are at higher risk of being impacted by a hazard. Two-way radio reception (among first responders) is also spotty and there are areas in the county where radio reception is poor. This lack of reception can also put residents at risk.

On the other hand, the County does use the AlertSense system for all storm events. Residents can sign up for the system – there are currently about 900 people in the County (population 3,145) that have signed up for the system. Alert Sense will alert people of weather watches and warnings so they can be more aware of upcoming weather hazards, which can reduce their risk from the hazard.

City of Miller
There is an unnamed creek on the east side of Miller that sometimes backs up into town and causes flooding. There might be obstructions upstream that cause the backup of water. A bigger risk in Miller is flooding from Ree Creek on the west side of town.

Because of the size of Miller, there are a number of ways in which city residents might actually be at lower risk to hazards than other areas of the County. Miller is unique in that as the largest town in the county, they have more access to necessary services than any other area of the county. They have access to a hospital, pharmacy and other necessary services, even during severe weather. The storm shelter that was finished in the Summer of 2020 also reduces the risk of harm to residents during tornadoes and other high wind events. The City of Miller has full time staff for their streets and utilities and so are able to respond to hazards quickly. They also have underground power lines – making residents at lower risk for utility interruptions.

Town of Ree Heights
Ree Heights does not have issues with flooding, except in cases of extreme snow melt. There is an unnamed creek in town, however, if water comes up in the creek it usually moves out pretty quickly without causing damage. However, there are times when road ditches are full of water after a rapid snow melt or heavy rain. There have also been instances where culverts and railroad ditches get plugged with debris and cause water to back up. Ree Heights may have a slightly increased risk to hazards because they do not regulate development or require building permits.

Like other small towns, the rural nature of Ree Heights puts its residents at higher risk. During severe weather such as blizzards or other winter storms, residents who need urgent medical care may not be able to make it to the nearest hospital for urgent or emergency care.

Ree Heights is also different from the other towns in the County because it does not provide water service to its residents. Water is provided by Mid Dakota Rural Water.

Town of St Lawrence
The creek in St Lawrence is below most of the residential properties in town, making the risk of flooding in St Lawrence lower than perhaps other areas of the county.

Like other small towns, the rural nature of St Lawrence puts its residents at higher risk. During severe weather such as blizzards or other winter storms, residents who need urgent medical care may not be able to make it to the nearest hospital for urgent or emergency care.

V. MITIGATION STRATEGY

CHANGES/REVISIONS TO THE MITIGATION SECTION:
Mitigation Strategies were added for each hazard identified. The format of this section was changed to group projects by hazard (not necessarily by jurisdiction). Separate sections were added to identify projects that have been completed as well as projects that are no longer a priority for the various jurisdictions.

MITIGATION REQUIREMENTS

Requirement 201.6(c)(3). *The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs, and resources and its ability to expand on and improve these existing tools.*

> ***Element C1-a.*** *Does the plan describe how the existing capabilities of each participant are available to support the mitigation strategy? Does this include a discussion of the existing building codes and land use development ordinances or regulations?*
>
> ***Element C1-b.*** *Does the plan describe each participant's ability to expand and improve the identified capabilities to achieve mitigation?*

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

> ***Element C3-a.*** *Does the plan include goals to reduce the risk from the hazards identified in the plan?*

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

> ***Element C4-a.*** *Does the plan include an analysis of a comprehensive range of actions/projects that each jurisdiction considered to reduce the impacts of hazards identified in the risk assessment?*
>
> ***Element C4-b.*** *Does the plan include one or more actions(s) per jurisdiction for each of the hazards as identified within the plan's risk assessment?*

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

Requirement 2016.6(c)(3)(iv). *For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.*

> ***Element C5-b.*** *Does the plan provide the position, office, department or agency responsible for implementing/administrating the identified mitigation actions, as well as potential funding sources and expected time frame?*

MITIGATION OVERVIEW

The State Hazard Mitigation Plan addresses four types of mitigation actions including: local plans and regulations, structure and infrastructure projects, natural systems protection and educated and awareness.

After public input and meetings with various individuals and citizens, a series of mitigation goals were devised to best aid the county in reducing the effects of hazards. Projects previously identified in the 2015 mitigation plan were carefully analyzed and discussed to determine which of the projects had enough merit to be included in the updated plan and to determine if the projects meet the hazard mitigation needs of the county. These projects were evaluated based on a cost/benefit ratio and priority. A *high* priority classification means that the project should be implemented as soon as possible and would minimize losses at a very efficient rate. A *moderate* classification means that the project should be carefully considered and completed after the high priority projects have been completed. A *low* priority means that the project should not be considered in the near future. However, it is a potential solution and should not be written off until further evaluation can be completed. Such projects may be completed in light of failures of all other projects striving toward the same goal.

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

Priorities were given considering the following factors:

- Number of people protected by the project
- Technical feasibility
- Political support
- Environmental impacts
- Available funding source

A guiding factor in prioritizing mitigation was the thought that mitigation should provide the greatest amount of good to the greatest amount of people when cost was taken into account. Recurrence intervals, past events, and damage estimates compiled during the assessing vulnerability section of this plan were also taken into account. After meetings with the local jurisdictions, stakeholders and opportunities for public input, a series of mitigation goals were devised to best aid the County in reducing the impacts of natural hazards. Projects previously identified in the plan were discussed to determine which of the projects had enough merit to be included in the updated plan and to determine if the projects meet the hazard mitigation needs of all jurisdictions. These projects were evaluated based on a preliminary evaluation cost/benefit ratio and priority based on either historical damages or anticipated damage. Consideration of prioritization also included possible future impacts due to climate variations and vulnerable and underserved populations.

A *high* priority classification means that the project should be implemented as soon as possible and would minimize losses at a very efficient rate. A *moderate* classification means that the project should be carefully considered and completed after the high priority projects have been completed. A *low* priority means that the project should not be considered in the near future. However, it is a potential solution and should not be eliminated until further evaluation can be completed.

A timeframe for completion, oversight, funding sources, and any other relevant issues were addressed. These implementation strategies are geared toward the specific goal and area. Notes were added to some projects for further clarification. For projects involving multiple jurisdictions, it is assumed that each jurisdiction will independently complete the project, unless otherwise noted that one jurisdiction will take the lead and work collaboratively.

None of the jurisdictions have adopted their own building codes. It is acknowledged that building codes play an important role in mitigating many hazards. However, due to the rural nature of the area and the limited staffing ability and time of all of the jurisdictions, many of them may not find a benefit in adopting their own building codes. Per South Dakota Codified Law, when any local unit of government in South Dakota has not adopted a building code ordinance, the design standard shall be based on the 2021 edition of the International Building Code as published by the International Code Council, Incorporated.

Hand County does have a comprehensive plan and zoning ordinances in place. They have somewhat limited abilities to expand or improve these capabilities at this time. Many county employees have multiple roles. They do have a membership with their planning district, Northeast Council of Governments, which can provide some technical assistance as needed.

Miller has some planning mechanisms in place. However, due to their small population and the fact that their staff all have multiple roles, their ability to expand or improve on these capabilities is also limited.

Because of their size (both with a population under 200), both of the other towns in Hand County have very limited capabilities and resources. They all have part-time Finance Officers and a small volunteer town boards/city councils.

Table 5.1 Mitigation Capabilities				
Local Jurisdiction				
	Hand Co	**Miller**	**St Lawrence**	**Ree Heights**
Plans				
Comprehensive Plan	Yes	Yes	No	No
Community Wildfire Protection Plan	No	No	No	No
Capital Improvements Plan	No	Yes	No	No
Local Emergency Operations Plan	Yes	C	C	C
Land Use Plan	Yes	Yes	No	No
Stormwater Management Plan	No	No	No	No
Bridge Plan	Yes	No	No	No
Community Operation Plan	No	No	No	No
Hazardous Materials Plan	Yes	C	C	C
Land Use Planning and Ordinances				
Zoning Ordinance	Yes	Yes	No	No
Flood Damage Prevention Ordinance	No	Yes	Yes	No
Open Burning Ordinance	Yes	Yes	No	No
Flood Insurance Rate Map (FIRM)	No	FHBM	FHBM	No
Floodplain Management Plan	No	No	No	No
Building Code	Int'l Bldg Code (IBC)	IBC	IBC	IBC
Drainage Ordinance	No	No	No	No
Subdivision Ordinance	No	No	No	No
Elevation Certificates	No	No	No	No
Mitigation Capabilities - Administrative				
Building Official	No	No	No	No
Civil Engineer+	No	No	No	No
Community Planner*	No	No	No	No
Floodplain Administrator	No	Yes	Yes	No
GIS Coordinator*	No	No	No	No
Emergency Manager	Yes	C	C	C
Planning Commission	Yes	Yes	No	No
Membership with NECOG	Yes	Yes	C	C
Mitigation Capabilities – Technical				
Grant Writing*	No	No	No	No
Hazard Vulnerability Analysis	No	No	No	No
GIS Analysis*	No	No	No	No
Mutual Aid Agreements	Yes	Yes	Yes	Yes
Other Studies/Reports/Maps				
Flood Insurance Studies/Engineering Studies/H&H Studies	No	Yes	No	No

Critical Facilities Map	Yes	Yes	No	No
Existing Land Use maps	Yes	Yes	No	No
Dam Inspection Report	Yes	No	No	No
Funding Resources				
Capital Improvement Project Funding	Yes	Yes	No	No
Community Development Block Grant	Yes	Yes	Yes	Yes
Water Fees	No	Yes	Yes	No
Sewer Fees	No	Yes	Yes	No
Electricity Fees	No	Yes	No	No
Stormwater Utility Fee	No	Yes	No	No
Federal (non-FEMA) Funding	Yes	Yes	Yes	Yes
State Funding Programs	Yes	Yes	Yes	Yes
Education and Outreach				
Community Newsletter	No	No	No	No
Local Newspaper	Yes	Yes	Yes	Yes
Website	Yes	Yes	No	No
Social Media	Yes	Yes	No	No
Text Alerts	Yes	C	C	C
Hazard Awareness Campaigns	Yes	Yes	Yes	Yes
Org. Rep. to Interact with Vulnerable Pop.	No	No	No	No
Notes				
C: the jurisdiction is covered under the County's policy/program/technical document				
*Some portions of services such as Planning, GIS Coordination/Analysis, Grant Writing can be provided through membership with the NECOG.				
+ All jurisdictions use an outside engineering firm when those services are needed.				

Dam Failure

Goal 1: Reduce the impact of dam failure in Hand County

The towns of Miller and Ree Heights have identified that dam failure is not a hazard to their jurisdiction.

Project 1	Continue to review inspection reports for High Hazard Dams
Jurisdictions	Hand County, Town of St Lawrence
Responsible Entity	Emergency Manager
Priority	Low
Funding Source	NA - No cost aside from staff time
Timeframe	Ongoing – Inspections occur every five years
Notes	The County Emergency Manager is provided a copy of the High-Risk Dam reports for all dams that aren't federally owned.

Project 2	Provide education to the public about the risk of dam failure and the risk of building downstream of a high risk dam
Jurisdictions	Hand County, Town of St Lawrence
Responsible Entity	Emergency Manager
Priority	Low
Funding Source	NA - No cost aside from staff time
Timeframe	Ongoing
Notes	Dam breaches can impact not only homes but also public infrastructure such as major roadways. Many High-Risk dams are used for recreational purposes so anyone could be impacted, not just homeowners downstream. The Jurisdictions should explore ways to provide education for dam failure such as posting on website or social media or providing brochures at County/City offices. The Jurisdictions should also make an effort to educate the public about the risks of building and/or developing downstream of high risk dams.

Drought

Goal 1: Reduce the impact of drought in Hand County

Project 1	Review and enforce water restrictions when applicable. Or provide information on water conservation in areas where ordinances aren't available.
Jurisdictions	All Jurisdictions
Responsible Entity	Each County Commission/City Council/Town Board
Priority	Low
Funding Source	NA - No cost aside from staff time
Timeframe	Ongoing
Notes	

Project 2	Review and use burn bans, as necessary. Where burn bans aren't implemented, provide education and awareness around the risks and proper use of controlled burns to prevent fires during drought conditions.
Jurisdictions	All Jurisdictions
Responsible Entity	County Commission and City Councils
Priority	Moderate
Funding Source	NA – No cost other than staff time
Timeframe	Ongoing
Notes	Hand County has a burn ban ordinance that prohibits open fires when a majority of the Open Burning Advisory Board votes to restrict open burning. Miller has an ordinance that regulates recreational fires.

Extreme Temperatures

Goal 1: Reduce the impact of extreme temperatures in Hand County

Project 1	Educate citizens regarding the dangers of extreme heat and cold and the steps they can take to protect themselves when extreme temperatures occur
Jurisdictions	All Jurisdictions
Responsible Entity	County Emergency Manager/City Finance Officers
Priority	High
Funding Source	NA – No cost aside from staff time
Timeframe	Ongoing
Notes	Special consideration should be given to vulnerable populations such as those over the age of 65. Information could be disseminated with water bills, the local newspaper, radio, social media, text messaging systems, etc.

Flooding

Goal 1: Reduce the impact of flooding in Hand County

Project 1	Conduct an engineering study to determine what can be done to reduce flooding and improve drainage in town.
Jurisdictions	Miller, St Lawrence
Responsible Entity	City Council/Town Board
Priority	Low
Funding Source	HMGP, USDA RD and SD DANR
Timeframe	3-5 years

Project 2	Conduct an engineering study to determine how to reduce the risk of landslides around the creek running through St Lawrence.

Jurisdictions	St Lawrence
Responsible Entity	Board of Trustees
Priority	Low
Funding Source	HMGP, USDA RD and SD DANR
Timeframe	3-5 years

Project 3	Identify roads and bridges that are prone to flood risk and determine if grade raise or flow capacity can be increased to prevent future damage.
Jurisdictions	Hand County
Responsible Entity	Highway Superintendent
Priority	High
Funding Source	HMGP, DOT
Timeframe	3-5 years

Project 4	Improve bridges throughout the county and participating entities. Identify bridges presently acknowledged as graded structurally or functionally deficient and determine if improvements or replacement is necessary.
Jurisdictions	Hand County
Responsible Entity	Highway Superintendent
Priority	High
Funding Source	HMGP, DOT
Timeframe	3-5 years

Project 5	Remove debris from creeks in Hand County. In some cases, storm drains empty into the creek. Debris has, at times, impeded the flow of water. Removing the debris will allow water to flow freely and prevent flooding.
Jurisdictions	All Jurisdictions
Responsible Entity	County Commission/City Council/Town Boards
Priority	Medium
Funding Source	Local
Timeframe	Ongoing
Notes	Jurisdictions will also encourage private landowners to clear out debris from the creeks to assist with water flow.

Project 6	Look into updating and digitizing FEMA flood maps, since effective flood maps date back to the 1970s and 1980s. Having updated and digitized flood maps would help with planning and development and corresponding mitigation for flood events with flood insurance and infrastructure planning.
Jurisdictions	All Jurisdictions
Responsible Entity	County Emergency Manager, Floodplain Administrators
Priority	Low
Funding Source	HMGP, City, County
Timeframe	5+ years

Project 7	Continue with televising and replacing, as needed, sanitary and storm sewer lines in the City of Miller to accommodate more flow caused by excessive rain.
Jurisdictions	Miller
Responsible Entity	Water/ Wastewater/ Airport Superintendent
Priority	High
Funding Source	USDA RD and SD DANR
Timeframe	Ongoing
Discussion	The City has completed much of this work but acknowledges that the work is also ongoing.

Project 8	Conduct a study of the storm water system. This evaluation will look at drainage of water entering the City of Miller from the southeast part of the City and other areas.
Jurisdictions	City of Miller
Responsible Entity	City Council
Priority	Medium
Funding Source	HMGP, Local
Timeframe	Ongoing
Notes	This project has been partially completed but more work remains to be done. The study will analyze topographical data, evaluate drainage and develop alternatives to mitigate flooding in the City.

Summer Storms

Goal 1: Reduce the impact of summer storms in Hand County

Project 1	Evaluate existing shelters and other structures to determine usefulness (and accessibility) as storm shelters. Retrofitting these facilities should be considered, as necessary. Construct storm shelters wherever needed throughout the county and place signage along major thoroughfares where travelers can see the locations of the nearest shelters.
Jurisdictions	All Jurisdictions
Responsible Entity	County Emergency Manager and/or Finance Officer
Priority	Medium to High
Funding Source	HMGP
Timeframe	1-5 years

Project 2	Installation of storm sirens for alert notifications
Jurisdictions	All Jurisdictions
Responsible Entity	County Emergency Manager and/or Finance Officer
Priority	Medium to High
Funding Source	County and City
Timeframe	1-5 years

Project 3	Installation of a generator with permanent hook ups at storm shelters for power through severe summer storms.

Jurisdictions	All Jurisdictions
Responsible Entity	County Emergency Manager and/or Finance Officer
Priority	Medium to High
Funding Source	HMGP
Timeframe	1-5 years

Project 4	Improve public awareness of the hazards caused by summer storms. Include information on the steps citizens can take to protect themselves when summer storms occur.
Jurisdictions	All Jurisdictions
Responsible Entity	County Emergency Manager and/or Finance Officer
Priority	High
Funding Source	NA – No cost other than staff time
Timeframe	Ongoing
Discussion	Disseminate information during Severe Weather Awareness Week. Information could be disseminated with water bills, the local newspaper, radio, social media, text messaging systems, etc. Jurisdictions could also participate in NWS StormReady Program. Topics could include safety issues on downed power lines, survival strategies during storms and signing up for AlertSense. Special considerations should be given to vulnerable populations such as those over the age of 65.

Tornados

Goal 1: Reduce the impact of tornados in Hand County

Project 1	Evaluate existing shelters and other structures to determine usefulness (and accessibility) as storm shelters. Retrofitting these facilities should be considered, as necessary. Construct storm shelters wherever needed throughout the county and place signage along major thoroughfares where travelers can see the locations of the nearest shelters.
Jurisdictions	All Jurisdictions
Responsible Entity	County Emergency Manager and/or Finance Officer
Priority	Medium to High
Funding Source	HMGP
Timeframe	1-5 years

Project 2	Installation of storm sirens for alert notifications
Jurisdictions	All Jurisdictions
Responsible Entity	County Emergency Manager and/or Finance Officer
Priority	Medium to High
Funding Source	County and City
Timeframe	1-5 years

Project 3	Improve public awareness of the hazards caused by tornados. Include information on the steps citizens can take to protect themselves when tornados occur.
Jurisdictions	All Jurisdictions
Responsible Entity	County Emergency Manager or Finance Officer
Priority	High
Funding Source	NA – No cost other than staff time
Timeframe	Ongoing
Discussion	Information could be disseminated with water bills, the local newspaper, radio, social media, text messaging systems, etc. Jurisdictions could also participate in NWS StormReady Program. Topics could include taking shelter, safe rooms, the safest places within houses during tornados and signing up for AlertSense. Special considerations should be given to vulnerable populations such as those over the age of 65.

Wildland Fires

Goal 1: Reduce the impact of wildland fires in Hand County

Project 1	Review and use burn bans, as necessary. Where burn bans aren't implemented, provide education and awareness around the use of controlled burns.
Jurisdictions	All Jurisdictions
Responsible Entity	County Commission and City Councils
Priority	Moderate
Funding Source	NA – No cost other than staff time
Timeframe	Ongoing
Notes	Hand County has a burn ban ordinance that prohibits open fires when a majority of the Open Burning Advisory Board votes to restrict open burning. Miller has an ordinance that regulates recreational fires.

Project 2	Install a smoke detection system with suppression capabilities in the Hand County Courthouse. The Hand County Courthouse was built in the early 1920s and presently has no fire suppression system.
Jurisdictions	Hand County
Responsible Entity	County Commission
Priority	Moderate
Funding Source	County/Local
Timeframe	Ongoing
Discussion	Hand County has installed an elevator in the courthouse which does have a fire alarm. But no alarm system exists in any of the offices or other public spaces.

Project 3	Construct water storage tanks at Sunshine Bible Academy for fire protection.
Jurisdictions	Hand County
Responsible Entity	County Commission
Priority	Moderate
Funding Source	SD DANR, Local
Timeframe	3-5 years

Project 4	Provide public information on fire prevention education such as the FireWise practices
Jurisdictions	All Jurisdictions
Responsible Entity	County Emergency Manager, Fire Chiefs in each jurisdiction
Priority	Low
Funding Source	NA – No cost other than staff time
Timeframe	Ongoing
Notes	Work to get Firewise information to homeowners. Many of the volunteer fire departments already conduct outreach events. Information could also be made available at the County Courthouse and/or City Halls. Social media could also be an effective strategy to share information. Special consideration should be given to vulnerable populations and underserved communities. Firewise materials can be obtained from the State OEM or BLM.

High/Strong Winds

Goal 1: Reduce the impact of high/strong winds in Hand County

Project 1	Provide more public education on personal safety during high wind events.
Jurisdictions	All Jurisdictions
Responsible Entity	County Emergency Manager and/or City Finance Officers
Priority	High
Funding Source	NA – No cost other than staff time
Timeframe	Ongoing
Notes	This could address orientation of mobile homes in regard to prevailing winds along with the use of tie downs.

Winter Storms

Goal 1: Reduce the impact of winter storms in Hand County

Project 1	Install backup generators with permanent hook ups at fire halls, storm shelters and other critical facilities as necessary to ensure vital services can continue during power outages.
Jurisdictions	All Jurisdictions

Responsible Entity	County Emergency Manager, Finance Officers
Priority	Moderate
Funding Source	HMGP
Timeframe	Ongoing

Project 2	Improve public awareness of the hazards and impacts caused by severe winter storms. Include information on the steps they can take to protect themselves when winter storms occur.
Jurisdictions	All Jurisdictions
Responsible Entity	County Emergency Manager, Finance Officers
Priority	High
Funding Source	NA – No cost other than staff time
Timeframe	Ongoing
Notes	Information on severe storms is often provided via cell phone alerts, radio stations, TV stations and weather-related apps. Topics could include informing the public about severe winter weather impacts or traveler emergency preparedness information about severe winter weather hazards. Special considerations should be given to vulnerable populations such as those over the age of 65

Changes since the last plan update

Requirement 201.6(d)(3). *A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five years in order to continue to be eligible for mitigation project grant funding.*

> ***Element E2-b.*** *Does the plan include a status update for all mitigation actions identified in the previous mitigation plan?*

Several changes to mitigation projects have been made since the last plan update in 2020. In some cases, projects have been streamlined and/or several projects in the previous plan have been combined into one overall project in this plan update. There were several projects related to storm shelters, raising roads and fire/burn bans that have been simplified and/or consolidated since the last plan update.

Projects that have been completed since the last plan update:

City of Miller
Goal 2: Reduce the Impact of Drought and Wildfires in Miller
Project 1: Rehabilitate the water storage ground tank that feeds the water tower. Having an operating and sufficient ground storage tank is essential for providing adequate water for fire suppression
Discussion: This project has been completed.

IMPLEMENTATION OF MITIGATION ACTIONS

> ***Element C5-a.*** *Does the plan describe criteria used for prioritizing actions?*

The strategy for prioritization has always been to work with the projects that will have the greater impact and benefit for the public. These projects are currently prioritized based on a number of factors, including: 1) Feasibility, 2) Impact to the public, 3) Improvements to the

systems that will provide the greatest operational flexibility, 4) Perceived Benefit to Cost ratio. As with any strategy, the possibility of change exists due to the fact that some of these factors may change as new and better information becomes available. Final cost estimates and further analysis of total benefits would need to be completed in order to do a true benefit cost analysis. After that information is completed, some of the priorities may change. Many of the projects are identified as “ongoing” and have little to no cost. These are mitigation measures that are part of typical, day to day, activities of the counties or emergency management departments and due to their ongoing nature are obviously not prioritized in the same manner as projects that will require actual construction and cash in order to be realized.

Upon adoption of the updated Hand County Natural Hazard Mitigation Plan, each jurisdiction will become responsible for implementing mitigation actions. The planning required for implementation is the responsibility of the local jurisdictions that have participated in the plan update. Jurisdictions that participated and adopted the plan can implement mitigation actions as they deem appropriate. Some of the municipalities have indicated that they do not have the financial capability to move forward with projects identified in the plan at this time, however, all will consider applying for funds through the State and Federal Agencies once such funds become available. If the local jurisdictions are able to secure funding for the mitigation projects, they will move forward with the projects identified. A benefit cost analysis will be conducted on an individual basis after the decision is made to move forward with a project.

VI. PLAN MAINTENANCE

CHANGES/REVISIONS TO PLAN MAINTENANCE:
Only minor changes were made to this section of the plan.

MONITORING, EVALUATING, AND UPDATING THE PLAN

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

> ***Element D2-a.*** *Does the plan describe the process that will be followed to track the progress/status of the mitigation actions identified within the Mitigation Strategy, along with when this process will occur and who will be responsible for the process?*
>
> ***Element D2-b.*** *Does the plan describe the process that will be followed to evaluate the plan for effectiveness? This process much identify the criteria that will be used to evaluate the information in the plan, along with when this process will occur and who will be responsible.*
>
> ***Element D2-c.*** *Does the plan describe the process that will be followed to update the plan, along with when this process will occur and who will be responsible for the process?*

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

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

ANNUAL REPORTING PROCEDURES

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

1. The County Elected body will receive an annual report and/or presentation on the implementation status of the plan.
2. The report will include an evaluation of the effectiveness and appropriateness of the mitigation actions proposed in the plan. This may include items such as:
    i. Have there been any recent disaster events?
    ii. Should the list of hazards in the plan be updated?
    iii. Do any new critical facilities or infrastructure need to be added?
    iv. Has any development occurred that would create or reduce risks?
    v. Have any policies, plans or regulations changed or been adopted?

vi. Has NFIP participation changed for any jurisdiction?
vii. What mitigation actions have been completed?
viii. Are there any new mitigation actions to consider?
ix. How can public participation improve?
x. What challenges or obstacles have there been to implementing mitigation actions?

3. The report will recommend, as appropriate, any required changes or amendments to the plan.
4. The report will include budget needs for any upcoming projects that require local match.

FIVE YEAR PLAN REVIEW

Requirement 201.6(d)(3). *A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five years in order to continue to be eligible for mitigation project grant funding.*

> ***Element E2-a.*** *Does the plan describe how it was revised due to changes in community priorities?*

The planning process for this update was strengthened by implementing a public survey to gain additional public input.

Participants evaluated their priorities regarding hazard mitigation planning and determined that their priorities and goals – to reduce the impacts of natural hazards in their areas remains the same as it did in the 2020 update.

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

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

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

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

PLAN AMENDMENTS

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

INCORPORATION INTO EXISTING PLANNING MECHANISMS

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

> ***Element D3-a.*** *Does the plan describe the process the community will follow to integrate the ideas, information and strategy of the mitigation plan into other planning mechanisms?*
>
> ***Element D3-b.*** *Does the plan identify the planning mechanisms for each plan participant into which the ideas, information and strategy from the mitigation plan may be integrated?*
>
> ***Element D3-c.*** *For multi-jurisdictional plans, does the plan describe each participant's individual process for integrating information from the mitigation strategy into their identified planning mechanisms?*

Requirement 201.6(d)(3). *A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five years in order to continue to be eligible for mitigation project grant funding.*

> ***Element E2-c.*** *Does the plan describe how jurisdictions integrated the mitigation plan, when appropriate, into other planning mechanisms?*

Hand County's comprehensive plan was adopted in 2009 and has not been updated since. Therefore, the Natural Hazard Mitigation Plan has not been included in the comprehensive plan. Hand County does not have a capital improvements plan. All of the other jurisdictions do not have comprehensive plans (with the exception of Miller) or capital improvement plans due to the lack of resources, staff, funding, or need for such planning mechanisms. Hand County will consider the mitigation requirements, goals, actions, and projects when it considers and reviews the other existing planning documents such as the comprehensive plan. Miller included the Flood Plain Map into their current CIP. There are also several mitigation strategies that are also included as projects in the CIP.

The local jurisdictions cannot incorporate the requirements of the mitigation plan into other planning mechanisms because they do not have any other planning mechanisms that currently exist. The risk assessment which was conducted for the purpose of this plan is specific to mitigation actions and projects included in the Plan and thus is not tied into any other mechanisms that would initiate conversations or actions by the city councils to move forward with actions or projects outlined in the Plan. Absence of such mechanisms creates a problem for the local jurisdictions because ideas, projects, and actions identified as a result of the Plan update process often never move forward because they are forgotten about and no mechanism exists to initiate the process of completing such projects. Thus, the local jurisdictions identified one unrelated mechanism that could be used to remedy the problem of mitigation projects getting lost in a bookshelf. Municipalities are required by State law to prepare budgets for the upcoming year and typically consider any expenditure for the upcoming year at that time. South Dakota Codified Law 9-21-2 provides that:

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

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

CONTINUED PUBLIC PARTICIPATION/INVOLVEMENT

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

> ***Element D1-a.*** *Does the plan describe how communities will continue to seek future public participation after the plan has been approved?*

During interim periods between the five-year update, efforts will be continued to encourage and facilitate public involvement and input. The plan will be available for public view and comment at the Emergency Management Office and the NECOG office. Comments will be received at any time.

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

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

POTENTIAL FUNDING SOURCES

Although all mitigation techniques will likely save money by avoiding losses, many projects are costly to implement. None of the local jurisdictions have the funds available to move forward with mitigation projects at this time, thus, the Potential Funding Sources section was included so that the local jurisdictions can work towards securing funding for the projects. Inevitably, due to the small tax base and small population, most of the local jurisdictions do not have the ability to generate enough revenue to support anything beyond the basic needs of the community. Thus, mitigation projects will not be completed without a large amount of funding support from State or Federal programs.

The Hand County jurisdictions will continue to seek outside funding assistance for mitigation projects in both the pre- and post-disaster environment. Primary Federal and State grant programs have been identified and briefly discussed, along with local and non-governmental funding sources, as a resource for the local jurisdictions

Federal

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

Title: Hazard Mitigation Grant Program (HMGP)
Agency: Federal Emergency Management Agency

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

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

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

Eligibility for funding under the HMGP is limited to state and local governments, certain private nonprofit organizations or institutions that serve a public function, Indian tribes and authorized tribal organizations. These organizations must apply for HMPG project funding on behalf of their citizens. In turn, applicants must work through their state since the state is responsible for setting priorities for funding and administering the program.

Title: Pre-Disaster Mitigation Program
Agency: Federal Emergency Management Agency

Through the Disaster Mitigation Act of 2000, Congress approved the creation of a national program to provide a funding mechanism that is not dependent on a Presidential Disaster Declaration. The Natural Hazard Mitigation Plan program provides funding to states and communities for cost-effective hazard mitigation activities that complement a comprehensive mitigation program and reduce injuries, loss of life, and damage and destruction of property.

The funding is based upon a 75% Federal share and 25% non-Federal share. The non-Federal match can be fully in-kind or cash, or a combination. Special accommodations will be made for “small and impoverished communities,” who will be eligible for 90% Federal share/10% non-Federal.

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

Title: Flood Mitigation Assistance Program
Agency: Federal Emergency Management Agency

FEMA’s Flood Mitigation Assistance program (FMA) provides funding to assist states and communities in implementing measures to reduce or eliminate the long-term risk of flood damage

to buildings, manufactured homes and other structures insurable under the National Flood Insurance Program (NFIP). FMA was created as part of the National Flood Insurance Reform Act of 1994 (42 USC 4101) with the goal of reducing or eliminating claims under the NFIP.

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

Title: Public Assistance (Infrastructure) Program, Section 406
Agency: Federal Emergency Management Agency

FEMA's Public Assistance Program, through Section 406 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, provides funding to local governments following a Presidential Disaster Declaration for mitigation measures in conjunction with the repair of damaged public facilities and infrastructure. The mitigation measures must be related to eligible disaster related damages and must directly reduce the potential for future, similar disaster damages to the eligible facility. These opportunities usually present themselves during the repair/replacement efforts.

Proposed projects must be approved by FEMA prior to funding. They will be evaluated for cost effectiveness, technical feasibility and compliance with statutory, regulatory and executive order requirements. In addition, the evaluation must ensure that the mitigation measures do not negatively impact a facility's operation or risk from another hazard.

Public facilities are operated by state and local governments, Indian tribes or authorized tribal organizations and include:

*Roads, bridges & culverts
*Water, power & sanitary systems
*Draining & irrigation channels
*Airports & parks
*Schools, city halls & other buildings

Private nonprofit organizations are groups that own or operate facilities that provide services otherwise performed by a government agency and include, but are not limited to the following:

*Universities and other schools
*Power cooperatives & other utilities
*Hospitals & clinics
*Custodial care & retirement facilities
*Volunteer fire & ambulance
*Museums & community centers

Title: SBA Disaster Assistance Program
Agency: US Small Business Administration

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

Title: Community Development Block Grants
Agency: US Department of Housing and Urban Development

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

Title: Water and Environmental Programs Agency: USDA Rural Development
Through Rural Utilities Service Water and Environmental Programs (WEP), rural communities obtain the technical assistance and financing necessary to develop drinking water and waste disposal systems. Safe drinking water and sanitary waste disposal systems are vital not only to public health, but also to the economic vitality of rural America. WEP provides funding for the construction of water and waste facilities in rural communities and is proud to be the only Federal program exclusively focused on rural water and waste infrastructure needs of rural communities with populations of 10,000 or less.

State

Title: Sanitary and Storm Sewer Project Funding Agency: South Dakota Department of Agriculture and Natural Resources
The Consolidated Water Facilities Construction Program was established to provide grants and loans for water related projects. The amount of funds available is dependent upon the amount appropriated by the Legislature and the amount of funds previously awarded.

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

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